

Effects of High-Sugar Dietary Patterns on Adolescents

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Abstract. Teenagers are in a crucial phase of development, and the impact of a high-sugar diet on their health and future well-being is a significant concern. This research paper explored the adverse effects of a high-sugar diet on teenagers and proposes prevention strategies. A high-sugar diet can have severe consequences for teenagers. When sugar is consumed, it is metabolized into blood sugar and enters the bloodstream, leading to an increase in blood sugar concentration. This elevation in blood sugar levels can result in a range of health problems, including diabetes, hypertension, and obesity. To address these serious health risks, several solutions are proposed. First, individuals should reevaluate their daily diets and reduce their consumption of foods that are high in sugar, opting for alternatives such as the Mediterranean diet. Additionally, addressing the common habit of consuming sugary drinks and beverages among young people is essential. Finally, while a low-sugar diet can be effective, it must be approached with caution, as it may carry its own potential risks. Overall, prioritizing a healthy diet with reduced sugar intake is crucial for the well-being and future health of teenagers.

Keywords: High-sugar diet, adolescents, Mediterranean diet, metabolism.

1. Introduction

In today's world, health and disease have become critical issues for people, and many of these health problems are associated with lifestyle habits. Certain habits, when consistently practiced, can deteriorate health and even lead to fatal diseases. Dietary patterns play a significant role in human health, and disease occurrence is often linked to people's eating habits. The abundance and diversity of food choices available today offer various flavors, however, these diverse dietary patterns can have significant health impacts, and poor dietary choices may increase the risk of diseases. Conversely, adopting a healthy dietary pattern can help prevent chronic diseases, even though the origins of such diseases are complex. There is substantial evidence suggesting that probability of getting the risk of developing chronic disease associated with a diet, such as diabetes will reduced by a healthy dietary pattern [1].

Sugar has become integrated into modern human life, with many people enjoying sweet foods because of the immediate pleasure they bring. However, this dietary pattern can be harmful in the long term, it increased the risk of diabetes and obesity, especially for teenagers. Adolescence is a critical period in a person's life, and poor dietary habits during this time can lead to obesity and diet-related diseases later in life. High-sugar dietary patterns are particularly popular among young people and teenagers, and can contribute to nutritional imbalance and the development of eating disorders. Additionally, recent research indicates that poor eating habits and impulsivity associated with obesity increase the consumption of processed foods and sugary beverages [2]. Maintaining a high-sugar diet can have negative effects not only during adolescence but also on one's future health. This research aims to explore the connection with high-sugar diets and disease in teenagers while discussing strategies to prevent young people from adopting this type of dietary pattern.

2. Consequence of High Sugar Diet

Sugar is one of the carbohydrates which the human body quickly breaks down and metabolizes for energy, it mainly consists of simple sugars. Almost of these sugars finally available for use for energy, in contrast to complex carbohydrates, which breakdown by human's body more slowly. In essence, sugar provides a rapid source of energy, enhancing physical strength and stamina for various activities.

However, it's essential to recognize that while sugar does offer an energy boost, it comes with drawbacks. Sugar provides few to no essential nutrients and often delivers excess calories that led to weight gain and related problems which are relevant to health. High sugar intake also linked to heart disease. Importantly, these health issues are interconnected.

Consuming sugar in moderation poses minimal risk, but overindulgence can lead to significant health problems over time. One of the most concerning outcomes of excessive sugar intake is the development of heart disease and obesity. Sugar consumption leads to the production of triglycerides, a type of fat that represents excess calories stored in the body. This surplus of calories contributes to obesity, which is a vital risk factor for heart disease.

For instance, a study found that added sugar intake substantially associate with the risk of death from cardiovascular disease [3]. Participants who consumed more than a quarter of their daily calories from sugar had a more than double probability of dying from cardiovascular disease all through the course of the 15-year examination compared with those who have been consuming less than 10 per cent of their day's calories from sugar. [4]. This underscores the serious health implications of excessive sugar consumption, particularly in the context of heart disease.

On the other hand, there is a discussion about the relationship between a high sugar diet and obesity. From the 1970s to the 2010s, the prevalence of obesity increased steadily. During this period, sugar intake ranged from 13.1% to 18.1% of total calorie intake, accounting for only a small portion of the factors contributing to obesity. Interestingly, around 2000, sugar consumption appeared to decline, yet the prevalence of obesity continued to rise. To determine whether sugar consumption is related to weight gain, researchers conducted randomized controlled trials (RCTs) where sugar consumption was the only variable that differed between groups, while other factors were controlled. It's worth noting that these experiments did not conclusively prove whether weight loss occurred owing to particular sugar qualities or just because the intervention group consumed fewer calories in general energy than the control group did. In all the individual studies where subjects consumed fewer sugar calories, they also consumed less total energy. Overall, when sugar was replaced with the same quantity of calories from other sources, there was no significant change in people's weight. Conversely, weight gain was observed in adults given additional calories in the form of sugar. This suggests that any effect of sugar on weight is primarily due to the energy it provides, rather than any unique properties of sugar itself. Whether weight gained or not occurred only when there was an increase or decrease in sugar-related calories in the diet, with no significant change in weight isocaloric exchange which based on [5].

Furthermore, excessive sugar intake is also linked to the development of diabetes. Diabetes can affect anyone, regardless of age, including teenagers, and it is a significant contributor to mortality. Dietary carbohydrates, such as sucrose, are believed to cause a more substantial post-meal increase in blood sugar and, consequently, increased insulin production compared to other carbohydrates with more complex molecular structures, owing to their shorter two-sugar molecule chain. Post-meal glucose responses can vary widely and depend on many different factors, such as the quantity of fiber or fats in foods. Additionally, faster digestion leads to a rapid increase in sugar levels [6].

Moreover, excessive sugar consumption can harm eyesight, and there is a link between diabetes and deteriorating vision. Diabetic retinopathy (DR) has become increasingly prevalent over time. The risk of developing diabetic macular edema (DME) and other eye conditions rises over time. Consequently, people experience vision loss, which can ultimately lead to blindness. Conditions such as vitreous bleeding and tractional detachment of the retina can result in significant vision loss when non-proliferative DR progresses to proliferative DR [7]. Given the global increase in diabetes prevalence, it is likely that a significant role in vision loss and the associated functional impairment for many years to come will continue played by DR and DME [8].

3. Solutions to the Consequences of A High-Sugar Diet

Given the prevalence of excessive sugar consumption among young people and the related health issues discussed in this article, it's essential to explore ways to reduce high sugar intake. Fig. 1 illustrates the percentage of sugar in the diets of young people, highlighting that a significant portion of sugar comes from sweet products and beverages [9]. As these sugary foods and drinks are closely linked to various diseases and health risks mentioned earlier, it's crucial for young people to reduce their consumption of sugary items. To prevent young people from developing these health problems, they should reconsider their dietary choices.

Before consuming any food, individuals should assess whether it contains added sugars and consider creating a new dietary plan. One valuable tool for evaluating post-meal glycemic responses is the glycemic index (GI). A high GI is typically defined as 70 or higher. In contrast, a low GI is 55 or less and may be related to legumes, pasta, fruits, or dairy products [6]. Using the GI measurement, people can identify foods with lower GI values and incorporate more of these options into their diets, reducing their overall sugar consumption. It's crucial for young people to be mindful of their sugar intake and make informed dietary choices by selecting foods with lower GI values. By doing so, they can reduce the risk of developing the health problems associated with excessive sugar consumption.

Furthermore, while sweet beverages are popular among children and teenagers, they can be harmful to their health. Most studies do not classify diet drinks (containing fewer than 40 calories per 8 oz), pure fruit juice and milk. Overconsumption of added sugars in sweetened beverages is associated with an increased risk of various diseases, including heart disease, obesity, and dental decay. Therefore, young people should aim to consume fewer sweetened beverages, including those with added sugars like sugar-sweetened drinks, sodas, and other sugary beverages. Carbonated beverage companies spent millions of dollars on advertising targeting youth, approximately 97% of this expenditure directed toward teenagers, in 2009. Recent data from Nielsen, indicated that revelation of children to advertisements for beverages which added carbonate substances increased by 19%, and their exposure to any kinds of sweetened drink increased by 38% from 2015 to 2016 [10]. To address this issue, local, regional, or national governments can implement regulations on sugary drinks. These regulations may involve increasing the price of sugary beverages or imposing taxes, such as excise taxes. Such taxes could be supported by stakeholders, and educational campaigns can inform the public about the risks associated with sugary drinks and the reasons for the taxes. Governments can also make efforts to reduce the production and availability of sweetened beverages, discouraging young people from purchasing them.

Choosing the Mediterranean diet (Med-diet) is another effective way to reduce sugar consumption. Fig. 2 illustrates the benefits of the Med-diet over the Western diet [11]. The Mediterranean diet is defined as a high intake of whole grains, with olive oil as the primary source of fat. Scientific evidence from numerous observational studies and clinical trials conducted over several decades consistently supports the positive impact of the Mediterranean diet on health. Besides improving diabetes and obesity, to eliminate the risk of CVD and certain types of cancer, it was shown by this type of dietary pattern. For instance, there was an experiment aimed at determining whether adherence to the Mediterranean diet could improve LVSD and ACS in participants. The results of this study revealed that greater adherence to the Mediterranean diet was related to better long-term prognosis and enhanced left ventricular systolic function in ACS patients [12].

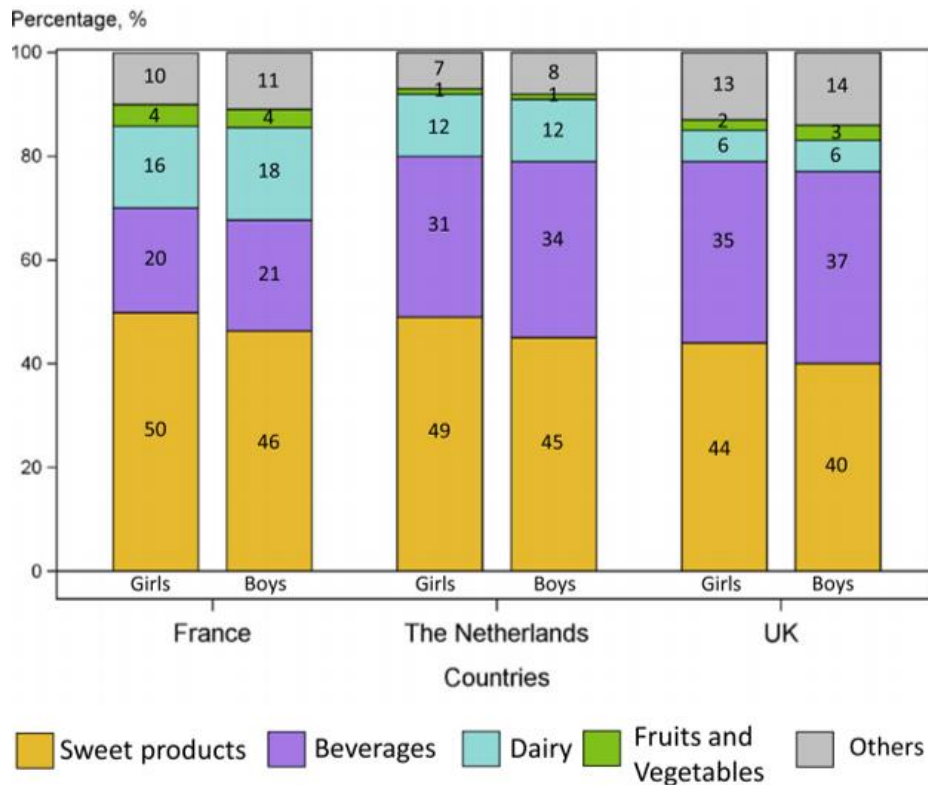


Figure 1. Contributors to add sugars among children [9].

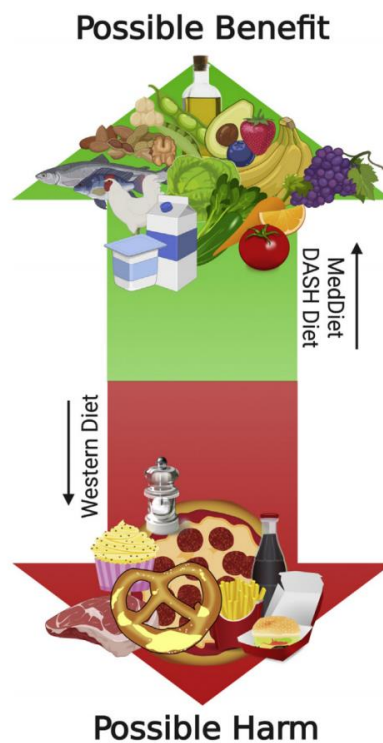


Figure 2. Comparison of Med-diet and Western diet [11].

4. Other Problems

It's important to recognize that while reducing sugar intake can have many health benefits, including a lower risk of certain diseases like diabetes and heart disease, no single dietary pattern can

prevent every type of health issue. The Med-diet has its limitations, and it may not be effective in preventing specific conditions like heart failure (HF). Research studies have examined the relationship between the Med-diet and various health outcomes, including HF. In this particular study, the Med-diet, whether supplemented with olive oil or nuts, did not appear to reduce the risk of heart failure in the study participants over the follow-up period. This underscores the complexity of heart disease and its various forms, which may not all respond equally to the same dietary pattern [10].

Regarding low-carb diet like ketogenic diets, they are indeed low in carbohydrates and sugar but are high in fat, particularly saturated fat. While these diets have shown promise in some areas, such as weight loss and managing epilepsy, they may not be suitable for everyone. High saturated fat intake can increase the risk of inflammation and other health problems. Achieving a balanced diet that limits both excessive sugar and excessive saturated fat is important for overall health.

Not everyone has same dietary pattern. People should aim for a balanced and varied diet that takes into account their individual health needs and goals. This may involve reducing sugar intake, limiting saturated fat, and including huge number of fruits, vegetables, whole grains, lean proteins, and healthy fats [13].

5. Conclusion

Today, a high-sugar diet is a major concern for teenagers. Since their bodies are still developing, they should establish a healthy dietary pattern and monitor their nutrient intake. A high-sugar diet can be extremely detrimental to the health of young people, leading to various diseases such as obesity, diabetes, and high blood pressure. The connection between a high-sugar diet and these health issues is significant, as sugar can elevate blood sugar levels and induce metabolic problems. Furthermore, excessive sugar consumption increases the risk of deteriorating vision, especially among today's teens who spend prolonged periods reading books or engaging in activities that strain their eyes. Excessive sugar intake can overload their eyes, ultimately leading to a decline in their vision. Addressing the issue of a high-sugar diet requires solutions, establishing a healthy dietary pattern is crucial. Teens should reconsider their food choices and opt for diets such as the Mediterranean diet, which contains less sugar. Additionally, since many young people are fond of sugary drinks and beverages, these should be reduced from their daily diets. In conclusion, addressing the health problems associated with a high-sugar diet is possible through dietary adjustments. However, it's important to note that a low-sugar diet is not without risks. People should aim for a balanced and varied diet that takes into account their individual health needs and goals.

References

- [1] M. L. Neuhouser. The importance of healthy dietary patterns in chronic disease prevention. *Nutrition Research*, 2019, 70: 3 - 6.
- [2] K. Beecher, I. Alvarez Cooper, J. Wang, et al. Long-term overconsumption of sugar starting at adolescence produces persistent hyperactivity and neurocognitive deficits in adulthood. *Frontiers in neuroscience*, 2021, 15: 670430.
- [3] B. V. Howard, J. Wylie-Rosett. Sugar and cardiovascular disease: A statement for healthcare professionals from the Committee on Nutrition of the Council on Nutrition, Physical Activity, and Metabolism of the American Heart Association. *Circulation*, 2002, 106 (4): 523 - 527.
- [4] Q. Yang, Z. Zhang, E. W. Gregg, et al. Added sugar intake and cardiovascular diseases mortality among US adults. *JAMA internal medicine*, 2014, 174 (4): 516 - 524.
- [5] R. Kahn, J. L. Sievenpiper. Dietary sugar and body weight: have we reached a crisis in the epidemic of obesity and diabetes? We have, but the pox on sugar is overwrought and overworked. *Diabetes care*, 2014, 37 (4): 957 - 962.
- [6] M. Veit, R. van Asten, A. Olie, et al. The role of dietary sugars, overweight, and obesity in type 2 diabetes mellitus: A narrative review. *European journal of clinical nutrition*, 2022, 76 (11): 1497 - 1501.

- [7] R. S. Beaser, W. A. Turell, A. Howson. Strategies to improve prevention and management in diabetic retinopathy: qualitative insights from a mixed-methods study. *Diabetes Spectrum*, 2018, 31 (1): 65 - 74.
- [8] T. A. Ciulla, A. G. Amador, B. Zinman. Diabetic retinopathy and diabetic macular edema: pathophysiology, screening, and novel therapies. *Diabetes care*, 2003, 26 (9): 2653 - 2664.
- [9] H. E. Billingsley, S. L. Hummel, S. Carbone. The role of diet and nutrition in heart failure: A state-of-the-art narrative review. *Progress in cardiovascular diseases*, 2020, 63 (5): 538 - 551.
- [10] A. Papadaki, et al. Mediterranean diet and risk of heart failure: results from the PREDIMED randomized controlled trial. *European Journal of Heart Failure*, 2017, 19 (9): 1179 - 1185.
- [11] H. E. Billingsley, S. L. Hummel, Carbone S. The role of diet and nutrition in heart failure: A state-of-the-art narrative review. *Progress in cardiovascular diseases*, 2020, 63 (5): 538 - 551.
- [12] N. D. Muth, W. H. Dietz, S. N. Magge, et al. public policies to reduce sugary drink consumption in children and adolescents. *Pediatrics*, 2019, 143 (4): e20190282.
- [13] I. Elisia, G. Krystal. The Pros and Cons of Low Carbohydrate and Ketogenic Diets in the Prevention and Treatment of Cancer. *Frontiers in Nutrition*, 2021, 8: 634845.