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REVIEW STUDY ON EFFECT OF SUGAR OVER HUMAN HEALTH

Dr. Prithpal Singh Matreja*; Dr. V K Singh**

*Department of General Medicine, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: drpsmatreja@yahoo.co.in

**Department of General Medicine, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: drvksingh.tmu@gmail.com

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ABSTRACT

Sugar is a carbohydrate building block that may be found naturally in a variety of foods such as fruit, milk, vegetables, and grains. Added sugar, on the other hand, can be found in flavored yogurt, sweetened drinks, baked goods, and cereals, and it is extensively utilized in industry. Carbohydrates come in a variety of forms, including monosaccharide and polysaccharide, and have a variety of characteristics in the food business and nutritionally. Sugars serve a variety of functions in the food business, including preservation, antioxidants, and the enhancement of color, taste, and texture, in addition to their primary function of sweetness. Many foods rich in added sugar offer energy, but they are also low in other nutrients, affecting the balance of nutrients such as minerals, vitamins, and proteins. As a result, excessive sugar consumption is very hazardous, particularly at crucial periods such as infancy, pregnancy, and aging. To maintain the body healthy, it's critical to limit the amount of high-sugar foods consumed. This page discusses the many kinds of sugars, their role in diet, and their health implications.

KEYWORDS: *Diet, Harmful, Health, Nutrition, Sugar.*

1. INTRODUCTION

Sugars are glycans/carbohydrates that are polyhydroxy aldehydes/ketones. Carbohydrates have acquired the status of macronutrients by supplying energy currency, ATP, and other useful physiological functions to the body. They may be found in a variety of meals and drinks. Carbohydrates' primary purpose is to provide energy to the body for its normal functioning and physical activity by using glucose as a fuel source. Sugar consumption provides this immediate energy. Furthermore, Prolotherapy, a treatment for treating persistent back pain, uses sugar (glucose or dextrose) in injections to relieve pain **[1–4].**

Furthermore, glycans (a kind of sugar) are an important component of many medicines. Glycans are found in medicines including heparin (used to treat and prevent blood clots in veins, arteries, and lungs), erythropoietin, certain anti-flu treatments, and cancer drugs **[5–7].** Despite the fact that sugar has numerous purposes, the debate over whether it is a friend or an adversary remains unresolved. Sugar is seen as an adversary in certain ways, yet its total removal from our diet will

have a significant impact on our health. As a result, this review emphasizes the impact of sugar consumption (whether helpful or detrimental) on human health.

1.1.Sugar's function in the body and the impact of its consumption on human health:

If we don't eat sugar, our bodies will stop working correctly. Sugars contained in fruits, lactose, milk sugar, and other naturally available sugars create significant profits in our diet. The sugars known as "added sugars," i.e., sugars added during the processing of food, drinks, and other preparations, are detrimental to our bodies, while "essential sugars" are carbohydrates that the body needs to absorb nutrients from their source. Basically, the latter's nutrients are known as glyconutrients, which are found in fruits and vegetables. Fruit sugars do not damage our bodies since they include fibre and other nutrients in addition to fructose **[8–10].** Fructose gives our bodies a burst of energy, whereas fibers balance out the fructose's effects, giving us long-lasting energy. Sugars in dairy meals are also good for our bodies since they supply us with additional nutrients. Whole grains and starchy vegetables, for example, include some beneficial sugars as well as other nutritional fibers.

1.2.The following are some of the most prevalent kinds of sugar found in our diets, as well as their impact on our bodies' health:

1.2.1. Glucose:

Glucose consumption causes the pancreas to produce insulin. This rise in insulin signals from the brain tells us to quit eating because we've eaten enough. After eating glucose, our bodies go through a number of processes, one of which happens in the liver and generates very low density lipoproteins (VLDL), which are linked to cardiovascular disease. However, the liver processes approximately 1 out of every 24 calories of glucose we eat and converts it to VLDL.

1.2.2. Sucrose:

Sucrose and high fructose corn syrups (HFCS) are both sugars with a high fructose content. Both sucrose and HFCS have a high fructose content (50 percent in sucrose and 55 percent in the HFCS). Because fructose is processed exclusively by the liver, a significant quantity of VLDL is generated along with lipids when we consume these sugars. Furthermore, since the brain rejects leptin, these carbohydrates cannot be regulated by the brain (a protein for energy intake regulation and to check the efficacy of metabolism). This isn't to say that consuming these sugars is always bad. In the case of athletes, HFCS consumption causes the buildup of glycogen in their liver, which is then utilized during their workouts or other athlete activities. This proves that HFCS consumption is advantageous to those who engage in high-intensity physical exercise and need immediate energy.

1.2.3. Fucose:

It's only found in high concentrations in human breast milk, marine kelp, Brewer's yeast, and even certain mushrooms. Monosaccharide L-fucose (6-deoxy-Lgalactose) is present in N- and Olinkedglycans and glycolipids produced by mammalian cells. These are crucial in blood transfusion, leukocyte-endothelium adhesion mediated by selection, host-microbe interaction, and ontogenic processes. Pathological diseases such as cancer and artherosclerosis are linked to changes in their expression. This sugar promotes long-term memory, protects respiratory

infections, and slows tumor development. They also have the ability to modulate the immune system.

Glycoproteins and glycolipids linked with this sugar are essential for immune system tuning and inflammation management. This sugar is responsible for the functions of antibodies, major histocompatibility complexes (MHCs), platelets, egg-sperm contact, connective tissue health, and the exchange of substances across and within tissues. It also has certain hormonal activities, such as follicle stimulating hormone, whereas the latter conducts cellular membrane tasks, such as substance exchange and cell-cell interactions, such as tissue formation. Rheumatoid arthritis is linked to a lack of this sugar. Low amounts of fucose have been seen in individuals with cystis fibrosis, diabetes, and hepatic diseases. Fucose is also necessary for the expulsion of the herpes virus from the body. By thickening the skin and increasing its moisture, this sugar minimizes wrinkles.

1.2.4. Galactosamine:

Shark cartilage and crab shells, as well as certain red algae, contain them (Phaeophyceae). Although it isn't absolutely necessary, it aids intercellular communication. These carbohydrates aid in the regulation of the immune system and inflammation. It's also essential for good joint health. Its low levels have been linked to heart and circulatory problems.

1.2.5. Glucosamine:

This glyconutrient aids in the maintenance of joint health. Because it is a precursor of cartilage, it aids in the treatment of osteoarthritis. Galactosamine is found in shark cartilage and crab shells. Administer when part of it is oxidized in our bodies and the rest is transformed into glycoproteins and glycolipids.

1.2.6. Galactose:

Lactose, a disaccharide in conjunction with glucose, makes up this sugar present in milk (nearly 5 percent solids in dairy products). This sugar may also be found in a number of fruits, vegetables, and plants. Galactose assists in the fast healing of injuries, aids in calcium absorption, and improves cognitive capacity.

1.2.7. Mannose:

Our immune system relies on mannose to function properly. Inflammation and certain illnesses are caused by a lack of this sugar. In comparison to glucose, it is absorbed at a slower rate in the body. It enters the circulation immediately after absorption. It may be found in Aloe Vera, sea kelp, beans, capsicum, cabbage, eggplant, tomatoes, turnips, currants, mushrooms, and Aloe Vera, with the latter serving as the primary source.

1.2.8. N-acetyl–neuramic acid (NANA):

The first meal a mammalian receives from his or her mother after birth is a special sugar found in colestrum. This sugar is an important component of gangliosides, which are found in the grey matter of the brain. It's also found in the ovulation hormone Follicle stimulating hormone (FSH). Additionally, this sugar differentiates mammals from other animal groups.

1.2.9. Xylose:

Xylose, an aldo-pentose present in the embryo of most edible plants, is known to help prevent malignancies of the digestive system. Aloe Vera, blackberries, broccoli, eggplant, green beans, guava, pears, peas, raspberries, sea kelp, and spinach are just a few fruits and vegetables that contain it.

1.3.The body's sugar metabolism:

After sugar molecules reach our body's cells, the HSK route (glycolysis) and TCA cycle, as well as other intermediates, may be used to generate a variety of chemicals that aid in various metabolic processes and storage. Sugar is transformed into glycoproteins and glycolipids after being digested by the digestive system and subsequent metabolism. The cell membrane of animal cells is made up of glycoproteins and glycolipids, as well as carbohydrates and fats. Both of these (glycolipids and glycoproteins) form tiny antennae on cell walls that serve as a means of communication between cells as well as absorb and process nutrients, enzymes, hormones, and other chemicals necessary for heart function, skin healing, bacterial infection treatment, arteriosclerosis, Alzheimer's, and Parkinson's diseases.

Sugar's main purpose as soon as we eat it is to give energy to our brain and neurological system, which control our everyday actions. In addition, there are a number of additional important reasons for us to include sugar in our diet. Here are a few examples:

1.3.1. Metabolizing fats:

This prevents our bodies from using proteins for energy that are otherwise needed as structural components. Energy reservoir: Glucose may be stored in the liver as glycogen, which acts as an energy reservoir. The body expends this energy during activity or when glucose is unavailable as an energy source. Their reservoirs also keep our blood sugar in check. An adult brain needs approximately 140 g of glucose per day to operate, which is nearly half of the total dietary carbohydrate eaten. Studies have demonstrated that drinking a sugar-sweetened beverage or eating a carbohydrate meal improves mental abilities such as remembering power, response speeds, attention span, and arithmetic skills. It also promotes cognitive benefits and decreases tiredness. Driving tests utilizing car stimulators revealed that those who took the exam after eating sweets made less errors than those who took the test after drinking just water.

Furthermore, sugar stimulates two brain hormones/neurotransmitters, serotonin (feel-good hormone) and beta-endorphin, which function as pain relievers and anxiety reducers. Myelin is a sheath that surrounds and protects the axon of a neuron, allowing the nervous system to operate properly. It is made up of 70-85% lipids (glycolipid and galactocerebroside) and 15-30% protein. Glucosamine, a product of glucose, is required for myelin formation.

1.3.2. Monocyte transportation:

Monocytes are the biggest known leucocytes (WBCs) and an important component of the immune system. Sugar consumption aids in their transit.

1.3.3. Muscle formation:

Muscle is a connective tissue found in animals that contains actin and myosin filaments. These glide past one other, providing contraction, posture, movement, and motility, as well as the operation of the internal organs. Glucose and its product glucosamine are required for muscle development and to maintain our muscles lean.

1.3.4. Skin formation:

The skin is our body's exterior protective and sensitive (for touch, heat, and so on) covering. Collagen and elastin, the skin's two major components, need glucose and glucosamine to be formed. Our skin ages prematurely or accelerates as a result of a shortage of sugar in our bodies. Fucose enhances skin elasticity by promoting elastin synthesis, deposition, and density maintenance.

1.3.5. Ageing:

Sugar molecules, together with proteins, enter the bloodstream and create AGEs (Advanced glycogen end products), which destroy elastin and collagen, making the skin fragile and affecting its firmness. Anti-oxidative enzymes that protect the skin from damaging UV rays are likewise neutralized by AGEs, causing our skin to age.

1.4.Sucrose intolerance is a condition in which a person is unable to consume sugar:

Sucrose intolerance occurs when the sucrase enzyme, which metabolizes sucrose in the body, is not generated in adequate amounts in the small intestine. According to Wikipedia, the latter is shown by stomach pains and bloating, diarrhea and constipation, hypoglycemia and headache, poor development, upper respiratory virus infection, anxiety, and so on.

Alaskans are more susceptible to sucrose intolerance. Congenital sucrose-isomaltase deficit, or sucrose isomaltase deficiency, is another name for it. Other sugar intolerances include fructose intolerance (due to a lack of the fructose carrier enzyme in enterocytes), trehalose intolerance (due to a lack of the enzyme trehalase), lactose intolerance (when a person is unable to digest milk sugar (lactose) due to a lack of the lactase enzyme), and glucose-galactose intolerance (when a person is (a rare disorder, where only fructose is digestible). Sugar malabsorption is another name for it.

2. DISCUSSION

Sugar intake should be limited to 100 calories per day, or 25 g or 6 tsf; nevertheless, greater sugar consumption will have an adverse effect on their health, with more frequent occurrences of illnesses such as breast cancer and increased breast density in women who have not reached menopause. Sugar consumption is linked to increased breast density in both pre-menopausal and post-menopausal women. Excess sugar consumption in women induces toxemia and has an impact on the muscle development and strength of their children. Excess sugar consumption has a similar effect on lactating mothers. It has also been linked to an increase in neural tube abnormalities in embryos, particularly in teenage mothers.

It also has an effect on premenstrual syndrome (PMS), a hormonal imbalance linked to sugar cravings in women. Due to an increase in insulin levels, the latter worsens the condition in women with Polycystic Ovary Syndrome (PCOS). The latter may activate androgen receptors while blocking egg release from the follicle, resulting in hair development on the face, arms, legs, and head, as well as acne. Sugar intake is linked to brain deterioration and pancreatic cancer in pre-diabetic and diabetic women. Unlike males, women's sex lives are affected by excessive sugar intake, which leads to an increase in testosterone and a decrease in the sex hormone

binding globulin (SHBG) gene. Infertility, polycystic ovaries, uterine cancer, and a higher incidence of CVDs would arise from low activity of the latter.

3. CONCLUSION

In today's world, sugar is one of the most essential components in culinary items. Sugar intake stimulates the brain's "feel good hormone," but it also has the potential to get you hooked to it. Sugar, no matter how sweet it tastes, has certain detrimental consequences on humans, particularly excessive intake, which outweighs its beneficial benefits on our health. Excess sugar consumption is hazardous even in non-diabetic people, especially in women. As a result, one should not only be cautious about eating too much sugar (beyond the recommended quantity) in one's diet, but also actively avoid it. It's crucial for future research on sugar intake in humans.

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