Time	Narration
00:01	Welcome to the **spoken tutorial** about the importance of **vitamin D**.
00:07	In this tutorial we will learn about:
00:10	Role of **vitamin D** in the body.
00:14	Symptoms of its deficiency.
00:17	Recommended intake.
00:19	Food sources.
00:22	Let us begin by briefly understanding what is **vitamin D**.
00:28	**Vitamin D** is a fat soluble **vitamin**.
00:32	It exists in two forms: **Vitamin D3** and
00:37	**Vitamin D2**.
00:40	**D3** is mainly produced by the skin on exposure to **UVB** rays from sunlight.
00:49	**UVB** is known as **ultraviolet B** rays.
00:55	It is one of the 3 types of sun rays.
00:59	You can also get small amounts of **D3** from non-vegetarian foods.
01:06	**Vitamin D2** however is present in a few vegetarian foods.
01:13	Supplements of both **Vitamin D2** and **D3** are available in the market easily.
01:21	Interestingly, **Vitamin D** obtained from all these sources is inactive.
01:28	To become active, it has to undergo two processes.
01:33	First process of activation is in the liver and the second is in the kidney.
01:41	Active form of **vitamin D**, also known as **calcitriol**, is formed in the kidney.
01:49	Once **vitamin D** gets activated, it plays several roles in the body.
01:56	One of the major roles is formation and maintenance of strong bones.
02:03	Another is the absorption of **calcium** in the intestine.
02:09	Maintaining the levels of **calcium** and **phosphate** in the blood is another role.
02:16	These two nutrients are required for growth and repair of bones.
02:22	They help in maintaining the correct bone density in our body.
02:29	Apart from bones, they also help in maintaining strong teeth and
02:35	muscles.
02:37	**Vitamin D** is an **immunomodulator**.
02:41	This means that it helps in controlling and supporting the immune system.
02:48	It helps to activate the body’s natural response to fight diseases.
02:55	**Vitamin D** protects the body against several respiratory infections.
03:02	For example: **pneumonia**,
03:04	**influenza**,
03:06	**tuberculosis (TB)**
03:08	and **COVID-19**.
03:11	Reduction in inflammation in the body is aided by **vitamin D**.
03:17	Its other properties are to protect the body from viruses, bacteria and fungi.
03:26	**Vitamin D** is found to improve **insulin** sensitivity.
03:31	Therefore, it helps in managing diabetes,

03:34	blood pressure
03:36	and body weight.
03:39	It also maintains good heart health.
03:43	It does so by helping in relaxation of blood vessels in the heart.
03:49	For many other functions in the body, **vitamin D** is essential.
03:55	For example: cell division,
03:58	brain development and
04:00	prevention of cancer.
04:03	If the requirements of **vitamin D** are not met, there can be a deficiency.
04:11	Let us see what factors put someone at risk for **vitamin D** deficiency.
04:18	Inadequate exposure to sunlight is one of the major risk factors.
04:25	**UVB** rays from sunlight are required to produce **vitamin D** in the skin.
04:33	Glass windows block these **UVB** rays in the house.
04:38	Hence, people with limited exposure to sunlight are at risk of deficiency.
04:46	For example: old people and people mostly working indoors.
04:53	**Vitamin D** deficiency is common in winter or in regions with cold climate.
05:00	The risk of deficiency is high in dark skinned people.
05:06	They have high amounts of a pigment called **melanin** in their skin.
05:12	This reduces the ability of their skin to produce **vitamin D** from sunlight.
05:20	They require longer exposure to sunlight as compared to light skinned people.
05:28	Inadequate intake of **vitamin D** from the diet is another risk factor.
05:34	Additionally, **vitamin D** requires fat for its absorption.
05:41	Hence, people with reduced ability to absorb fat can suffer from deficiency.
05:49	This can occur in people with gallbladder
05:52	or intestinal diseases.
05:56	Individuals with liver or kidney diseases are also at risk of deficiency.
06:03	Conversion of **vitamin D** to active form takes place in the kidney and liver.
06:11	Hence, people with liver or kidney diseases are also at risk of deficiency.
06:19	Obese people and those who have had bypass surgery can also become deficient.
06:26	Pregnant and breastfeeding mothers need **vitamin D** for the foetus
06:32	and the infant.
06:34	Otherwise, the mother is at risk of becoming deficient in **vitamin D**.
06:42	Next, let us understand the effects of **vitamin D** deficiency.
06:47	Signs of deficiency may vary with severity and age group.
06:53	Some of the general signs are fatigue,
06:57	mood swings and poor immunity.
07:01	Muscle cramps, spasms and seizures are also seen.
07:07	Without adequate **vitamin D**, bones become thin, soft and brittle.
07:14	Low **vitamin D** impairs the immune system.
07:19	Thus, there is an increased chance of catching infections.

07:24	It also results in an increase in inflammation in the body.
07:30	All this makes a person more susceptible to getting infected with **COVID-19**.
07:37	The severity of effects of **COVID-19** and
07:41	death due to it rises with deficiency.
07:46	The risks of several cancers also increase due to deficiency of **vitamin D**.
07:54	Cancer of colon, prostate and breast are a few examples.
08:02	Low **vitamin D** levels can raise the risk of **multiple sclerosis**.
08:07	It is a condition in which protective covering of the nerve is damaged.
08:14	This disrupts the communication between the brain and body.
08:19	It affects the brain, spinal cord and optic nerves.
08:25	Deficiency of **vitamin D** during pregnancy can result in a rise in blood pressure.
08:33	It can have negative effects on the baby also.
08:37	There can be an increased risk of premature birth and
08:42	low birth weight babies.
08:45	Babies born to mothers with **vitamin D** deficiency, will also be deficient.
08:52	**Vitamin D** deficiency can cause **rickets** in infants and children.
08:59	**Rickets** is a disorder of the skeletal system.
09:04	The growth gets stunted and there are changes in the shape of the spine.
09:10	Other signs are sunken ribs, protruding forehead and bow shaped bent legs.
09:18	Widening of the wrist, elbow, knee and ankle joints can be seen.
09:25	Children with **rickets** are also at a risk of getting infectious disease.
09:31	There is a delay in tooth eruption.
09:34	A pot belly and an abnormal walk is also seen.
09:39	Muscle pain, irritability and increased sweating are other signs.
09:46	In adolescents and adults, deficiency causes **osteomalacia**.
09:52	It is a condition of weakening and softening of bones.
09:57	The bones become easily prone to fractures.
10:01	Severe pain in back,
10:03	hips, pelvis
10:05	and legs can occur.
10:08	Other signs include muscle weakness and spasms.
10:13	To avoid deficiency, getting adequate **vitamin D** is important.
10:19	For infants of 0 to 12 months, 400 **IU** or 10 **micrograms** per day is recommended.
10:30	600 **IU** or 15 **micrograms** per day is recommended for people of age group 1 to 70 years.
10:42	This includes children, adolescents, adults, pregnant and lactating mothers.
10:51	For men and women above 70 years, 800 **IU** or 20 **micrograms** is recommended.
11:01	Many experts recommend much higher doses.
11:05	Let us now learn how to get adequate **vitamin D**.
11:10	Our body can produce it on exposure to **UVB** rays of the sunlight.
11:16	The best time to get maximum **UVB** rays is from 11 a.m to 2 p.m

11:26	15 to 20 minutes of daily exposure to midday sunlight is recommended.
11:33	For dark skinned people, 3 to 5 times longer exposure in sunlight is needed.
11:41	Approximately 10,000 **IU** of **vitamin D** is generated during this time.
11:49	Note that the body can't make **vitamin D** if you are seated indoors by the window.
11:56	This is because the glass blocks the **UVB** rays.
12:01	Hence, you should get sunlight from outdoors.
12:05	You can even keep the windows open and let the sunshine in.
12:11	Next, let us look at food sources of **vitamin D**.
12:16	Only a small amount of **vitamin D** can be obtained from foods.
12:22	Among which fish are the best sources.
12:26	For example: sardine, herring (hilsa -Hindi), black pomfret, salmon and cod.
12:33	100 grams of sardines has 3.5 **microgram** of **vitamin D**.
12:41	100 grams of herring fish (hilsa -Hindi) has about 5 **microgram** of **vitamin D**.
12:48	Other seafood like prawns and crabs also have little amounts of **vitamin D**.
12:56	100 grams of prawns have about 1 **microgram**.
13:02	Other non-vegetarian sources of **vitamin D** are egg yolk and
13:07	chicken liver.
13:09	100 grams of chicken liver has about 2.6 **microgram** of **vitamin D**.
13:17	2 egg yolks of about 40 grams have nearly 1.3 **micrograms**.
13:24	Few vegetarian foods have **vitamin D**.
13:27	For example: mushrooms, soyabean, finger millet, sesame seeds.
13:34	100 grams of mushroom has around 20 **micrograms**.
13:39	50 grams of soybean has 33 **micrograms**.
13:45	However, along with intake, absorption is very important.
13:50	**Vitamin D3** is better absorbed and used in the body as compared to **D2**.
13:58	Hence, sunlight and non-vegetarian food are best sources of **vitamin D**.
14:05	Please consult your doctor before taking any supplements.
14:10	This brings us to the end of the tutorial. Thanks for joining.