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UPLOADING OF MOUTHWATERING ICE CREAM & FAST FOODS DUO: DOWNLOADING OF FAT IN BELLY

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ABSTRACT

The term "fast food" generally refers to food that people intend to consume quickly. They cost relatively little and tastes good but their negative effects on physical health last much longer than these immediate concerns. With the high-calorie meals come more fat, cholesterol, salt and sugar and therefore fewer vitamins, minerals and other nutrients than in healthier foods. There are growing concern regarding the alarming trend of fast-food consumption and its related cardio metabolic outcomes including overweight and obesity. Fast food concern and out of home food is a main risk factor for lower diet quality, higher calorie and fat intake and lower micronutrients density of diet. Frequent consumption of fast foods is one of the main reasons for rising trends of overweight and obesity, cardiovascular disease, type 2 diabetes and other metabolic abnormalities. This review explores the irreparable effects of ice-cream and fast-food consumption in human body.

KEYWORDS: Fast food, obesity, metabolic syndrome, lipoprotein disorders.

INTRODUCTION

Fast food can be defined as the easily prepared processed food served in snack bars and restaurants as a quick meal or to be taken away. In recent years, the consumption of fast food along with the growing cardio metabolic disorders has become a growing concern among the population. Out-of-home meals and fast foods are rich in highly processed meat and refined carbohydrate, sodium, total fat, saturated and trans fatty acids, cholesterol, and poor in essential nutrients and dietary fibers. The fast-food pattern also has undesirable effects on overall diet quality especially in children and adolescents. Frequent consumption of fast foods can lead to overweight, impaired insulin and glucose homeostasis, induction of systemic inflammation and oxidative stress, cardiovascular disease, type 2 diabetes and other metabolic abnormalities. Higher consumption of fast-food products is associated with higher mortality and hospital admission rates for acute coronary heart disease.

One of the popular fast food dairy products is ice cream. Ice cream is a sweetened frozen dairy product preferred as snacks or dessert made of milk and milk products. Nowadays, a typical scoop of ice cream can add upto 250 – 350 calories into your diet, out of which about 50% comes straight from its high fat content. With an average fat content of 7 to 22 grams, eating too much of this high saturated fat food (milk fat is predominantly cholesterol, a saturated fat) could lead bad cholesterol levels in our blood to soar – leading to a build-up of fatty deposits in our arteries which increases our chances of heart disease and stroke.

Considering the growing concern of consumption of dietary foods and fast-food products along with the global burden of cardiovascular diseases, diabetes and obesity, this review takes on the journey to relation to adverse effects of fast-food patterns on non-communicable diseases with focusing on cardio metabolic risk factors.[1]

Ice Cream and it's bad effects: Ice cream is a sweetened frozen dairy product preferred as snacks or dessert made of milk and milk products, that is often added with fruits (raw and/or dried form), along with other essential ingredients like flavors, colors. It is typically sweetened with sugar or sugar alternatives. Flavorings and colorings are added in combination to stabilizers and emulsifiers. Ice cream is a high-fat food, since it must contain greater than 10 percent milk fat to

be designated ice cream, with some products having as much as 16 percent.

Figure 1: Ice-Cream.

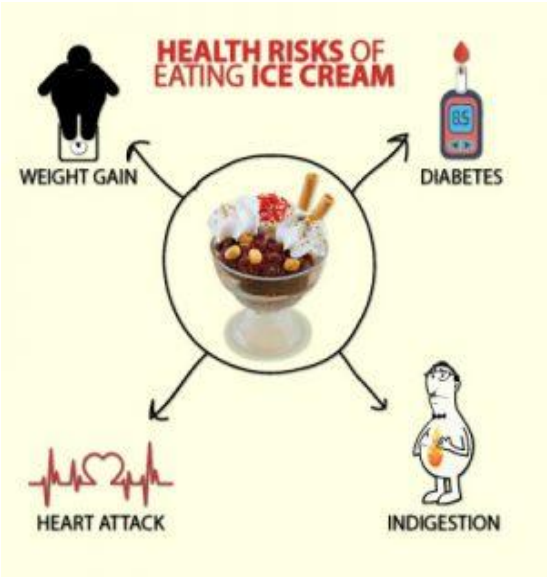
Milk fat is largely cholesterol, a saturated fat. When our blood cholesterol level is too high, it can build up as plaque, a fatty deposit in your arteries that interferes with blood flow and raises our risk of heart disease and stroke. Ice cream is also high in sugar, which makes up the majority of its carbohydrate content. Consumption of too much sugar can lead to health risk factors such as weight gain, cavities and increased levels of blood triglycerides.[2]

Sugar and Fat contents of ice cream: Ice cream is a highly complex food matrix, containing proteins, fat, sugars, air, minerals, etc. and countless interfaces between the different constituents. As sugar consumption increased, the number of diseases related to excessive sugar consumption such as diabetes and cardiovascular diseases heightened. Both sugar and fats are found in ice cream in a high amount that may cause health problems and the concern should be given for this since it may be dangerous for public health. The carbohydrate (sugar) contents of an ice cream are said to be between 20.7 and 22.1 per 100g of an ice cream which is a very high contents for consumption. Also, one-half cup of vanilla ice cream provides 137 kilocalories of energy, about twice the amount in one-half cup of whole milk.

Ice cream is a good choice when you need energy or if you are pursuing a program to gain weight. This may be dangerous for health and leads to obesity and diabetic disease. Ice cream is also high in sugar, which makes up the majority of its carbohydrate content. Fat content is a vital parameter for texture and quality of ice cream and reduced fat ice cream has a body and texture can be associated with customer dissatisfaction. Milk naturally contains lactose (milk sugar), which is not very sweet. Ice cream makers need to add a lot more sugar than you probably realize usually, sucrose or glucose. Cold tends to numb the taste buds, making them less sensitive. So, more sugar needs to be added to produce the desired effect at the low temperatures at which ice cream is usually served. A big reason why ice cream tastes so good is because of its high fat content. Unless it is labeled as light, low-fat, or non-fat ice cream must contain at least 10% fat and this fat must come from milk. After milk is homogenized, the thick layer of cream that arises at the top has a high fat concentration—up to50%—and supplies most of the fat in ice cream. Premium ice creams may have up to 20%fat, which gives it a velvety, rich texture. As the consumption of high fat content increases, the risk of excess calorie consumption and weight gain also increases.[3]

Microbial health factors of ice cream: Ice cream which is a milk-based product, can be considered a good medium for microbial growth due to its nutrient content, almost neutral pH (pH 6–7) and long storage duration. However, pasteurization, freezing and hardening steps can eliminate most of these hazards. Pasteurization of milk can destroy most of the pathogens posed risk to public health. However, the potential microbiological hazards can still be found in the final products after pasteurization through the addition of contaminated ingredients. Although ice cream is stored at low (-18°C) storage temperature, contamination can occur at different stages. Most ice creams become contaminated with microbes during production, transit, and preservation. Such contaminated food product can be responsible for food borne infections in children, elderly people and immune-suppressed patients.[4]

Figure 2: Top ice cream companies [Amul, Kwality Walls, Vadilal, Havmor, Mother Dairy, Arun, Top N Town, BR Baskin Robbins, Cream Bell, Dinshaw's, Rollick].



Firure 3: Bad effects of taking ice cream.

High-Fat, Fast-Food results in an increase in oxidative stress in metabolic syndrome: Metabolic syndrome includes high blood pressure, high blood sugar, excess body fat around the waist and abnormal cholesterol levels. The syndrome increases a person's risk of heart attack and stroke. Postprandial lipemia is a prominent feature of dyslipidemia in both type 2 diabetes mellitus and metabolic syndrome and is also associated with coronary heart disease. Oxidative stress and inflammation are of crucial importance in all stages of atherosclerosis. Humans spend most of the day in the postprandial state. Postprandial lipemia is an independent risk factor for cardiovascular diseases, and a prominent feature in diabetes and metabolic syndrome. Oxidative stress may be an important mechanism by which postprandial lipemia alters vascular function. High fat meals are particularly damaging to the vasculature. Consumption of a fatty meal results in impaired vascular function and increased concentrations of pro-inflammatory cytokines.[5]

Problems related with junk foods

There are various problems related to junk food:

- High salt Content: Fast foods contain salt in more quantity as required by the body. Salt results in increase of blood pressure. High quantity of salt is not good for the body as it may result in hypertension in many human beings.
- High sugar content: Fast foods including soda and biscuits, etc. contain a high content of sugar. A majority of the population likes sweet taste but sugar has its own disadvantages like too much sugar rots the teeth and could trigger a lot of tooth problems like ache etc. Excessive amount of sugar increases the sugar content in the body and as a result of that people could suffer from diabetes.

- High in Fat Content: Junk foods like pizzas, chips, sandwiches etc. contain high quantity of saturated fats. These facts are not easy to digest, as a result of which it gets accumulated and cause weight gain in people that can lead to obesity. All these could result in heart diseases and many metabolic disorders.[6]

Figure 4: Fast Foods.

Harmful effects of junk foods

- OBESITY: Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Medically normal body mass index should be between 20-25. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese. It is a medical problem that increases your risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers. Although there are genetic, behavioral, metabolic and hormonal influences on body weight, obesity mainly occurs when you take in more calories than you burn through exercise and normal daily activities. Your body stores these excess calories as fat.

- DIABETES: Junk food contains high amount of sugar as a result of it people could suffer from it. It is of 2 types Type 1 and Type 2. Type 2 is caused because of junk food consumption.
- HYPERTENSION: High amount of salt is present in junk food. As a result of that when people consume junk food it increases the blood pressure of the body. Excessive amount of salt in body could lead to hypertension, which could trigger many other problems related to the heart.
- HEART PROBLEMS: Junk food fats get clotted in the heart arteries which could increase the chances of heart attack. It takes more time to treat it and is medically expensive.
- CAVITIES: The junk food gets accumulated on tooth spaces as a result of that it forms plague and ultimately causes cavities. This is quite popular among children.
- It could also trigger kidney diseases related to renal or polyuria because of salt and sugar present in junk food
- Junk food contains artificial flavors and preservatives which could cause asthma.

Effect on the respiratory system: Excess calories from fast-food meals can cause weight gain. This may lead toward obesity. Obesity increases your risk for respiratory problems, including asthma and shortness of breath. Metabolism is the process of changing food to fuel in the body. Oxygen is important in this process to help burn the food's nutrient molecules. When sugars, fibers, fats and proteins are broken down, energy is the final product. Carbon dioxide is created as a waste product and is exhaled. Different types of nutrients require different amounts of oxygen and produce different amounts of carbon dioxide. Carbohydrates use more oxygen and produce more carbon dioxide, whereas fats produce less carbon dioxide for the amount of oxygen consumed.

How to help reduce the effect of fast food on respiratory system

- **Vitamin D:** Low levels of vitamin D have been linked to increased risk of asthma attacks in children and adults. Vitamin D plays an important role in boosting immune system responses and helps to reduce airway inflammation. Adults with asthma may benefit from vitamin D supplements, such as protective effects against acute respiratory infection and reduced rate of exacerbations needing treatment with systemic corticosteroids. Foods that contain vitamin D are orange juice, eggs, fortified milk etc.
- **Vitamin E:** Vitamin E contains a chemical compound called tocopherol. This chemical compound can help to reduce the risk of some asthma symptoms like coughing or wheezing. Sources of vitamin E include: almonds, raw seeds, Swiss chard, mustard greens, kale, broccoli and hazelnuts.[7]

Effect on cardiovascular system: The consumption of fast foods causes cardiovascular diseases such as high blood pressure, heart disease, stroke, diabetes, obesities and other related chronic conditions. These problems occur because of a specific disease known as Arteriosclerosis. Arteriosclerosis occurs when the blood vessels that carry oxygen and nutrients from our heart to the rest of your body (arteries) become thick and stiff — sometimes restricting blood flow to our organs and tissues. It happens due to the atheromatous plaques that are stored in the artery walls. Atherogenic is the term that is used for describe the substances/plaques that cause Arteriosclerosis.

The substances that are referred to as plaques are the fatty materials from fast foods such as low-density lipoproteins such as triglycerides (trans fatty acids) and cholesterol. Saturated fats and cholesterol cannot travel in the bloodstream and need special carriers to help them travel through the blood. These special carriers are low-density proteins. When LDL-bound cholesterol levels are too high, cholesterol are deposited in arterial walls. Plaques are deposited within the wall of the artery between the smooth muscle and the inner lining in the vessel is diseased. In over some time the smooth muscles move from middle layer into the lining of artery walls where they join with the foam cells (formed when monocytes and T cells starts become activated and move from bloodstream into the artery) and starts to grow inside the artery. It builds up in the artery walls slowly progressive and cumulative over time as fast-food consumption continues. Over the time, the level of Atheromatous plaque in the artery increases. The formation of atheromatous plaques may form ventricular aneurysm. It slows down/blocks the blood flow through the vessel and causes heart beat to abnormal by reducing the pumping ability of the heart. As the blood flows slowly through the aneurysms, blood clots may form in the heart chambers blocking the blood flow to the chambers. And this is the case with all the fast-food consumers. As they consume fast food too much, low-density lipoproteins, (the trans fatty acids and the cholesterol) which are in the foods, start to form atheromatous plaque in the arteries but mostly in the coronary arteries, the vessel which delivers oxygen-rich blood to myocardium. It can also lead to angina (an obstruction in the vessel, a lack of blood and oxygen), stroke, and possible heart attacks.[8]

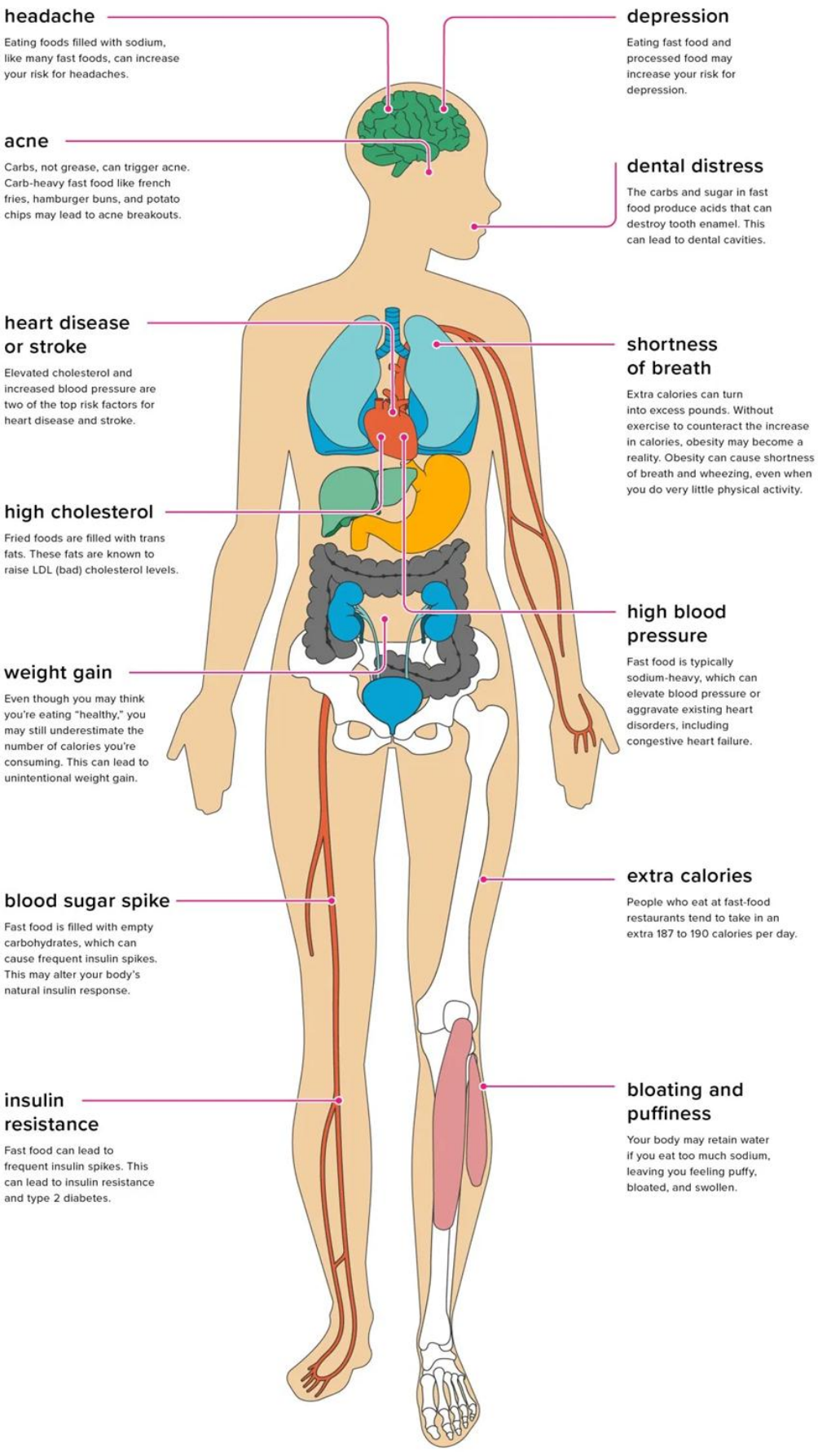


Figure 5: Effects of Fast Food on Various Parts of The Human Body.

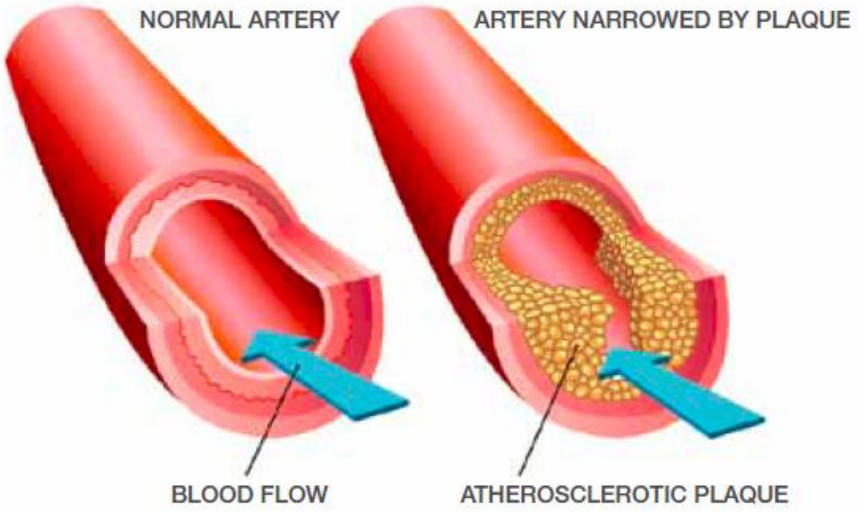


Figure 6: Normal Artery and Blocked Artery.

Effect on Central Nervous System, Insulin resistance and Stability: Rates of obesity and insulin resistance have increased to a greater amount over the past 30 years. These epidemics are temporally related to a dramatic rise in consumption of fast food.

a. Linking Fast Food to Obesity: In the recent studies, it was found the proportion of obesity (BMI >30) in in India was 10.03%, that of overweight and obesity (BMI >25) was 42.01% (51.4% males, 31.2% females). Nutritional analysis shows fast food to be high in fat, saturated fat, energy density, fructose, and glycemic index, yet poor in fiber, vitamins A and C, and calcium. A typical fast-food meal contains 1400 kcal, 85% of recommended daily fat intake, 73% of recommended saturated fat, but only 40% of recommended fiber and 30% of recommended calcium. Fast food's macronutrient composition, its large portion sizes, and intake of equally large proportion of sugar-sweetened soft drinks contribute to excessive energy intake. Adults who report eating fast food have higher mean BMI than those who do not, and observational cross-sectional studies have repeatedly linked fast food to obesity and to insulin resistance. In a study of fast-food habits, baseline fast food intake correlated with obesity; increases in fast food intake were associated with increases in BMI and development of insulin resistance, even after controlling for demographics and macronutrient composition. Individuals with >2 visits to fast food restaurants per week gained 4.5 kg over 15 years and were more likely to become insulin resistant.[9]

b. Linking Obesity to CNS Insulin Resistance: Insulin resistance is thought to underpin the metabolic syndrome, which has been defined as 3 of the 5 following criteria: abdominal obesity, hypertriglyceridemia, low high-density lipoprotein, hypertension, and high fasting glucose. Risk of insulin resistance escalates with increasing obesity. Moreover, weight gain from overfeeding induces insulin resistance. Free fatty acids (FFAs) may be one of the mechanisms that link both obesity and insulin resistance with each other. High circulating levels of FFAs released from adipocytes promote insulin resistance in liver and muscle in a phenomenon known as "lipotoxicity". Second connection between them is the adipose tissue derived hormone *adiponectin*, which increases insulin sensitivity. Obese individuals secrete less adiponectin than lean individuals; the adipocyte-derived hormone *resistin* has also been implicated in causing insulin resistance in hepatic tissue.

c. Insulin is the primary hormonal signal for energy storage into adipocytes: Insulin hypersecretion by the pancreas plays a role in the pathogenesis of some forms of obesity. Insulin resistance appears to contribute to weight gain in adults and children, particularly with regard to the development of abdominal obesity. This may occur because of heterogeneity in insulin resistance between tissues. Adipose tissue tends to retain its sensitivity to insulin in the face of hepatic and skeletal muscle resistance.

Prenatal events may also set the stage for insulin resistance in later childhood. Newborns that have experienced intrauterine stress, are small or large for gestational age, or are twins have all been shown to have insulin resistance in later life, a variable predisposition to obesity, and an increased risk of metabolic syndrome. Insulin hypersecretion may alter glucose transport or downregulate insulin receptor expression. Conversely, insulin resistance in the liver and muscle may trigger compensatory increases in insulin secretion.[10]

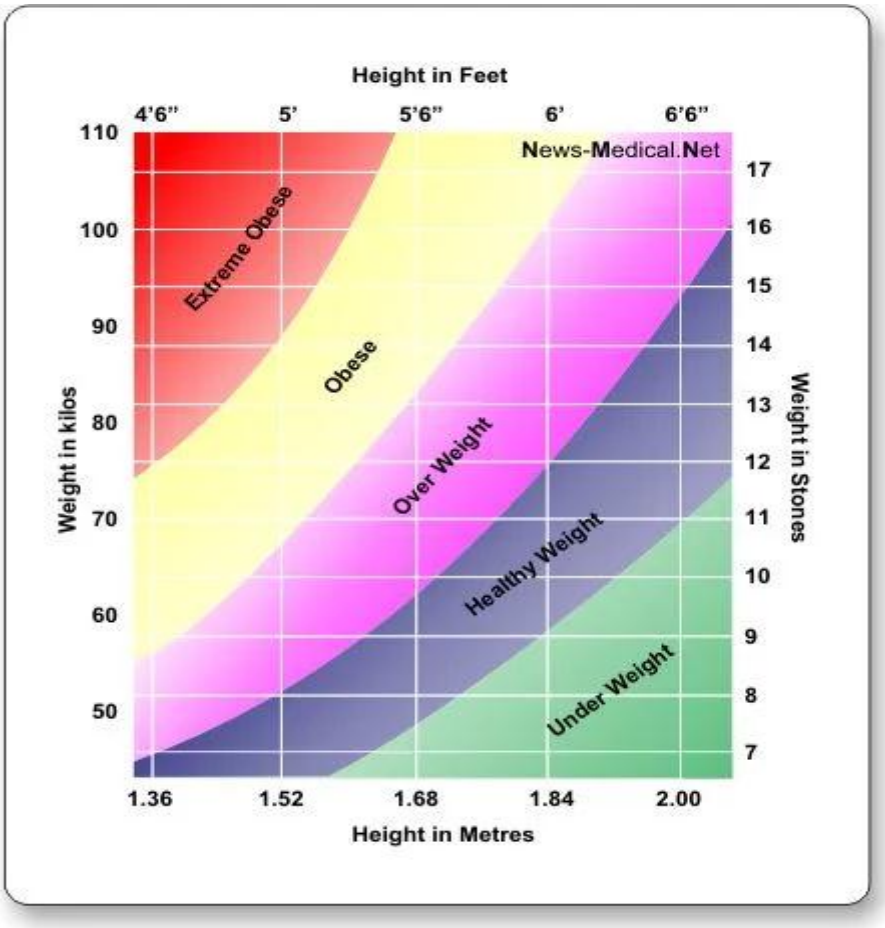


Figure 7: Obesity Meter.

d. Linking Fast Food to CNS Insulin Resistance: Energy density is linked to obesity via a number of mechanisms. First, energy-dense foods may interfere with appetite control mechanisms. Humans tend to ingest a similar bulk and weight of food day to day; consuming energy-dense foods drives daily caloric intake upward. Fast food tends to be high in dietary fat. Although dietary fat is a strong predictor of weight gain, the relationship between dietary fat and carbohydrate appears to be more relevant than fat intake alone. Although diets that are both high in fat and low in carbohydrates (e.g., Atkins) may attenuate the postprandial insulin response, the combination of both a fat load and a glycemic load appears to exaggerate the insulin response and promote further weight gain. With increasing obesity, the insulin response ultimately attenuates, possibly contributing to glucose intolerance.

Insulin resistance and hyperinsulinemia are more closely linked to saturated than unsaturated fats. The ability of fatty acids to stimulate insulin secretion depends on their chain length, saturation, and cis/trans conformation. A diet rich in saturated fat is an independent predictor for high fasting and postprandial insulin concentrations. In humans, increases in dietary saturated fat are associated with increases in fasting insulin, postprandial insulin, and insulin secretion. High-fat diets may also contribute to weight gain via their effects on satiety signaling, in particular via CNS insulin and leptin. In women, high-fat meals, which produce smaller glucose and insulin responses than high-carbohydrate meals, reduce 24-hour leptin secretion.[11]

Sugar and Reduced Fat Intake: Many fast-food meals have added sugar. Not only does that mean extra calories, but also little nutrition. It is suggested to only eat 100 to 150 calories of added sugar per day. That's about six to nine teaspoons. Many fast-food drinks alone hold well over 12 ounces. A 12-ounce can of soda contains 8 teaspoons of sugar. That equals 140 calories and 39 grams of sugar.

A. Fast Food as a Source of Fructose: Fructose is a type of sugar known as a monosaccharide. Like other sugars, **fructose** provides four calories per gram. In most places, non-diet soft drinks are usually sweetened with high-fructose corn syrup (HFCS), which contains up to 55% of the monosaccharide fructose. Because of its abundance, high relative sweetness, and affordability, HFCS has become the most common sweetener used in commercially produced foods. HFCS is found in processed foods ranging from soft drinks and candy bars, to crackers, ketchup, sauces, and even hamburger buns. The growing dependence on

fructose in the recent diets may be fueling the obesity and type 2 diabetes mellitus.[12]

The metabolism of fructose differs from that of other monosaccharides such as glucose in ways that modify insulin dynamics and obesity risk. Fructose is absorbed in the intestine by the transporter GLUT5. Glucose, which is frequently found in the same foods as fructose, enhances intestinal absorption of fructose. The GLUT5 receptor is expressed at low levels in muscle and adipose tissue, but the receptor's most important site of action is the liver, where fructose is avidly absorbed from the portal circulation. There, fructose is converted to fructose-1-phosphate and enters the glycolytic pathway beyond the main regulatory step of glycolysis, phosphofructokinase. The enzymatic activity of phosphofructokinase responds to changes in glycogen stores and products of glycolysis (e.g., citrate, ATP) and thus tightly regulates metabolism of glucose; fructose in contrast enters the glycolytic pathway unchecked. Fructose metabolism leads to an accumulation of intermediates of glycolysis that are converted to glycerol and acetyl-coenzyme A (CoA) before being synthesized into fatty acids, very-low-density lipoproteins, and triglycerides. The lack of insulin secretion in response to fructose in turn reduces leptin production from adipose tissue, which negatively alters CNS perception of energy stores. In conclusion, fructose consumption has metabolic and hormonal consequences that may facilitate development of insulin resistance, leptin reduction, and obesity.

B. Fast Food and Reduced Fiber Intake: Fast foods tend to be poor in fiber, which may be one of the characteristics that link it to obesity and insulin resistance. Cohort studies of young and middle-aged adults demonstrate that fiber intake is inversely associated with weight gain, fasting insulin levels, and risk of type 2 diabetes mellitus. Fiber intake may be mechanistically linked to obesity through its effects on glycemic index and energy density. Fiber may also influence obesity risk through distinct hormonal and digestive mechanisms. High-fiber meals tend to be more satiating because they induce a greater sensation of fullness than low-fiber meals. Fiber content also tends to add bulk and viscosity to meals, thereby slowing gastric emptying. Fiber-containing foods show slower glucose absorption, which lessens the postprandial insulin surge and may decrease lipogenesis.[13]

C. Fast Food and Reduced Dairy Product Consumption: Fast food tends to contain less calcium than other foods. Emerging epidemiologic and clinical evidence has recently started to link calcium and dairy intake to risk of obesity and insulin resistance. A longitudinal study of dietary intake among young adults demonstrated that a high intake of dairy products was protective against the development of metabolic syndrome, even after controlling for demographic and nutritional factors such as race, age, gender, BMI, calorie intake, fruit and vegetable consumption, and dietary fiber. It has been suggested that dairy products are protective against obesity and insulin resistance because they are low-glycemic-index foods (The glycemic index is a value assigned to foods based on how slowly or how quickly those foods cause increases in blood glucose levels). High-calcium diets may also exert anti-obesity effects by increasing fecal fat excretion, particularly in response to high-fat diets. High circulating calcium levels suppress circulating 1, 25-dihydroxyvitamin D_3, which decreases intracellular calcium in the adipocyte and in turn reduces lipogenesis and augments lipolysis.

Effect on Reproductive System: The ingredients in junk food and fast food may have an impact on the fertility of women. A survey of 5,598 women found those who ate fast food four or more times a week took nearly a month longer to get pregnant than those who never or rarely ate it. They also calculated that the women with the lowest intake of fruit had a 12% risk of having been unable to conceive within a year, while this was 16% for those who had eaten fast food four or more times a week. One study found that processed food contains phthalates. Phthalates are chemicals that can interrupt how hormones act in your body. Exposure to high levels of these chemicals could lead to reproductive issues, including birth defects.

Effect On The Integumentary System (Skin, Hair, Nails): Studies have shown that carbs in particular may lead to acne breakouts or eczema. Atopic **dermatitis** (**eczema**) is a condition that makes the skin red and itchy. Carb rich diets can cause blood sugar spikes which then trigger outbreaks of acne as well as an increased risk of getting eczema.[14]

Figure 8: Eczema and Acne.

Effect on Skeletal Muscle (Bones): Carbs and sugar in fast food and processed food can increase acids in our mouth. These acids can break down tooth enamel. As tooth enamel disappears, bacteria can take hold, and cavities may develop. Obesity can also lead to complications with bone density and muscle mass. People who are obese have a greater risk for falling and breaking bones. It's important to keep exercising to build muscles, which support our bones, and maintain a healthy diet to minimize bone loss.[15]

Effects of sodium: The combination of fat, sugar, and lots of sodium (salt) can make fast food tastier. But diets high in sodium can lead to water retention, which is the reason why people feel puffy, bloated, or swollen after eating fast food. A diet high in sodium is also dangerous for people with blood pressure conditions. Sodium can elevate blood pressure and put stress on the heart and cardiovascular system. According to one study, about 90 percent of adults underestimate how much sodium is in their fast-food meals. The study surveyed 993 adults and found that their guesses were six times lower than the actual number (1,292 milligrams). This means sodium estimates were off by more than 1,000 mg.[16-25]

Figure 9: Fast Food with High Sugar Content.

CONCLUSION

Fast food consumption has shown a dramatic rise in the recent 30 years. Almost everybody is aware that fast food or street food is generally unhealthy. Just because of low cost and faster availability people prefer to go to fast food center rather than eating home food. Working people and students prefer eating in fast food centers during their working hours as it saves their time. Fast food tends to be high in salt, sugar, saturated fats, trans fats, calories, and processed preservatives and ingredients. Frequent fast-food intake can lead to numerous diseases including overweight and obesity, cardiovascular disease, type 2 diabetes and other metabolic abnormalities. Higher availability of fast-food services is associated with higher mortality and hospital admission rates for acute coronary heart disease as well as a higher risk of overweight and obesity.

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