

Chocolate Consumption in Children and Adults

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Abstract

Chocolate is a unique flavored food used in our society. Chocolate is also known as 'food of Gods'. It is prepared from the seeds of a plant *Theobroma cacao*. It contains many active ingredients. The most important ingredient of chocolate is caffeine, a Central Nervous System (CNS) stimulant. Caffeine also has a potency to make its user addicted to it. The chocolates are widely used in many recipes and drinks as well as gifts. Chocolate is also aphrodisiac in nature. Our survey aims to find out its consumption and addiction is children and professional and non-professional adults. The data was collected from different private and public places, schools, parks and malls of Karachi, Pakistan in the month of September to December, 2014. According to our survey on consumption of chocolates in children, we find that only 7.5% children do not take chocolate and chocolate containing foods, While other 92.5% children takes chocolate and chocolate containing food daily. In professional adults, 90% takes chocolates on daily or weekly bases while other 10% do not take it. In non-professional adults, all the samples eat chocolates and chocolate containing food on weekly or daily basis.

Key words: Theobroma Cacao, Caffeine, CNS Stimulant, Aphrodisiac

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Introduction

Chocolate is a sweet, brown, food preparation of *Theobroma cacao* seeds, roasted and ground, often flavored, as with vanilla. Cocoa powder and chocolate are made from the dried seeds that are found in the fruits of the cacao tree. The complex chocolate manufacturing process begins with harvesting fruit of the cocoa tree. In the 18th century, Carolus Linnaeus, who was a Swedish botanist, changed the name of cocoa tree giving it the Greek name *Theobroma Cacao*, which is now the official botanical name, that literally means 'food of the Gods'. The flavor of chocolate differs depending on the ingredients used and the preparation method of chocolate. Chocolate is made up of cocoa. Expensive ingredient of cocoa is 'cocoa butter'. An additional ingredient of cocoa is vegetable fat (5%).

The *Theobroma Cacao* is a native of the Amazon basin and other tropical areas of South and Central America. These plants grow best under canopy of tropical rainforests, seldom reaching more

than 7.5 meters high. Sometimes, they need to be shaded from direct sun and wind, to flourish, especially in the stage of early growth. Their leaves are broad and dark, that are about 25cm in length. The flowers are pale-coloured. Pods are grow from flowers contains cocoa beans. Cocoa trees begin to bear fruit when they are three to four years old.

Processing the Cocoa seeds

Processing of cocoa beans involves six steps:

1. **Fermentation:** During fermentation the cocoa pulp clinging to the beans matures and a liquid is made and the flavor of true chocolate starts to develop.
2. **Drying and bagging:** After fermentation, the seeds are dried in the sun, or by using special drying equipment.
3. **Winnowing:** The dried beans are cracked and a stream of air separates the nib and shell. The nibs are small pieces which are used for chocolate making.

- Roasting:** The nibs are roasted in special ovens at temperatures between 105-120°C.
- Grinding:** The roasted nibs are ground in stone mills until the friction and heat of the milling reduces them to a thick chocolate-coloured liquid, known as 'mass.' It contains 53-58% cocoa butter and solidifies on cooling.
- Pressing:** In powerful machines, the cocoa mass is pressed to extract the cocoa butter which is an essential component in chocolate making [1].

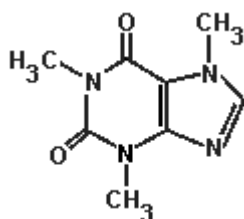
Constituents of chocolates

Methyl xanthines

The two main methylxanthines present in chocolate are Theobromine and Caffeine, both of which are only present in small quantities and are weak central nervous system stimulants [2].

Caffeine

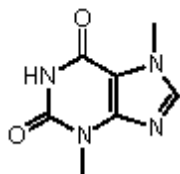
Caffeine is an alkaloid drug, associated with tea and coffee but is also present in chocolate but in small amounts. Caffeine is a CNS stimulant, and it also stimulates the heart. It promotes wakefulness and increases mental activity. However it is also a diuretic and causes headaches, and can cause constriction in some vascular blood vessels.



Caffeine

Theobromine

Theobromine is the principal alkaloid of the cacao bean and about 1.5-3% of chocolate is theobromine. It is also an alkaloid, and is a weak stimulant for the central nervous system. Theobromine is responsible for the bitter taste of chocolate. As it only has a half-life of 6 to 10 hours it is in the body for quite a short time and hence does not have strong subjective effects. However it is a diuretic, a cardiac stimulant and will cause dilation of arteries. Too much theobromine one could suffer from nausea, insomnia, restlessness, excitement and even mild delirium. But the good news is that you would have to eat an awful lot of chocolate before the theobromine effects are seen.



Theobromine

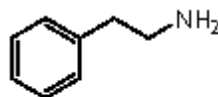
Phenolics

It is believed that phenols protect against heart disease by acting

as an anti-oxidant. The chemical process of oxidation is now thought to damage substances in the blood known as low-density lipoproteins (LDLs). The action of phenolics leads to buildup of a fatty mass called 'plaque' that clogs the arteries. Clogging and clotting in the human arteries are major causes of often fatal heart attacks. Phenols prevent the oxidation of low density lipoproteins into the bad fats reducing the risk of heart disease. Phenolics also prevent the fat in chocolate from becoming rancid.

Phenyl ethylamine

Phenyl ethylamine is also an important constituent of chocolate, which is a chemical that can raise blood pressure and blood sugar levels. Chocolate acts as 'aphrodisiac' due to the presence of Phenylethylamine, which is also known as the "love drug". It mimics the chemistry of brain of a person in love. When the phenyl ethylamine levels raises in the body it relieves depression [2].

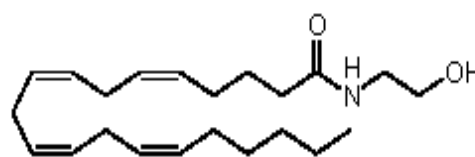


Phenylethylamine

Anandamide

Chocolate contains a substance known as anandamide which is a cannabinoid and is naturally produced in a brain. These substances have several effects in humans:

- Decrease pain perception
- Change perception of time
- Decrease hypomobility
- Produce euphoria



Anandamide

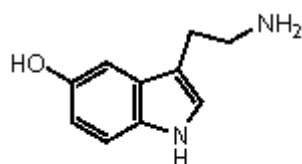
Serotonin

Serotonin is an aromatic chemical which acts as a neurotransmitter in the body. It has many effects on the body such as:

- Increased gastrointestinal mobility
- Causes the smooth muscle contraction
- Mixture of vascular constriction and dilatation
- Platelet aggregation
- Excitation of CNS neurons

As a result one can feel nauseas, and mood is affected. If there is a decrease in serotonin levels in the brain this leads to craving for

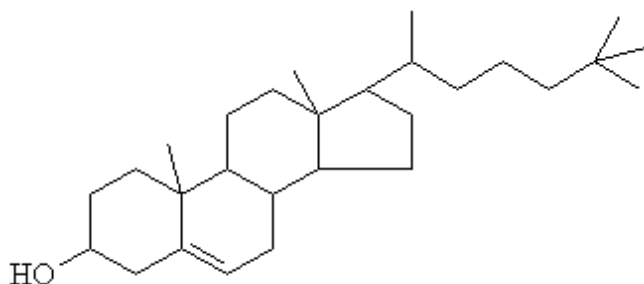
starchy and sweet foods like chocolate. Once the serotonin levels rise again then one feels good.



Serotonin

Fats and Sugars

Chocolate contains a saturated fat called stearic acid which is a long chain hydrocarbon with 16 carbons, which is unbranched. This fatty acid is believed to lower cholesterol levels possibly by being converted in the liver to oleic acid, a benign monounsaturated fat and hence although chocolate has a high fat content, blood cholesterol levels do not raise.



Fats and Sugars

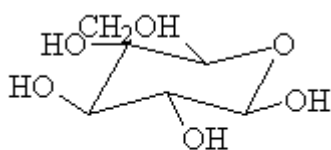
The structure of cholesterol is shown above and a major part of animal plasma membranes, it is also a metabolic precursor of the steroid hormones.

Chocolate of course contains a lot of other fats and sugars. Fatty acids have four important roles in the body.

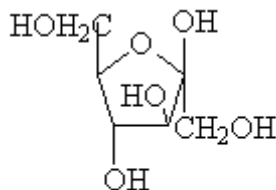
- They are used to make essential components of biological membranes
- Fatty acids act as fuel molecule, being turned into triacylglycerols and broken down to generate energy.
- Derivatives of fatty acids serve as hormones and intercellular signals.

The sugars present in chocolate are mainly in the form of glucose and fructose which are used in glycolysis to produce energy.

Too much sugar and it is converted into glycogen which is stored in the body. While too much fat can cause obesity.



D- Glucose



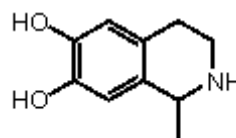
D-Fructose

Other Chemicals

There are many other active ingredients in chocolate as well as carbohydrates, proteins, vitamins, and minerals.

Other ingredients include

- Salsolinol a tetrahydroisoquinoline.
- Histamine another neurotransmitter possibly responsible for the craving of chocolate and change in mood.
- Magnesium and Potassium, which are essential for all living things, and are present in high quantities in chocolate
- Thyphylline is a potent CNS and cardiovascular stimulant with diuretic and bronchial smooth muscle relaxant properties [3].



Salsolinol

Methodology

A cross-sectional survey was conducted for the collection of data about the consumption of chocolate in children and adults (professionals and non-professionals) in Karachi, Pakistan. Data were collected between September to December, 2014 from different private and public places, schools, parks and malls in Karachi city. A specially designed questionnaire was used for data collection. Data from 100 adults (50 professionals, 50 non-professionals) and 200 children were collected. Data collection was based on daily consumption in children and weekly consumption in adults. The questionnaire was designed in order to check the daily consumptions and addiction of chocolates in children and adults (people belonging to different professions and non-professionals).

Data Analysis

We have used charts for representation of data obtained.

Result

Chocolate is all time favorite food and flavor for many sweet dishes. Several ingredients are present in chocolate which have effects on health of human. Chocolate is proved to be beneficial

for human health. We have checked its consumption in children and adults.

Discussion

In children, in the first age group, that is 0-5years, total 7 children are questioned about their chocolate consumption habit. 6 children answered that they eat 1-3 chocolates daily while 1 child answered that he take more than 10 chocolates daily. In children, in the second age group, that is 5-10 years, total 145 children are questioned about their chocolate consumption habit. 12 of them answered that they do not take chocolate due to its bitter taste. 93 children answered that they eat 1-3 chocolates daily, 25 children answered that they take 4 to 6 chocolates daily, 8 children answered that they take 7 to 9 chocolates daily, while 7 children answered that they take more than 10 chocolates daily. In children, in the third age group, that is 10-15 years, total 48 children are questioned about their chocolate consumption habit. 3 of them answered that they do not take chocolate due to its bitter taste. 24 children answered that they eat 1-3 chocolates daily, 16 children answered that they take 4 to 6 chocolates daily, 2 children answered that they take 7 to 9 chocolates daily, while 3 children answered that they take more than 10 chocolates daily (Figure 1).

In the first age group (15-22years) of professional adults the question about their weekly consumption of chocolate was asked from 18 samples. 4 of them takes 1 to 3 chocolates weekly, 2 of them takes 4 to 6 chocolates weekly, 6 of them takes 7 to 9 chocolates weekly while other 6 answered that they take more than 10 chocolates weekly. In the second age group (23-28years)

of professional adults the question about their weekly consumption of chocolate was asked from 22 samples. 3 of them answered that they do not take chocolate due to its bitter taste. 10 of them takes 1 to 3 chocolates weekly, 1 of them takes 4 to 6 chocolates weekly, 3 of them takes 7 to 9 chocolates weekly while other 5 answered that they take more than 10 chocolates weekly. In the third age group (29-35 years) of professional adults the question about their weekly consumption of chocolate was asked from 10 samples. 2 of them answered that they do not take chocolate due to its bitter taste. 2 of them takes 1 to 3 chocolates weekly, 1 of them takes 4 to 6 chocolates weekly, 3 of them takes 7 to 9 chocolates weekly while other 2 answered that they take more than 10 chocolates weekly (Figure 2).

In the first age group (15-22 years) of non-professional adults the question about their weekly consumption of chocolate was asked from 44 samples. 10 of them takes 1 to 3 chocolates weekly, 1 of them takes 4 to 6 chocolates weekly, 7 of them takes 7 to 9 chocolates weekly while other 26 answered that they take more than 10 chocolates weekly. In the second age group (23-28years) of non-professional adults the question about their weekly consumption of chocolate was asked from 1 sample. Who answered that he takes more than 10 chocolates weekly. In the third age group (29-35 years) of non-professional adults the question about their weekly consumption of chocolate was asked from 5 samples. 2 of them takes 1 to 3 chocolates weekly, while other 3 answered that they take more than 10 chocolates weekly (Figure 3). We have done this type of survey which is useful for health professional [4-7].

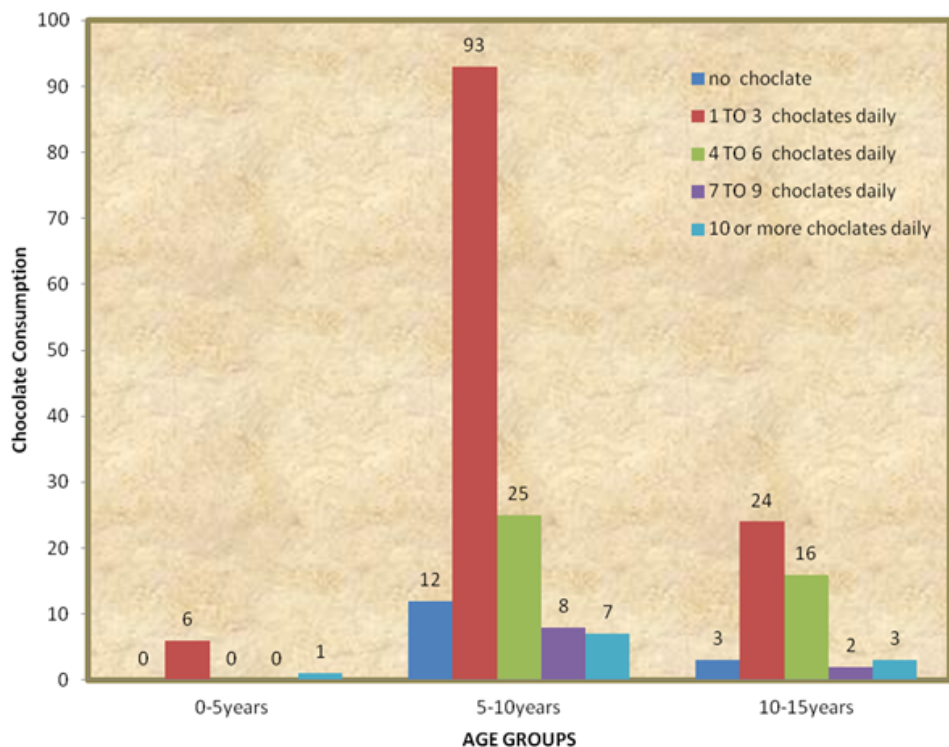


Figure 1: Daily consumption of chocolate in children

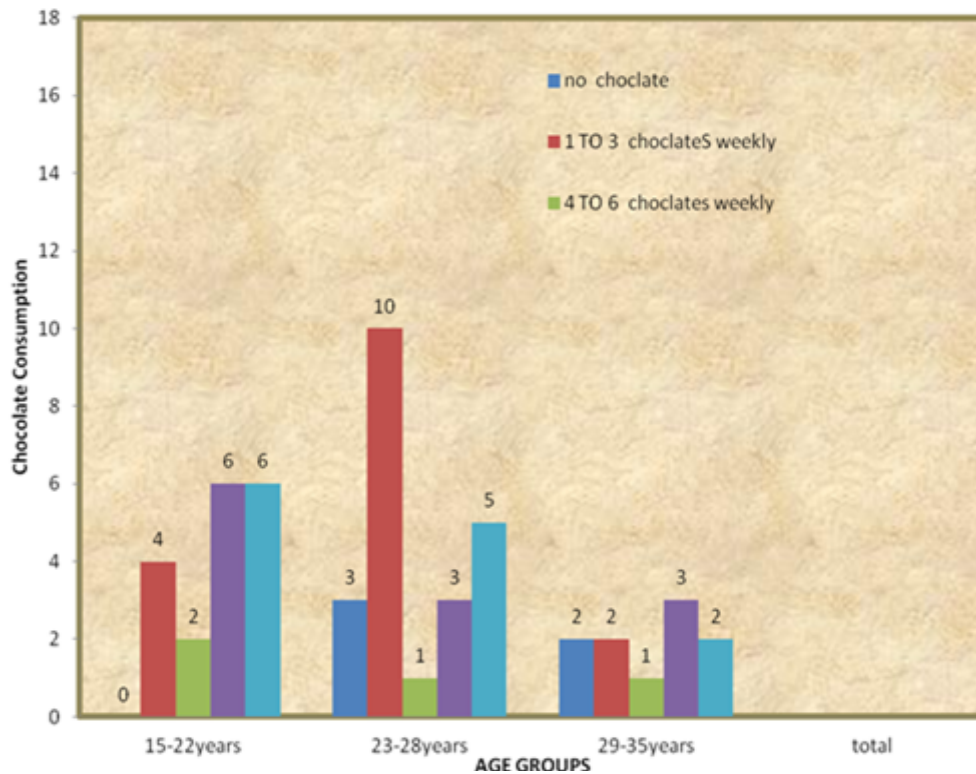


Figure 2: Weekly consumption of chocolate in professional adults

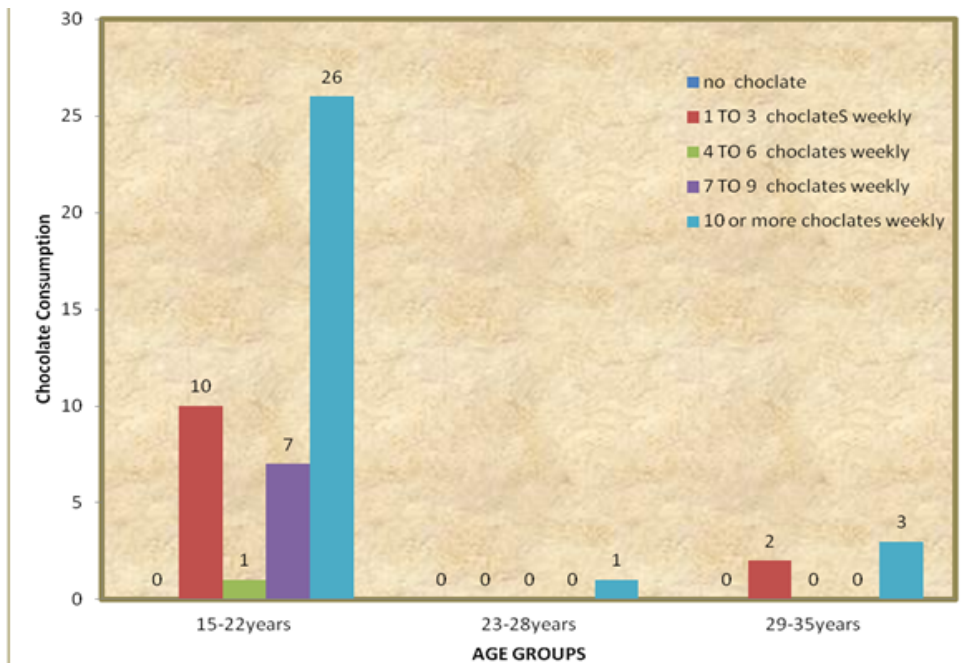


Figure 3: Weekly Consumption of chocolate in non-professional adults

Conclusion

According to our survey on consumption of chocolates in children, we find that only 7.5% children do not take chocolate and chocolate containing foods, While other 92.5% children takes

chocolate and chocolate containing food daily. In professional adults, 90% takes chocolates on daily or weekly bases while other 10% do not take it. In non-professional adults, all the samples eat chocolates and chocolate containing food on weekly or daily basis.

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