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Chocolate: the "food of God"- a review

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Abstract:-

Chocolate, a product of ground seeds of the cacao tree pods, is very popular among people for its tempting taste and health benefits. It is usually sweet, but dark chocolates are more bitter than white chocolates due to more cocoa solids and less sugar. Chocolate is prepared by using different processes like fermentation, leaning, roasting, breaking winning, milling, the addition of flavouring substances, sugar, Cocoa, milk, cocoa butter, mixing, refining, tempering and molding. Chocolate is used in various recipes, such as desserts, cakes, pudding, mousse, cookies, and beverages like hot chocolate, chocolate milk, etc. In the past, chocolate consumption was considered a sin associated with obesity, hypertension, coronary heart disease, and diabetes mellitus. Even physicians warn patients about consuming a large number of chocolates. But after the discovery of biologically active phenolic components that possess antioxidant activity, the perceptions changed. Flavonol-rich chocolate helps to reduce insulin resistance, lower blood pressure and cardiovascular disease, gives protection against skin damage. Nowadays, It is used as a novel therapy for treating different conditions.

Keywords: chocolate, cacao, phenolic compounds, flavonols, antioxidant,

Introduction:

The word 'Chocolate' is derived from the classical Nahuatl word "Chocolatl".^[1] At first, in the 16th century, chocolate came to Europe, and Cocoa originated in America.^[2] In the 21st century, west Indian countries, mainly Ghana, are the leading producers of Cocoa. The majority of Mesoamerican people made chocolate beverages.^[1] Most people of the world have a chocolate craving.^[2] Chocolate is generally made in the form of liquid or block in shape.^[3] It usually is considered a luxury item, but now it is used as medicine. A few years ago, chocolate was criticized for containing fat and causing acne, hypertension, obesity, diabetes, cardiovascular disease, and atherosclerosis. But after research, chocolate is beneficial to us for its significant antioxidant properties.^[2] Chocolate also uses in many foodstuffs as a flavouring ingredient. Mainly desserts, chocolate cakes, pudding, mousse, cookies, and beverages like hot chocolate,

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chocolate milk, etc.^[4]

Aims and objectives

- To inform people about the benefits of chocolate On health & also that chocolate consumption doesn't always have harmful effects.
- To identify the uses of chocolate as food and as a novel therapy to prevent and cure different diseases.
- To evaluate the phytochemical and antioxidant properties of chocolate.

Discussion

Chocolate is a preparation of ground seeds of the cacao tree pods. In American English, before processing, the dried seeds and its tree are called "cacao", but after the roasting and grinding process, it is known as 'cocoa.' 'Chocolate' is prepared from roasted cacao seeds. Chocolate is grown extensively in Brazil, West Indies, and Sri Lanka.

It is generally sweet in taste and fat content products. But dark chocolates are more bitter than white chocolates due to the presence of more cocoa solids and less amount of sugar. Chocolate helps in making hot chocolate, chocolate milk, cake, desserts, pudding, etc.^[4] A few years ago, chocolate is criticized for different types of diseases, but nowadays, chocolate is used as a medicine.^[2]

About cocoa tree

The cocoa tree grows naturally in Amazon. Leaves are greenish, and they are about 300 mm long. ^[6] Flowers and fruits are small, about 15mm. After pollination, they develop into the pods. After 5-6 months, the seeds are designed and are long, about 100-350 mm, weighing 200 gm-1kg. The pods are different in shape, colour, and surface texture.^[7]

They ripen, pods changed in colour, mainly green, yellow, or red to yellow or orange. By splitting or cracking, pods are opened to release the beans. Inside the pod, beans are attached to the placenta. The placenta is cut out, and the seeds are manually separated. [9]

What is cocoa?

Cocoa beans come from the fruits of *Theobroma cacao L*, in Nigeria. The base ingredient for cocoa powder, cocoa butter, and chocolate products is cocoa beans. Cocoa is an essential ingredient in chocolate making. Cocoa beans are rich in protein, fat, carbohydrates, and phytonutrients, mainly catechins and procyanidins. Cocoa is available in a variety of forms,

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flavours, colours, and microbiological quality.^[12] At 400° F, cocoa beans are cleaned and roasted to loosen the shells and intensity of the rich chocolate flavour and colour. Shells are removed, and the 'nib' is released that is used in making chocolate.^[13]

HISTORY OF CHOCOLATE:-

About 4000 years ago, *Theobroma cacao*, the tree that bears the pods and beans that are ultimately made into chocolate, was probably domesticated initially in Amazon regions.^[10] Chocolate is originated from Mexico. Mayas, Incas, and Aztecs cultivate the cacao tree. At first, it was accessible only for the people belonging to the affluent and prosperous society. Later on, coffee replaced chocolate for its excessive amount and tea as the main drink. However, chocolate became a favourite confectionery product in the most developed countries, including Europe, and North America. Nowadays, Cocoa is grown mainly in West Africa, Indonesia, Sri Lanka.

In the past, due to health effects, chocolate considered as the "drink of God." *Theobroma cacao* is from the Greek word theo(God) and bromo(drink). It was given by the Swedish naturalist Carl VonLinne(1701-1778).^[11] Chocolate was served as a beverage to adult men, mainly priests, government officers, and military officers. It is intoxicated and stimulating and not suitable for women and children.^[10]

Types of Chocolate

- Unsweetened chocolate
- Bitter chocolate
- Milk chocolate
- Semisweet chocolate
- Sweet Baking chocolate
- White chocolate

Descriptions:

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Unsweetened chocolate- It is chocolate without added sugar. Made of chocolate liquor, pure chocolate. It is bitter in taste.



Milk chocolate Milk-Chocolate is made of milk solids, refined wheat flour, hydrogenated vegetable fats, sugar, edible vegetable fats, cocoa solids, raising agents, yeasts, flour treatment agents, iodized salts. Artificial substances vanilla also contains.



Sweet Baking chocolate-Sweet baking chocolate is made of sugar, hydrogenated vegetable fats, edible vegetable fats, milk solids, cocoa solids and artificial flavouring substances vanilla.



Semisweet chocolate-Milk chocolate is made of sugar, milk solids, edible vegetable fats, hydrogenated vegetable fats, cocoas olis . Also contain artificial flavouring substances like vanilla. It is sweet in taste.



Bittersweet chocolate-Bittersweet chocolate is also known as dark chocolate.It is made of cocoa butter, cocoa solids and sugar. It is bittersweet in taste.

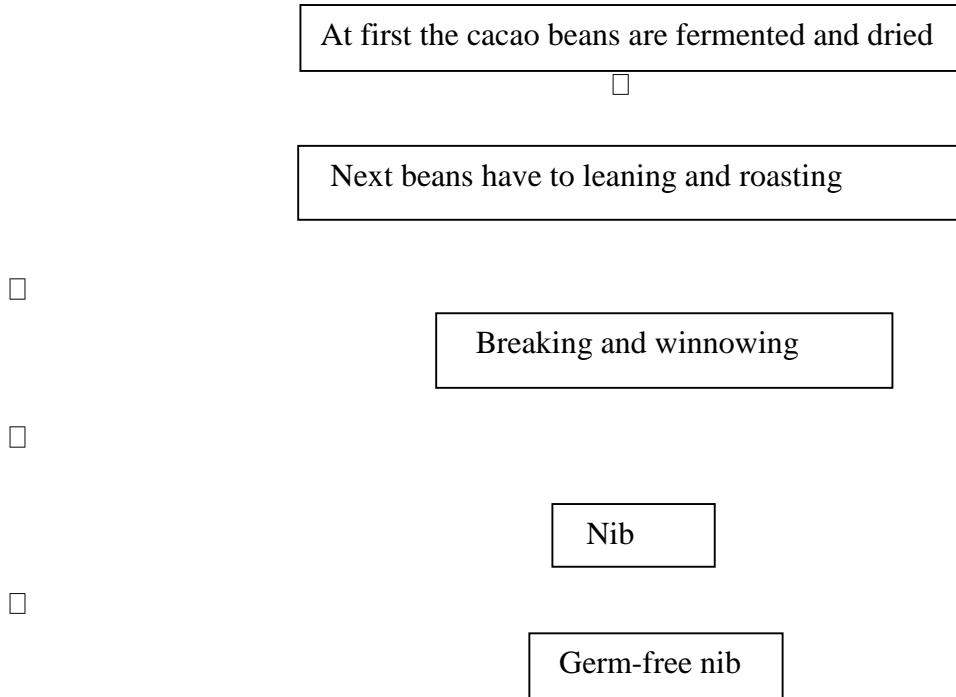
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<p><u>White chocolate</u>-White chocolate is sweet in taste and made of vegetable fats, hydrogenated vegetable fats and sugar. Flavouring substances vanilla is added.</p>	
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Chocolate preparation



□

Milling

□

Cacao mass(chocolate liquor)

□

Addition of sugar and flavours in cacao mass

□

Add milk and cocoa butter

□

Mixing well

Then refining to produce smooth texture



□

Conching lowers volatiles, polyphenols, pigments, proper coating of fat to sugar and cocoa solids; brings velvet texture.

□

Tempering forms stable fat crystals and prevent 'Fat bloom 'during storage

□

Next moulding

□

Plan or milk chocolates

[15]

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Composition of chocolates

The ingredients that makeup chocolate are milk powder, sugar, cocoa liquor, and cocoa butter. The amount of cocoa butter significantly impacts how sweet solid chocolate is. The triglyceride molecules that makeup cocoa butter are divided into six different polymorphs, each with an other melting point.^[16]

	<u>Cocoa Butter</u>	<u>Cocoa Liquor</u>	<u>Sugar</u>	<u>Milk Powder</u>
Dark Chocolate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk Chocolate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
White Chocolate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Nutritive value of different types of chocolates

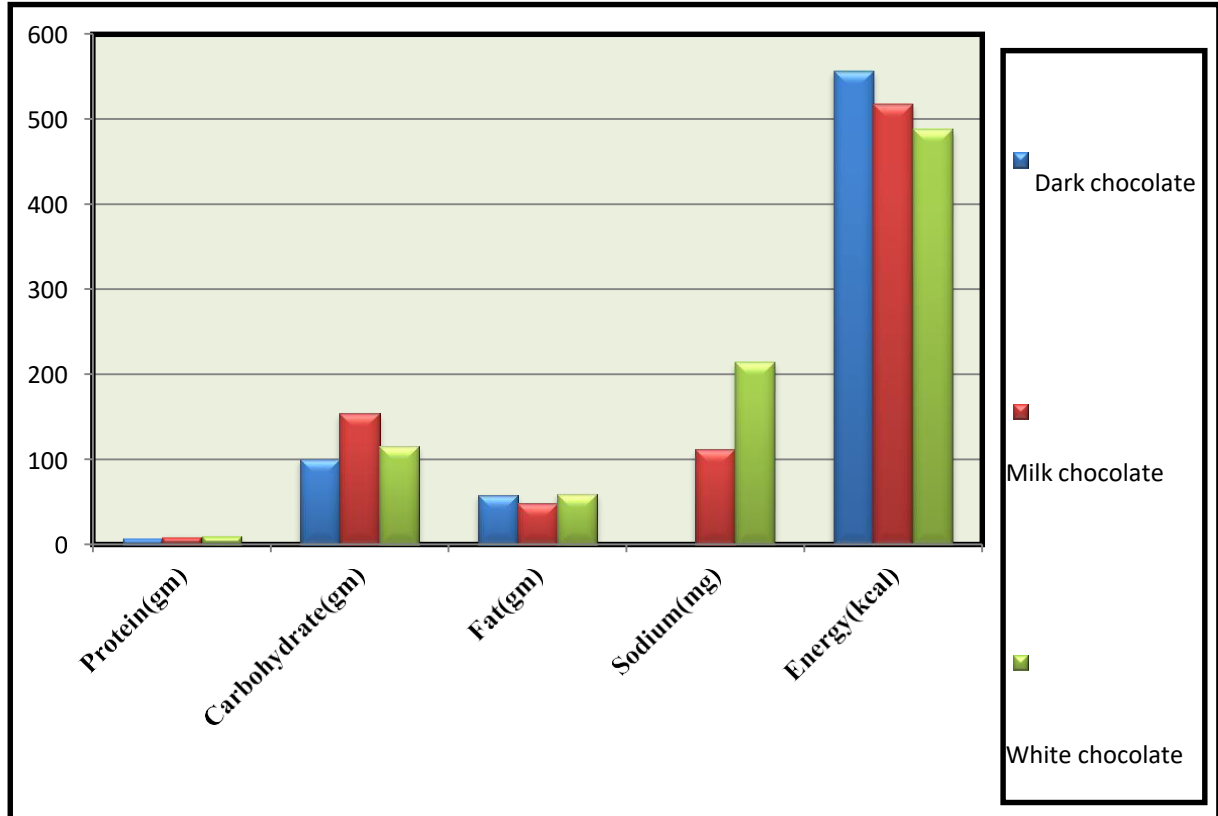
<u>Nutritive value (per 100gm)</u>	<u>Dark chocolate</u>	<u>Milk chocolate</u>	<u>White chocolate</u>
Protein(gm)	6	8	9
Carbohydrate(gm)	100.3	154.2	115.1
Fat(gm)	58.1	48.74	59.37
Sodium(mg)	—	112.2	213.3
Energy(kcal)	557	518	488

Source :- IFCT 2017, NIN, ICMR

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Graphical representation of the nutritive value of different chocolates

ANTIOXIDANT PROPERTIES OF CHOCOLATES

Cocoa contains large amounts of biologically active compounds with antioxidant activities, such as polyphenols, flavonoids, epicatechins, catechins, alkaloids, and procyanidin. Cocoa has higher amounts of flavonoids than tea or wine. So as dark chocolate contains more flavonoids than milk chocolates. Furthermore, dark chocolate has greater biological effects from flavonoids than milk chocolate. Anti-oxidant scavenge free radicals and

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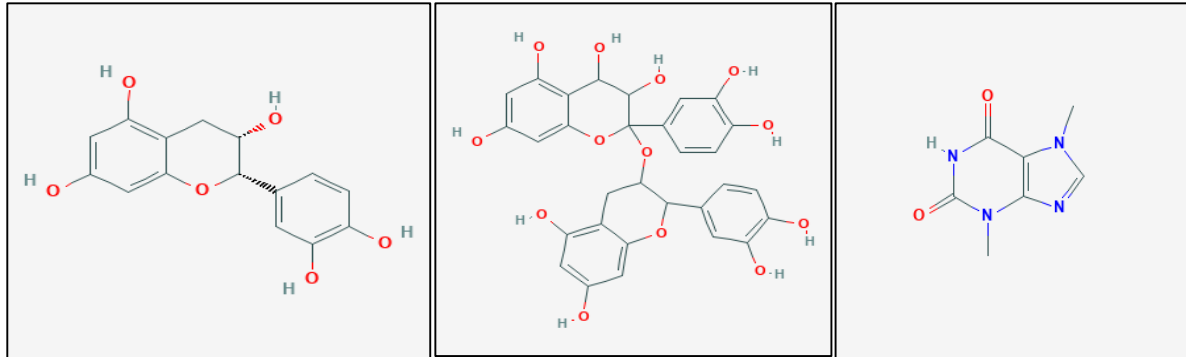


Figure 1. epicatechins

fig 2. Procyanidin

fig 3 . Theobromine

decreases oxidative stress. As a result, it helps delay the onset of many diseases, including Parkinson's disease, Alzheimer's disease, diabetes mellitus, cancer, and heart disease.[8,14]

Epidemiological evidence about the health effects of chocolates

Low prevalence of atherosclerosis, type 2 diabetes, and hypertension are characteristics of the Kuna Indian population of the Panamanian islands. Because indigenous Kuna Indians intake daily homemade cocoa drinks.

Higher cocoa intake was linked in a prospective analysis to a decline in cardiovascular and all-cause mortality.^[17]

Potential health benefits of chocolate consumption

Chocolate helps in cardiovascular disease- Many studies show that Cocoa has beneficial effects of reducing cardiovascular disease. Dark chocolate consumption daily is a successful CVD patient preventive measure.

Rich source of antioxidants- Chocolate is a rich source of antioxidants. Antioxidant inhibits the plasma lipid oxidation. Study shows that after the consumption of chocolate, in plasma, antioxidant capacity is increased in a large amount. Flavonol rich food increases uric acid levels.

Blood pressure-lowering effects- After numerous studies, a person who consumes Cocoa has significantly lower blood pressure than those who didn't. Minimum of 15 days of dark chocolate bar consumption helps prevent systolic blood pressure.^[17]

Inhibit platelet activation-The combined effects of cocoa and aspirin are thought to improve clot prevention because cocoa has an aspirin-like impact on platelet activation. Platelet aggregation and adhesion are both decreased by chocolate, which has a dual effect on them.

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Chocolate with a high procyanidin content reduces leukotriene levels and raises prostacyclin levels.

Anti-diabetic effects- Flavonol-rich chocolate helps reduce insulin resistance and increase insulin sensitivity in healthy people and hypertensive patients.

Anti-stress effects - Chocolate contains a variety of bioactive substances that reduce stress. After 14 days of dark chocolate consumption, stress levels in adults with high anxiety profiles were comparable to those of low-stress individuals.

By encouraging the production of the neurotransmitter serotonin, chocolate lowers stress levels.

Anti-obese effects- Obesity is another significant risk factor for developing CVD. According to the study, cocoa lowers serum triglycerides, mesenteric white adipose tissue, and overall body weight.

Effects on the neurons- Daily intake of Cocoa increase the cerebral blood flow. The study suggested that Cocoa play an important in improving cerebral condition like dementia and stroke. Regular ingestion of Cocoa helps in developing cognitive performance. Larsson et al. investigated whether eating chocolate lowers the risk of having a stroke attack.^[18]

Chocolate is good for the skin- Due to its high flavonol content, specially-made dark chocolate is photoprotective and provides nutritional protection against sun-damaged skin. Cocoa consumption is good for healthy skin to improve cutaneous microcirculation, influencing thermoregulation and surface oxygen.^[19]

Chocolate eating is healthy during sadness and joy- Study shows chocolate eating qualitatively affects the emotions of sorrow and joy. Chocolate motivates effectively to eat and helps to respond to anger, fear, sorrow and joy.^[20]

Use of chocolates as a novel therapy for the treatment of health disorders-

There is some scientific support for the claim that consuming moderate amounts of dark chocolate daily is healthy for an individual. A few years ago, chocolate came under fire for having a lot of sugar and triglycerides. As a result, a person would need to burn more calories by exercising regularly or limiting their intake of fats, sugars, and carbohydrates.

But according to the most recent research, the flavonol and epicatechin content of chocolate accounts for the majority of its health benefits. Therefore, adding flavonol-rich chocolate to

our diets is beneficial for our health. [21]

Use of chocolates

Medicinal use of chocolate- In the middle of the 1500s, the therapeutic use of chocolate as a primary remedy and a vehicle for delivering other medicines spread from the New World to Europe. Bowel issues and skin rashes are treated with cocoa flowers. Fever can be managed and heart palpitations can be treated with cocoa. Emaciated patients who want to gain weight can benefit from chocolate. By stimulating the kidney, chocolate aids in digestion and enhances bowel function.[22]

Chocolate for healthy skin - Phytochemical-rich Cocoa is beneficial for skin protection. Leather's bioactive component has a significant effect on our skin. Cocoa provides photoprotection and aids in maintaining healthy skin. Consuming chocolate is a good way to emphasise skin physiology. Consuming chocolate enhances dermal blood flow, supports healthy skin, and shields the human skin from damaging UV rays. The polyphenol in Cocoa is helpful in preventing skin cancer and ageing of the skin. Because polyphenol has anti-inflammatory, antioxidant, and DNA-repair abilities, it can help prevent a variety of skin conditions brought on by prolonged exposure to UV light from the sun. Polyphenol offers sufficient defence against UV rays and the ensuing photoaging. Pure theobromine from cocoa extract reduces the appearance of wrinkles. [23]

Use as mood food- Chocolate consumption has a sectional relationship with adult depression. High chocolate consumption is significantly correlated with depression. High cultural traditions linked eating chocolate to positive effects on mood. Depression can increase the chocolate craving. Caffeine is one of the nutrients found in chocolate that helps improve mood in adult women.

Conclusion

Chocolate has tremendous antioxidant properties. Antioxidants inhibit plasma lipid oxidation. Flavonol-rich chocolate helps to reduce insulin resistance and increase insulin sensitivity and uric acid levels in people. High cocoa content chocolate helps in lowering blood pressure. Dark chocolate consumption is an effective preventive strategy for controlling CVD. Dark chocolate contributes nutritional protection against skin damage and protects human skin from the harmful UV effects of sunlight. Chocolate consumption also improves dermal blood flow.

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Chocolate has therapeutic use as medicine in many ways. Cocoa flower helps in the treatment of bowel dysfunction and skin irritations. Chocolate helps in digestion and improves bowel function by stimulating the kidney. So chocolate is really good food for us, and the daily consumption of chocolate helps to keep us healthy in our daily life. But manufacturers are now established processing techniques by which less bitter chocolates are produced. For which bitterness as well as flavonoid contents are simultaneously decreased. More than 90% of flavonoids are lost during cocoa processing. So further studies are needed to investigate whether these less polyphenol content chocolates are associated with any health benefits in humans.

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