

Literature review

1. Health benefits of Candy

Flavored chewy and gummy candy confection that are made from scratch often use plant based sources and from their extracts leads to the innovation in current flavored chewy candy present in market with improved nutritional content (Ervin et al, 2011). due to this innovation in confectionary industry certain valuable components are added like healthy edible oil components, certain fiber and water components, certain antioxidant, flavonoids and dietary supplement component which are considered having a good nutritional profile (Duyff et al, 2015). due to this innovation the sugar content is reduced up to 75% and have a good healthy nutritional profile which have good texture, taste and feels like regular flavored chewy and gummy candy. These candies are far much better than regular flavored chewy candy with better nutritional content, taste profile, rich antioxidants and dietary fibers (Palmer et al, 2010).

There are different ways of making flavored chewy gummy candies like from fat free monosaccharides and disaccharides, partially and fully hydrogenated oils with a trans-fat in them. due to trans fat in them the candies that are made from them have high sugar content, little nutritional value as they are considered as unhealthy oil for the body.

Thirdly some flavored chewy candies are made from fat of palm oil, coconut oil, palm kernels, the candies that are made from these fats have much better healthy contents as they don't have trans-fat but still having 50% sugar contents, but much better nutritional value as compared to above (Kumar et al, 2015). Some flavored candies have carbohydrate sweeteners that are replaced by polyols or sugar alcohols partially or completely. due to presence of polyols and sugar alcohols in them they have approximately zero sugar content, but their taste is not good as regular flavored gummy chewy candy which have sweeteners in them (Joy et al, 2022).

According to Harvard school of public health has conducted food study to examine how fats affect health of consumers. for good consumers health there should be more unsaturated fats like monounsaturated fats and polyunsaturated fats than saturated fats in them. the health issues like cardiovascular disease, coronary heart disease and other disorders are prevailed due to saturated fats, fully hydrogenated and partially hydrogenated and trans fat so they are replaced with monounsaturated and polyunsaturated fats having zero trans fat, due to current invention of flavored chewy gummy candy having good antioxidant profile gives specific flavor due to blend

of coconut oil , vanilla powder and edible oils as compared to flavored candy available in market (Algarni et al ,2020).

In order to decrease calorie amount in flavored chewy gummy tablets certain dietary fibers component are considered like fructooligosaccharides which have calorie of about 1.8 per gram as compared to sugar and fat having 4.5 and 8.5 per gram respectively. candies in which fructooligosaccharides are used as dietary sources are low calorie candies so if a person eats bag of candies in one sitting will not account any serious health issue. The high calories containing candies like Twizzlers, starburst and skittles are sold in market under different brands.

1.1 Orange peel Candy:

From the recent years food industry is revolutionized by using organic material (plant based)as a source in formation of several components in food industry like using of citrus peels in making of flavored candies .bioactive compounds like polyphenols , pectin , protein , pigments , dietary fibers and essential oils are extracted and have wide applications as antimicrobial , antioxidant ,anticancer and antidiabetics .so citrus peels which is in fact as waste but under proper waste utilization it can works as food additive in food industry .due to certain active components like flavonoids , antioxidants , alkaloids , dietary fiber and phenolic acid in them they have positive impacts on health by reduction in blood glucose level , cancer , hypertension and cardiovascular diseases (Mahyunidar et al ,2022).

There are several potential health benefits of orange peel candy.

Rich in nutrients

Orange peel candy contains a higher concentration of nutrients and rich in fiber, vitamin C fiber, calcium, potassium and antioxidants like flavonoids and polyphenols.

Digestive health:

Due to fiber content present in orange peel helpful in digestion by promoting good bowel movements and prevents constipation. due to pectin present in peel acting as prebiotic and also be used to feed beneficial bacteria in gut.

Immune support:

As oranges belong to citrus family so they are abundant in vitamin C and due to it is beneficial for immune system so concentrated amount of vitamin C in orange peel will be helpful in boosting good immune system and preventing from infections.

Antioxidant protection:

Antioxidants like flavonoids and polyphenols present in orange peel will be helpful in neutralization of unhealthy free radicals in body, shielding cells from oxidative damage and reducing risk of chronic diseases like cancer and heart diseases.

Anti-inflammatory properties:

Certain components present in orange peel like hesperidin and limonene have anti-inflammatory properties which will reduce inflammation in the body and reduce inflammatory conditions like arthritis.

Weight management

Due to dietary fiber content in orange peel causes a feeling of fullness and help in weight management by decreasing overall calorie intake and preventing overeating.

Oral health:

In general candy is not considered as good for teeth and leads to major cause of tooth decay but orange peel candy has less detrimental effect on dental health as compared to candy which has high sugar content. Also, the presence of essential oils in orange peel will contribute in combating oral bacteria and possess antibacterial activity.

Apart from its health benefits in consuming orange peel candy it should be consumed in moderation by keeping in view the balanced diet as excessive intake will cause negative health issues like weight gain and tooth decay.

According to (Mahato et al., 2019, Sharma et al., 2017) components like ferulic and sinapinic acid are present in peel of sour oranges. They are used in several confectionary industries and food industries in different applications. No doubt due to certain bioactive compounds it has good nutritional content but apart from it due to poor water solubility, low bioavailability and instability limit its application in food industry the increased sensitivity of flavonoids towards

environmental condition like acidic pH leads to its degradation which causes lower flavonoids content. high acidic conditions also affect antioxidant activity .

2.In Babies Skin Health:

Due to good nutritional content in orange peel, it has several benefits in health sector like pectin (a natural fiber) which helps in maintaining gut health and prevent constipation. The essential oils present in orange peel will make skin elastic, strong and beautiful. According to (Etebu and Nwauzoma, 2014) it also acts as good natural cleanser used in soap industry and help in cleansing without use of hazardous chemicals. In perfume industry it is also used in scents and in beauty industry. due to certain flavonoids in orange peels and antioxidants it causes antibacterial, anti-microbial, anti-inflammatory properties and anti-fungal properties and due to it makes it good for skin. For further skin issues like exfoliation of skin or doing scrubbing, to treat acne and pus-filled pimples, to remove blackheads, for treatment of dark spots and pigmentation and in prevention of aging dried peel powder is used.(Mahato et al ,2018).

According to (Pallavi et al., 2018) due to presence of d-limonene in orange peel it acts as natural sunscreen and used to prevent ultraviolet rays from sun. In order to fight hemorrhoids, anti-inflammatory properties of orange peel is used and flavonoids present in orange peel will retard growth of cancer cells.

Orange peel will provide several benefits to baby's skin health when used properly.

Natural moisturizer: Due to natural oils present in orange peel it acts as good moisturizer and help in hydration of baby's delicate skin and prevent it from dryness and flakiness.

Antibacterial properties: Due to presence of natural oils in orange peel it shows anti-bacterial properties and prevent bacterial infections from baby's skin health.

Antioxidant properties: Certain antioxidants present in orange peel like vitamin C and flavonoids which help in protection baby skin from the damage that is caused by free radicals and environmental pollutants.

Soothing properties: Due to gentle fragrance in orange peel it is helpful in providing calming effect on babies' skin and in soothing irritation and in promoting relaxation.

Exfoliation: Dried orange peel powder is used as natural exfoliant in removing dead skin cells and promote healthier looking skin (Gediya et al ,2011).

Treatment for skin condition: Orange peel extract and oils are considered as natural remedy in treating skin conditions in babies like diaper rash and eczema and also aid in providing soothing and antibacterial property.

Aromatherapy: The aroma of orange peel is known for uplifting and mind boosting effect which creates soothing effect for babies during bath time and massage.

Due to presence of essential oils present in orange peel it causes calming effect. They are smelled through nostrils containing receptors that catches aroma and then signals are sent towards brain and regulate emotions thus used in various health sectors in aromatherapy. In infants good sleep quality is a major measure to determine their good health and development. Babies with poor sleep quality will affect their development and factors which affect their sleep quality are fatigue, environmental conditions and bad nutritional content in diet. So, baby massage is one of the therapies that are given to infants of aged 6-12 months for better sleep. Baby massage is also known as touch therapy which causes stimulations that help in development of structures during development stages. It is also used to relieve muscular tension. Apart from it is a way of expressing love between parents and children that will impact physical and emotional development in babies (Ali et al ,2013).

The essential oils that are present in orange peel are limonene having high percentage of 95%, mirsen, octanal, decanal, neral, geranial, valence, sinensial and sinnsial . Due to presence of these components, it is used in massage therapy for massage of babies (Tkacheva et al ,2022).

Various research is conducted in different age groups of infants to check the effect of massage in babies skin health and statistical data is collected which shows that infants aged between 6-12 months has effect of massage containing aroma of orange tart and shows good sleep (Trak et al ,2022).

While orange peel give these potential benefits, it's essential to use caution and consult with a pediatrician before using any new skincare products or remedies on a baby's delicate skin. Allergies and sensitivities can vary from baby to baby, so it's crucial to perform a patch test and monitor for any adverse reactions before widespread use. Additionally, always dilute orange peel extracts or oils properly and avoid direct contact with the eyes and mucous membranes (Hosseini et al , 2020).

3.Benefits on Immune System

Orange peel candy that are made from zest of oranges have potential benefits on immune system some are listed below.

Vitamin C:

Orange peel is enriched with vitamin C, an essential nutrient helpful in providing immune-boosting properties. Vitamin C helps in production of white blood cells, which are key components of the immune system. Consuming foods high in vitamin C, such as orange-peel candy, can help support immune function (Zvaigzne et al , 2013).

Antioxidants:

Orange peel contains various antioxidants, including flavonoids and polyphenols, that help to combat oxidative stress and inflammation in the body. By reducing oxidative damage, these antioxidants can support overall immune health.

Antimicrobial properties:

Some compounds found in orange peel, such as limonene and citral, exhibit antimicrobial properties. These compounds may help fight off harmful bacteria, viruses, and fungi, thereby supporting the body's ability to fend off infections (Zvaigzne et al , 2024).

Fiber:

Orange peel is a good source of dietary fiber, which plays a role in maintaining gut health. A healthy gut microbiome is essential for proper immune function, as a significant portion of the body's immune cells are in the gut.

Anti-inflammatory effects:

Chronic inflammation can weaken the immune system over time. Certain components of orange peel, such as flavonoids, have been found to possess anti-inflammatory properties, which may help modulate the immune response and reduce the risk of inflammatory-related conditions (Okwu,et al ,2008).

Stress reduction:

While not directly related to the immune system, consuming orange peel candy can provide a sensory experience that may help reduce stress. Chronic stress can suppress immune function, so finding ways to relax and unwind can indirectly support immune health.

Essential oils:

Orange peel contains essential oils, such as limonene, citral, and linalool, which contribute to its aromatic flavor and fragrance. These essential oils have antimicrobial properties and help in reducing the growth of bacteria, viruses, and fungi. By reducing the proliferation of pathogens, essential oils support the body's immune defenses and reduce the risk of infections.

Polyphenols:

Orange peel is rich in polyphenols, which are plant compounds with anti-inflammatory and antimicrobial properties. Polyphenols are used to modulate the immune response by regulating the activity of immune cells and cytokines, which are signaling molecules involved in inflammation. By exerting anti-inflammatory effects, polyphenols help maintain immune balance and reduce the risk of inflammatory-related conditions (Abdulameer et al ,2019).

Mood and stress:

The sensory experience of consuming orange peel candy, with its vibrant color and citrusy aroma, can have mood-enhancing effects. Citrus fragrances have been associated with stress reduction and relaxation, which can positively impact immune function. Chronic stress can weaken the immune system by suppressing immune responses and increasing susceptibility to infections. Therefore, finding ways to manage stress, such as enjoying sensory experiences like consuming orange peel candy, can indirectly support immune health (Saini et al ,2022).

Incorporating orange peel candy as part of a balanced diet, along with other immune-boosting foods like fruits, vegetables, whole grains, and lean proteins, can help support overall immune function and promote wellness. However, it's essential to consume orange peel candy in moderation and choose options that are low in added sugars and artificial ingredients to maximize its health benefits.

4.Hypoglycemia:

Hypoglycemia is a medical condition characterized by low blood sugar levels, typically defined as a blood glucose concentration below 70 milligrams per deciliter (mg/dL). Glucose, that we get from food , serves as the primary source of energy for cells throughout the body, including the brain. When blood sugar levels drop too low, it can lead to various symptoms and, if severe or prolonged, can be dangerous (Cryer et al ,1994).

The general causes of Hypoglycemia

Medications:

Certain medications, such as insulin and some oral diabetes medications, can lower blood sugar levels. This is particularly relevant for individuals with diabetes who use medications to manage their condition.

Dietary factors:

Skipping meals, inadequate food intake, or consuming food with insufficient carbohydrates will lead to low blood sugar levels.

Excessive physical activity:

Engaging in strenuous exercise without adequate carbohydrate intake or adjusting insulin or medication doses appropriately can cause hypoglycemia. (Guettier et al , 2006 ., Cryer et al ,2008).

Alcohol consumption:

To drink alcohol, especially on an empty stomach or in excess, can lead to hypoglycemia as it interferes with the liver's ability to release stored glucose into the bloodstream.

Symptoms of Hypoglycemia

- Shakiness or tremors
- Sweating
- Palpitations or rapid heartbeat
- Hunger
- Irritability and mood changes
- Weakness or fatigue
- Headache
- Blurred vision

The treatment for hypoglycemia depends on its severity and underlying cause. Mild to moderate hypoglycemia can often be treated by using fast-acting carbohydrates like fruit juice, glucose tablets, or candy, followed by a more substantial snack or meal containing protein and

carbohydrates to stabilize blood sugar levels. Severe hypoglycemia may require emergency medical attention, including the administration of intravenous glucose.(Cryer et al , 1997).

4.1. Health Benefit of Orange Peel Candy on Hypoglycemia

Orange peel candy can offer some potential health benefits for individuals with hypoglycemia, though it must be consumed in moderation and as part of a balanced diet. Here's how orange-peel candy may be beneficial:(Cryer et al, 2008).

Fiber content:

Orange peel contains dietary fiber, which can help slow down the absorption of sugar into the bloodstream. This can prevent rapid spikes and drops in blood sugar levels, which is particularly important for individuals with hypoglycemia.

Vitamin C:

Oranges and their peels are rich in vitamin C, an antioxidant that supports immune function and may help regulate blood sugar levels.

Flavonoids:

Orange peel contains flavonoids, which are plant compounds with antioxidant properties. Some studies suggest that certain flavonoids may have a beneficial effect on blood sugar regulation.

Natural sweetness:

Orange peel candy may provide a natural source of sweetness without the rapid spike in blood sugar levels that refined sugars can cause. However, it's still important to monitor portion sizes and overall sugar intake.

Low glycemic index:

Foods with a low glycemic index (GI) release sugar into the bloodstream more slowly, which can help prevent blood sugar crashes. While the candy itself may have added sugars, the presence of orange peel may mitigate its impact on blood sugar levels (Ademosun et al , 2018 ., Sharma et al ,2019 ., Khan et al ,2021).

Despite these potential benefits, it's essential for individuals with hypoglycemia to check their blood sugar levels closely and consult with a healthcare professional or dietitian before making significant changes to their diet, including incorporating orange peel candy. Additionally,

individuals should be mindful of portion sizes and overall sugar intake to avoid potential negative effects on blood sugar control (Coram et al ,1986 ., Gans et al , 1977).

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