

Eating for Diabetes Management

Informed food choices are essential to living well. Have you heard that knowledge is power? This is true for eating healthy, too. Learning about meal patterns that have been proven to help manage diabetes will improve your wellbeing. Using meal patterns as a guide to create an eating plan is the first step in your diabetes journey. Science-Based Nutrition Recommendations Every year, the American Diabetes Association (ADA) publishes our Standards of Care in Diabetes (Standards of Care). The Standards of Care is a set of practice guidelines based on the latest scientific research and clinical trials. These guidelines are used by health care professionals to treat diabetes and its related health conditions.

Every five years, a group of experts come together for an in-depth review of the nutrition guidelines in the Standards of Care. The result of this review is called the Nutrition Consensus Report. This is the foundation for the ADA's recommendations for nutrition. The Nutrition Consensus Report identifies nutrition strategies that have been shown to help people reach or stay at their blood glucose (blood sugar) targets, reach weight management goals, and low risk for health conditions related to diabetes. The nutrition recommendations highlight that eating plans should be based on the needs of each person. Your own eating plan will be based on your own needs and preferences. The current report outlines seven key meal patterns that have been shown to help manage diabetes. Work with your health care team to decide which meal pattern works best for you. What is the best eating plan for diabetes? "Diet" is a tricky word that can carry a lot of emotional baggage for some people. This four-letter word can trigger a lot of stressful thoughts and is often thought of as a more of a short-term approach to eating. Instead, health care professionals prefer to use terms like "meal" or "eating plans" and "meal patterns" to talk about when, what, and how much we eat to help offer a more long-term approach that can lead to reaching goals. The short answer is that there isn't one eating plan that prevents or manages diabetes that anyone can use. There are millions of people living with diabetes, and when you consider cultural backgrounds, personal preferences, other health conditions they may have, and elements like costs of food, living situations, and access to healthy foods—there are too many factors for a single approach to nutrition that will work for everyone. The ADA focuses on meal patterns that are scientifically proven to help manage diabetes. These meal patterns are meant to be a way of eating that lasts and works with your needs and preferences. While fad diets may help you to lose weight quickly, it's more important to focus on food choices you will want to stick with over time and that you can integrate into your lifestyle for long-lasting results. Meal Patterns for Diabetes Management A big part of managing diabetes is a healthy lifestyle, including what you eat. When considering what meal plan will work best for you, consider the types of foods you like to eat, the time you have to prepare food, your budget, and your family's dietary needs. Consult with your health care team about what meal pattern might work well for you based on your particular health needs and goals.

Mediterranean-Style Meal Pattern

This pattern is great for people who are looking to reduce their risk of diabetes, reduce their A1C, lower their triglycerides, or reduce their risk of cardiovascular events.

Mediterranean-style meal pattern highlights:

Plant-based foods (vegetables, beans, nuts and seeds, fruits, and whole grains)
Fish and other seafood

Olive oil as the main source of dietary fat
Dairy products (mainly yogurt and cheese) in low to moderate amounts
Fewer than four eggs/week
Red meat in low frequency and amounts
Wine in low to moderate amounts
Concentrated sugars or honey rarely

Vegetarian or Vegan Meal Patterns

For people who are looking to reduce their risk of diabetes, reduce their A1C, achieve weight loss, or reduce their LDL and non-HDL cholesterol values, one of these patterns would be a good choice.

Vegetarian or vegetarian meal pattern highlights:

- Plant-based foods
- Excludes all animal-based products (vegan)
- Excludes meats, seafood, or poultry but includes eggs and/or dairy products (vegetarian)

Low-Fat Meal Pattern

The low-fat meal pattern is great for people who are looking to reduce their risk of diabetes or lose weight.

Low-fat meal pattern highlights:

- Vegetables
- Fruits
- Carbohydrates (e.g., breads/crackers, pasta, whole grains, starchy vegetables)
- Lean protein sources (including beans)
- Low-fat dairy products

In this review of the nutrition consensus, it was defined as total fat intake less than 30% of total calories and saturated fat intake less than 10%.

Very Low-Fat Meal Pattern

For people who are looking to lose weight or reduce their blood pressure, this meal pattern might be a good choice.

Very low-fat meal pattern highlights:

- Fiber-rich vegetables
- Beans
- Fruits
- Whole grains

- Non-fat dairy
- Fish
- Egg whites

This pattern comprises 70–77% carbohydrate (including 30–60g fiber) and less than 10% total calories from fat.

Low Carbohydrate Meal Pattern

This pattern is great for people who are looking to reduce their A1C, achieve weight loss, lower their blood pressure, lower triglycerides, or increase HDL cholesterol.

Low-carb meal pattern highlights:

- Non-starchy vegetables
- Healthy fats
- Protein in the form of meat, poultry, fish, shellfish, eggs, cheese, nuts, and seeds
- Quality carbohydrates are included but limited

In this review, a low-carbohydrate eating pattern is defined as reducing carbohydrates to 26–45% of total calories.

Very Low Carbohydrate Meal Pattern

For people who are looking to reduce their A1C, achieve weight loss, lower their blood pressure, lower triglycerides, or increase HDL cholesterol, this pattern might be a good choice.

This meal pattern is similar to the low-carbohydrate pattern but further limits carbohydrate-containing foods. Meals typically contain more than half of calories from fat. This pattern often has a goal of 20–50g of non-fiber carbohydrate per day. In this review, a very low-carbohydrate eating pattern is defined as reducing carbohydrate to less than 26% of total calories.

Dietary Approaches to Stop Hypertension (DASH) Meal Pattern

This pattern is great for people who are looking to reduce their risk of diabetes, lose weight, or lower their blood pressure.

DASH meal pattern highlights:

- Vegetables
- Fruits
- Low-fat dairy products
- Whole grains
- Poultry

Fish

Nuts

Reduced saturated fat, red meat, sweets, and sugar-containing beverages

May also be reduced in sodium

Using the Diabetes Plate with Meal Patterns

The [Diabetes Plate](#) can be a framework for all the above meal patterns, but is currently a visual way to create a meal following the low-carbohydrate meal pattern. By using the specific strategies outlined in each of the meal patterns, the Diabetes Plate can be changed to become a visual tool for any eating occasion.

When you live with diabetes or prediabetes or have diabetes-related complications like heart or kidney disease, informed food choices are essential to managing your health. Work with your health care team to find the best meal pattern and management strategies that work for you. If you respond best to carbohydrate counting or limit certain foods that have more of an impact on your blood glucose (blood sugar), these are all ways you can master your diabetes management. Find what works best for you!

Non-Starchy Vegetables for Blood Glucose Control

Eat more! You don't often hear that when you have diabetes, but non-starchy vegetables are one food group where you can satisfy your appetite.

Vegetables are full of vitamins, minerals, fiber and phytochemicals—and with so few calories and carbohydrate, everyone can enjoy more!

There are two main types of vegetables—starchy and non-starchy. For this section, we are going to focus only on the non-starchy vegetables.

Choosing non-starchy vegetables

Choose fresh, frozen and canned vegetables and vegetable juices without added sodium, fat, or sugar.

- **If using canned or frozen vegetables, look for ones that say no salt added on the label.**
- **As a general rule, frozen or canned vegetables in sauces are higher in both fat and sodium.**

- If using canned vegetables with sodium, drain the vegetables and rinse with water to decrease how much sodium is left on the vegetables.

For good health, try to eat at least six servings of vegetables a day. A serving of vegetables is:

- ½ cup of cooked vegetables
- 1 cup of raw vegetables

Common non-starchy vegetables

The following is a list of common non-starchy vegetables:

- Amaranth or Chinese spinach
- Artichoke
- Artichoke hearts
- Asparagus
- Baby corn
- Bamboo shoots
- Beans (green, wax, Italian)
- Bean sprouts
- Beets
- Brussels sprouts
- Broccoli
- Cabbage (green, bok choy, Chinese)
- Carrots
- Cauliflower
- Celery
- Chayote
- Cucumber
- Daikon
- Eggplant
- Greens (collard, kale, mustard, turnip)
- Hearts of palm
- Jicama
- Kohlrabi
- Leeks
- Mushrooms
- Okra
- Onions
- Pea pods
- Peppers
- Radishes
- Rutabaga

- Salad greens (chicory, endive, escarole, lettuce, romaine, spinach, arugula, radicchio, watercress)
- Sprouts
- Squash (cushaw, summer, crookneck, spaghetti, zucchini)
- Sugar snap peas
- Swiss chard
- Tomato
- Turnips
- Water chestnuts
- Yard-long beans

Protein Food for Diabetes

Foods high in protein such as fish, chicken, meats, soy products and cheese, are all called “protein foods.” You may also hear them referred to as “meats or meat substitutes.”

Not all protein-rich foods for diabetes are the same—some contain higher amounts of fat, while plant-based proteins may also include carbohydrates. Understanding these differences can help in choosing the best protein source for managing your diabetes.

Plant-based proteins

Plant-based protein foods provide quality protein, healthy fats and fiber. They vary in how much fat and carbohydrate they contain, so make sure to read labels.

- Beans such as black, kidney and pinto
- Bean products like baked beans and refried beans
- Hummus and falafel
- Lentils such as brown, green or yellow
- Peas such as black-eyed or split peas
- Edamame
- Soy nuts
- Nuts and spreads like almond butter, cashew butter or peanut butter
- Tempeh, tofu
- Products like meatless “chicken” nuggets, “beef” crumbles, “burgers”, “bacon”, “sausage” and “hot dogs”

Fish and seafood

Try to include fish at least two times per week.

- Fish high in omega-3 fatty acids like Albacore tuna, herring, mackerel, rainbow trout, sardines and salmon
- Other fish including catfish, cod, flounder, haddock, halibut, orange roughy and tilapia
- Shellfish including clams, crab, imitation shellfish, lobster, scallops, shrimp and oysters.

Poultry

Choose poultry without the skin for less saturated fat and cholesterol.

- Chicken
- Turkey
- Cornish hen

Cheese and eggs

- Reduced-fat cheese or regular cheese in small amounts
- Cottage cheese
- Whole eggs

Game

- Buffalo, ostrich, rabbit or venison
- Dove, duck, goose or pheasant (no skin)

Beef, pork, veal and lamb

It's best to limit your intake of red meat which is often higher in saturated fat and processed meats like ham, bacon and hot dogs which are often higher in saturated fat and sodium. If you decide to have these, choose the leanest options, which are:

- Select or Choice grades of beef trimmed of fat including: chuck, rib, rump roast, round, sirloin, cubed, flank, porterhouse, T-bone steak or tenderloin
- Lamb: chop, leg or roast
- Veal: loin chop or roast
- Pork: Canadian bacon, center loin chop, ham or tenderloin

Fruit

Fruit contains carbohydrate so you need to count it as part of your meal plan. Having a piece of fresh fruit or fruit salad for dessert is a great way to satisfy your sweet tooth and get the extra nutrition you're looking for.

What are the best fruit choices for diabetes?

The best choices of fruit are any that are fresh, frozen or canned without added sugars.

- If choosing canned fruit, look for words like "packed in its own juices," "unsweetened" or "no added sugar."
- Dried fruit and 100% fruit juice are also nutritious choices, but the portion sizes are small so they may not be as filling as other choices.

Tips for fitting fruit into your diabetes eating plan

If you count carbs:

A small piece of whole fruit or about $\frac{1}{2}$ cup of frozen or canned fruit has about 15 grams of carbohydrate. Servings for most fresh berries and melons are from $\frac{3}{4}$ –1 cup. Fruit juice can range from $\frac{1}{3}$ – $\frac{1}{2}$ cup for 15 grams of carbohydrate.

Only two tablespoons of dried fruit like raisins or dried cherries contains 15 grams of carbohydrate so be cautious with your portion sizes!

Fruit can be eaten in exchange for other sources of carbohydrate in your meal plan such as starches, grains or dairy.

If you follow the Diabetes Plate Method:

If using the plate method, having a small piece of whole fruit or a $\frac{1}{2}$ cup of fruit salad for dessert is a great complement to the non-starchy vegetables, small portion of starch and protein foods that are on your plate.

Common fruits

The following is a list of common fruits:

- Apples
- Apricots

- Avocado
- Banana
- Blackberries
- Blueberries
- Cantaloupe
- Cherries
- Grapefruit
- Grapes
- Honeydew melon
- Kiwi
- Mango
- Nectarine
- Orange
- Papaya
- Peaches
- Pears
- Pineapple
- Plums
- Raspberries
- Strawberries
- Tangerines
- Watermelon

This also includes dried fruit such as:

- Cherries
- Cranberries
- Dates
- Figs
- Prunes
- Raisins

Fats

No doubt about it, carbohydrate—commonly known as carbs—gets all the attention in diabetes management. However, another important nutrient to consider as part of a balanced diet is fat. Even though it sounds counter intuitive to what you might expect, eating the right amount of the right type of fat plays an important role in our bodies.

What is fat?

Fat cushions organs, stores energy, insulates the body against elements, supports cell growth and more. Since fats are higher in calories per gram, when it comes to fat, the key is being mindful of portions. Eating the right types of fat is also important for

reducing your risk of type 2 diabetes, cardiovascular disease, some cancers and other health problems.

There are four main types of fat: saturated, trans, monounsaturated and polyunsaturated fat. The American Diabetes Association (ADA) recommends including more monounsaturated and polyunsaturated fats than saturated or trans fats in your diet. Some types of fat are listed in the Nutrition Facts label on food products. [Learn how to decode the label.](#)

What is cholesterol and what you should know about it

When we talk about fat, it's important to understand what we mean when we mention cholesterol. There are two types: the type found in our blood, known as blood cholesterol, and the cholesterol we eat, known as dietary cholesterol.

Blood cholesterol plays an important role in the body and is the starting point in making hormones, cell structures, vitamin D and more. Your body makes more than enough cholesterol for these uses, but it can also absorb small amounts from the foods you eat.

When the total cholesterol in your blood is too high, you are at greater risk of heart disease. However, contrary to popular belief, dietary cholesterol has less of an impact on this number than previously believed. For most people, saturated fat and trans fat play a much more significant role in increasing blood cholesterol, resulting in an increased risk of heart disease. Since foods that are typically high in dietary cholesterol are also high in saturated fat, it's easiest to focus on limiting saturated fat.

To figure out what targets are right for you, talk to a registered dietitian nutritionist (RD/RDN) or your health care provider.

The Four Types of Fat

Monounsaturated fat

Monounsaturated fats are considered part of a healthy, balanced diet because of the protective effect they have on our hearts. These fats have been shown to lower our low-density lipoprotein (LDL) cholesterol, an important marker for heart health. Monounsaturated fats are not required to be listed on the Nutrition Facts label, but for foods where they are a good source, they often are.

Sources of monounsaturated fat include:

- Avocado
- Canola oil
- Nuts like almonds, cashews, pecans and peanuts
- Olive oil and olives (look for low/reduced sodium)
- Peanut butter and peanut oil
- Safflower Oil

To include more monounsaturated fats in your diet, try to substitute olive or canola oil instead of butter, margarine or shortening when cooking. Sprinkling a few nuts on a salad, yogurt or cereal is an easy way to eat more monounsaturated fats. But be sure to be mindful of the portions you are eating—like all fats, these products are high in calories.

Polyunsaturated fat

Polyunsaturated fats are another important fat to include as part of a healthy balanced diet. Much like monounsaturated fat, this fat lowers LDL cholesterol and your risk for heart disease and stroke.

Omega-3 and Omega-6 fatty acids are two types of polyunsaturated fat that are also linked with improved heart health. Considered essential fatty acids because our body is unable to produce them, these fats need to be included as part of a healthy diet.

Sources of Omega 3s include:

- Oily fish (salmon, sardines, herring, mackerel, tuna)
- Walnuts
- Flaxseeds and flaxseed oil
- Canola Oil
- Chia seeds

Sources of Omega 6s include:

- Tofu
- Walnuts
- Flaxseed and flaxseed oil
- Canola oil
- Eggs
- Sunflower seeds
- Peanut butter

Saturated fat

This type of fat can increase your cholesterol, and as a result, your risk of heart disease. This is one of the fats that should be limited in our diet. Typically, this fat is found in animal products and tropical oils that are solid at room temperature.

Animal products containing saturated fat include:

- Lard
- Fatback and salt pork
- High-fat meats like regular ground beef, bologna, hot dogs, sausage, bacon and spareribs
- High-fat dairy products such as full-fat cheese, cream, ice cream, whole milk, 2% milk and sour cream.
- Butter
- Cream sauces
- Gravy made with meat drippings
- Poultry skin (example: chicken, turkey etc.)

Oils containing saturated fat include:

- Palm oil and palm kernel oil
- Coconut and coconut oil

Saturated fat grams are listed on the Nutrition Facts label under “total fat”. The goal is to get less than 10% of one’s calories from saturated fat. For example, someone eating a 2,000 calorie diet should aim for 20 grams or less of saturated fat. To figure out the right target for you, talk to your dietitian.

Trans fat

Trans fats are produced when liquid oil is made into a solid fat—a process called hydrogenation. Like saturated fat, trans fat can be damaging to blood cholesterol levels. It is more harmful than saturated fat, and for a heart-healthy diet, you want to eat as little trans fat as possible by avoiding foods that contain it.

Trans fats are listed on the Nutrition Facts label, making it easier to identify these foods. However, keep in mind that if there isn’t at least 0.5 grams or more of trans fat in a food, the label can claim 0 grams. To avoid as much trans fat as possible, you should read the ingredients list on food labels. Look for words like hydrogenated oil or partially hydrogenated oil. Avoid foods that where a liquid oil is listed first on the ingredients list.

Sources of *trans* fat include:

- Processed foods like snacks (crackers and chips) and baked goods (muffins, cookies and cakes) with hydrogenated oil or partially hydrogenated oil
- Margarines
- Shortening
- Some fast food items, such as french fries

For help figuring out what targets are right for you when it comes to fats, talk to a registered dietitian nutritionist (RD/RDN) or your health care provider.

What superstar foods are good for diabetes?

You may have seen the word “superfood” used on social media, on food packages, or in advertisements. It is a marketing term used to promote a food thought to have “extra” health benefits. However, there is no official definition of the word by the Food and Drug Administration (FDA). The FDA regulates the health claims allowed on food labels to ensure there is scientific research to support the claims.

However, our list of “superstar” foods for diabetes are essential for a healthy diabetes meal plan. These foods are rich in protein, healthy fats, vitamins, minerals, antioxidants, and fiber. They are good for overall health and may also help prevent diseases like diabetes.

Superstar Non-Starchy Vegetables

Image

According to the [Diabetes Plate](#), non-starchy vegetables should make up half of your meal.

Dark green leafy vegetables

Packed with vitamins and minerals such as vitamins A, C, K, and folate; iron; calcium; and potassium, these foods are low in calories and carbohydrates and fit on the non-starchy vegetables section of the Diabetes Plate. Additionally, try adding dark leafy vegetables like spinach, collards, and kale to salads, soups, and stews.

Avocado

This nutrient-packed food is important for contributing fat-soluble vitamins and fiber and can help you feel full. Avocados are not only versatile and delicious, they also provide a heart-healthy source of fat to the Diabetes Plate.

Superstar Protein Foods

Image

According to the Diabetes Plate, protein foods should fill up one quarter of your plate.

Beans, Dried Peas, & Legumes

These foods are plant-based protein superstars because they are packed with fiber, folate, potassium, iron, and zinc. There are different kinds of beans like kidney, pinto, navy, or black beans, and legumes like chickpeas, split peas, and lentils that all offer a host of nutrient-packed benefits.

These plant-based proteins do contain carbohydrates, but ½ cup also provides as much protein as an ounce of meat without the saturated fat. To save time, you can use canned beans. But be sure to drain and rinse them to get rid of as much added salt as possible. Choosing dry beans, peas, and legumes are not only affordable, but you can personalize them with your own flavors.

Fish High in Omega-3 Fatty Acids

Omega-3 fats may help reduce the risk of heart disease and inflammation. Fish high in these healthy fats are sometimes referred to as "fatty fish." Salmon is well known in this group and other fish high in omega-3 are herring, sardines, mackerel, trout, and albacore tuna

Choose fish that is broiled, baked, or grilled to avoid extra carbohydrate and calories that would be in fish that is breaded and fried. Try eating fatty fish at least twice a week to get the nutritional benefits.

The [Nutrition Consensus Report](#) states:

“The recommendation for the general public to eat a serving of fish (particularly fatty fish) at least two times per week is also appropriate for people with diabetes.”

Nuts

An ounce of nuts can go a long way in getting key healthy fats, magnesium, and fiber and can help manage hunger. Some nuts and seeds, such as walnuts and flax seeds, are also a good source of omega-3 fatty acids. Try roasting and seasoning your own nuts to cut down on the added sodium of prepared nuts.

Superstar Carbohydrate Foods

Image

According to the Diabetes Plate, protein foods should fill up one quarter of your plate.

Berries

Berries are a great option for a diabetes meal plan, packed with antioxidants, vitamins C and K, manganese, potassium, and fiber. They are naturally sweet can be a great option to satisfy your sweet tooth without added sugar.

Citrus Fruit

Most of us know citrus fruits are a great vitamin C source, but did you know they also have fiber, folate, and potassium? From grapefruits, oranges, lemons, limes, and beyond, choose whole fruits over juices to get the full benefits of eating fruit, including the fiber from the pulp.

Whole Grains

Whole grains are rich in vitamins and minerals like B vitamins, magnesium, iron, and manganese. They are a great source of fiber too. Look for products that have the first ingredient with the word “whole” in it. Some examples of whole grains include whole oats, quinoa, barley, farro, and whole wheat.

Milk and Yogurt

You may have heard milk and yogurt can help build strong bones and teeth with calcium. In addition to calcium, many milk and yogurt products are fortified to make them a good source of vitamin D. More research is emerging on the connection between vitamin D and good health.

Milk and yogurt contain carbohydrates, which you will need to plan for when you have diabetes. Look for yogurt products that are lower in fat and added sugar. Try adding some natural sweetness to low-fat plain Greek yogurt with berries and top with walnuts for a satisfying breakfast

How to Shop for Superstar Foods on a Budget

Eating healthy with a diabetes-friendly food list doesn't have to be expensive. Shop your local markets for foods and produce that is in season or on sale. Vegetables and fruit in other forms (frozen, canned, or dried) are great choices, just be sure to select ones without added sugar or sauces. Rinse canned vegetables to help reduce sodium. Look for frozen or canned fish and lower sodium nuts. Dry beans and legumes and whole grains you cook from scratch are affordable and allow you to personalize with your favorite flavors.

Why You Should Drink More Water

As temperatures rise, make sure you're drinking enough water to beat the heat. Staying hydrated carries a host of health benefits—it helps us maintain a normal body temperature and blood pressure, flushes out toxins, regulates our gut health, and cushions our joints. It also helps the body keep a delicate balance of sodium, vitamins, mineral, and hormones, among other important nutrients.

Studying the Health Benefits of Staying Hydrated

A new study gives us even more reason to fill our water glass. The study suggests that people who are well-hydrated are less likely to develop many chronic diseases and may even live longer than those who don't drink enough fluids.

Researchers caution that the study can't speak to cause and effect, only that there seems to be an association between being adequately hydrated and being healthier. Of course, people who drink water regularly are also more likely to have other healthy habits. For example, being physically active, making good food choices, and keeping up with routine health checks and screenings—all of which also support good health and can help prevent chronic illness.

8 Tips to Get Enough Water

1. Make drinking a glass of water one of the first things you do each morning—and before each meal.
2. Check the color of your urine. Your urine can tell you a lot about whether you are getting enough fluids. It should ideally be clear or a light-colored yellow, and if it's darker, you'll know you need to be more hydrated.
3. Invest in a fun reusable water bottle. Set reminders if you need a nudge to drink throughout the day.
4. Mix up your water options. Try adding some fruit, like [pineapple](#), [watermelon](#), or lemon, or vegetables and herbs, like [cucumber](#) or mint. Choose seltzer or sparkling water over juices and sugary beverages.
5. Don't forget fluids are in many foods too. About 20% of the fluid we need comes from foods like vegetables and fruits.
6. If you feel thirsty—and certainly if your lips show signs of being dry—you're already not getting enough fluids. Start drinking water right away if you have these symptoms.
7. Up your water intake when it's hot and humid, especially if you are also being active.

8. Limit alcohol and caffeinated drinks. These can cause you to lose water.

Signs You Aren't Drinking Enough Water

Not being well hydrated can leave you feeling sluggish and generally unwell. Common signs may include:

Dark yellow or orange urine (the darker your urine, the more dehydrated you are)

Feeling dizzy, lightheaded, or tired

Having a dry mouth or lips

Getting more headaches

Feeling nauseous

Getting muscle cramps when you're active

How Much Water Should You Drink?

It really depends on your age, how active you are, where you live (in terms of the climate), body weight, and certain medical conditions. If you have heart failure or another condition for which you need to be careful of how much fluid you drink each day, talk with your doctor or dietitian about how to stay hydrated.

Health & Wellness

Fitness

It's a great time to get moving

Whether you're just getting started or are an experienced athlete, regular physical activity is an important part of diabetes management.

Image

Regular exercise can help put you in control of your life.

If you're not into regular exercise, putting together an exercise plan can be a bummer.

But remember, along with your diet and medications, regular physical activity is an important part of managing diabetes or dealing with prediabetes. Because when you're active, your cells become more sensitive to insulin so it works more effectively to lower your blood glucose, also known as blood sugar. (You might notice that exercising sometimes raises your blood glucose, [find out why.](#))

Exercise just makes you feel better. So, however you want to do it—taking regular walks around the block, going for a run, or signing up for a marathon—getting started is the most important part.

How to get started exercising safely

It doesn't matter where you are physically. If you've never set foot in a gym, that's okay—as long as you start doing something now. If you haven't been very active or are worried about your health, it's important to consult your doctor and start slowly.

Light walking is a great place to start—and a great habit to incorporate into your life. Walk with a loved one, with your dog, or just by yourself while listening to an audio book. Set goals every day and meet them and you'll start feeling like you're back in control of your life. [Learn more about how to get started safely.](#)

Even little changes make a big difference

If you're still struggling with getting started or feeling overwhelmed by the idea of starting a more active life, take heart: every change, no matter how small, makes a difference in your ability to manage diabetes. Even losing 10–15 pounds can have a significant impact on your health. The power to change is firmly in your hands—so get moving today.

Exercise & Type 1

Regardless of the type of diabetes you have, regular physical activity is important for your overall health and wellness. With type 1 diabetes, it's very important to balance your insulin doses with the food you eat and the activity that you do—even when you are doing house or yard work.

Managing Your Blood Glucose When Exercising

Planning ahead and knowing how your blood glucose (blood sugar) and body respond to exercise can help you keep your blood glucose from going too low or too high.

How to Prevent Lows

Your blood glucose response to exercise will vary depending on:

your blood glucose level before you start
the intensity of the activity
the length of time you are active
the changes you've made to insulin doses

Sometimes people experience a drop in blood glucose during or after exercise, so it is very important to check your blood glucose, plan ahead, and be prepared to treat hypoglycemia (low blood glucose).

To learn how different types of activity affect you, you should check your blood glucose before, during and after an exercise session. Put a trial and error system into place. For example, increased activity may mean that you need to lower your insulin dose or eat some extra carbs before exercising to keep your blood glucose in a safe range. Some activities may cause your blood glucose to drop quickly while others do not.

If your blood glucose is trending down before a workout, have a pre-exercise snack. Always carry a carbohydrate food or drink (like juice or glucose tabs) that will quickly raise your blood glucose. It may take a while to figure out what works best for you.

If your blood glucose level is less than 100 mg/dl before you start your activity, try having a small carbohydrate snack (about 15 grams) to increase your blood glucose and reduce your risk for hypoglycemia. This is especially important if you took insulin recently and if you will be exercising for longer than 30 minutes.

If you use an insulin pump, you may be able to avoid adding an extra snack by lowering your basal insulin rate during the activity. And if you have repeated problems with your blood glucose dropping during or after exercise, consult your doctor.

What to Do When Your Blood Glucose is High

Blood glucose can also run high during or after exercise, particularly when you do a high-intensity exercise that increases your stress hormone (i.e. glucose-raising hormone) levels.

If your blood glucose is high before starting exercise, check your blood or urine for ketones. If you test positive for ketones, avoid vigorous activity. If you do not have ketones in your blood or urine and you feel well, it should be fine to exercise.

How to Handle Exercise for Kids with Type 1 Diabetes

Spontaneous Activity and Blood Glucose

The tricky part about exercise in children of all ages is that it is often unplanned and spontaneous. Will your child come home from school today and do homework for an hour or want to bike with friends for an hour? Sometimes you don't know if your child is going to run around for 15 minutes, or run around for an hour and need extra carbs to prevent a low.

Be prepared to give 5–15 grams of carb, depending on the child's age and size, for every 30 minutes of sustained activity and monitor blood glucose levels frequently.

Infants and Toddlers

No matter the age, you can help children stay active. For example, encouraging infants in active play to explore movement and their surroundings supports physical and mental development. For toddlers, 30 minutes or more of physical activity a day with no more than 60 minutes of sitting at a time will help promote motor skills and muscular development.

For preschoolers, aim for a minimum of at least 60 minutes of activity per day. Give your child 5–15 grams of carbohydrates for every 30 minutes of activity, depending on initial blood glucose levels and the intensity of the exercise. Check pre-exercise blood glucose levels in active children since a young child may not be able to verbalize the symptoms of a low. Starting exercise with blood glucose in the 150–200 mg/dL range may help lower the risk of hypoglycemia (low blood glucose) in toddlers. Pay attention to your child's blood glucose levels before and after exercise.

Young Children and Adolescents

Children and adolescents should have at least 60 minutes or more of physical activity each day.

Include aerobic activities such as running, swimming, biking.
Anaerobic exercises consists of short exertion, high-intensity movements, such as jumping and sprinting.
Include strength training, such as yoga, weights and other activities.

Your Health Care Team's Role

Your health care team can help you find the balance between activity, food and insulin. When testing on your own to learn about your reaction to different activities, keep a record of your activity and your numbers. Your health care team can use that data to suggest adjustments and refine your plan. If you are having chronic lows or highs, they may need to alter your insulin dose or make a change in your meal plan.

Gestational Diabetes

Can you have gestational diabetes and a healthy baby? Yes.
Image

It can be a scary diagnosis, but it's one that's fairly common.

Gestational diabetes (GDM)—diabetes during pregnancy—affects up to 9% of pregnancies in the U.S. each year, so know you're not alone. If you are diagnosed, this doesn't mean you had diabetes before pregnancy nor does it mean you'll have it after giving birth. The key is to act swiftly, remain consistent, and stay on top of your condition. GDM is treatable, manageable, and something you can effectively manage. With your health care provider's support, you can have a healthy pregnancy and baby.

What We Know About GDM

The exact cause of GDM is unclear and there's a lot we don't know. But—we do know that the placenta's hormones, which support the baby's growth, can sometimes block the mother's insulin, leading to insulin resistance. This makes it harder for the body to use insulin effectively, requiring the mother to produce more. If the body can't produce enough insulin during pregnancy, glucose remains in the blood, leading to high blood glucose (blood sugar).

No matter the cause, you can work with your health care provider to create a plan that ensures a healthy pregnancy. Don't hesitate to ask questions or seek support—there are many effective ways to manage GDM.

Protecting You and Your Baby

Take these steps to keep you and your baby healthy:

Get screened: Early treatment helps prevent health issues for both you and your baby. The key is to act quickly so you can start managing it right away.

Make a treatment plan: Early treatment helps prevent health issues for both you and your baby. Work with your health care team to develop a treatment plan.

GDM Treatment

Taking quick action is essential. While GDM is treatable, it can pose health risks to both you and your baby if left unmanaged. The primary goal of treatment is to keep your blood glucose levels within a normal range. This may involve special meal plans, regular physical activity, daily blood glucose testing, and insulin injections.

Remember, with the right approach and the support of your health care team, you can ensure a healthy pregnancy.

Image

Healthy Eating Is Key to Success

As with all forms of diabetes, diet is a crucial management tool. Your health care provider can help you develop a personalized meal plan that will guide you toward the best food choices and easy meal ideas that keep you healthy and strong throughout your pregnancy. An easy way to start your healthy eating journey is with the [Diabetes Plate](#).

Image

Move More to Manage

Exercise plays a vital role in managing GDM. Collaborate with your health care provider to determine the safest level of activity for you and your baby during pregnancy. Start slow and make the movement more fun by bringing your partner, friend, or family member along with you!

Image

Reduce Your Risk for Type 2 Diabetes

Did you know that about 50% of women with GDM go on to develop type 2 diabetes? That doesn't have to be your story. The National Diabetes Prevention Program (National DPP) is a lifestyle change program proven to reduce the risk of developing type 2 diabetes by 58%. If you've been diagnosed with GDM, you may qualify for the National DPP.

Gestational Diabetes WHAT IS GESTATIONAL DIABETES? Gestational diabetes (GDM) is diabetes that is only present during pregnancy when you did not have diabetes before you became pregnant. After birth, GDM goes away, but you may develop type 2 diabetes right away and you are at a higher risk for developing it later in life. GDM is a condition that needs to be taken seriously, but you can learn how to manage it, taking steps to have a healthy pregnancy for you and your baby. **WHAT CAUSES GESTATIONAL DIABETES?** When you eat (or drink beverages), your body breaks food down into glucose and sends it into the blood. Insulin helps move the glucose from the blood into your cells. When glucose enters your cells, it is either used as fuel for energy right away or stored for later use. During pregnancy, your placenta makes a lot of hormones. Some of these hormones block insulin from moving glucose into the cells. If you have GDM, your body's insulin can't keep your blood glucose in a healthy range. This is called insulin resistance. To make up for this "resistance," your body then makes more insulin. However, if you have GDM, your body can't make enough insulin to keep up. Without enough insulin, your blood glucose rises higher than a healthy range. This is called high blood glucose (hyperglycemia). Higher blood glucose levels can cause your baby to gain too much weight during the pregnancy. **WHAT ARE THE RISK FACTORS FOR GESTATIONAL DIABETES?** Your chance of getting GDM isn't caused by something you did or didn't do, but there are risk factors for it.

Your chances go up if: You are living with overweight or obesity. You have a parent, brother, or sister with diabetes. Your family background is Black, Asian American, Latino/Hispanic, Native American, or Pacific Islander. You're 25 years old or older. You've had GDM before or you've had a baby who weighed more than nine pounds at birth. Your blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes (prediabetes).

Newly Diagnosed with Diabetes

1.4 million people will be diagnosed with diabetes this year. We make sure that's not the end of the story.

Image

Finding out you have diabetes can be overwhelming and confusing. If you're newly diagnosed with diabetes, it's natural to wonder, "What now?" Understanding your diagnosis is the first step toward managing it effectively.

Well, the good news is you have a community to fall back on. You don't have to maneuver this by yourself. You have the support of countless others who have felt the same shock. Your diagnosis is simply the first step. There are ways you can manage your diabetes—through diet, exercise, medical support and emotional help. Dig in. Take action. And know that we have everything you need to help you live a long, healthy life surrounded by people who know exactly what you're going through.

Getting started with type 2

To use blood glucose (blood sugar) as energy, your body uses insulin. But with type 2 diabetes, your body doesn't make enough insulin, use it well, or both—and your body's cells can't use blood glucose for the energy it needs. When blood glucose isn't used and your blood glucose levels rise, it can cause serious problems.

Taking medication

Medication is an important part of managing type 2 diabetes. Work with your doctor to see what medications fit into your diabetes management plan to help reach your target range. Here are a few questions about your medications you can ask your doctor, pharmacist, or diabetes care and education specialist:

How much do I take?

How often should I take it, and when?

Should I take my medication on an empty stomach or with food?

What if I forget to take my medication and remember later?

What side effects could I have?

What should I do if I have side effects?

Will this medication cause a problem with any of my other medications?

Living with type 1

If you have type 1 diabetes, it means that your pancreas does not produce insulin. It requires monitoring your blood glucose and administering multiple daily insulin injections with a pen, syringe, or a pump.

If you've just learned you have type 1 diabetes, know that you have an array of tools at your disposal to help you manage it. Finding ways to manage your blood glucose levels, your insulin intake, diet and exercise, and working with your diabetes care team, can help you feel healthier and help you stay on top of your condition.

Remember, millions of people live healthy lives with type 1. Find others with type 1 and ask them what they do to stay healthy. You may be curious about an insulin pump, and find someone who uses one. You can get tips and tricks that will make life just a little bit easier.

The important thing is to share your feelings with those around you and don't hold back from asking for help. Reaching out is key to living a vital life with type 1 diabetes.

Life doesn't end with type 2 diabetes.

Your best days lie ahead—and that's why we're here.

Image

Maybe you've just been diagnosed with type 2 diabetes. Or maybe you've been living with it for awhile.

Here's the thing: your journey is unique and it starts fresh every day.

No matter where you are with type 2 diabetes, there are some things you should know. It's the most common form of diabetes. Type 2 means that your body doesn't use insulin properly. And while some people can control their blood glucose (blood sugar) levels with healthy eating and exercise, others may need medication or insulin to manage it. Not sure where to start? [Find out about type 2 diabetes.](#)

Every Journey is Unique

There's no one-size-fits-all treatment for type 2, but we can help you take each step forward. Whatever step you take next, know that you won't take it alone.

[Explore Treatment and Care](#)

Image

The Right Fuel

A huge part of managing type 2 diabetes is developing a healthy diet. Find helpful tips and diet plans that best suit your lifestyle.

[Eat To Win, Every Day](#)

Image

Get Moving with a Fitness Plan

Fitness is a key part of managing diabetes. And the good news, all you have to do is get moving. You don't have to become an ultra-marathoner. You can start slowly with a walk around the block or a simple bike ride. The key is to find activities you love and do them as often as you can.

Here's How You Can Get Started

Work with your doctor to determine what level of physical activity you should engage in

Figure out how much time per day you can devote to exercise

Set fitness goals—having clear goals can help you stay motivated

Consider where you'll start working out—the gym, in your neighborhood, in a park?

Build different activities into your daily routine

Start slowly and allow for recovery time

Keep track of what you do and stay focused on your goals

Listen to your bod

Low Blood Glucose (Hypoglycemia)

Part of living with diabetes is fluctuations in your blood glucose levels. Here's what you need to do when your blood glucose level drops low.

Image

What You Need to Know About Low Blood Glucose (Blood Sugar)

Key Points

Low blood glucose is when your levels fall below 70 mg/dL
Use the 15/15 rule of 15g fast-acting carbs/15 minutes rule to treat low blood glucose
It's important to treat low blood glucose levels as soon as possible, as they can quickly become dangerous
Severe low blood glucose is an emergency and will require help from others to treat it

Don't hesitate to call 911. If someone is unconscious and glucagon is not available or someone does not know how to use it, call 911 immediately.

Living with diabetes means that your blood glucose (sometimes called blood sugar) levels fluctuate. You should have a target range that you want to keep your blood glucose levels within. This target should be discussed with your [health care team](#). This range is important because it helps protect your body from [diabetes-related complications](#). But what happens when your level drops below your target range?

What Is Low Blood Glucose (Hypoglycemia)?

For people living with type 1 diabetes or are taking insulin, you should be regularly [checking your blood glucose levels](#). Throughout the day, your blood glucose levels will change—going up or down. This is expected and impacted by many different factors. If it goes up or down within your target range, you probably won't be able to tell. But if it goes below your target range and is not treated, it can get dangerous.

Low blood glucose, sometimes just called a low, is when your blood glucose levels have fallen low enough that you need to take action to bring them back to your target range. This is usually when your blood glucose is less than 70 mg/dL.

It's important to talk to your health care professional about your own blood glucose levels and if you're at risk for going low. Together, you can determine what level is too low for you and when you should treat for a low.

"I was very much in denial about my type 1 diabetes. So much so that I pushed it to the side while I struggled with the very busy schedule of being a lead actress on a TV show in a foreign country. Unfortunately, this was the start of my many scary experiences with hypoglycemia. It wasn't until my blood sugar went so low that I went unconscious that I finally started accepting my condition. Being diagnosed with diabetes came with a new set of challenges, but it didn't have to disrupt my goals and aspirations. I realized that I could still live my life how I wanted to, as long as I made an effort to manage my condition properly." —Alexandra Park

Symptoms of Low Blood Glucose

Just as each body is different, so is each person's reaction to low blood glucose. While the symptoms can come on quickly, those symptoms can vary widely from person to person.

Because it can be different from person to person, it's important to learn the signs and symptoms you have when your blood glucose levels are low.

[Learn About Symptoms](#)

Image

Treating Low Blood Glucose

When your blood glucose begins to drop below 70 mg/dL, it's important to treat it quickly to prevent it going lower.

Fast-acting carbs are the best choice to treat hypoglycemia and preventing a severe hypoglycemia incident.

[Discover the Best Treatments](#)

Image

Causes of Low Blood Glucose

There are many things that can cause blood glucose levels to drop. It is especially common for people with type 1 diabetes or people with type 2 diabetes taking insulin or other similar medications.

Understanding what causes your blood glucose to go down is important so you can steps to prevent lows from happening.

[Prevent Low Blood Glucose](#)

Image

What Is Severe Hypoglycemia?

When low blood glucose isn't treated and you need someone to help you treat it, it's considered severe hypoglycemia.

During a severe hypoglycemia incident, you may lose consciousness or be unable to eat or drink on your own. In these events, you will need specialized treatment called glucagon.

Diet Plan for Diabetes & Hypertension

Diet plays a central role in the management of both diabetes and hypertension. The first priority is **reducing salt intake**, as excess sodium contributes to high blood pressure and fluid retention. Patients are advised to avoid foods like papads, pickles, chips, salted snacks, sauces, and processed foods. Cooking should be done with minimal salt, and flavor can be enhanced with herbs and spices instead. Along with salt restriction, **fat intake must be controlled**. High-fat sources such as butter, ghee, vanaspati, and coconut oil increase cholesterol and cardiovascular risk. Instead, healthier oils like sunflower, safflower, soybean, or mustard oil can be used in limited quantities. Fried foods, bakery items, and fast foods should be strictly avoided.

When it comes to **carbohydrates**, refined and processed carbs (like white bread, pastries, and sweetened drinks) should be eliminated, as they cause rapid spikes in blood sugar. Patients should rely on complex carbohydrates such as brown rice, oats, whole wheat, and millets, which release glucose gradually and help maintain stable blood sugar levels. For **proteins**, the diet should emphasize plant-based proteins like lentils, legumes, sprouts, milk, curd, and paneer, along with moderate amounts of fish, lean meat, and eggs. Red meat and processed meats should be avoided due to their high fat and salt content. Fruits and vegetables are an essential component—**five to six servings daily** are recommended. Seasonal fruits and leafy vegetables provide fiber, vitamins, and antioxidants. However, fruits with a high glycemic load like mangoes, bananas, grapes, and chikoo should be restricted. Sugar in all forms, including honey, jaggery, and sugarcane juice, should be avoided. If necessary, artificial sweeteners may be used, but only under medical guidance. The overall principle is to have a **balanced, low-fat, high-fiber, nutrient-rich diet** that supports both blood sugar and blood pressure control.

Exercise Plan for Diabetes & Hypertension

Exercise is equally important as diet in managing these conditions. Regular physical activity improves insulin sensitivity, helps lower blood pressure, aids in weight reduction, and improves cardiovascular health. The recommended goal is at least **30–45 minutes of moderate aerobic exercise** such as brisk walking, jogging, cycling, or swimming, on at least **five days a week**. Aerobic activity improves circulation and enhances the efficiency of the heart and lungs. Alongside aerobics, **strength training** is encouraged 2–3 times a week using light weights or resistance bands, as building muscle mass helps in glucose utilization and improves metabolism.

Flexibility and balance exercises are also important, especially yoga and stretching routines. These not only improve physical flexibility but also contribute to stress management, which is a significant factor in both diabetes and hypertension. Stressful states elevate blood sugar and blood pressure, so yoga and meditation provide dual benefits. However, patients need to exercise with caution. Those with uncontrolled hypertension should avoid vigorous workouts until stabilization. Diabetics must check their blood sugar levels before and after exercise to prevent hypoglycemia. Warm-up and cool-down sessions are vital to avoid sudden cardiac strain. Overall, a **combination of aerobic activity, strength training, and**

yoga creates a holistic exercise plan that helps in the long-term management of both diseases.

Lifestyle Recommendations for Diabetes & Hypertension

Lifestyle modifications act as the foundation for controlling diabetes and hypertension beyond diet and exercise. **Weight management** is the first step. Maintaining a healthy body weight, ideally with a BMI between 18.5 and 24.9, significantly lowers blood pressure and improves insulin sensitivity. Reducing abdominal fat is especially important since central obesity is strongly linked to both conditions. Along with weight control, **stress management** is crucial. Stress can cause surges in blood sugar and blood pressure due to hormonal changes. Practicing relaxation techniques such as meditation, deep breathing, and mindfulness can reduce stress levels. Yoga is highly recommended because it combines physical activity with mental relaxation.

Adequate **sleep** is another important aspect. Adults should aim for 7–8 hours of uninterrupted sleep. Poor sleep quality has been linked to insulin resistance, weight gain, and hypertension. **Tobacco and alcohol** must be strictly avoided, as both directly damage blood vessels, increase cardiovascular risk, and interfere with glucose control. Regular health monitoring is essential—patients should check their blood sugar and blood pressure frequently and attend follow-up appointments with their doctors to ensure medications are effective and doses are appropriate. **Hydration** should be maintained by drinking sufficient water throughout the day, while avoiding sugary beverages, sodas, and packaged fruit juices. A structured daily routine that balances nutrition, exercise, rest, and stress management provides long-term protection and helps in preventing complications like heart disease, kidney disease, and stroke.

1. Salt Restriction and Blood Pressure Control

Excessive salt (sodium) intake directly raises blood pressure and worsens fluid retention in the body. For people with diabetes, high blood pressure adds to the risk of kidney damage, eye complications, and heart disease. Therefore, salt intake should be **limited to less than 5 grams per day** (around 1 teaspoon). This includes “hidden salt” found in processed foods like pickles, sauces, papads, chips, bread, bakery products, and canned foods. Flavor can be enhanced using natural herbs, lemon juice, garlic, ginger, or spices instead of extra salt. Patients are encouraged to taste food before adding salt and avoid keeping a salt shaker on the dining table.

2. Fats and Oils

Diabetes and hypertension are closely linked to cardiovascular disease. Reducing unhealthy fats is critical for protecting the heart. **Saturated fats** (butter, ghee, coconut oil, vanaspati) and **trans fats** (present in fried foods, bakery items, packaged snacks) should be avoided. Instead, choose **heart-healthy oils** like mustard oil, sunflower oil, safflower oil, soybean oil, or olive oil — but even these should be used in moderation (not more than 3–4

teaspoons/day). Nuts like almonds and walnuts provide healthy fats but should be consumed in small portions. Deep-fried foods should be replaced with baked, grilled, or steamed options.

3. Carbohydrates and Blood Sugar Control

Carbohydrates are the main source of glucose in the body. In diabetes, not all carbs are equal. **Refined carbohydrates** like white bread, noodles, pasta, biscuits, pastries, and sugary drinks cause a rapid rise in blood sugar and must be restricted. Instead, focus on **complex carbohydrates** such as whole wheat, oats, barley, millets, brown rice, and quinoa, which release glucose slowly and maintain stable sugar levels. Portion control is equally important — using the **plate method** helps ($\frac{1}{2}$ plate vegetables, $\frac{1}{4}$ plate protein, $\frac{1}{4}$ plate healthy carbs).

4. Proteins for Strength and Repair

Protein-rich foods help repair tissues, provide satiety, and prevent sudden blood sugar spikes. Ideal sources include lentils, beans, chickpeas, sprouts, milk, curd, paneer, egg whites, fish, and lean poultry. Red meat should be avoided as it is high in saturated fat and may increase blood pressure and cholesterol. For vegetarians, mixing cereals and pulses (like rice with dal) provides complete protein.

5. Fruits and Vegetables

A diet rich in **fiber, vitamins, and antioxidants** is protective against both diabetes complications and hypertension. Fresh seasonal vegetables should be included in every meal. Fruits should be consumed in moderation — 1–2 servings per day. Low-glycemic fruits like apple, guava, papaya, orange, pear, and berries are better choices. High-sugar fruits such as mango, banana, grapes, and chikoo should be minimized. Juices should be avoided as they lack fiber and spike blood sugar quickly.

6. Sugar and Sweeteners

All concentrated sugars — sweets, chocolates, honey, jaggery, sugarcane juice, sweetened beverages — must be avoided. Artificial sweeteners (like sucralose, stevia) can be used occasionally but only under a doctor's advice. Patients must be cautious not to overuse them, as it can encourage cravings for sweet foods.

Summary: The diet for diabetes and hypertension should be **low in salt, sugar, and unhealthy fats; high in fiber, lean protein, and complex carbs**. It should be colorful, balanced, and portion-controlled.

Detailed Exercise Plan for Diabetes & Hypertension

1. Aerobic Exercise

Aerobic activities strengthen the heart, improve circulation, lower blood pressure, and increase insulin sensitivity. Examples include brisk walking, cycling, jogging, dancing, and

swimming. Patients should aim for **150 minutes of moderate-intensity activity per week** (e.g., 30 minutes, 5 days/week). Even a daily brisk walk after meals can significantly reduce post-meal blood sugar.

2. Strength Training

Building muscle is beneficial because muscle tissue helps absorb and utilize glucose efficiently. Strength training also strengthens bones and joints. Simple bodyweight exercises (squats, push-ups, lunges), resistance band workouts, or light weightlifting 2–3 times a week are recommended. Patients new to strength training should begin gradually under supervision.

3. Flexibility & Stress-Relief Exercises

Yoga and stretching are particularly useful for people with diabetes and hypertension. Yoga postures such as **Bhujangasana (cobra pose)**, **Shavasana (relaxation pose)**, and **Pranayama (breathing exercises)** improve blood pressure control and reduce stress hormones. Stretching helps prevent stiffness, improves circulation, and reduces the risk of injury.

4. Safety Precautions

- Patients with uncontrolled hypertension should start with light activity and avoid heavy lifting.
- Diabetic patients should check blood sugar before and after exercise to avoid hypoglycemia.
- Carry a small snack (like a fruit or glucose tablet) during exercise in case of low blood sugar.
- Warm-up and cool-down are essential to avoid sudden strain on the heart.

Summary: A balanced exercise plan includes **aerobic activity for stamina, strength training for glucose utilization, and yoga/stretching for stress control.**

Lifestyle Recommendations for Diabetes & Hypertension

1. Weight Management

Excess weight, especially abdominal fat, worsens insulin resistance and elevates blood pressure. Maintaining a BMI between **18.5–24.9** and a healthy waist circumference (<90 cm for men, <80 cm for women) is critical. Weight loss of even **5–10% of body weight** can significantly improve both diabetes and hypertension control.

2. Stress Reduction

Stress triggers the release of hormones like cortisol and adrenaline, which increase blood sugar and blood pressure. Stress management should be part of daily routine. Techniques such as meditation, deep breathing exercises, mindfulness, yoga, and hobbies (reading,

music, gardening) can help reduce stress levels. Patients are encouraged to avoid multitasking overload and maintain a positive mindset.

3. Sleep Hygiene

Poor sleep is linked to insulin resistance, weight gain, and hypertension. Adults should aim for **7–8 hours of restful sleep** daily. A consistent sleep schedule, avoiding late-night screen use, and a calm bedtime routine (light reading, meditation) can improve sleep quality.

4. Avoiding Tobacco & Alcohol

Smoking damages blood vessels, increases heart disease risk, and worsens blood pressure. Alcohol contributes to weight gain, raises blood pressure, and destabilizes blood sugar levels. Both should be eliminated from the lifestyle of people with diabetes and hypertension.

5. Regular Monitoring & Medical Adherence

Regular self-monitoring of blood sugar and blood pressure helps track progress and detect early problems. Patients should keep a health diary to record readings and follow up regularly with doctors. Medication adherence is vital — skipping doses can cause dangerous spikes in blood sugar or pressure.

6. Hydration and Healthy Habits

Adequate hydration (6–8 glasses of water daily) supports kidney function and metabolism. Sugary and carbonated drinks must be avoided. Patients should also maintain **regular meal timings**, eat slowly, and avoid overeating.

Diet Plan (DASH Eating Plan)

The DASH (Dietary Approaches to Stop Hypertension) plan is a scientifically proven eating pattern designed to reduce blood pressure, manage weight, and improve heart health.

- **Core Principles**
 - **Emphasize:** Fruits, vegetables, whole grains, lean proteins (fish, poultry, beans), nuts, seeds, and low-fat dairy.
 - **Limit:** Saturated fats (fatty meats, full-fat dairy, tropical oils), sweets, and sugar-sweetened beverages.
 - **Reduce:** Sodium intake (target 2,300 mg/day; ideally 1,500 mg/day).
 - **Balance:** Fill half the plate with vegetables/fruits, one-quarter with whole grains, and one-quarter with lean protein.
- **Recommended Servings (for 2,000 kcal/day)**
 - Grains: 6–8 servings/day (preferably whole grains).
 - Vegetables: 4–5 servings/day.
 - Fruits: 4–5 servings/day.
 - Low-fat dairy: 2–3 servings/day.
 - Lean meats, poultry, fish: ≤6 oz/day.
 - Nuts, seeds, legumes: 4–5 servings/week.

- Fats & oils: 2–3 servings/day.
 - Sweets: ≤5 servings/week.
 - **Tips for Success**
 - Gradually increase vegetables, fruits, and low-fat dairy.
 - Replace red meats with fish or plant proteins twice a week.
 - Choose whole grain bread/pasta instead of refined grains.
 - Use herbs, spices, lemon, or vinegar instead of salt for flavor.
 - Snack on fruits, yogurt, or unsalted nuts instead of chips/candy.
 - Track food intake with a “What’s on Your Plate?” worksheet.
-

2. Exercise Plan (Get Active with DASH)

Physical activity strengthens the effects of the DASH diet.

- **Types of Activities**
 - **Aerobic (endurance):** Brisk walking, jogging, swimming, cycling, rope-jumping (best for heart and lungs).
 - **Muscle-strengthening:** Resistance bands, weight training, push-ups, squats.
 - **Bone-strengthening:** Weight-bearing activities like running, walking, rope-jumping, and resistance training.
 - **Stretching:** Yoga, side stretches, toe touches to improve flexibility.
 - **Recommendations**
 - **At least 150 minutes/week** of moderate-intensity activity (e.g., brisk walking for 30 min/day, 5 days/week).
 - Or **75 minutes/week** of vigorous activity (e.g., jogging, cycling, aerobics).
 - Include **muscle-strengthening exercises** at least 2 days/week.
 - Gradually build up if you are new to exercise; even small amounts make a difference.
 - **Benefits**
 - Lowers blood pressure and cholesterol.
 - Improves blood flow and heart strength.
 - Aids in weight management.
 - Reduces stress and risk of diabetes.
-

3. Lifestyle Plan

Lifestyle habits work hand-in-hand with diet and exercise to manage hypertension.

- **Weight Management**
 - Even losing 5–10% of body weight can significantly lower blood pressure.
 - Use the **Body Weight Planner** (niddk.nih.gov/bwp) to set calorie and weight goals.
- **Sodium & Salt Management**
 - Cook without salt; flavor with spices and herbs.
 - Avoid processed, packaged, and canned foods (high sodium).

- When dining out, request “no added salt.”
- **Potassium Intake**
 - Eat potassium-rich foods (bananas, potatoes, spinach, salmon, yogurt).
 - Potassium balances sodium and supports heart health.
- **Alcohol & Smoking**
 - If you drink: limit to **1 drink/day for women, 2/day for men**.
 - Quit smoking to reduce blood vessel damage.
- **Stress Management**
 - Try mindfulness, meditation, yoga, or deep breathing.
 - Maintain social support and sleep well (7–8 hrs).
- **Long-Term Habits**
 - Don’t panic about occasional slips; restart gradually.
 - Celebrate small successes with non-food rewards.
 - Involve the family so everyone follows a healthier lifestyle.

1. Diet Plan (DASH-Based + Practical Guidance)

The **DASH (Dietary Approaches to Stop Hypertension)** eating plan is one of the most effective dietary approaches to prevent and control high blood pressure. It emphasizes **nutrient-rich, low-sodium foods** and limits unhealthy fats and added sugars.

Core Dietary Principles

- **High in:** Fruits, vegetables, whole grains, lean proteins, nuts, seeds, and low-fat dairy.
- **Moderate in:** Healthy oils (olive, canola), poultry, fish, legumes.
- **Low in:** Sodium, saturated fat, red meat, sweets, and sugar-sweetened drinks.
- **Rich in:** Potassium, magnesium, calcium, fiber, and protein — nutrients that lower blood pressure.

Daily DASH Servings (Based on 2,000 kcal/day)

- **Grains (6–8 servings):** Whole wheat bread, oats, brown rice, quinoa.
- **Vegetables (4–5 servings):** Leafy greens, carrots, tomatoes, spinach, broccoli.
- **Fruits (4–5 servings):** Apples, bananas, berries, oranges, melons.
- **Low-fat Dairy (2–3 servings):** Skim milk, low-fat yogurt, reduced-fat cheese.
- **Lean meats, poultry, fish (≤6 oz/day):** Skinless chicken, salmon, tuna, turkey.
- **Nuts, seeds, legumes (4–5 servings/week):** Almonds, peanuts, sunflower seeds, beans, lentils.
- **Fats & oils (2–3 servings/day):** Olive oil, canola oil, avocado oil.
- **Sweets (≤5 servings/week):** Dark chocolate, fruit desserts (limit added sugar).

Practical Meal Ideas

- **Breakfast:** Oatmeal topped with berries and almonds + low-fat milk.
- **Lunch:** Grilled salmon, brown rice, steamed broccoli, salad with olive oil.
- **Snack:** Apple slices with unsalted peanut butter OR low-fat yogurt.
- **Dinner:** Grilled chicken, whole wheat pasta, spinach sautéed with garlic.

Tips to Reduce Sodium

- Choose “low-sodium” or “no-salt-added” foods.
 - Cook rice/pasta without salt; flavor with lemon, garlic, herbs.
 - Avoid processed foods like canned soups, instant noodles, packaged snacks.
 - Remove the salt shaker from the dining table.
-

2. Exercise Plan (Get Active with DASH)

Exercise works hand-in-hand with diet to lower blood pressure. It helps strengthen the heart, improve blood circulation, manage weight, and reduce stress.

Types of Physical Activity

- **Aerobic/Endurance:** Walking, jogging, cycling, swimming, dancing.
- **Strength Training:** Weightlifting, resistance bands, push-ups, squats.
- **Flexibility:** Yoga, stretching, Pilates.
- **Bone-strengthening:** Jump rope, brisk walking, running.

How Much Exercise is Needed?

- **150 minutes/week of moderate activity** (e.g., 30 mins/day, 5 days/week).
- **OR 75 minutes/week of vigorous activity** (e.g., jogging, aerobic classes).
- **Add 2+ days of strength training** for muscles and bones.
- Even 10-minute bursts of activity (walking, climbing stairs) count.

Benefits of Regular Exercise

- Lowers systolic & diastolic blood pressure by 4–9 mmHg.
 - Improves cholesterol (raises HDL, lowers LDL).
 - Helps regulate blood sugar and prevents diabetes.
 - Reduces stress hormones that raise BP.
 - Boosts energy, mood, and sleep quality.
-

3. Lifestyle Plan (Healthy Habits for Life)

Hypertension is not just about food and exercise — daily habits play a huge role in blood pressure control.

Weight Management

- Even a **5–10% weight loss** can reduce blood pressure significantly.
- Track calorie intake with apps or journals.
- Choose portion control, avoid overeating.

Alcohol & Caffeine

- Alcohol: Limit to **1 drink/day (women), 2/day (men)**.
- Too much alcohol can raise blood pressure and interfere with medication.
- Caffeine: Limit excessive intake (2–3 cups coffee/day is usually safe).

Smoking

- Quit smoking entirely — it damages blood vessels and accelerates hypertension.
- Secondhand smoke also worsens BP.

Stress Management

- Stress raises BP temporarily and long-term stress damages heart health.
- Use techniques like:
 - Deep breathing (inhale 4 sec, hold 4 sec, exhale 6 sec).
 - Meditation or mindfulness apps.
 - Yoga or tai chi.
 - Listening to music, hobbies, prayer.

Sleep & Rest

- Aim for **7–8 hours of quality sleep** nightly.
- Poor sleep raises cortisol (stress hormone), which increases BP.
- Maintain consistent sleep/wake times.

Staying on Track

- Don't give up after slip-ups — restart the plan.
- Make gradual changes instead of drastic ones.
- Involve family in healthy cooking and activities.
- Reward yourself with non-food pleasures (movies, hobbies, massages).

DASH Eating Plan – Expanded Detailed Guide

The **DASH Eating Plan** (Dietary Approaches to Stop Hypertension) is a nutrition program specifically designed to reduce blood pressure, improve heart health, and promote overall well-being. Unlike restrictive fad diets, the DASH plan focuses on balance and variety, encouraging the inclusion of foods rich in nutrients that directly benefit cardiovascular health. It emphasizes eating whole, minimally processed foods, which are naturally high in potassium, calcium, magnesium, and fiber — nutrients proven to lower blood pressure — while limiting sodium, unhealthy fats, and added sugars.

What makes the DASH plan particularly practical is its **structured weekly approach**. The plan outlines a full **seven-day meal schedule**, offering diverse and balanced food options that keep meals interesting while fulfilling the daily requirements of essential food groups. Each day's menu is carefully crafted to ensure that individuals consume the right proportions of grains, fruits, vegetables, proteins, dairy, and fats. For example, a day might begin with a breakfast of whole-grain toast, low-fat yogurt, and fresh fruit, followed by a lunch of grilled chicken with a vegetable salad, and dinner might feature baked fish with brown rice and

steamed greens. Snacks could include fresh fruit, unsalted nuts, or raw vegetables with hummus.

The **nutritional foundation** of the DASH plan is based on specific serving targets. In a 2,000-calorie plan, a person should ideally consume 6–8 servings of grains (with at least half being whole grains), 4–5 servings each of fruits and vegetables, 2–3 servings of low-fat dairy, and up to 6 ounces of lean meats, poultry, or fish per day. Additionally, the plan recommends 4–5 servings per week of nuts, seeds, or legumes, 2–3 servings of healthy oils daily, and no more than 5 servings of sweets in a week. These serving guidelines are not arbitrary; they are scientifically calculated to ensure a balance of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins and minerals) that directly support heart health.

Another key feature of the DASH eating plan is its **flexibility with sodium intake**. The standard version limits sodium to **2,300 milligrams per day**, while the stricter version recommends **1,500 milligrams daily** for greater blood pressure reduction. The PDF provides clear examples of how small substitutions can lower sodium without sacrificing taste. For instance, choosing unsalted margarine instead of salted versions, using herbs and spices instead of salt, and opting for fresh or frozen vegetables rather than canned ones can make a significant difference in daily sodium consumption. These substitutions also demonstrate that the DASH diet does not require bland meals — flavors can still be enhanced using natural seasonings like garlic, lemon, pepper, and vinegar.

The **seven-day menu** provided in the plan ensures that individuals get variety while staying within nutrient targets. Across the week, meals include creative dishes like turkey meatloaf, zucchini lasagna, chicken salad sandwiches, and baked fish with spinach. Each meal is paired with complementary side dishes such as fruit salads, steamed vegetables, or whole grains, making the diet sustainable and enjoyable. This structure helps individuals plan ahead, avoid last-minute unhealthy choices, and feel confident that their daily intake aligns with health goals.

What sets DASH apart from many other diets is that it does not only aim for blood pressure control but also supports **weight management and cholesterol reduction**. The foods encouraged in the plan are naturally lower in calories and saturated fats, helping individuals achieve or maintain a healthy weight. For people with high cholesterol, the reduction of red meat and full-fat dairy products further supports heart health by lowering LDL (“bad”) cholesterol levels. Additionally, the emphasis on fiber-rich foods aids digestion, supports satiety, and stabilizes blood sugar levels.

The plan also addresses **behavioral strategies** for long-term adherence. It suggests comparing one’s current eating habits with DASH recommendations and making gradual changes instead of drastic overhauls. For example, if someone rarely eats vegetables, they can start by adding one serving at lunch and dinner before working up to the full 4–5 servings. If dairy is missing from the diet, low-fat milk with breakfast or yogurt as a snack can be introduced. The key idea is that progress, not perfection, leads to sustainable lifestyle change.

Importantly, the DASH eating plan is designed to be **inclusive and family-friendly**. Since it uses common foods and simple preparation methods, it can be followed by the entire

household, making it easier to maintain. Families can cook and eat together, reinforcing healthy habits across generations. Children and adults alike benefit from reduced sodium, increased fruit and vegetable intake, and balanced nutrition.

In conclusion, the **DASH Eating Plan is more than just a diet — it is a lifestyle blueprint** for better health. By following its structured menus, embracing nutrient-rich foods, reducing sodium intake, and making gradual adjustments, individuals can experience measurable improvements in blood pressure within just a few weeks. Over the long term, it helps reduce the risk of heart disease, stroke, and kidney disease, while also supporting healthy weight and energy levels. Most importantly, it proves that managing hypertension does not require sacrifice but can instead be achieved through delicious, varied, and satisfying meals.

Lifestyle Plan for Hypertension

Lifestyle plays a critical role in the development and management of high blood pressure. Beyond food choices, the way we live day-to-day can either aggravate or reduce the risk of hypertension. One of the most important lifestyle modifications is **weight management**. Even a modest weight loss of 5–10% of body weight can lead to a significant reduction in blood pressure. Carrying extra weight, especially around the abdomen, forces the heart to work harder, which in turn raises blood pressure. Tracking body weight regularly and aiming for gradual, sustainable loss through diet and activity is more effective than sudden, restrictive attempts.

Another major lifestyle factor is **sodium control**. Processed foods, packaged snacks, canned soups, and fast foods are the main sources of hidden sodium. Cooking at home using fresh ingredients, avoiding excessive table salt, and flavoring food with herbs, spices, garlic, lemon, or vinegar instead of salt are practical strategies. Pairing this with a diet rich in **potassium**—from foods like bananas, spinach, sweet potatoes, salmon, and yogurt—helps balance electrolytes and naturally lowers blood pressure.

Alcohol and smoking are two habits that directly harm blood pressure and heart health. Alcohol should be consumed in moderation, with no more than one drink per day for women and two for men. Excessive drinking contributes not only to hypertension but also to obesity and organ damage. Smoking, on the other hand, should be completely avoided. Every cigarette causes a temporary spike in blood pressure, and over time, smoking damages blood vessels, accelerates atherosclerosis, and increases the risk of heart attack and stroke.

Stress management is another pillar of lifestyle change. Chronic stress raises cortisol and adrenaline levels, which tighten blood vessels and increase heart rate, leading to higher blood pressure. Learning to manage stress through deep breathing, mindfulness, meditation, prayer, yoga, or relaxation hobbies is essential. Equally important is **quality sleep**—adults should aim for 7–8 hours of restful sleep. Poor sleep patterns, whether due to insomnia or sleep apnea, can worsen hypertension. Sticking to a consistent sleep schedule and creating a calm bedtime routine can improve both sleep quality and cardiovascular health.

Finally, long-term success comes from **consistency and family support**. Instead of drastic, short-lived changes, small gradual improvements—like adding an extra vegetable to dinner, walking 10 more minutes per day, or replacing soda with water—are easier to sustain. Encouraging family members to join the journey makes lifestyle changes more enjoyable

and lasting. The DASH plan, when combined with these lifestyle strategies, becomes more than a temporary diet; it turns into a sustainable way of living that reduces blood pressure and improves overall well-being.

Exercise Plan for Hypertension

Alongside diet and lifestyle, **physical activity** is one of the most powerful natural tools for lowering blood pressure. Regular exercise strengthens the heart, improves circulation, helps manage weight, and reduces stress—all of which directly impact blood pressure control. The best part is that exercise does not need to be extreme; consistent moderate activity is enough to deliver lasting results.

Aerobic exercises such as brisk walking, jogging, cycling, swimming, and dancing are the foundation of a hypertension exercise plan. These activities increase the efficiency of the heart and lungs, improve oxygen delivery to the body, and make blood vessels more flexible. Engaging in aerobic activity for at least **150 minutes per week** (about 30 minutes a day, five days a week) has been shown to reduce systolic blood pressure by 4–9 mmHg. For those who enjoy more vigorous workouts, 75 minutes per week of higher-intensity activity like running or aerobics can provide similar benefits.

In addition to aerobic exercise, **strength training** plays an important role. Lifting weights, using resistance bands, or doing body-weight exercises like push-ups and squats at least two days a week helps build lean muscle, boosts metabolism, and supports overall cardiovascular health. Stronger muscles also support joints and bones, making daily activities easier and reducing the risk of injury.

Flexibility and balance exercises, such as yoga, tai chi, or stretching, should not be overlooked. While they may not directly lower blood pressure, they reduce stress, improve posture, prevent stiffness, and complement aerobic and strength workouts. Yoga, in particular, has been found to combine physical activity with breathing techniques and relaxation, offering a triple benefit for people with hypertension.

Importantly, exercise does not always mean going to the gym. Everyday physical activities like walking to the store, taking stairs instead of elevators, gardening, or playing with children also contribute to overall activity levels. For beginners or those with limited fitness, starting slowly—perhaps with 10-minute walks after meals—and gradually increasing intensity and duration is both safe and effective.

The benefits of exercise for hypertension extend beyond just lowering blood pressure. It improves cholesterol balance, reduces the risk of type 2 diabetes, helps with stress management, and promotes better sleep. Together with the DASH diet and healthy lifestyle habits, regular physical activity completes the triad of natural, sustainable strategies to control and prevent high blood pressure.

What is Hypertension?

Hypertension, or high blood pressure (HBP), is defined by the American Heart Association as a condition where the force of blood pushing against the walls of blood vessels is consistently too high. There are two types: **primary (essential) hypertension**, which accounts for about 90–95% of adult cases and is influenced by genetics, inactivity, obesity, and diet; and **secondary hypertension**, which represents 5–10% of cases and is linked to specific diseases affecting the kidneys, arteries, heart, or endocrine system. Hypertension is often called the “**silent killer**” because it rarely causes noticeable symptoms, yet it gradually damages the body, making regular blood pressure checks essential.

Why is Hypertension Harmful?

When blood pressure is consistently elevated, the heart and blood vessels are forced to work harder. This strain weakens the arteries and heart over time, leading to dangerous consequences. One major risk is **atherosclerosis**, where LDL (“bad”) cholesterol contributes to plaque build-up on artery walls, narrowing them and limiting blood flow. This process not only weakens arteries but also increases the risk of **stroke, heart failure, dementia, and memory loss**. The heart often responds by thickening its muscles and enlarging, but this adaptation reduces efficiency, making it harder to pump blood effectively.

How Exercise Helps

Though blood pressure rises temporarily during exercise, regular physical activity lowers both systolic and diastolic blood pressure by an average of **5–7 mmHg**. These benefits can last for up to 22 hours after a single session, and with consistency, they bring long-term improvements. Even modest reductions in blood pressure, especially for those with severe hypertension, can significantly lower the risk of cardiovascular disease.

Diet for Hypertension – The DASH Plan

The **DASH (Dietary Approaches to Stop Hypertension) eating plan** is proven effective for reducing high blood pressure. It emphasizes fresh fruits, vegetables, whole grains, low-fat dairy, lean meats, poultry, fish, nuts, legumes, and vegetable oils. At the same time, it discourages red meats, sugary drinks, sweets, and foods high in saturated or trans fats. Sodium intake is especially important—ideally **under 1,500 mg per day**, which equals less than one teaspoon of table salt. This diet works best in combination with exercise and lifestyle changes.

Exercise Guidelines – The FITT Principle

The **FITT principle (Frequency, Intensity, Type, Time)** explains how to exercise effectively for blood pressure control:

- **Frequency:** Exercise most days of the week, ideally 5–7 times, with resistance training 2–3 days weekly. Even a single exercise session provides benefits for up to 24 hours.
- **Intensity:** Moderate exercise (40–59% of heart rate reserve) is ideal. Heart rate monitors or formulas like Gellish’s equation help calculate targets. However, people on medications such as beta-blockers should rely more on **perceived exertion (RPE)**

scale)—moderate activity feels like “somewhat hard” (12–13), while vigorous is “hard” (14–16).

- **Type:** Aerobic activities such as brisk walking, jogging, cycling, and swimming produce the greatest reductions in blood pressure. Resistance training (at 60–70% of 1RM, progressing to 80%) is also important, especially combined with flexibility exercises like yoga or stretching. Breathing regularly during activity is essential—holding your breath raises blood pressure unnecessarily.
- **Time:** Aim for **30 minutes of moderate activity per day** (or 20 minutes of vigorous exercise), totaling 90–150 minutes weekly. This can be broken into smaller chunks—such as three 10-minute walks per day—making it easy to fit into daily routines.

Medication and Lifestyle

While diet and exercise alone can be powerful, some individuals need additional **pharmacological treatment**. Common medications include ACE inhibitors, ARBs, calcium channel blockers, diuretics, and beta-blockers. These drugs lower blood pressure through different mechanisms, such as reducing blood vessel constriction or lowering fluid volume. However, they should **complement**, not replace, healthy lifestyle changes.

Staying Active Pays Off

Research shows that physically active people live longer, healthier lives. Even those with risk factors like hypertension, diabetes, or smoking benefit significantly from regular activity. Exercise not only lowers blood pressure but also supports weight loss, controls blood sugar, improves cholesterol, strengthens bones, and boosts mental well-being.

Safe Participation in Exercise

Before starting, individuals should consider their health status:

- If you do **not exercise regularly** and have no diagnosed cardiovascular, metabolic, or kidney disease, you can begin light to moderate exercise right away.
- If you **have been diagnosed** or show symptoms of these conditions, seek medical clearance first.
- If you **already exercise regularly**, you can safely continue, gradually progressing intensity as tolerated, but still seek clearance if new symptoms develop.

Building a Complete Program

A balanced exercise plan includes **aerobic, resistance, and flexibility training**. Examples include walking, swimming, stair climbing, rowing, yoga, weightlifting, and resistance bands. ACSM recommends **at least 30 minutes of moderate-intensity activity on most days** or **20 minutes of vigorous exercise three times a week**. The combination of aerobic and resistance training provides maximum benefit for controlling hypertension.

Stress and Mental Health

Chronic stress is one of the most underestimated contributors to hypertension. When stress hormones like cortisol and adrenaline surge, blood vessels tighten, the heart beats faster,

and blood pressure rises. Over time, persistent stress damages blood vessels and the heart. Managing stress effectively through **meditation, yoga, tai chi, journaling, listening to music, or spending time in nature** has been shown to lower blood pressure. Cognitive behavioral therapy (CBT) can also help those who struggle with anxiety-driven hypertension.

Importance of Sleep

Sleep plays a vital role in cardiovascular health. Poor sleep—whether due to insomnia, sleep apnea, or irregular schedules—raises blood pressure and increases the risk of heart attack and stroke. Research shows that **7–8 hours of quality sleep per night** helps regulate blood pressure and heart function. People with sleep apnea (where breathing stops briefly during sleep) should seek treatment since it significantly worsens hypertension. Good sleep hygiene includes limiting screen time before bed, maintaining a dark and quiet bedroom, and keeping consistent sleep-wake cycles.

Regular Monitoring and Medical Checkups

Hypertension is called the “**silent killer**” because many people do not feel symptoms until complications arise. That’s why **regular blood pressure monitoring** is essential. Home BP monitors allow individuals to track trends, while regular doctor visits help detect early changes. Blood tests for cholesterol, kidney function, and blood sugar provide a fuller picture of cardiovascular risk. Early detection and consistent monitoring are key to preventing long-term damage.

Complementary and Alternative Therapies

Some natural approaches can support conventional treatment. **Mind-body practices** like mindfulness, acupuncture, or progressive muscle relaxation have been linked to modest blood pressure reductions. Dietary supplements such as **omega-3 fatty acids, garlic extract, hibiscus tea, and coenzyme Q10** may help in some cases, but these should be used only under medical supervision, since they can interact with medications.

Environmental and Social Factors

Hypertension is not only a personal health issue but also influenced by **social and environmental contexts**. People living in high-stress urban environments or with limited access to healthy foods may face higher risks. Social support networks—friends, family, or community groups—play a crucial role in encouraging physical activity, healthy eating, and stress reduction. Workplaces can also promote heart health by encouraging breaks, walking meetings, and healthier cafeteria choices.

Hydration and Caffeine

Adequate **hydration** supports healthy circulation and kidney function. Water is the best choice, while sugary drinks should be avoided as they increase weight and diabetes risk. **Caffeine** affects people differently—while moderate intake (2–3 cups of coffee per day) is safe for most, some individuals are “caffeine sensitive” and may see spikes in blood pressure after drinking it. Monitoring personal response is important.

Practical Everyday Strategies

- Start with **small lifestyle swaps**: replace sugary snacks with fruit, replace one soda per day with water, and take short walking breaks after meals.
- Use a **pedometer or smartwatch** to track daily steps; aim for at least 7,000–10,000 steps daily.
- Keep a **blood pressure diary** to identify patterns (e.g., spikes after salty meals or stressful days).
- Cook at home more often — restaurant meals are usually higher in sodium.
- Meal prep for the week using **DASH guidelines** to avoid impulse eating.
- Build an **accountability system**—exercise with a partner, join a support group, or share progress with friends.

INTRODUCTION

Nutrition is a basic human need and a prerequisite to a healthy life. A proper diet is essential from the very early stages of life for proper growth, development and to remain active. Food consumption, which largely depends on production and

distribution, determines the health and nutritional status of the population. The recommended dietary allowances (RDA) are nutrient-centred and technical in nature. Apart from supplying nutrients, foods provide a host of other components (non-nutrient phytochemicals) which have a positive impact on health. Since people consume food, it is essential to advocate nutrition in terms of foods, rather than nutrients. Emphasis has, therefore, been shifted from a nutrient orientation to the food-based approach for attaining optimal nutritional status. Dietary guidelines are a translation of scientific knowledge on nutrients into specific dietary advice. They represent the recommended dietary allowances of nutrients in terms of diets that should be consumed by the population. The guidelines promote the concept of nutritionally adequate diets and healthy lifestyles from the time of conception to old age.

Formulation of dietary goals and specific guidelines would help in providing required guidance to people in ensuring nutritional adequacy. The dietary guidelines could be directly applied for general population or specific physiological or high risk groups to derive health benefits. They may also be used by medical and health personnel, nutritionists and dietitians. The guidelines are consistent with the goals set in national policies on Agriculture, Health and Nutrition.

The dietary guidelines ought to be practical, dynamic and flexible, based on the prevailing situation. Their utility is influenced by the extent to which they reflect the social, economic, agricultural and other environmental conditions. The guidelines can be considered as an integral component of the country's comprehensive plan to reach the goals specified in the National Nutrition Policy.

The major food issues of concern are insufficient/ imbalanced intake of foods/nutrients. The common nutritional problems of public health importance in India are low birth weight, protein energy malnutrition in children, chronic energy deficiency in adults, micronutrient malnutrition and diet-related non-communicable diseases. However, diseases at the either end of the spectrum of malnutrition (under nutrition and overnutrition) are important. Recent evidences indicate that undernutrition in utero may set the pace for diet-related chronic diseases in later life. Population explosion, demographic changes, rapid urbanization and alterations in traditional habits contribute to the development of certain unhealthy dietary practices and physical inactivity, resulting in diet-related chronic diseases.

The dietary guidelines emphasize promotion of health and prevention of disease, of all age groups with special focus on vulnerable segments of the population such as infants, children and adolescents, pregnant and lactating women and the elderly. Other related factors, which need consideration are physical activity, health care, safe water supply and socio-economic development, all of which strongly influence nutrition and health.

In this document, food-related approaches, both in qualitative and quantitative terms, have been incorporated. Emphasis is on positive recommendations which can maximize protective effects through use of a variety of foods in tune with traditional habits. The higher goals set with respect to certain food items such as pulses, milk and vegetables/fruits are intended to encourage appropriate policy decisions. Suitable messages for each of these guidelines have been highlighted. A variety of foods, which are available and are within the reach of the common man, can be selected to formulate nutritionally adequate diets. While there are only four accepted basic food groups, in India, there are a variety of food preparations and culinary practices. Different cereals/millets are used as staple food, apart from a variety of cereal/millet/pulse combinations in different regions of India. The

cooking oils and fat used are of several kinds. The proposed guidelines help to formulate health promoting recipes and diets which are region- and culture-specific. It is difficult to compute standard portion sizes, common to all regions of India. Nevertheless, attempts are made to give portion sizes and exchanges.

Translation of knowledge into action calls for the coordinated efforts of several government and non-government organizations. The fifteen guidelines prescribed, herein, stress on adequacy of intake of foods from all food groups for maintenance of optimal health. Effective IEC strategies and other large-scale educational campaigns should be launched to encourage people to follow the dietary guidelines. Such efforts should be integrated with the existing national nutrition and health programs.

2CURRENT DIET AND NUTRITION SCENARIO

Health and nutrition are the most important contributory factors for human resource development in the country. India has been classified by the World Bank 1 as a country with a lower middle income, with per capita GNP of US \$ 996-3945 . It ranks 160 in terms of human development among 209 countries. Among the Indian population, about 28% in the rural and 26% in the urban areas are estimated to be 2 below the poverty line , which is defined as the expenditure needed to obtain, on an average, 2400 Kcal per capita per day in the rural areas and 2100 Kcal in urban areas. Long-term malnutrition leads to stunting and wasting, non-communicable chronic diet related disorders, increased morbidity and mortality and reduced physical work output. It is a great economic loss to the country and undermines development.

Common Nutrition Problems

Protein Energy Malnutrition (PEM), micronutrient deficiencies such as vitamin A deficiency (VAD) , Iron Deficiency Anemia (IDA), Iodine Deficiency Disorders(IDD) and vitamin B-complex deficiencies are the nutrition problems frequently encountered, particularly among the rural poor and urban slum communities.

Undernutrition starts as early as during conception. Because of extensive

maternal undernutrition (underweight, poor weight gain during pregnancy, nutritional anaemia and vitamin deficiencies), about 22% of the infants are born with low birth-weight (<2500 g) , as compared to less than 10% in the developed countries. Both clinical and sub-clinical undernutrition are widely prevalent even during early childhood and adolescence. Though the prevalence of florid forms of severe PEM like kwashiorkor and marasmus among preschool children is <1 %, national surveys indicate that about half of (48%) <5 year children suffer from sub-clinical undernutrition such as underweight (43%) stunting and wasting (20%) which indicates that undernutrition is of long duration . The studies have shown that there is a steep increase in the prevalence of underweight with increase of age, from 27% at 6 months of age to a high of 45% at 24 months of age . This is attributable to faulty infant and young child feeding practices prevailing in the community.

Persistent undernutrition throughout the growing phase of childhood leads to short stature in adults. About 33% of adult men and 36% of the women have a Body Mass Index (BMI) [Weight in kg/(Height in meter)] below 18.5, which indicates Chronic Energy Deficiency or CED (Table1) . In the case of vitamin A deficiency, 0.8-1% of preschool children show the signs of Bitot's spots and night blindness.

Vitamin A deficiency also increases the risk of disease and death.

Table 1

Particulars Prevalence

Infants and Preschool children (%)

Low birth weight 22

Kwashiorkor/Marasmus <1

Bitot's spots 0.8-1.0

Iron deficiency anaemia (6 -59 months) 70.0

Underweight (weight for age)* (<5 years) 42.6

Stunting (height for age)* (<5 years) 48.0

Wasting (weight for height)* 20.0

Childhood Overweight/ Obesity 6-30

Adults (%)

Chronic Energy Deficiency (BMI <18.5) among

Rural Adults Men 33.2

Women 36.0

Tribal Adults Men 40.0

Women 49.0

Anaemia (%)

Women (NPNL) 75.2

Pregnant women 74.6

Iodine deficiency disorders (IDD)

Goitre (millions) 54

Cretinism (millions) 2.2

Still births due to IDD (includes neo natal deaths) 90,000

Prevalence of chronic diseases Over weight/obesity4 (BMI>25) (%)

Rural Adults Men 7.8

Women 10.9

Tribal Adults Men 2.4

Women 3.2

Urban Adults Men 36.0

Women 40.0

Hypertension

Urban 35.0

Rural 25.0

Men 25.0

Women 24.0

Tribal 24.0

Men 25.0

Women 23.0

Diabetes Mellitus (%) (year 2006)

Urban 16.0

Rural 5.0

Coronary Heart Disease9 (%)

Urban 7-9

Rural 3-5

Cancer incidence Rate10 (Per 100,000)

Men 113

Women 123

*<Median -2SD of WHO Child Growth Standards

NNMB Rural Survey - 2005-06

NNMB Tribal Survey - 2008-09 43 Among children between the ages of 6 and 59 months, a majority (70%) are

anemic. Nearly three fourth (75%) of women in India are anemic, with the prevalence 5 of moderate to severe anemia being highest (50%) among pregnant women . It is 6 estimated that nutritional anemia contributes to about 24% of maternal deaths every year and is one of the important causes of low birth weight. It adversely affects work output among adults and learning ability in children.

Iodine deficiency disorders (IDD) are very common among large sections of population in several parts of the country. About 167 million are estimated to be living in IDD endemic areas. Iodine deficiency causes goiter (enlargement of thyroid gland in the neck), neonatal hypothyroidism, cretinism among new borns, mental retardation, delayed motor development, stunting, deaf-mutism and neuromuscular disorders. The most important consequence of iodine deficiency in mothers is cretinism in which the children suffer from mental and growth retardation right from the birth. About 90,000 still-births and neonatal deaths occur every year due to maternal iodine deficiency. Around 54 million persons are estimated to have goiter, 7 2.2 million have cretinism and 6.6 million suffer from mild psycho-motor handicaps . India is passing through the phase of economic transition and while the problem of undernutrition continues to be a major problem, prevalence of overnutrition is

emerging as a significant problem, especially in the urban areas. The prevalence of overweight/ obesity is higher among the women (10.9%) compared to men (7.8%) in 4 8 rural areas . The prevalence of Diabetes Mellitus and Coronary Heart Disease 9 (CHD) is also higher in urban areas as compared to their rural counterparts. The incidence rate of cancer is comparatively higher among women (123) compared to 10 men (113 for 100,000) .

Food availability and consumption

The overall production of food grains (cereals/millet/pulses) recorded a significant increase from about 108 million tones in 1970-71 to a little over 230 million 11,12 tones during 2007-2008 . Though the production of cereals and millets appears to be adequate, production of pulses, the source of protein for the rural poor, actually shows a decline. Total Production of vegetables is about 30% less than the demand 13 of 100 million tones . The total production of milk during 2006-2007 was about 100.9 million tones, corresponding to about 245 g per caput per day, which is lower than 14 the world average of 285 g per day . Though the per capita availability of various foods stuffs is comparable to RDA, the distribution of foods, both within the community and the family, may be unfavorable to some vulnerable groups due to low income and purchasing power. In view of the high cost of milk, a large proportion of the Indian population subsists on diets consisting mostly of plant foods with low nutrient bio-availability (Table 2).

5Table 2. Food availability (per caput/g/day)

Food Group

Year RDA

1990 2000 2001 2002 2003 2004 2006/07 Per

CU

Per

caput*

Cereals 431.5 422.7 386.2 458.7 408.5 426.9 412.1 460 400

Pulses 41.1 31.8 30.0 35.4 29.1 35.8 32.5 40.0 35

Milk 176 220 225 230 231 232 245 150 131

Vegetables - - - - - 210 60 52

Oils 17.8 26.0 27.9 23.6 NA NA NA 20 17

Meat 12.6 13.7 14.0 14.2 NA NA NA - -

Eggs

no.s / head / annum 25 36 38 39 40 41 - - -

*0.87 CU (Consumption Unit) per caput . Source: Ref Nos. 2,15,16,17,18 & 19

4 National Nutrition Monitoring Bureau (NNMB) surveys indicate that the daily intake of all foods except cereals and millets (396g) in Indian households is lower than the Recommended Dietary Allowances or RDA (Table 3). The average consumption of pulses and legumes like green gram, bengal gram and black gram, which are important source of protein was less than 50% of RDA. Consumption of green leafy vegetables (<14g) and other vegetables (43 g), which are rich sources of micronutrients like beta-carotene, folate, calcium, riboflavin and iron was grossly inadequate. Intake of visible fat was also less than 50% of the RDA.

Table 3. Food Consumption (g/day)

* Source: National Nutrition Monitoring Bureau, 2006.

Source: RDA -2010 for moderately active person

The proportion of households with energy inadequacy was about 70%, while that with protein inadequacy was about 27%. Thus, in the cereal/millet-based Indian dietaries, the primary bottleneck is energy inadequacy and not the protein, as was earlier believed. This dietary energy gap can be easily reduced by the poor by increasing the quantities of habitually eaten foods.

6

Intake *

CU Per Caput

R #

DA

Cereals/millets 396 345 400

Pulses 28 24 80

Milk 82 71 300

Vegetables 49 43 300

Oils 14 12 30 On the other side of the spectrum of malnutrition, diet-related non-communicable diseases are commonly seen. With increasing urbanization, energy-rich diets containing higher amount of fat and sugar, which also provide less dietary fibre and complex carbohydrates, are being frequently consumed, particularly by high-income groups. In addition, the urban population is turning to be more sedentary with little physical activity. Consumption of alcohol, providing empty calories, and tobacco use is also common among them. Hence, prevalence of disorders like obesity, heart disease, hypertension (high blood pressure) diabetes and certain types of cancers is on the increase.

Determinants of Malnutrition

Widespread malnutrition is largely a result of dietary inadequacy and unhealthy lifestyles. Other contributing factors are poor purchasing power, faulty feeding habits, large family size, frequent infections, poor health care, inadequate sanitation and low agricultural production. Population living in the backward and drought-prone rural areas and urban slums, and those belonging to the socially backward groups like scheduled castes and tribal communities are highly susceptible to undernutrition. Similarly, landless labourers and destitutes are also at a higher risk.

The most rational, sustainable and long-term solution to the problem of malnutrition is ensuring availability, accessibility and consumption of adequate amounts of foods. Dietary guidelines help to achieve the objective of providing optimal nutrition to the population.

DIETARY GOALS

1. Maintenance of a state of positive health and optimal performance in populations at large by maintaining

ideal body weight.

2. Ensuring adequate nutritional status for pregnant women and lactating mothers.
3. Improvement of birth weights and promotion of growth of infants, children and adolescents to achieve their full genetic potential.
4. Achievement of adequacy in all nutrients and prevention of deficiency diseases.
5. Prevention of chronic diet-related disorders.
6. Maintenance of the health of the elderly and increasing the life expectancy.

9DIETARY GUIDELINES

Right nutritional behavior and dietary choices are needed to achieve dietary goals. The following 15 dietary guidelines provide a broad framework for appropriate action:

1. 2. 3. 4. Eat variety of foods to ensure a balanced diet.

Ensure provision of extra food and healthcare to pregnant and lactating women.

Promote exclusive breastfeeding for six months and encourage breastfeeding till two years or as long as one can.

Feed home based semi solid foods to the infant after six months.

5. Ensure adequate and appropriate diets for children and adolescents, both in health and sickness.

6. 7. Eat plenty of vegetables and fruits.

Ensure moderate use of edible oils and animal foods and very less use of ghee/ butter/ vanaspati.

8. 9. Avoid overeating to prevent overweight and obesity.

Exercise regularly and be physically active to maintain ideal body weight.

10. Restrict salt intake to minimum.

11. Ensure the use of safe and clean foods.

12. Adopt right pre-cooking processes and appropriate cooking methods.

13. 14. Drink plenty of water and take beverages in moderation.

Minimize the use of processed foods rich in salt, sugar and fats.

15. Include micronutrient-rich foods in the diets of elderly people to enable them to be fit and active.

10 Guideline 1

Eat variety of foods to ensure a balanced diet

Rationale: Nutritionally adequate diet should be consumed through a wise choice from a variety of foods

Nutrition is a basic prerequisite to sustain life.

Variety in food is not only the spice of life but also the essence of nutrition and health.

A diet consisting of foods from several food groups provides all the required nutrients in proper amounts.

Cereals, millets and pulses are major sources of most nutrients.

Milk which provides good quality proteins and calcium must be an essential item of the diet, particularly for infants, children and women.

Oils and nuts are calorie-rich foods, and are useful for increasing the energy density and quality of food.

Inclusion of eggs, flesh foods and fish enhances the quality of diet. However, vegetarians can derive almost all the nutrients from diets consisting of cereals, pulses, vegetables, fruits and milk-based diets.

Vegetables and fruits provide protective substances such as vitamins/ minerals/ phytonutrients.

Diversified diets with a judicious choice from a variety food groups provide the necessary nutrients.

Why do we need nutritionally adequate food?

Nutrients that we obtain through food have vital effects on physical growth and development, maintenance of normal body function, physical activity and health. Nutritious food is, thus needed to sustain life and activity. Our diet must provide all essential nutrients in the required amounts. Requirements of essential nutrients vary with age, gender, physiological status and physical activity. Dietary intakes lower or higher than the body requirements can lead to undernutrition (deficiency diseases) or overnutrition (diseases of affluence) respectively. Eating too little food during certain significant periods of life such as infancy, childhood, adolescence, pregnancy and lactation and eating too much at any age can lead to harmful consequences. An adequate diet, providing all nutrients, is needed throughout our lives. The nutrients must be obtained through a judicious choice and combination of a variety of foodstuffs from different food groups (Figure 1).

11 EAT SPARINGLY

EAT MODERATELY

EAT LIBERALLY

CONSUME ADEQUATELY Carbohydrates, fats and proteins are macronutrients, which are needed in large amounts. Vitamins and minerals constitute the micronutrients and are required in small amounts. These nutrients are necessary for physiological and biochemical processes by which the human body acquires, assimilates and utilizes food to maintain health and activity.

Carbohydrates

Carbohydrates are either simple or complex, and are major sources of energy in all human diets. They provide energy of 4 Kcal/g. The simple carbohydrates, glucose and fructose, are found in fruits, vegetables and honey, sucrose in sugar and lactose in milk, while the complex polysaccharides are starches in cereals, millets, pulses and root vegetables and glycogen in animal foods. The other complex carbohydrates which are resistant to digestion in the human digestive tract are cellulose in vegetables and whole grains, and gums and pectins in vegetables, fruits

and cereals, which constitute the dietary fibre component. In India, 70-80% of total dietary calories are derived from carbohydrates present in plant foods such as cereals, millets and pulses.

Dietary fibre delays and retards absorption of carbohydrates and fats and increases the satiety value. Diets rich in fibre reduce glucose and lipids in blood and increase the bulk of the stools. Diets rich in complex carbohydrates are healthier than low-fibre diets based on refined and processed foods.

Proteins

Proteins are primary structural and functional components of every living cell.

Almost half the protein in our body is in the form of muscle and the rest of it is in bone, cartilage and skin. Proteins are complex molecules composed of different amino acids. Certain amino acids which are termed “essential”, have to be obtained from proteins in the diet since they are not synthesized in the human body. Other non-essential amino acids can be synthesized in the body to build proteins. Proteins perform a wide range of functions and also provide energy (4 Kcal/g).

Protein requirements vary with age, physiological status and stress. More proteins are required by growing infants and children, pregnant women and individuals during infections and illness or stress. Animal foods like milk, meat, fish and eggs and plant foods such as pulses and legumes are rich sources of proteins. Animal proteins are of high quality as they provide all the essential amino acids in right proportions, while plant or vegetable proteins are not of the same quality because of their low content of some of the essential amino acids. However, a combination of cereals, millets and pulses provides most of the amino acids, which complement each other to provide better quality proteins.

13Fats

Oils and fats such as butter, ghee and vanaspathi constitute dietary visible fats.

Fats are a concentrated source of energy providing 9 Kcal/g, and are made up of fatty acids in different proportions. Dietary fats are derived from two sources viz. the invisible fat present in plant and animal foods; and the visible or added fats and oils

(cooking oil). Fats serve as a vehicle for fat-soluble vitamins like vitamins A, D, E and K and carotenes and promote their absorption. They are also sources of essential polyunsaturated fatty acids. It is necessary to have adequate and good quality fat in the diet with sufficient polyunsaturated fatty acids in proper proportions for meeting the requirements of essential fatty acids (Refer chapter 7). The type and quantity of fat in the daily diet influence the level of cholesterol and triglycerides in the blood. Diets should include adequate amounts of fat particularly in the case of infants and children, to provide concentrated energy since their energy needs per kg body weight are nearly twice those of adults. Adults need to be cautioned to restrict intake of saturated fat (butter, ghee and hydrogenated fats) and cholesterol (red meat, eggs, organ meat). Excess of these substances could lead to obesity, diabetes, cardiovascular disease and cancer.

Vitamins and minerals

Vitamins are chemical compounds required by the body in small amounts. They must be present in the diet as they cannot be synthesized in the body. Vitamins are essential for numerous body processes and for maintenance of the structure of skin, bone, nerves, eye, brain, blood and mucous membrane. They are either water-soluble or fat-soluble. Vitamins A, D, E and K are fat-soluble, while vitamin C, and the B-complex vitamins such as thiamin (B₁), 1 riboflavin (B₂), niacin, pyridoxine (B₆), folic 2 6 acid and cyanocobalamin (B₁₂) are water-12 soluble. Pro-vitamin like beta-carotene is converted to vitamin A in the body.

Fat-soluble vitamins can be stored in the body while water-soluble vitamins are not and get easily excreted in urine.

Food Groups

Vitamins B-complex and C are heat labile vitamins and are easily destroyed

by heat, air or during drying, cooking

and food processing.

Minerals are inorganic elements

found in body fluids and tissues. The

important macro minerals are sodium,

potassium, calcium, phosphorus, magnesium and sulphur, while zinc, copper,

selenium, molybdenum, fluorine, cobalt, chromium and iodine are micro minerals.

They are required for maintenance and integrity of skin, hair, nails, blood and soft

tissues. They also govern nerve cell transmission, acid/base and fluid balance,

enzyme and hormone activity as well as the blood-clotting processes. Approximate

calorific value of nuts, salads and fruits are given in annexure 1.

What is a balanced diet?

A balanced diet is one which provides all the nutrients in required amounts and

proper proportions. It can easily be achieved through a blend of the four basic food

groups. The quantities of foods needed to meet the nutrient requirements vary with

age, gender, physiological status and physical activity. A balanced diet should

provide around 50-60% of total calories from carbohydrates, preferably from

complex carbohydrates, about 10-15% from proteins and 20-30% from both visible

and invisible fat.

In addition, a balanced diet should provide other non-nutrients such as dietary

fibre, antioxidants and phytochemicals which bestow positive health benefits.

Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium

protect the human body from free radical damage. Other phytochemicals such as

polyphenols, flavones, etc., also afford protection against oxidant damage. Spices

like turmeric, ginger, garlic, cumin and cloves are rich in antioxidants. Balanced Diet

for Adults - Sedentary/Moderate/Heavy Activity is given in annexure 2 and figures 3

& 4. Also, sample menu plans for sedentary adult man and woman are given in

annexure 2a and 2b respectively.

What are food groups ?

Foods are conventionally grouped as :

- 1.Cereals, millets and pulses
- 2.Vegetables and fruits
- 3.Milk and milk products, egg, meat and fish
- 4.Oils & fats and nuts & oilseeds

However, foods may also be classified according to their functions (Table 4).

What are nutrient requirements and recommended dietary allowances (RDA)?

Requirements are the quantities of nutrients that healthy individuals must obtain from food to meet their physiological needs. The recommended dietary allowances (RDAs) are estimates of nutrients to be consumed daily to ensure the requirements of all individuals in a given population. The recommended level depends upon the bioavailability of nutrients from a given diet. The term bioavailability indicates what is absorbed and utilized by the body. In addition, RDA includes a margin of safety, to cover variation between individuals, dietary traditions and practices. The RDAs are suggested for physiological groups such as infants, pre-schoolers, children, adolescents, pregnant women, lactating mothers, and adult men and women, taking into account their physical activity. In fact, RDAs are suggested averages/day.

However, in practice, fluctuations in intake may occur depending on the food availability and demands of the body. But, the average requirements need to be satisfied over a period of time (Annexure-3).

Our diet must provide adequate calories, proteins and micronutrients to achieve maximum growth potential. Therefore, it is important to have appropriate diet during different stages of one's life (Figure 2). There may be situations where adequate amounts of nutrients may not be available through diet alone. In such high risk situations where specific nutrients are lacking, foods fortified with the limiting nutrient(s) become necessary. A good example of such fortified foods is the salt fortified with iron and iodine.

Table – 4 Classification of foods based on function

MAJOR NUTRIENTS OTHER NUTRIENTS

ENERGY Carbohydrates & fats

RICH FOODS Whole grain cereals, millets Protein, fibre, minerals, calcium,

iron & B-complex vitamins

Vegetable oils, ghee, butter Fat soluble vitamins, essential fatty acids

Nuts and oilseeds Proteins, vitamins, minerals

Sugars Nil

BODY Proteins

BUILDING

FOODS Pulses, nuts and oilseeds B-complex vitamins, invisible fat, fibre

Milk and Milk products Calcium, vitamin A, riboflavin, vitamin B12

Meat, fish, poultry B-complex vitamins, iron, iodine, fat

PROTECTIVE Vitamins and Minerals

FOODS

Green leafy vegetables Other vegetables and fruits Antioxidants, fibre and other carotenoids

Fibre, sugar and antioxidants

Eggs, milk and milk products and flesh foods

Protein and fat

16POINTS TO PONDER

Choose a variety of foods in amounts appropriate for age, gender, physiological status and physical activity.

Use a combination of whole grains, grams and greens. Include jaggery or sugar and cooking oils to bridge the calorie or energy gap.

Prefer fresh, locally available vegetables and fruits in plenty.

Include in the diets, foods of animal origin such as milk, eggs and meat, particularly for pregnant and lactating women and children.

Adults should choose low-fat, protein-rich foods such as lean meat, fish, pulses and low-fat milk.

Develop healthy eating habits and exercise regularly and move as much as you can to avoid sedentary lifestyle.

17Figure 2

IMPORTANCE OF DIET DURING DIFFERENT STAGES OF LIFE

For being physically

active and healthy.

Nutrient- dense low

fat foods.

For maintaining health,

productivity and prevention of

diet-related disease and to

support pregnancy/lactation.

Nutritionally adequate diet

with extra food for child

bearing/rearing

For growth spurt, maturation and bone

development.

Body building and protective foods.

For growth, development and to fight infections.

Energy-rich, body building and protective foods

(milk, vegetables and fruits).

For growth and appropriate milestones.

Breastmilk, energy-rich foods (fats, Sugar).

18Figure 3

BALANCED DIET FOR ADULT MAN (SEDENTARY)

FATS/OILS

*5g X 5**

3

* Portion Size. ** No. of Portions

Elderly man: Reduce 3 portions of cereals and millets and add an extra serving of fruit

BALANCED DIET FOR ADULT WOMAN (SEDENTARY)

4

* Portion Size. ** No. of Portions

Extra Portions:

Pregnant women Lactating women : Fat/Oil-2, Milk-2, Fruit-1, Green Leafy Vegetables-1/2.

: Cereals-1, Pulses-2, Fat/Oil-2, Milk-2, Fruit-1, Green Leafy

Vegetables-1/2

Between 6-12 months of lactation, diet intake should be gradually brought back to normal.

Elderly women : Fruit-1, reduce cereals and millets-2.

20Guideline 2

Ensure provision of extra food and healthcare to
pregnant and lactating women

Rationale:

Additional food and extra care are required during
pregnancy and lactation

Pregnancy is physiologically and nutritionally a highly demanding period. Extra
food is required to meet the requirements of the fetus.

A woman prepares herself to meet the nutritional demands by increasing her
own body fat deposits during pregnancy.

A lactating mother requires extra food to secrete adequate quantity/ quality of
milk and to safe guard her own health.

Why additional diet is required during pregnancy and lactation ?

Pregnancy is a demanding physiological state. In India, it is observed that diets
of women from the low socioeconomic groups are essentially similar during pre-
pregnant, pregnant and lactating periods. Consequently, there is widespread
maternal malnutrition leading to high prevalence of low birth weight
infants and very high maternal mortality. Additional foods are required
to improve weight gain in pregnancy (10-12 Kg) and birth weight of

infants (about 3 Kg).

What are the nutrients that require special attention ?

The daily diet of a woman should contain an additional 350 calories, 0.5 g of protein during first trimester and 6.9 g during second trimester and 22.7 g during third trimester of pregnancy. Some micronutrients are specially required in extra amounts during these physiological periods. Folic acid, taken throughout the pregnancy, reduces the risk of congenital malformations and increases the birth weight. The mother as well as the growing fetus needs iron to meet the high demands of erythropoiesis (RBC formation). Calcium is essential, both during pregnancy and lactation, for proper formation of bones and teeth of the offspring, for secretion of breast-milk rich in calcium and to prevent osteoporosis in the mother. Similarly, iodine intake ensures proper mental health of the growing fetus and infant. Vitamin A is required during lactation to improve child survival. Besides these, nutrients like vitamins B₁₂ and C need to be taken by the lactating mother.

How can the pregnant and lactating women meet these nutritional demands?

The pregnant/lactating woman should eat a wide variety of foods to make sure that her own nutritional needs as well as those of her growing foetus are met. There is no particular need to modify the usual dietary pattern. However, the quantity and frequency of usage of the different foods should be increased. She can derive maximum amount of energy (about 60%) from rice, wheat and millets. Cooking oil is a concentrated source of both energy and polyunsaturated fatty acids. Good quality protein is derived from milk, fish, meat, poultry and eggs. However, a proper combination of cereals, pulses and nuts also provides adequate proteins. Mineral and vitamin requirements are met by consuming a variety of seasonal vegetables

particularly green leafy vegetables, milk and fresh fruits. Bioavailability of iron can be improved by using fermented and sprouted grams and foods rich in vitamin C such as citrus fruits. Milk is the best source of biologically available calcium. Though it is possible to meet the requirements for most of the nutrients through a balanced diet, pregnant/lactating women are advised to take daily supplements of iron, folic acid, vitamin B and calcium (Annexure 3). 12

What additional care is required ?

Adequate intake of a nutritious diet is reflected in optimal weight gain during pregnancy (10 kg) by the expectant woman. She should choose foods rich in fibre (around 25 g/1000 kcal) like whole grain cereals, pulses and vegetables, to avoid constipation. She should take plenty of fluids including 8-12 glasses of water per day. Salt intake should not be restricted even to prevent pregnancy-induced hypertension and pre-eclampsia. Excess intake of beverages containing caffeine like coffee and tea adversely affect fetal growth and hence, should be avoided.

In addition to satisfying these dietary requisites, a pregnant woman should undergo periodic health check-up for weight gain, blood pressure, anaemia and receive tetanus toxoid immunization. She requires enough physical exercise with adequate rest for 2-3 hrs during the day. Pregnant and lactating women should not indiscriminately take any drugs without medical advice, as some of them could be harmful to the fetus/baby. Smoking and tobacco chewing and consumption of alcohol should be avoided. Wrong food beliefs and taboos should be discouraged. The most important food safety problem is microbial food borne illness and its prevention during pregnancy is one of the important public health measure. Avoiding contaminated foods is important protective measure against food borne illness.

22POINTS TO PONDER

Eat more food during pregnancy.

Eat more whole grains, sprouted grams and fermented foods.

Take milk/meat/eggs in adequate amounts.

Eat plenty of vegetables and fruits.

Avoid superstitions and food taboos.

Do not use alcohol and tobacco. Take medicines only when prescribed.

Take iron, folate and calcium supplements regularly, after 14-16 weeks of pregnancy and continue the same during lactation.

EAT FOLATE-RICH FOODS

Folic acid is essential for the synthesis of haemoglobin.

Folic acid deficiency leads to macrocytic anaemia.

Pregnant women need more of folic acid.

Folic acid supplements increase birth weight and reduce congenital anomalies.

Green leafy vegetables, legumes, nuts and liver are good sources of folic acid.

500 mg (0.5mg) folic acid supplementation is advised preconceptionally and through out pregnancy for women with history of congenital anomalies (neural tube defects, cleft palate).

23EAT IRON-RICH FOODS

Iron is needed for hemoglobin synthesis, mental function and to provide immunity against diseases.

Deficiency of iron leads to anemia.

Iron deficiency is common particularly in women of reproductive age and children.

Iron deficiency during pregnancy increases maternal mortality and low birth weight infants.

In children, it increases susceptibility to infection and impairs learning ability.

Plant foods like green leafy vegetables, legumes and dry fruits contain iron.

Iron is also obtained through meat, fish and poultry products.

Iron bio-availability is poor from plant foods but is good from animal foods.

Vitamin C - rich fruits like gooseberries (Amla), guava and citrus improve iron absorption from plant foods.

Beverages like tea bind dietary iron and make it unavailable. Hence, they should be avoided before during or soon after a meal.

Commonly consumed plant based diets provide around 18mg of iron as against recommended intake of 35mg per day. Therefore, supplementation of iron (100 mg elemental iron, 0.5 mg folic acid) is recommended for 100 days during 1st pregnancy from 16 week onwards to meet the demands of pregnancy.

24Guideline 3

Promote exclusive breastfeeding for six months and encourage breastfeeding till two years or more, if possible

Rationale:

Exclusive breast-feeding ensures safe nutrition to the infant and all round development of health

Breast-milk is the most natural and perfect food for normal growth and healthy development of infants.

Colostrum is rich in nutrients and anti-infective factors and should be fed to infants.

Breast-feeding reduces risk of infections.

It establishes mother-infant contact and promotes mother-child bonding.

It prolongs birth interval by fertility control (delayed return of menstruation).

Breast-feeding helps in retraction of the uterus.

Incidence of breast cancer is lower in mothers who breast feed their children.

Breast feeding is associated with better cognitive development of children and may provide some long-term health benefits.

Why breast-feed the infant?

Breast-milk contains all essential nutrients needed for the infant; it provides the best nutrition and protects the infant from infections. Breast-milk is a natural food and is more easily digested and absorbed by the infant as compared to formula milk prepared from other sources. Colostrum, which is the milk secreted during the first 3-

4 days after child birth, is rich in proteins, minerals, vitamins especially vitamin A and antibodies. In addition, it has a laxative effect as well. Breast-feeding helps in reducing fertility and facilitates spacing of children. Lactation provides emotional satisfaction to the mother and the infant. Recent evidence suggests that human milk may confer some long term benefits such as lower risk of certain autoimmune diseases, inflammatory bowel disease, obesity and related disorders and probably some cancers. Therefore, breast milk is the best milk for the newborn and growing infant.

What are the advantages of breast-milk?

In addition to providing nutrients, breast-milk has several special components such as growth factors, enzymes, hormones and anti-infective factors. The amount of milk secreted increases gradually in the first few days after delivery, reaching the peak during the second month, at which level it is maintained until about 6 months of age. An average Indian woman secretes about 750 ml of milk per day during the first 6 months and 600 ml/day subsequently up to one year. Many essential components are in concentrated amounts in colostrum as compared to mature milk, compensating for the low output during early lactation.

Breast-milk provides good quality proteins, fat, vitamins, calcium, iron and other minerals up to 4-6 months. In fact, quality of some of the nutrients can be improved by supplementing the diet of the mother with nutrients. Growth performance of majority of the breast-fed infants is satisfactory up to 6 months of age. Breast feeding is associated with better cognitive development possibly due to the high content of docosahexaenoic acid (DHA) which plays an important role in brain development.

When to start breast feeding and how long to continue?

Mother-infant contact should be established as early as possible (immediately after birth) by permitting the infant to suck at the breast. Mothers can breast-feed from as early as 30 minutes after delivery.

Colostrum should be made available to the infant immediately after birth. Feeding honey, glucose, water or dilute milk formula before lactation should be avoided and the infant should be allowed to suck, which helps in establishing lactation. Colostrum should not be discarded, as is sometimes practiced.

Breast-feeding in India is common among the rural and urban poor, being less so among the urban middle and upper classes. The poorer groups continue breast-feeding for longer duration than the educated upper and middle income groups. The economically advantaged or the working mother tends to discontinue breast-feeding early. A baby should be exclusively breast-fed only up to 6 months and complementary foods should be introduced thereafter. Breast-feeding can be continued as long as possible, even up to 2 years. Demand feeding helps in maintaining lactation for a longer time. If babies are quiet or sleep for 2 hours after a feed and show adequate weight gain, feeding may be assumed as adequate. Breast-fed infants do not need additional water. Feeding water reduces the breast milk intake and increases the risk of diarrhoea and should, therefore, be avoided. Giving additional water is unnecessary even in hot climate.

26 What are the effects of maternal malnutrition on breast-milk?

Composition of breast-milk depends to some extent on maternal nutrition. In general, even the undernourished mothers can successfully breast-feed. But in the case of severe malnutrition, both the quality and quantity of breast-milk may be affected. Protein content of breast-milk appears to be much less affected as compared to fat in malnutrition. Concentration of water-soluble vitamins as well as fat soluble vitamin A (beta-carotene) is influenced by the quality of the maternal diet. Supplementation of vitamins A and B-complex to lactating mothers increases the levels of these vitamins in breast-milk. Zinc and iron from breast-milk are better absorbed than from other food sources. Trace element composition of breast-milk, however, is not affected by the mother's nutritional status.

How does breast-milk protect against infection ?

Diseases and death among breast-fed infants are much lower than those among formula-fed infants. Breast-feeding protects against diarrhoea and upper respiratory tract infections. The bifidus factor in breast-milk promotes the natural gut flora. The gut flora and the low pH of breast-milk inhibit the growth of pathogens. Breast-milk has immunoglobulins (IgA), lactoferrin, lactoperoxidase and complements which protect the infant from several infections. Antibodies to E-coli and some viruses are found in breast milk, which protect the gut mucosa. Breast-feeding also protects infants from vulnerability to allergic reactions.

What ensures an adequate supply of breast-milk?

It is necessary that the woman is emotionally prepared during pregnancy for breast-feeding and is encouraged to eat a well-balanced diet. Anxiety and emotional upset must be avoided and adequate rest should be ensured. It is necessary to prepare the breast, particularly the nipple, for breast-feeding. Mother should initiate breast-feeding as early as possible after delivery and feed the child on demand. Milk production of the mother is determined by the infant's demand. Frequent sucking by the baby and complete emptying of breast are important for sustaining adequate breast milk output. A working mother can express her breast milk and store it hygienically up to 8 hrs. This can be fed to her infant by the caretaker.

Are drugs secreted in breast-milk ?

Since, drugs (antibiotics, caffeine, hormones and alcohol) are secreted into the breast-milk and could prove harmful to the breast-fed infant, caution should be exercised by the lactating mother while taking medicines.

27Should HIV positive women breast feed their babies?

HIV may be transmitted from mother to infant through breast milk. However, women living in the resource poor settings in developing countries may not have access to safe, hygienic and affordable replacement feeding options. Considering the important role of breast milk in child growth and development, following recommendations have been proposed by National AIDS Control Organization

(NACO). When replacement feeding is not acceptable, feasible, affordable, sustainable and safe (AFASS), exclusive breast-feeding is recommended during the first months of life. Every effort should be made to promote exclusive breast-feeding for up to four months in the case of HIV positive mothers followed by weaning, and complete stoppage of breast feeding at six months in order to restrict transmission through breast feeding. However, such mothers will be informed about the risk of transmission of HIV through breast milk and its consequences. In addition, based on the principle of informed choice, HIV infected women should be counseled about the risk of HIV transmission through breast milk and the risks and benefits of each feeding method, with specific guidance in selecting the option most likely to be suitable for their situation. In any case, mixed feeding i.e. breast-feeding along with other feeds should be strictly discouraged as it increases the risk of HIV transmission.

POINTS TO PONDER

Start breast-feeding within an hour after delivery and do not discard colostrum.

Breast-feed exclusively (not even water) for a minimum of six months if the growth of the infant is adequate.

Continue breast-feeding in addition to nutrient-rich complementary foods (weaning foods), preferably up to 2 years.

Breast-feed the infant frequently and on demand to establish and maintain good milk supply.

Take a nutritionally adequate diet both during pregnancy and lactation.

Avoid tobacco (smoking and chewing), alcohol and drugs during lactation.

Ensure active family support for breast-feeding.

28Guideline 4

Feed home based semi-solid foods to the infant after six months

Rationale:

Easy to cook home made preparations are hygienic and healthy foods for the growing baby

Breast-milk alone is not adequate for the infant beyond 6 months of age.

Introduction of food supplements (semi-solid complementary foods) along with breast-feeding is necessary for infants after 6 months of age.

Provision of adequate and appropriate supplements to young children prevents malnutrition.

Hygienic practices should be observed while preparing and feeding the complementary food to the child; otherwise, it will lead to diarrhoea.

It is well accepted that breast milk is the best food for an infant. Fortunately, in India, most rural mothers are able to breast-feed their children for prolonged periods.

In fact, this is a boon to Indian children as otherwise the prevalence of under-nutrition among them would have been much higher. However, often, children are solely breast-fed even beyond the age of one year in the belief that breast-milk alone is adequate for the child until he/she is able to pick up food and eat. This practice results in under-nutrition among young children. Working mothers, on the other hand are unable to breast-feed their children for longer periods, as they go to work outside.

What are supplementary/complementary foods?

Foods that are regularly fed to the infant, in addition to breast-milk, providing sufficient nutrients are known as supplementary or complementary foods. These could be liquids like milk or semi-solids like 'kheer' in the case of infants or solid preparations like rice etc., in the case of children over the age of one year.

Why use complementary foods and when?

At birth, mother's milk alone is adequate for the infant. Requirements of all the nutrients progressively increase with the infant's growth. Simultaneously, the breast-milk secretion in the mother comes down with time. Thus, infants are deprived of adequate nutrients due to the dual factors of increased nutrient requirements and

decreased availability of breast-milk. Usually, these changes occur at about 6 months of age. Hence, promotion of optimal growth in infants, calls for introduction of adequate food supplements in addition to continued breast feeding, from the age of 6 months onwards.

29 Can home-made recipes be nutritious supplements?

Low-cost food supplements can be prepared at home from commonly used ingredients such as cereals (wheat, rice, ragi, jowar, bajra, etc.); pulses (grams/ dhals), nuts and oilseeds (groundnut, sesame, etc.), oils (groundnut oil, sesame oil etc.) and sugar and jaggery. Such supplements are easily digested by all infants, including those with severe malnutrition. The impression that only the commercially available supplementary foods are nutritious is not correct. Some examples of low cost complementary foods are given on page 33.

What are the principles in preparing complementary food supplements?

Weaning foods based on cereal-pulse-nut and sugar/ jaggery combinations will provide good quality protein, adequate calories and other protective nutrients.

Since infants cannot consume bulky complementary food, in sufficient quantities, energy-rich foods like fats and sugars should be included in such preparations.

Infants can also be fed green leafy vegetables (GLVs), which are rich, yet inexpensive, sources of vitamins and minerals. However, greens should be well cleaned before cooking lest the infants develop loose motions. Dietary fibre in green leafy vegetables can, by itself, promote the bowel movements leading to loose motions in infants. Since GLVs are rich in dietary fibre, it is advisable to initially feed only the juice of the GLVs after cooking them properly. Infants should be introduced to different vegetables and fruits gradually. It should, however, be remembered that these dietary articles should be thoroughly cooked and mashed before feeding. In families which can afford egg yolk and meat soup can be introduced. At about one year of age, the child should share the family diet.

Amylase-Rich Foods (ARFs)

Flours of germinated cereals, which are rich

in the enzyme alpha-amylase, constitute ARFs.

Even small amounts of this type of foods liquefy and reduce the bulk of the cereal-based diet.

Thus, ARFs help in increasing the energy density of weaning gruels and in reducing its bulk as well.

Mothers can add ARF to increase the digestibility of the low-cost weaning foods prepared at home. Preparation of ARF is very simple and can be done by mothers at home.

30 PREPARATION OF AMYLASE RICH FOOD (ARF)

Take 250 g of wheat

Add 2-3 volumes of water soak it for 8 hrs

Drain excess water

Germinate wheat in dark for 24-48 hours

Sun dry for 5-8 hours

Roast gently in flat pan just to remove water

Grind and powder the grains (ARF)

Store in airtight bottles/jars

Add 5 g (one tea spoon) of ARF, after cooking, to every feed

How to feed a young infant?

Infants cannot eat large quantities of food in one sitting at a given time. So, they should be fed small quantities at frequent intervals (3-4 times a day). Also, the food should be of semi-solid consistency for easy swallowing. When such semi-solid foods are offered initially, the infant tends to spit it out. This should not be mistaken as dislike for that food. The fact is that the young infant cannot achieve full coordination needed for the act of swallowing and hence, brings out the food by movements of its tongue. Physiological maturity of swallowing the semi-solid food develops when the

food is regularly given every day.

What are the hygienic practices to be adopted?

It is important to ensure that hygienic practices are scrupulously followed. All the dietary ingredients should be thoroughly cleaned. Vegetables should be washed well to remove contaminants/ parasites/ pesticides before cutting. Vegetables should preferably be steam-cooked to reduce cooking losses. At the time of preparation and feeding of the recipes, mother should observe proper personal hygiene and the utensils used for cooking should be thoroughly washed or sterilized, wherever possible. A number of pre-cooked and ready-to-eat foods can be prepared for use as complementary foods (Refer page 33). Such foods should be stored in clean bottles or tins. As feeding is likely to be time consuming, the cup or the plate from which the recipe is being fed to the infant should be kept covered to protect it from flies. Most often, diarrhea is caused by unhygienic practices adopted by mothers. The weaning foods which are properly cleaned and well-cooked are safe even for young infants.

POINTS TO PONDER

Breast-milk alone is not enough for infants after 6 months of age.

Complementary foods should be given after 6 months of age, in addition to breast-feeding.

Do not delay complementary feeding.

Feed low-cost home-made complementary foods.

Feed complementary food on demand 3-4 times a day.

Provide fruits and well cooked vegetables.

Observe hygienic practices while preparing and feeding the complementary food.

Read nutrition label on baby foods carefully.

WHAT SHOULD BE DONE IF BREAST-MILK IS NOT ADEQUATE?

If breast-feeding fails, the infant needs to be fed animal milk or commercial infant formula.

Milk should be boiled before being fed to the baby.

To start with, milk may be diluted with an equal volume of water.

Full strength milk may be started from 4 weeks of age.

Infants fed animal milk should receive supplements of iron and vitamin C.

About 120-180 ml of milk should be fed with one teaspoon of sugar per feed, 6-8 times over the day.

While reconstituting the infant formula, the instructions given on the label should be strictly followed.

The feeds should be prepared and given using a sterile cup, spoon, bottles and nipples taking utmost care.

Overfeeding should be avoided in artificially-fed infants to prevent obesity.

Low-cost home-made complementary foods should be preferred.

32 COMPLEMENTARY FOODS

1. Kichidi

Method: Rice ... 35 g

Green gram dhal ... 10 g

Leafy vegetables ... 2 t. sp

Fat ... 2 t. sp

Cumin (jeera)

Clean rice and dhal and cook them in water with salt till the grains are soft and water is absorbed. Leafy vegetables can be added when the cereal/pulse is 3/4th done. Cumin is fried in fat and added towards the end.

2. Malted Ragi Porridge

Malted Ragi ... 30 g

Roasted Groundnut ... 15 g

Jaggery ... 20 g

Method: Malted ragi, roasted groundnuts and jaggery are powdered. Sufficient water is added and cooked.

3. Wheat Payasam

Wheat ... 30 g

Roasted Bengal gram flour ... 15 g

Roasted & crushed Groundnut ... 5 g

Sugar ... 15 g

Method: Roast whole wheat and powder. Add roasted

Bengal gram flour, groundnut and sugar. Cook with sufficient water.

4. Kheer

Method: Note: 2. Vermicelli/Rice ... 30 g

Milk ... 100 ml.

Water ... As required

Jaggery ... 20 g

Boil rice/vermicelli in water till half done. Add milk and bring to boil. Add jaggery and cook well.

1. All these recipes provide approximately 250 Kcals. and 5 g proteins and amounts given are for 2 servings.

Recipes Nos.2 and 3 can be prepared and stored in airtight containers to be used whenever required.

3. Non-vegetarian foods such as soft boiled egg, minced meat may be introduced at the age of 6 months.

33Guideline 5

Ensure adequate and appropriate diets for children and adolescents both in health and sickness

Rationale:

Well-formulated balanced diets for children and adolescents help optimum growth and boosts their immunity

A nutritionally adequate and balanced diet is essential for optimal growth and development.

Appropriate diet and physical activity during childhood is essential for optimum

body composition, BMI and to reduce the risk of diet-related chronic diseases in later life and prevent vitamin deficiency.

Common infections and malnutrition contribute significantly to child morbidity and mortality.

A child needs to eat more during and after episodes of infections to maintain good nutritional status.

Why do children and adolescents require more food?

Childhood and adolescence are periods of continuous growth and development.

An infant grows rapidly, doubling its birth weight by 5 months and tripling it by 1 year of age. During the second year, the child increases not only in height by 7-8 cm but also gains 4 times of its birth weight. During the pre-adolescent period the child grows, on an average, 6-7 cm in height and 1.5 to 3 kg in weight every year and simultaneously development and maturation of various tissues and organs take place (Table 5).

Adolescent period (teenage) is spread almost over a decade. It is characterized by rapid increase in height and weight, hormonal changes, sexual maturation and wide swings in emotion. Adolescent growth spurt starts at about 10-12 years in girls and two years later in boys.

The annual peak rates for height and weight are 9-10 cm and 8-10 kg. Development of critical bone mass is essential during this period as this forms the ground for maintaining mineral integrity of the bone in later life.

The pattern and proportion of various body components like body water, muscle mass, bone and fat increase during the entire childhood and adolescence to reach adult values by about 18 years. Adolescent girls are at greater physiological stress than boys because of menstruation. Their nutritional needs are of particular importance as they have to prepare for motherhood. All these rapid anabolic changes require more nutrients per unit body weight.

34 Growing children and adolescents require more calcium. Though recommended dietary allowances for calcium are about 600-800 mg/day, it is desirable to give higher quantities of calcium for adolescents to achieve high peak bone mass. To achieve optimal peak bone mass, it is recommended to consume calcium rich foods like milk and milk products, fox tail millet (Ragi), til etc.

Young children below the age of 5 years should be given less bulky foods, rich in energy and protein such as legumes, pulses, nuts, edible oil/ghee, sugar, milk and eggs. Vegetables including green leafy vegetables and locally available seasonal fruits should be part of their daily menu. Snacks make a useful contribution to the nutrient requirements, particularly in older children and adolescents. Frequent changes in the menu are often liked by children.

Older children and adolescents should consume plenty of milk to fulfill the high calcium requirements. Cooking oils/ghee (25-50g) should be consumed. Over-indulgence in fats may be avoided. Excessive salt intake should be avoided particularly by children having a family history of hypertension. Adolescence is the vulnerable stage for developing wrong food habits as well as bad habits like smoking, chewing tobacco or drinking alcohol. These should be avoided. In addition to consumption of a nutritious well balanced diet, appropriate lifestyle practices and involvement in physical activity such as games/sports should be encouraged among children and adolescents. Balanced diet for children and adolescents are given in annexure 4 and adolescent growth standards are given in annexure 5.

How do infections in children lead to malnutrition?

Common childhood infections like diarrhea, measles and pneumonia occur in association with malnutrition and contribute to about 70% of mortality. Appropriate feeding during infection is essential, which demands a lot of patience from the mother.

During periods of infection, children tend to eat less due to reduced appetite.

Many children vomit frequently. Nutrients are also lost in urine and faeces. The unhealthy practice of restricting diet, including breast-feeding, by the mother during

any sickness could further aggravate the problem. Hence, extra care is needed in feeding the child appropriately during and after illness to prevent subsequent nutritional deficiencies.

How should a child be fed during illness?

Breast-feeds are often well accepted and tolerated even by sick children and should be continued except in severe gastroenteritis associated with shock. For older children, consuming an adult diet, soft cooked food may be offered at frequent intervals. The quantity of the feeds may be increased, after the illness has subsided, till the original weight is regained.

35What should be done during diarrhea?

Diarrhea is a common childhood disease which leads to dehydration and sometimes death. The child requires prompt correction of fluid and electrolyte loss using oral rehydration solution (ORS) along with appropriate/adequate feeding. ORS can be prepared by adding a pinch of salt (between thumb and index finger) and a teaspoon of sugar to a glass of potable water. Home-made fluids such as rice kanji or buttermilk with salt can also be used. During infections, children should frequently be given small quantities of fluids by mouth, including plain water. During diarrhea, feeding should be continued, though this goes against the popular practice. Breast-milk promotes sodium and water transport across the gut and, thus, prevents dehydration and weight loss, in addition to providing other nutrients.

The diet of 1-2 year old children with diarrhea should provide energy of about 1000 Kcal/day. Calorie-rich, semi-solid, soft diets may be prepared from a variety of cereals and pulses. Sprouted grains are easily digestible and provide good nutrition. Fat and sugar help in reducing the bulk of the diets and make them energy dense. Milk may be mixed with cereal diet to avoid lactose malabsorption. If milk is not tolerated, it may be replaced by an equal volume of curd/yogurt/soymilk. Mashed vegetables may be incorporated in the diet. Feeding becomes easier after the infection subsides. About 6-8 feeds should be given during the day so that the extra food (120-140 Kcal/kg) may be consumed by the child without any difficulty.

How important is the problem of lactose intolerance?

Deficiency of the enzyme lactase leads to lactose intolerance. During acute or chronic diarrhea, lactose intolerance is a mild and transient problem. This problem can be overcome by reducing the quantity of milk taken at a time or taking milk along with a cereal-pulse meal. There is no need to stop milk in acute diarrhoea. In chronic diarrhea, some children may develop lactose intolerance. In such children, milk may be stopped temporarily. A diet based on cereals and pulses or chicken and egg white allows the gut to recover and milk can then be slowly introduced. Adequate feeding during and after diarrhea prevents malnutrition.

POINTS TO PONDER

Take extra care in feeding a young child and include soft cooked vegetables and seasonal fruits.

Give plenty of milk and milk products to children and adolescents.

Promote physical activity and appropriate lifestyle practices

Discourage overeating as well as indiscriminate dieting.

36EAT CALCIUM-RICH FOODS

Calcium is needed for growth and bone development.

Children require more calcium.

Calcium prevents osteoporosis (thinning of bones).

Milk, curds and nuts are rich sources of bio-available calcium (Ragi and GLV are also good dietary sources of calcium).

Regular exercise reduces calcium loss from bones.

Exposure to sunlight maintains vitamin D status which helps in calcium absorption.

DURING ILLNESS

Never starve the child.

Feed energy-rich cereals-pulse diet with milk and mashed vegetables.

Feed small quantities at frequent intervals.

Continue breast-feeding as long as possible.

Give plenty of fluids during illness.

Use oral rehydration solution to prevent and correct dehydration during diarrhea episodes.

Guideline 6

Rationale:

Green leafy vegetables, other vegetables and fresh fruits are treasure trove of several minerals and vitamins and hence, protect from diseases

Normal diet, to be wholesome and tasty, should include fresh vegetables and fruits, which are store houses of micronutrients
Vegetables/fruits are rich sources of micronutrients.

Fruits and vegetables also provide phytonutrients and fibre which are of vital health significance

They help in prevention of micronutrient malnutrition and certain chronic diseases such as cardiovascular diseases, cataract and cancer.

Fresh fruits are nutritionally superior to fruit juices.

Why should we eat vegetables/fruits?

Fresh Vegetables and fruits are rich sources of micronutrients and macronutrients (Annexure 15). The micronutrients present are minerals (like iron and calcium) and vitamins (like vitamin C, folic acid, B complex vitamins and carotenoids) whereas, the macronutrients present are complex carbohydrates/fibre. They contain abundant amounts of iron, calcium, vitamin C, folic acid, carotenoids (precursors of vitamin A) and phytochemicals. Some vegetables and fruits provide very low calories (Annexure 6), whereas some others such as potato, sweet potato, tapioca and yam as well as fruits like banana are rich in starch which provides energy in good amount. Therefore, vegetables and fruits can be used to increase or decrease calories in our diet.

What functions do these nutrients and special factors in vegetables/fruits perform in our body?

Iron

Iron is an essential element necessary for the formation of haemoglobin, the red pigment present in the red cells of blood. Haemoglobin plays an important role in the transport of oxygen to the tissues. Reduction in haemoglobin in blood leads to anaemia, a condition characterised by paleness and easy fatigue and increased susceptibility to infections. Iron is available in plenty in green leafy vegetables. But the absorption of iron is limited. Vitamin C rich foods must be consumed daily to improve iron absorption.

40Vitamin A

This fat-soluble vitamin is necessary for clear vision in dim light, and for maintaining the integrity of epithelial tissues. In vitamin A deficiency, the white of the eye (conjunctiva) loses its luster and becomes dry. In severe vitamin A deficiency, the black area of the eye (cornea) gets necrosed, leading to irreversible blindness in young children. Vitamin A also has a role in maintaining resistance of the body to common infections. Carotenoids are plentiful in fruits and vegetables that are green or deep yellow/orange in colour, such as green leafy vegetables, carrots, tomatoes, sweet potatoes, papaya, mango etc.

Vitamin C

Vitamin C is an essential nutrient required for healthy bones and teeth. It also promotes iron absorption. Vitamin C deficiency is characterised by weakness, bleeding gums and defective bone growth. Vitamin C is abundantly available in fresh amla, citrus fruits, guava, banana and certain vegetables such as tomatoes. However, it is very susceptible to destruction by atmospheric oxidation. It is for this reason that when vegetables become dry and stale or cut and exposed to air most of the vitamin C originally present is destroyed.

Folic acid

Folic acid is a haemopoietic vitamin essential for multiplication and maturation of red cells in our body. Its deficiency leads to megaloblastic anaemias. Folic acid intake during pregnancy protects the foetus from developing certain congenital defects. It also promotes the birth weight of infants. Folic acid deficiency increases homocysteine levels in blood, thereby increasing the risk for heart disease. Green leafy vegetables, legumes, nuts and liver are good sources of folates.

Calories

Many of the vegetables and fruits have low calories (Annexure 6). Large intake of low calorie vegetables and fruits can help in reducing calories in diet and help in obesity management. On the other hand vegetables like colocasia, potato, tapioca, yam, sweet potato and fruits like banana, avocado pear (215 Kcal) and mahua (111 Kcal) have more than 100 kcal per 100gram (Annexure 7).

Phytonutrients

Vegetables provide phytochemicals and considerable health significance to the human body. Among these, dietary fibre, antioxidants and other bio-active constituents require special mention. These special factors are required for delaying ageing and preventing the processes which lead to diseases such as cataract, cardio-vascular diseases, diabetes and cancer.

Dietary Fibre

Dietary fibre delays the intestinal transit of the food consumed. Dietary fibre is important for proper bowel function, to reduce chronic constipation, diverticular disease, haemorrhoids coronary heart diseases, diabetes and obesity. They also reduce plasma cholesterol. The protective role of dietary fibre against colon cancer has long been recognised.

Antioxidants

In the recent past, the role of vegetables and fruits as sources of antioxidants has been receiving considerable attention. Antioxidants restrict the damage that reactive oxygen free radicals can cause to the cell and cellular components. They are of primary biological value in giving protection from certain diseases. Some of the diseases that have their origin in deleterious free radical reactions are atherosclerosis, cancer, inflammatory joint diseases, asthma, diabetes etc. Raw and fresh vegetables like green leafy vegetables, carrots, fresh fruits including citrus and tomatoes have been identified as good sources of antioxidants (free radical-scavengers). The nutrients vitamin C and carotenoids that are present in these vegetables are also potential antioxidants. Different colored vegetable provide different antioxidants like orange colored provide beta-carotene, red provide lycopene, deep red provide betalines, blue and purple provide anthocynins.

How much should we consume?

The Expert Committee of the Indian Council of Medical Research, taking into consideration the nutrient requirements, has recommended that every individual should consume at least 300 g of vegetables (GLV : 50 g; Other vegetables : 200 g; Roots & Tubers : 50 g) in a day. In addition, fresh fruits (100 g), should be consumed regularly. Since requirements of iron and folic acid are higher for pregnant women they should consume 100g of leafy vegetables daily. High calorie vegetables and fruits to be restricted for over weight/ obese subjects.

Which vegetables and fruits should be consumed?

We should consume fresh, locally available and preferably seasonal vegetables and fruits. They have more micronutrients and are tasty. However, no single fruit or vegetable provides all the nutrients you need. The key lies in eating a variety of them and with different colors. Include commonly consumed leafy greens, tomatoes and other vegetables, apart from those which are yellow, orange, red, deep red, purple colored citrus fruits, being vitamin C-rich enrich the diets significantly. Along with these, try selecting some new vegetables and fruits to your meals.

How to prevent cooking losses ?

Vitamins are lost during washing of cut vegetables and cooking of foodstuffs. However, proper methods of cooking can substantially reduce these losses. Nutrient loss is high when the vegetables are washed after cutting or when they are cut into small pieces for cooking. Consumption of properly washed raw and fresh vegetables is always beneficial.

How do we get these foods?

Green leafy vegetables (GLVs), other vegetables and fruits are easily available. Most vegetables, particularly GLVs are inexpensive. In fact, these foods can be grown in the backyard with very little effort and cost. Even in lean seasons like summer, they can be grown using water and waste from kitchen.

How to accommodate more servings of vegetables and fruits in a day?

To get the maximum nutritional benefits from fruits and vegetables, it is important to find ways to eat more servings of vegetables and fruits per day.

POINTS TO PONDER

Include green leafy vegetables in daily diet.

Eat as much of other vegetables as possible daily.
 Eat vegetables/ fruits in all your meals in various forms (curry, soups, mixed with curd, added to pulse preparations and rice).
 Consume raw and fresh vegetables as salads.
 Grow the family's requirements of vegetables in the kitchen garden if possible.
 Green leafy vegetables, when properly cleaned and cooked are safe even for infants.
 Let different varieties of vegetables and fruits add color to your plate and vitality to your life.
 Beta-carotene rich foods like dark green, yellow and orange colored vegetables and fruits (GLVs, carrots, papaya and mangoes) protect from vitamin A deficiency.

44Guideline 7

Rationale:

Excessive use of plant and animal based fats leads to the elevation of blood lipids thereby increasing the risk of heart disease and other illnesses.

Fats/oils have high energy value and induce satiety.
 Fats provide energy, essential fatty acids and promote absorption of fat-soluble vitamins.
 Fats are precursors of biologically-active compounds in the body.
 Diets that provide excess of calories, fats and cholesterol elevate blood lipids (cholesterol and triglycerides) and promote blood clotting.
 Excessive fat in the diet increases the risk of obesity, heart disease, stroke and cancer.
 Ill effects of excess dietary fats are initiated early in life.

Why do we need fats?

Cooking oils (liquid) and solid fats together are referred to as fats. Fats contribute to texture, flavor and taste and increase the palatability of the diet. Fats are essential for meeting some of the nutritional needs like essential fatty acids (linoleic n-6 and alpha-linolenic n-3) and serve as rich sources of energy. Therefore, fats should be consumed, in moderation. However, for the growth of young children high-calorific diets are required. This is achieved by inclusion of adequate amounts of fat (1g fat = 9 Kcals) in their diets as they cannot consume large quantities of bulky cereal - pulse- based diets.
 Fats also promote the absorption of the four fat-soluble vitamins (A,D,E and K), impart a feeling of fullness and satisfaction and thus, delay the onset of hunger.
 Along with proteins, fats constitute major components of body fluids and cell membranes. The two essential fatty acids (EFA) namely, linoleic (LA n-6) and alpha-linolenic (ALA n-3) acids (important dietary polyunsaturated fatty acids) are metabolized at various sites in the body to generate a group of biologically-active compounds, which perform several important physiological functions.

What are the sources of fat?

Dietary fats can be derived from plant and animal sources. Fats that are used as such at the table or during cooking (vegetable oils, vanaspati, butter and ghee) are termed as "visible" fats. Fats that are present as an integral components of various foods are referred to as "invisible" fat. Fats, in processed and ready to eat foods are known as hidden fats. Cereals contain only 2-3% of invisible fat. However, their contribution to overall fat intake is significant as they contribute to bulk of our Indian diets. The small amounts of invisible fat present in various foods add up to a substantial level in our daily diet (about 15 g in rural population and 30g among urban middle-income and high-income groups). Most animal foods provide high amounts of invisible fat.

How much visible fat do we need?

The total fat (visible + invisible) in the diet should provide between 20-30% of total calories. The visible fat intake in the diets can go upto 50g/person/day based on the level of physical activity and physiological status. Adults with sedentary lifestyle should consume about 25 g of visible fat, while individuals involved in hard physical work require 30 - 40g of visible fat. Visible fat intake should be increased during pregnancy and lactation to 30g. The higher fat and EFA requirements during pregnancy and lactation are to meet the requirements of fetus and young infants, in view of their crucial role in physical and neuronal growth and development. Diets of young children and adolescents should contain about 30-50g/day. However,

ingestion of too much fat is not conducive to good health.

What are the chemical components of fat?

Fatty acids: All fats in foods provide mixtures of three types of fatty acids, which are the “building blocks” of fats. Fatty acids are the primary constituents of all dietary fats. Based on their chemical nature, the fatty acids are broadly grouped as saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA). There are several fatty acids in each group. Fats from coconut oil, vanaspati, animal fats (ghee and butter) and animal foods like milk, milk products and meat provide saturated fatty acids. The short and medium chain saturated fatty acids present in ghee, butter and coconut oil are easily digested and absorbed and are therefore, good for infants and young children. However, high intake of saturated fatty acids increases atherogenic risk and their intake should be limited in adults. Oils from sources such as palm, groundnut, cottonseed, sesame and olive are rich in monounsaturated fatty acids as compared to other oils. Linoleic (n-6) and α -linolenic (n-3) acids are the simple PUFA, which are present only in plant foods (Table 6). All vegetable oils (except coconut) are good sources of linoleic(n-6) acid. Soyabean, rapeseed and mustard oils are the only vegetable oils, which contribute significant proportion of α -linolenic (n-3) acid. Legumes/pulses mustard and fenugreek seeds and green leafy vegetables are also good sources of α -linolenic (n-3) acid (Table 7). On the other hand, fish and fish oils provide long chain n-3 fatty acids, which are biologically more active than α -linolenic (n-3) acid present in plant foods.

Table - 6

Major Types of Fatty Acids in Fats and Oils

SATURATED MONO-

UNSATURATED POLYUNSATURATED

Coconut

Palm kernel

Ghee/butter

Vanaspati

Red palm oil

Palmolein

Groundnut

Ricebran

Sesame

α -LINOLENIC

(n-3)

Rapeseed, Mustard

Soyabean

LINOLEIC

(n-6)

Low Red palm oil

Palmolein

Moderate Groundnut, Ricebran

Sesame

Safflower, Sunflower

High

Cottonseed, Corn,

Soyabean

Dietary fats also contain minor components such as tocopherols, tocotrienols, sterols etc. The natural flavour of fats/oils is largely due to these minor components. Since most of the minor components are antioxidants, they prevent fats from going rancid. Tocotrienols in palm oil, lignans in sesame oil and oryzanol and tocotrienols in rice-bran oil reduce blood cholesterol. Refining of oils, though does not alter their fatty acid composition, modifies the composition of minor components; for example, carotenes are lost during refining of crude palm oil.

Cholesterol: Cholesterol is present only in foods of animal origin such as milk, meat, shrimp and prawn, but not in plant foods. Vegetable oils do not contain cholesterol. Egg yolk, and organ meats such as liver, kidney and brain contain very high amounts of cholesterol. Cholesterol is found in all body cells and plays a key role in the formation of brain, nerve tissue and is a pre-cursor for some hormones and vitamin D. It is synthesized in the body and hence it is not an essential dietary component.

47Table – 7

Quantities of foods required to furnish 0.1 g ALA

Foods Gram

70

20

60

60

400

400

5

1

0.5

0.3

Cereal/Millet

Wheat & Pearl millet (bajra) Pulses

Blackgram (kala chana), kidney beans

(rajmah) & cowpea (lobia)

Other pulses

Vegetables

Green leafy

Other Vegetables

Fruits Spices

Fenugreek seed (methi)

Mustard (sarson)

Unconventional

Flaxseed (alsi)

Perilla seeds (Bhanjira)

Higher dietary cholesterol increases blood cholesterol. The blood cholesterol-elevating effect of dietary saturated fats increases, when cholesterol consumption is high. Therefore, cholesterol intake should be maintained below 200 mg/day. One can reduce both saturated fat and cholesterol intake by limiting the consumption of high-fat animal foods like butter, ghee, meat, egg and organ meats and consuming low fat (skimmed) milk instead of whole milk. However, consumption of eggs (3 eggs/week) is recommended in view of several nutritional advantages.

What are the physiological/health implications of different fats/fatty acids?

Saturated fatty acids are known to increase serum total and LDL-cholesterol levels, reduce insulin sensitivity and enhance thrombogenicity and increase CVD risk. Therefore, SFA intake should not exceed 8-10% of total energy. Skimmed milk should be preferred instead of whole milk. Restrict consumption of butter and cheese. PUFAs are essential components of cell membranes. While n-6 PUFAs are predominant in all cells, the nerve tissue has high levels of long chain n-3 PUFA. An appropriate balance of the these two classes of PUFAs, namely, linoleic and -alpha

linolenic acids in the diets is essential for the functioning of vascular, immune, nervous and renal systems and for early human development. PUFAs particularly n-3 PUFA increase insulin sensitivity, increase peripheral glucose utilization and decrease adiposity and hence are anti-atherogenic. n-6 PUFA decrease plasma cholesterol as well as HDL cholesterol level (only at high intake). The lipid lowering and other physiological effects of individual members of the PUFAs vary widely.

As compared to linoleic acid, alpha-linolenic (n-3) acid is more beneficial for prevention of inflammation and accumulation of fatty material in blood vessels (atherosclerosis) and clotting of blood (thrombosis). The long chain n-3 PUFA of fish oils and micro algae have greater antiatherogenic, antithrombotic and anti-inflammatory effects than alpha-linolenic (n-3) acid of plant foods. They are important for vision and brain growth. Therefore, pregnant women should consume foods that are rich in ALA and long chain n-3 PUFA from fish and fish oils.

The intake of PUFA should be 8-10% of energy intake. The remaining 8-10% of fat calories can be derived from mono-unsaturated fatty acids, which also help in maintaining plasma cholesterol. Excessive use of highly unsaturated fats should be avoided. Further, to get a good proportion of all the classes of fatty acids, it is advisable to consume more than one type of vegetable oils.

Fats/ lipids (triglycerides, cholesterol and phospholipids) are transported in blood in combination with proteins in the form of 'lipoproteins'. The low density lipoproteins (LDL) transport cholesterol from liver to various tissues. High blood levels of LDL cholesterol ('bad' cholesterol) result in accumulation of lipids in the cells (atherogenic effect). High density lipoproteins (HDL) ('good' cholesterol) transport excess cholesterol from the tissues to the liver for degradation, and are therefore, anti-atherogenic.

Choice of cooking oils

In view of the above, an ideal quality fat for good health is the one which maintains a balance, so as to give a ratio of polyunsaturated/ saturated (PUFA/ SFA) of 0.8-1.0, and linoleic/ α -linolenic (n-6/ n-3) of 5-10 in the total diet. For ensuring this appropriate balance of fatty acids in cereal-based diets, it is necessary to increase the α -linolenic (n-3) acid intake and reduce the quantity of linoleic (n-6) acid obtained from the cooking oil. Hence, the choice of cooking oil should be as follows:

Groundnut or Sesame or Rice bran

Groundnut or Sesame or Rice bran

Groundnut or Sesame or Rice bran

+ Mustard

+ Canola

+ Soyabean

Palmolein + Soyabean

Safflower or Sunflower + Palmolein + Mustard

Use of more than one source of fat/oil has the added advantage of providing a variety of minor components in the diet. An additional way of increasing alpha-linolenic (n-3) acid intake is to ensure regular consumption of oils and foods rich in 49alpha 6 &

-linolenic (n-3) acid (Table 7). Non-vegetarians have an advantage of eating fish, which provides preformed long chain n-3 PUFA. Ideally, part of visible fat and/or invisible fat from animal foods may be substituted by whole nuts and legumes with good proportion of -linolenic (n-3) acid, which are also good sources of protein, fiber, vitamins and minerals (ALA content of foods is given in annexure 9). The plant oils in addition contain certain useful substances such as lignans (sesame oil), sterols, tocopherols (vitamin E) oryzanole (rice bran oil), carotenoids - all of which reduce cholesterol and reduce oxidant damage due to ageing, inflammation which occur in chronic diseases.

What about vanaspati ?

Vanaspati is prepared by hydrogenation of vegetable oils. During hydrogenation, the liquid oils become solid because the mono and polyunsaturated fatty acids are converted into saturated fatty acids and isomers called trans fatty acids. Vanaspati is used as a substitute for ghee in cooking and the preparation of bakery products, sweets and snack foods. Since, saturated fats are resistant to oxidation, foods prepared in vanaspati keep fresh for a longer period. Current evidence indicates that saturated fatty acids and a high intake of trans fatty acids may increase the risk of heart disease. Therefore, it is essential to limit the intake of vanaspati. The intake of trans fatty acids should not exceed 1% of energy intake.

50POINTS TO PONDER

Take just enough fat.

Substitute part of visible fat and invisible fat from animal foods with whole nuts.

Moderate the use of animal foods containing high fat, SFA and cholesterol.

Limit the use of ghee, butter, especially vanaspati as a cooking oil.

Choose low- fat dairy foods in place of regular whole fat dairy foods.

Eat foods rich in alpha-linolenic (ALA) acid such as legumes, green leafy vegetables, fenugreek and mustard seeds.

Eat fish more frequently (at least 100-200g /week), prefer it to meat, poultry and limit/ avoid organ meats such as liver, kidney, brain etc.

Egg has several important nutrients but is high in cholesterol. Limit the consumption to 3 eggs/ week. However, egg white may be consumed in good amounts.

Minimize consumption of ready- to- eat fast foods, bakery foods and processed foods prepared in hydrogenated fat.

Use of re-heated fats and oils should be avoided.

Use fats and oils in moderation and consume varieties of foods to get good proportion of all fatty acids for optimal health benefits.

51Guideline 8

Rationale:

O

overweight/obesity is the causative factor for several chronic non-communicable diseases including heart disease, diabetes and certain types of cancers

A dramatic increase in the prevalence of overweight and obesity among all the age groups has occurred in last 2-3 decades.

About 30-50% of adult Indians are either overweight or obese.

Overweight and obese individuals are at an enhanced risk of co-morbidities including type 2 diabetes, fatty liver disease, gallstones, high blood cholesterol and triglycerides, orthopedic disorders (Osteoarthritis), hypertension and other cardiovascular diseases, certain cancers and psycho-social problems.

The imbalance between the energy intake and energy output leads to excess accumulation of fat in various parts of the body.

What is desirable or ideal body weight or Body Mass Index (BMI)?

There is no clear definition of a desirable or ideal body weight. Body weight for a given height of person with good health and long lifespan is considered as Ideal body weight. A much simpler and more acceptable measure is the ratio of weight and height, which estimates total body mass and correlates highly with the % of

body fat. The most commonly used ratio is the BMI. It is computed by dividing the weight in kilograms by the square of the height in meters [BMI = Weight (kg) ÷ 2 (Height M)]. The ideal ranges of weights for a given height are provided by WHO (annexure 5), which is useful for categorizing persons as normal (ideal), under-nourished and overweight or obese.

What is obesity?

Definition of obesity is based on the degree of excess fat. More than a general accumulation, the distribution of fat around the abdomen is now considered to be more harmful than fat around the hips. Accumulation of fat around abdomen indicated by higher waist circumference is considered as risk factor. In general, BMI ranging from 18.5 to 25 is considered to be normal. However, for Asians it is recommended that the BMI should be between 18.5 and 23, since, they tend to have higher percentage body fat even at lower BMI compared to Caucasians and Europeans, which puts them at higher risk of chronic non-communicable diseases. 52The cut-off levels for categorizing overweight and obesity in children and adolescents are different.

Since, growth spurt in boys and girls occurs in different age groups, age and gender specific BMI centiles of reference population is used to assess their nutritional status. Thus, children with BMI less than 5th centile are considered as undernourished and those with 5th to 85th centiles are normal, and those with 85th to 95th centile are considered as overweight. More than 95th centile are considered as obese.

Central obesity

The waist circumference and waist-to-hip ratios are useful for estimation of central and truncal obesity respectively. Several studies have shown that the central obesity was directly correlated with chronic degenerative diseases especially metabolic syndrome. Waist-to-hip ratio of more than 0.9 among men and 0.8 in women and waist circumference 90cm for men and 80cm for women are associated with increased risk of several chronic diseases especially in Asian Indians.

Why should we avoid obesity?

There are several health consequences of obesity. Excessive body weight increases the risk of heart disease, hypertension, diabetes, gallstones, certain types of cancers and osteoarthritis. Obesity invariably predisposes to reduced levels of high density lipoproteins ('good' cholesterol) and to increased levels of low density lipoproteins ('bad' cholesterol), and triglycerides, besides an abnormal increase in glucose and insulin levels in blood. Considering the increasing trend in the prevalence of coronary artery disease, hypertension and diabetes in India, it is important to maintain desirable body weight for height and avoid obesity.

What causes obesity ?

Over-feeding during infancy, childhood and adolescence predisposes to overweight/ obesity during adulthood. The tendency of familial obesity seems to be inherited. Eating junk or unhealthy foods coupled with low physical activity is considered as a main contributor.

Complex behavioral and psychological factors influence the eating patterns. In addition, metabolic errors in energy utilization may favor fat accumulation.

Insulin is an important modifier of energy and fat metabolism favoring fat deposition. Low and high birth weight

53(<2500 g and >3500g), obesity during childhood and adolescence are likely to lead to obesity in adults. It is therefore, necessary to maintain a desirable body weight by consuming just enough calories or adjust physical activity to maintain energy balance (intake = output). Body weight must, therefore, be checked and monitored periodically.

Several studies have suggested that hours spent in watching television is strongly associated with weight gain in childhood and adolescents, mostly due to the sedentary behavior, tendency to consume snack foods while watching television and influence of the advertisements of energy dense foods.

Adults usually tend to gain weight between the ages of 25-50 years. In women, obesity develops just around pregnancy and after menopause.

How to reduce body weight?

There is no single regimen for weight reduction; it has to be individualized. Weight reduction should be gradual. Weight reduction diets should not be less than 1000 Kcal/day and provide all nutrients. A reduction of half a kilogram body weight

per week is considered to be safe. Extreme approaches should be avoided and use of drugs may be dangerous. In children, obesity should be controlled by increasing physical activity rather than restricting food intake. Modifications in dietary habits have to be incorporated into one's lifestyle along with adequate exercise to keep the body weight within the normal limits.

As fat contains more than twice the calories (9Kcal) per gram compared to protein (4Kcal) and carbohydrate (4Kcal), weight reducing diets should limit the fat intake. Refined sugars (4Kcal) and alcohol (7Kcal) provide empty calories and should be avoided. Refined carbohydrates which promote fast absorption of glucose (Glycemic carbohydrates) also need to be restricted (Annexure 10). Plant foods that provide complex carbohydrates and fibre may be preferred as they reduce blood glucose, cholesterol and triglycerides. Weight-reducing diets must be rich in proteins and low in carbohydrates and fats. Consumption of plenty of fruits and vegetables would not only result in satiety but could also help to maintain adequate micronutrient intake. Frequent fasting/ semi-fasting (cyclic weight reduction) followed by adequate or excess food consumption will also aggravate the problem of weight gain. All reducing regimens should be monitored by a doctor and a dietitian.

54POINTS TO PONDER

Slow and steady reduction in body weight is advisable.

Severe fasting may lead to health hazards.

Achieve energy balance and appropriate weight for height.

Encourage regular physical activity.

Eat small meals regularly at frequent intervals.

Cut down sugar, salt, fatty foods, refined foods, soft drinks and alcohol.

Eat complex carbohydrates, low glycemic foods and fibre rich diets.

Increase consumption of fruits and vegetables, legumes, whole grains and nuts.

Limit fat intake and shift from saturated to unsaturated fats.

Avoid Use low- fat milk.

trans-fatty rich foods (vanaspati , bakery products and sweets).

55Guideline 9

Rationale:

Regular physical exercises increase strength and stamina, elevates 'good' cholesterol and adds pink tinge to health

Physical activity of moderate intensity is recommended for health and well-being.

Physical activity is essential to maintain ideal body weight by burning excess calories and is of vital significance for health and prevention of non-communicable diseases.

Physical activity is a major modifiable risk factor in reduction of non-communicable chronic diseases.

Physical activity may reduce the risk of falls and injuries in the elderly.

Exercise is a prescriptive medicine.

Move your body as much as you can.

ENERGY INPUT

ENERGY OUTPUT

MAINTENANCE OF

Body Weight

&

Body

Composition

ENERGY BALANCE

How much of physical exercise is needed?

It is recommended to carry out at least 45 minutes of physical activity of moderate-intensity for at least 5 days in a week. This amount of physical activity may reduce the risk of some chronic diseases. To lose weight, experts recommend that at least 60 minutes of moderate- to vigorous-intensity physical activity be taken on most days of the week. In addition, one should follow a nutritious eating plan and consume fewer calories. Therefore, it is essential to remember that the body weight is affected by the balance of "calories-consumed" and "calories-burned." Those, who are on low calorie diets for body weight reduction should have moderate to vigorous intensity physical activities at least for 60-90 minutes daily. Physical activity is essential for successful long-term weight management and will depend on current BMI and health condition (Annexure 11).

Levels of physical activity

There are two basic levels of physical activity.

Moderate:

This includes walking briskly (about 5-6 KM in an hour), climbing, gardening/yard work, dancing, walking short distances for fetching milk and vegetables, bicycling (about 16 KM in an hour), and weight training (a general light workout), yogasanas and pranayama, playing with children.

Vigorous:

Examples are running/jogging (7 KM in an hour), cycling (> 16 KM in an hour), swimming (freestyle laps), aerobics, brisk walking (6 KM in an hour), weight lifting (vigorous effort), competitive sports and heavy yard work, such as digging, cutting wood.

The approximate energy costs of various physical activities in different intensities for a 60 kg person are given in annexure-11.

If a physical activity does not increase the heart rate, it is not intense enough to be counted in the category of "45 minutes of exercise a day". Activities that do not increase the heart rate include walking at a casual pace, grocery shopping, and doing light household chores.

Types of physical activities

These activities are very beneficial to health.

Aerobic activities

These speed your heart rate and breathing while improving heart and lung fitness. Examples: brisk walking, jogging and swimming.

Resistance, strength building and weight-bearing activities

These help build and maintain bones and muscles by working them against gravity. Lifting weights, walking with child in arms are a few examples.

Balance and stretching activities

Dancing, gentle stretching, yoga, martial arts and Tai chi reduce risk of injuries by improving physical stability and flexibility.

57Health Benefits of Physical Activity

Controls body weight and composition.

Reduces risk chronic diseases, such as Type 2 diabetes, high blood pressure, heart disease, osteoporosis, arthritis and certain types of cancers.

Builds strong muscles, bones and joints.

Improves flexibility.

Wards off depression.

Improves mood, sense of well-being and self esteem.

Regard movement as an opportunity and not an inconvenience

Children and teenagers need at least 60 minutes of physical activity every day.

In the case of pregnant women 30 minutes or more of moderate-intensity physical activity every day is recommended. However, it should be undertaken in consultation with the physician. Like others, geriatric population also will be benefitted considerably by physical activity, which will help in the reduction of functional impairment and improve lean body mass.

58People with heart disease, high blood pressure, diabetes, asthma, osteoporosis and obesity should consult physician before taking up the exercise program. Men over 40 and women over 50 should also consult doctor or health care provider before starting a vigorous physical activity program.

POINTS TO PONDER

A minimum 30-45 minutes brisk walk/physical activity of moderate intensity improves overall health.

Include 'warm-up' and 'cool-down' periods, before and after the exercise regimen.

Forty five minutes per day of moderate intensity physical activity provides many health benefits.

59Guideline 10

Rationale:

Increased salt intake may pose health risk and may lead to hypertension and heart disease

Sodium is the major electrolyte in the extra-cellular fluid.

Sodium plays an important role in nerve conduction and fluid balance in the body.

Maintenance of sodium balance depends on kidney function.

High intake of salt (sodium chloride) is associated with high blood pressure and stomach cancer.

All foods contain sodium. Sodium requirements can be met with moderate salt intake.

Sodium intake needs to be balanced by potassium intake.

Salt is an essential ingredient of food and enhances its taste. From time immemorial, it has been used as a preservative. All food substances contain sodium, but added salt (sodium 40%, chloride 60%) is the major source of sodium in our diet. Sodium is primarily involved in the maintenance of water balance and equilibrium. It also plays an important role in electro-physiological functions of the cell. Humans have powerful in-built mechanisms for maintaining blood pressure even on minimal sodium intake.

Sodium is rapidly absorbed from the gastrointestinal tract and a positive balance is achieved on intakes just above minimal requirements. Sodium requirements depend on its losses through urine, faeces and sweat. The sweat loss varies according to climatic conditions. High ambient temperatures and vigorous physical exercise increase sodium loss through sweat. Even after 6 hours of hard physical labor, which may generate 3 litres of sweat, the requirement of sodium chloride may not be more than 6 g/day.

Sources of sodium

Natural diets, in general, provide about 300-400 mg of sodium a day. Cereals, pulses, vegetables, milk, animal and sea foods are the major sources of sodium. Indian data indicate that per capita consumption of salt ranges from less than 5g to 30g/day in different States with almost 40% of population consuming about 10g/day. Since, the taste for salt is acquired, its consumption could be restricted right from an early age.

Preserved foods such as pickles, sun dried foods such as papads, sauces/ ketch up and canned foods contribute to higher intakes of salt.

What are the health problems associated with excessive salt/sodium intake?

There is a strong association between salt intake and blood pressure.

Prevalence of hypertension is low in populations consuming less than 3 g salt per day. The usual increase in blood pressure with age is also not seen with such intakes. The amount of salt consumed is reflected in urinary sodium. Drastic restriction of dietary salt decreases the risk of hypertension. However, this effect is not uniform as only 20-30% of population is salt sensitive. Potassium-rich foods such as fresh vegetables and fruits decrease blood pressure. In fact, it is the ratio of sodium to potassium in the diet which is important. Salt intake higher than 8 g/day is considered as a risk factor for hypertension.

Besides increasing blood pressure, excessive salt may also affect stomach mucosa and result in atrophic gastritis and gastric cancer.

Higher sodium intake leads to greater calcium excretion which may result in reduction in bone density. Existing evidence reveals a deleterious impact of high salt intake on blood vessels, blood pressure, bones and gastrointestinal tract. Salt intake in our population generally exceeds the requirement. It should not be more than 6 g per day. Salt is used as a vehicle for food fortification since, it is commonly used in food preparation.

POINTS TO PONDER

Restrict the intake of added salt right from an early age.

Develop a taste for foods/diets that are low in salt.

Restrict intake of preserved and processed foods such as papads, pickles, sauces, ketch up, salted biscuits, chips, cheese and salted fish.

Eat plenty of vegetables and fruits. They are good source of potassium.

Use always iron fortified iodized salt (double fortified salt).

Guideline 11

Rationale:

Contaminated and adulterated foods
several food-borne illnesses in the country
are major causes for

Safe and good-quality foods are essential for maintaining good health

Naturally-occurring toxins, environmental contaminants and adulterants in foods constitute a health hazard.

Consumption of unsafe foods can lead to food-borne diseases.

What makes food unsafe?

Microbes (bacteria and moulds) and their products are responsible for food spoilage. Natural enzymes present in food also lead to its deterioration. Besides, insects, rodents, adulterants, natural toxins and various chemical residues beyond permissible levels, make the food unwholesome. In addition to moisture and environmental conditions like temperature, storage time also influence the quality of the food.

How do we select safe food?

Selection of the right food is the first step to ensure safe and good quality diet. Food items purchased from reliable sources having a high turnover ensure their freshness. Some foods carry certification mark assuring good quality. For example AGMARK for honey and ghee; FPO (Fruit Products Order) for fruit and vegetable products (jams, squashes, etc); ISI (Bureau of Indian Standards) for food colours and essences. While purchasing packaged food always look for 'best before' or 'date of expiry'.

Food grains purchased should be free from infestation and foreign matter (rodent excreta and insect remains). They should be of uniform size and should not be shrivelled, shrunken or mouldy. Foodstuffs should be free from artificial colors. There is a risk of adulteration when fats/oils are purchased loose from unsealed containers. Therefore, it is always safer to purchase reputed brand products in sealed sachets/containers. It is necessary to buy pasteurized milk in sachets from a reputed dairy or a reliable vendor to avoid the risk of adulteration and contamination. Milk products such as butter, ghee and khoa should also be purchased from reliable sources. Whole spices, uniform in color, size and shape should be preferred. Since powdered spices are more likely to be adulterated, always buy certified products. Fruits and vegetables that show patches, physical damage with bruises or wilted and decayed with visible evidence of insects and moulds, should be avoided. Eggs should be fresh and free from cracks. Meat or poultry must be examined for characteristic color, odor and texture and should be purchased fresh or frozen. Freshness of fresh-water fish is indicated by a stiff body, bright, clear and bulging eyes, reddish gills, tight scales and absence of stale odor or discoloration. Fresh fish will not show any pitting on finger pressure.

What are the best practices of storage ?

Agricultural commodities should be dried and adequately in a safe storage structure, to protect them from moisture and to prevent the damage from microbes like bacteria and mould producing toxins (eg. aflatoxins). Rodent attacks, and the presence of insects and microbes, not only reduce the availability of nutrients but render the foods harmful. Frequent and careful disinfection of the storage premises using rodenticides like aluminium phosphide is essential. Some traditional household practices such as application of edible oils to grains, placing dried neem leaves in storage bins etc., are known to prevent infestations.

Why do foodborne diseases occur?

Foodborne infections and toxicities are common particularly with consumption of susceptible foods such as milk products like khoa, meat, poultry and even cooked foods like rice. Improper processing, handling and cooking, and keeping cooked foods in warm conditions for several hours before eating, promote bacterial growth and toxin production.

How should perishable foods be handled ?

Perishable foods like milk, meat, vegetables and cooked foods, are prone to spoilage due to microbes. These foods should be stored under refrigeration, preferably at a temperature of 10 °C or less, which retards multiplication of microorganisms. However, even refrigerated foods, if stored for long, can get spoilt. Cross contamination can be avoided by keeping cooked and raw foods separately. In case of food which is cooked, if not consumed immediately has to be stored for some time, it should be kept either hot (more than 60 °C) or be cooled quickly (below 10 °C). Most micro-organisms multiply at temperatures between 10 and 60 °C. Refrigerated cooked food should be heated before consumption. However, repeated heating may be avoided.

What about personal hygiene ?

Food handlers should observe good personal hygiene to maintain food safety. They should be free from obvious signs of illness, wounds and sores. Traditionally in India, cooked food is touched by bare hands while preparing, serving and eating. Use of spoons and ladles should be encouraged to avoid contamination. Hands should be washed thoroughly with soap before starting the preparation of food and after every interruption. Household pets like cats and dogs often harbour dangerous pathogens. They should be kept away from places where food is cooked, stored or served.

What are the common adulterants?

Foods may be adulterated with non-food material or inferior quality product. Spoilt, stale or poor quality food is made attractive and fresh by adding harmful colors or other chemicals. Frequently adulterated food items are milk and milk products, cereals, pulses and their products, edible oils and spices. The different classes of adulterants include non-permitted colors like metanil yellow; non-edible oils like castor oil; cheaper agricultural produce like various starches in milk powder; extraneous matter like husk, sand and sawdust; and metal contaminants like aluminum or iron filings. Consumption of adulterated foods could lead to disease outbreaks of epidemic proportions. Buying from a reliable and reputed source,

careful checking of foods before purchase and insisting on certified brands will all minimize the risk of food adulteration.

How to minimize effects of pesticide residues?

Pesticides, used during cultivation of crops, can remain as residues in foodstuffs, especially vegetables and fruits. Exposure of the population to pesticide residues may be harmful and can be minimized by washing the foodstuffs thoroughly in running water or by peeling. Cooking and other processes can also reduce such residues (Annexure 12).

Insect control operations such as disinfection in the kitchen by spraying pesticides is another source of contamination. Utmost care should be taken to ensure that eatables are well covered and protected from exposure to such harmful agents.

POINTS TO PONDER

Buy food items from reliable sources after careful examination.

Wash vegetables and fruits thoroughly before use.

Store the raw and cooked foods properly and prevent microbial, rodent and insect invasion.

Refrigerate perishable food items.

Maintain good personal hygiene and keep the cooking and food storage areas clean and safe.

Always use thoroughly cleaned utensils for cooking/ eating.

Guideline 12

Rationale:

Healthy and positive food concepts and cooking practices are foundation for good health

Cultural factors play an important role in dietary practices.

Faulty food fads and beliefs adversely affect nutrition and health.

Cooking renders food palatable and helps in easy digestion.

Cooking destroys harmful germs.

Faulty pre-cooking and cooking process lead to loss of nutrients.

Cooking at high temperatures leads to destruction of nutrients and formation of harmful substances.

What are common Indian food beliefs, fads and taboos?

Food habits are formed early in childhood, passed on from the elders in the family and perpetuated to adulthood. Food beliefs either encourage or discourage the consumption of particular type of foods. There can be neutral, harmless or harmful practices. Unfortunately, most of the food fads and prejudices (taboos) are associated with women and children, who are also the most vulnerable to malnutrition. Exaggerated beneficial or harmful claims in respect of some foods, without scientific basis constitute food fads. In addition, the belief of heat producing and cold inducing foods is widely prevalent. Some examples are jaggery, sugar, groundnuts, fried foods, mango, bajra, jowar, maize, eggs and meat. Papaya fruit is strongly suspected to lead to abortion, though there is no scientific basis. Buttermilk, curd, milk, green gram dhal, green leafy vegetables, ragi, barley flour and apples are considered as cold inducing foods which are actually nutritious. Vegetarianism is often practiced in India on religious grounds. Since vitamin B₁₂ is present only in foods of animal origin, vegetarians should ensure an adequate consumption of milk. During certain illnesses like measles and diarrhea, dietary restriction is practiced. This can aggravate malnutrition in young children.

What are the effects of the pre-cooking processes?

Foods, in their natural state, contain different nutrients in varying amounts. Cooking improves the digestibility of most foods. Flesh foods get softened on cooking and become easily chewable. Proper methods of cooking render foods palatable by improving the appearance, taste, flavor and texture, thereby enhancing acceptability. In addition, they help in destroying disease causing organisms and eliminating natural inhibitors of digestion. In the course of food preparation, depending on the recipe, foods are subjected to various processes such as washing, grinding, cutting, fermentation, germination and cooking. In the Indian cuisine, fermentation (idli, dosa, dhokla) and germination (sprouting) are common practices. These methods improve digestibility and increase nutrients such as B-complex vitamins and vitamin C.

What are the effects of washing and cutting ?

Foods should be washed well before cooking and consumption to remove contaminants like pesticide residues, parasites and other extraneous material

(Annexure 12). However, certain precautions need to be taken while washing and cutting to minimize the loss of nutrients. Repeated washing of food grains like rice and pulses results in losses of certain minerals and vitamins. Vegetables and fruits should be washed thoroughly with potable water before cutting. Cutting of vegetables in to small pieces exposes a greater surface area of the foodstuff to the atmosphere, resulting in loss of vitamins due to oxidation. Therefore, vegetables should be cut in to large pieces. Cut vegetables should not be soaked in water for long, as water-soluble minerals and vitamins get dissolved.

What are the effects of cooking ?

There are many methods of cooking like boiling, steaming, pressure cooking, frying, roasting and baking. Boiling is the most common method of cooking, during which heat-labile and water-soluble vitamins like vitamin B-complex and C is lost. The practice of using excess water while cooking rice should be discouraged since it leads to loss of vitamins; just sufficient water to be fully absorbed should be used.

Use of baking soda for hastening cooking of pulses

should not be practiced, as it results in loss of

vitamins. Frying involves cooking food

in oil/ghee/vanaspati at high

temperatures. Shallow frying

involves use of much smaller amounts of oils than deep frying.

Repeated heating of oils

particularly PUFA-rich oils

results in formation of

peroxides and free radicals

and, hence, should be avoided

by using just enough oil. Similarly, oils which have been repeatedly heated should not be mixed with fresh oil but should be used for process such as seasoning.

Microwave Cooking

Microwave cooking is convenient, fast and preserves nutrients and also useful in reheating of food. But it can reheat or cook unevenly and leave some cold spots in the food by which harmful bacteria can enter into our body. So it is discouraged to use large amounts or big pieces in the microwave oven otherwise mix the food in between for even heating or cooking. Never use partially heated food. Don't cook frozen food in the microwave oven directly as it leaves some parts of the food partially cooked.

Always use glass or pottery dishes and food grade microwave friendly plastic dishes and wrap to re-heat foods. Approximate calorific value of some cooked food preparation are given in annexure 8.

POINTS TO PONDER

Avoid food fads and discard erroneous food beliefs.

Do not wash foodgrains repeatedly before cooking.

Do not wash vegetables after cutting.

Do not soak the cut vegetables in water for long periods.

Do not discard the excess water left over after cooking. Use only sufficient water for cooking.

Cook foods in vessels covered with lids.

Prefer pressure/steam cooking to deep frying/roasting.

Encourage consumption of sprouted/fermented foods.

Avoid use of baking soda while cooking pulses and vegetables.

Do not reheat the left over oil repeatedly.

Guideline 13

Rationale:

Water is the most important nutrient of all and helps in the upkeep of our health

Water is the major constituent of the human body.

Beverages are useful to relieve thirst and to meet fluid requirements of the body.

Some beverages provide nutrients while others act as stimulants.

Milk is an excellent beverage for all age groups as it is a rich source of nutrients.

Why do we need water?

Water accounts for 70% of our body weight. It is a constituent of blood and other vital body fluids. Water plays a key role in elimination of body wastes and regulation of body temperature. The body loses water through sweat, urine and faeces. This loss must be constantly made good with clean and potable water. A normal healthy person needs to drink about 8 glasses (2 litre) of water per day. During very hot

weather and while undertaking vigorous physical activity, this requirement increases as a considerable amount of water is lost through sweat.

When is water considered safe and wholesome ?

Water should be safe and wholesome i.e., it should be free from disease-causing agents like bacteria, viruses, parasites etc., and harmful chemical substances like pesticides, industrial wastes, heavy metals, nitrates, arsenic and excess of fluoride. Fluorosis, a disease with bone deformities and dental problems, results from drinking water containing an excess of fluoride over long periods. Generally, a concentration of 0.5 to 0.8 mg of fluoride per litre of drinking water is considered safe.

How is water rendered safe ?

If a water source is not safe for drinking, boiling it for 10-15 minutes is a satisfactory method of purification of the water. It kills all disease-causing organisms and also removes temporary hardness. However, boiling will not remove other chemical impurities. Tablets containing 0.5g of chlorine can disinfect 20 litres of water. There are many modern gadgets which claim to provide safe and wholesome water. However, they vary in efficacy. Drinking water standards given in annexure-13.

70How nutritious is milk ?

Milk is a well accepted and wholesome food and beverage for all age groups. It contains most of the nutrients necessary for growth and development. It is, therefore, specially useful or feeding infants, toddlers, growing children and expectant women and nursing mothers. All the macro and micro-nutrients are present in an easily digestible and assimilable form in milk. Milk proteins possess high biological value which is almost equal to that of meat, eggs and other high-quality animal proteins. Milk proteins are valuable supplements to most vegetarian diets.

vitamin B Milk is a rich source of bioavailable calcium which helps in the building up of strong bones. Milk fat serves as a vehicle for important fat-soluble vitamins A, D and E. Since, milk fat is of the saturated type those who have to be on a low fat diet can consume skimmed/toned milk. For strict vegetarians, milk is the only source of . Milk is also rich in riboflavin, but is a poor source of vitamins C and iron. 12 However, only pasteurized or boiled milk should be consumed to ensure protection from disease-causing agents.

What is lactose intolerance ?

Lactose, the sugar present in milk, helps in the establishment of lactic acid bacteria in the intestinal tract. If lactase, an enzyme required for digestion of lactose, is not present in sufficient amounts, such individuals develop abdominal symptoms on consumption of excess of milk. This is common in children following diarrhea and is described as lactose intolerance. Drinking small quantities of milk at a time does not usually cause any gastrointestinal problems and there is no need to discourage intake of milk by children except in severe cases of diarrhea.

What are soft drinks ?

Soft drinks are generally of two categories, natural soft drinks and artificial or synthetic soft drinks. Water is the main constituent of all beverages. Orange, lemon, grape, mango, pineapple and apple are generally used in making fruit juice. sugar cane juice is also extensively used in India, particularly during summer. Natural fruit juices provide in addition to energy, some vitamins (beta-carotenes, vitamin C) and minerals (potassium, calcium). Fruit juices being potassium rich are ideal beverages for those suffering from hypertension. However, they cannot be equated with fruits which also provide dietary fibre.

Compared to natural fruit juices, synthetic drinks do not contain nutrients unless they are fortified. Generally, synthetic drinks are prepared using preservatives, artificial colors and flavors such as cola, orange, mango and lime, and mostly they⁷¹are carbonated. Carbonated beverages contain phosphoric acid and may damage the enamel of teeth, and affect appetite if taken in excessive amounts. Water used for preparation of beverages should be free from disease-causing agents and harmful chemical impurities.

Beverages like buttermilk, lassi, fruit juices and coconut water are better alternatives to synthetic drinks.

What about tea and coffee ?

Tea and coffee are popular beverages.

They are known to relieve mental and muscular fatigue. This characteristic stimulating effect is due to their caffeine content. A cup (150 ml) of brewed coffee contains 80-120 mg of caffeine and instant coffee 50-65 mg, while tea contains 30-65 mg of caffeine. Caffeine stimulates the central nervous system and induces physiological dependence.

Generally, low doses (20-200 mg) of caffeine produce mild positive effects like a feeling of well-being, alertness and being energetic. Higher doses (>200 mg) can produce negative effects like nervousness and anxiety, especially in people who do

not usually consume caffeine-containing beverages. Therefore, moderation in tea and coffee consumption is advised so that caffeine intake does not exceed the tolerable limits. Tannin is also present in tea and coffee and is known to interfere with iron absorption. Hence, tea and coffee should be avoided at least for one hour before and after meals.

Excess consumption of coffee is known to increase blood pressure and cause abnormalities in heart beat. In addition, an association between coffee consumption and elevated levels of total and LDL cholesterol ('bad' cholesterol), triglycerides and heart disease has been demonstrated. Therefore, individuals with heart disease need to restrict coffee consumption. Also, those who experience adverse effects from caffeine should stop drinking coffee.

Besides caffeine, tea contains theobromine and theophylline. These are known to relax coronary arteries and thereby promote circulation. Tea also contains flavonoids and other antioxidant polyphenols, which are known to reduce the risk for coronary heart disease and stomach cancer. However, as a result of its caffeine content, excess tea consumption is deleterious to health. Decaffeinated coffee and tea are being marketed to obviate the adverse effects of caffeine.

72Tender coconut water

Tender coconut water is a nutritious beverage. It has a caloric value of 17.4 per 100 gm. The concentration of sugar steadily increases from 1.5% to about 5.5% in the early months of maturation and this slowly falls to about 2% at the stage of full maturity.

Tender coconut water contains most of the minerals such as potassium (290 mg%), Sodium (42 mg%), Calcium (44 mg%), magnesium (10 mg%), Phosphorus (9.2 mg%), iron (106 mg%), and copper (26 mg%). It is an oral rehydration medium and keeps the body cool. However, in patients with hyperkalemia such as renal failure, acute adrenal insufficiency and in patients with low urine output, TCW should be avoided.

Alcohol

Alcoholic beverages contain ethyl alcohol in varying proportions. Beer contains 2-5% and wine 8-10% of alcohol, while brandy, rum and whisky contain much higher concentrations (30-40%). Alcohol has been extensively abused as an appetite stimulant and as a sedative-hypnotic drug. Alcohol intake, which is initiated as an innocent social habit may gradually result in a serious addiction. It may lead to several serious psycho-social problems and accidents.

Alcohol provides higher calories (7 Kcal/g) than carbohydrates and proteins and thus, can contribute to obesity. Ironically, excessive intake of alcohol is known to suppress appetite and interfere with absorption and metabolism of nutrients, leading to various nutritional deficiency diseases.

Excessive intake of alcohol suppresses appetite and as a result, leads to several nutritional deficiency diseases. People who regularly consume more than two alcoholic drinks (one equals about 30 ml of ethanol) are at a higher risk for hypertension and stroke. Alcohol intake has also been shown to increase the risk of cancer of the mouth, larynx and oesophagus, prostate and of the breast in women. Excessive alcohol intake weakens the heart muscle (cardiomyopathy) and also damages the liver (cirrhosis), brain and peripheral nerves. It also increases serum triglycerides.

73POINTS TO PONDER

Drink enough of safe and wholesome water to meet daily fluid requirements.

Drink boiled water, when safety of the water is in doubt.

Consume at least 250 ml of boiled or pasteurized milk per day.

Drink natural and fresh fruit juices instead of carbonated beverages.

Prefer tea over coffee.

Avoid alcohol. Those who drink should limit its intake.

74Guideline 14

Rationale:

Processed foods being rich in fats, salt, sugar and preservatives may pose a health risk if consumed regularly

Urbanization has increased the intake and demand for processed foods.

There is a trend towards replacing traditionally cooked foods with processed foods.

Processed foods may not be nutritionally balanced unless fortified.

Sugar, a processed food, provides empty calories.

What are processed foods?

Foods that are subjected to technological modifications either for preservation or for converting into ready-to-use/eat foods, eliminating laborious household procedures, are called "processed foods". Some of the examples are ready mixes, dehydrated foods, pasta products, canned foods, confectioneries, bakery, dairy products and breakfast foods. Manufacture of processed foods requires technology application and machinery, and as a result, processed foods are expensive.

Do we need processed foods?

There is an increased demand for processed, ready-to-eat and convenience foods due to changes in lifestyle. As more and more women go to work outside, and families have become nuclear, consumption of processed foods, particularly in urban areas, will be on the increase. Today's consumer is looking for convenient, easy-to-cook, and ready-to-eat foods which require less time to prepare than traditional home-cooked foods. Food processing is must to preserve highly perishable products like milk, meat, fish and fresh fruits and vegetables. Food processing increases the seasonal availability of foods and enables easy transportation and distribution over long distances.

75 Do processed foods contribute to nutrient intake?

Processed foods are generally consumed either as part of a meal, or as a snack item. Their contribution in terms of essential nutrients depends on the type of processing and fortification, the frequency of use, and the quantity consumed. Processed foods are generally refined and a majority of them are rich in fat or in salt/sugar, and are calorie dense. They lack dietary fibre and micronutrients. Thus, caution needs to be exercised when processed foods constitute a major part of the meal.

Breakfast cereals are increasingly being used in urban areas. Traditional breakfast items like idli, dosa, upma and roti are rich sources of nutrients. Puffed and parched rice products (eg. flaked rice) besides being crisp and tasty, are easily digestible. Food items like chips, candies, peppermints, chocolates, etc., which are popular among children, are considered as unhealthy since, they provide only empty calories often containing artificial colors and other additives. Their use should be discouraged.

What is the difference between instant foods, fast foods, street foods and unhealthy (junk) foods?

Instant foods

Instant foods are those, which undergo special processing designed to dissolve or to disperse particles more rapidly in a liquid than the untreated product. For instance, instant noodles, soup powders, cornflakes fall under this category. Although all instant foods need not be unhealthy in terms of high calorie or salt contents, there are concerns about the presence of certain additives like monosodium glutamate, which may also add up to the over-all sodium intake from the foods.

Fast Foods

Fast foods are foods already made or cooked to order within minutes for consumption like noodles, burgers, fried fish, milk shakes, chips, salads, pizzas, sandwiches, etc. Storage, handling and microbiological contamination are the major concerns. Further they are calorie dense foods.

Street Foods

Street foods comprises of a wide range of ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers, especially on streets and other public places. Idly, Wada, Dosa, Chat Items etc are examples of street foods. They may be contaminated with pathogenic organisms unless hygienically prepared.

76 Unhealthy (Junk) Foods

Unhealthy foods are those containing little or no proteins, vitamins or minerals but are rich in salt, sugar, fats and are high in energy (calories). Some examples are chocolates, artificially flavored aerated drinks, potato chips, ice creams, french fries etc.

Why should we restrict intake of unhealthy processed foods?

Frequent consumption of unhealthy processed food increases calorie intake without providing any nutrients, vitamins and minerals. Apart from being non-nutritious, processed foods also contain food additives. Food additives consumed beyond permissible limits may have adverse effects on health. The national food regulatory authorities periodically review these limits. Thus, consumption of

processed foods may not only affect intake of nutrients, but in addition, increase the risk of exposure to various chemical additives.

In the coming years, with larger constraints on time at home, demand for processed foods is certain to increase. Therefore, it is necessary to ensure that intake of a nutritionally balanced diet is not compromised with unwise intake of various processed and convenience foods. Processed vegetables and fruits available in the market are no match to nutrient rich fresh vegetables and fruits.

Why should we moderate intake of sugar ?

Sugars occur both naturally and as an ingredient in many foods. They are present in natural foods like fruits, vegetables, milk and honey. Added sugars provide taste and texture to foods. Sugar is present in processed foods like chocolates, jams, ice-creams and soft drinks. The most familiar sugar is sucrose. Refined or table sugar (sucrose) provides "empty calories". Foods such as cakes, pastries, confectionery and sweets often have high amounts of fat, and sugar, and are prepared with refined cereals. Excess consumption of sugary foods may lead to obesity and elevated blood lipids. Children overindulging in chocolates and candies are prone to dental caries. For prevention of diet-related chronic diseases, sugars and refined cereals should be sparingly used.

77POINTS TO PONDER

Prefer traditional, home made foods.

Avoid replacing meals with snack foods.

Limit consumption of sugar and unhealthy processed foods which provide only (empty) calories.

Prefer fortified processed foods.

Always read food labels (given on containers) regarding content of nutrients, shelf-life and the additives present.

78Guideline 15

Rationale:

Senior citizens need more of vitamins and minerals to remain healthy and active

Body composition changes with advancing age, and these changes affect nutritional needs of the elderly.

Elderly or aged people require reduced amounts of calories, as their lean muscle mass and physical activity decrease with ageing.

Elderly are more prone to diseases due to lowered food intake, physical activity and resistance to infection.

Good /healthy food habits and regular comfortable level of physical activity are required to minimise the ill effects of ageing and to improve the quality of life.

Elderly need adequate amounts of protein, carbohydrates, fat, vitamins, minerals and dietary fibre.

Elderly need more calcium, iron, zinc, vitamin A and antioxidants to prevent age-related degenerative diseases and for healthy ageing.

Who is an elderly person?

Individuals of 60 years and above (WHO) constitute the elderly. In India, the elderly constitute about 7 percent of the total population (Census, 2001) and by 2016 and by they are likely to increase to 10 percent.

How are the elderly different?

Ageing affects almost all the systems of the body, and is associated with several physiological, metabolic and psychological changes. The changes include decline in physical activity, digestion, metabolism, bone mass and muscle mass. Failing eye-sight and impaired hearing may also occur. Low appetite as a result of loss of taste and smell perception, dental problems, atrophic changes in GIT, constipation and decreased physical activity could lead to overall decrease of food intake and poor absorption of nutrients. Inability to prepare food, economic dependency and other psycho-social problems adversely affects the health and nutritional status of the elderly.

There is a decline in immune function with advancing age, which leads to decreased resistance to infectious diseases. The increased parathyroid hormone (PTH) secretion in the elderly leads to increased bone turn over i.e. osteoporosis. Similarly, elderly individuals are at increased risk of osteomalacia i.e. defective bone mineralization due to lack of exposure to sunlight and poor diet.

How can the elderly lead an active life?

In general, majority of the health problems among the elderly are nutrition related. Consumption of nutritious foods rich in micronutrients including antioxidant vitamins & minerals and fibre, comfortable level of physical activity would enable the elderly to

live active and meaningful healthy lives, without being a burden on society and their family members. Uncomplicated ageing can also be quite productive, say in the domestic sphere.

What are the common diseases among the elderly?

Resistance to disease declines in the elderly. The common ailments in the elderly are degenerative diseases such as arthritis (joint diseases), osteoporosis, osteomalacia, cataract, diabetes, cardiovascular (stroke, heart diseases) problems, neurological (Parkinson's, Alzheimer's) and psychiatric (dementia, depression, delirium) disorders and cancer. Besides these, the prevalence of respiratory, gastro intestinal tract (GIT) and urinary tract infections is common among the elderly.

What type of diet should the elderly eat?

As people grow older, they tend to become physiologically less active and therefore need fewer calories to maintain their weights. The daily intake of oil should not exceed 20 g. Use of ghee, butter, vanaspati and coconut oil should be avoided. They need foods rich in protein such as pulses, toned milk, egg-white etc. The elderly population is prone to various nutritional deficiencies. Therefore, the elderly need nutrient-rich foods rich in calcium, micro-nutrients and fibre. Apart from cereals and pulses, they need daily at least 200-300 ml of milk and milk products and 400 g of vegetables and fruits to provide fibre, micro-nutrients and antioxidants. Inclusion of these items in the diet improves the quality of the diet and bowel function. Flesh foods and eggs add to the quality of diet (annexure 14 & 15).

The diet needs to be well cooked, soft and less salty and spicy. Small quantities of food should be consumed at more frequent intervals and adequate water should be consumed to avoid dehydration, hyponatraemia and constipation.

How can elderly remain fit and active ?

Exercise is an integral part of maintaining healthy life. It helps to regulate body weight. The risk of degenerative diseases is considerably decreased by regular exercise. Exercise schedule should be decided in consultation with a physician.

80POINTS TO PONDER

Eat a variety of nutrient-rich foods.

Match food intake with physical activity.

Eat food in many divided portions in a day.

Avoid fried, salty and spicy foods.

Consume adequate water to avoid dehydration.

Exercise regularly.

TIPS FOR GOOD HEALTH

Exercise regularly.

Avoid smoking, chewing of tobacco and tobacco products (Khaini, Zarda, Paan masala) and consumption of alcohol.

Check regularly for blood sugar, lipids and blood pressure after the age of 30 years at least every 6 months.

Avoid self medication.

Adopt stress management techniques (Yoga and Meditation).

HEALTH BENEFITS OF IODIZED SALT

Iodine is required for formation of thyroid hormones.

Thyroid hormones are necessary for growth and development.

Iodine deficiency leads to goitre (enlargement of thyroid gland)

Lack of iodine in the water and diet is the main cause of iodine deficiency disorders.

Iodine deficiency during pregnancy results in still births, abortions and cretinism.

Use of iodized salt ensures adequate iodine intake.