

Exploring Risk Factors for Obesity in Relation to the Association Between Family History of Overweight, and Smoking Habits

ABSTRACT

Objective and background : Obesity is a complex health condition with rising prevalence worldwide, linked to both genetic predispositions and lifestyle factors. Family history of overweight and smoking habits are independently associated with an increased risk of obesity, yet their combined influence remains understudied. This study aims to analyze the correlation considering factors like a family history of overweight, smoking habits, and obesity, the goal is to determine whether individuals with a genetic predisposition to obesity are more vulnerable to weight gain associated with smoking. **Methods:** Using data from a cross-sectional study, we analyzed patterns in BMI, smoking status, and family history of overweight. **Results:** These findings may provide valuable information for preventive strategies targeting individuals at higher risk of obesity.

1. INTRODUCTION

Obesity has become a global epidemic, heightening the risk of chronic illnesses like heart disease, diabetes, and cancer [1]. The likelihood of obesity is shaped by a complex interplay of genetic, lifestyle, and surroundings factors. Family history of overweight and obesity and smoking are recognized as significant independent risk factors for obesity. [2] However, the extent to which a family history of overweight may intensify the impact of smoking on obesity risk is not yet well understood. Understanding this correlation could support more targeted interventions for high-risk populations [3].

Family history of obesity reflects both genetic predispositions and environmental factors. Genetic contributions to BMI account for approximately 40-70% of an individual's likelihood of developing obesity, with factors related to appetite regulation, metabolic rates, and fat storage [4]. On the other hand, smoking habits have shown a complex relationship with body weight: smoking is sometimes associated with weight reduction, but it also promotes central fat accumulation, which increases obesity-related health risks [5]. According to Riskesdas statistics, an analysis of individual food consumption surveys indicates that many Indonesians still do not maintain a balanced diet. The eating habits of the general population tend to favor fatty foods while failing to meet the body's essential needs for vitamins, minerals, and fiber. [6] To address the rising obesity rates, innovative approaches involving various government and community stakeholders are necessary. One potential solution is to implement health interventions that focus on behavioral factors. Given the urgency of addressing the obesity issue, this study is crucial for identifying the factors that contribute to the incidence of obesity [7].

A genetic background of obesity refers to strong indicator of obesity risk, due to both genetic predispositions and familial environmental factors [8]. Children and adults with obese family

members often have similar eating habits and lifestyles, which increases the risk of obesity [9]. In addition, familial obesity is also associated with similar psychological and social factors, such as food consumption habits and sedentary behavior patterns, which increase the prevalence of obesity among family members [10].

Smoking is associated with changes in fat distribution and metabolic activity, contributing to abdominal obesity, especially in heavy smoker [11]. Interestingly, smoking cessation is often followed by weight gain, with an average increase of 4-5 kg within a year. This phenomenon is attributed to metabolic changes and an increased appetite after quitting smoking [12]. Individuals with a genetic predisposition to obesity may have a higher risk of gaining weight after quitting smoking. [13] Limited research has explored the potential interaction between a family history of obesity and smoking habits. Individuals with a genetic background of overweight may use smoking as a weight control strategy, complicating the relationship between these two factors [14] the tendency to gain weight after quitting smoking appears to be more pronounced in individuals with a family history of overweight or obesity, suggesting that genetic and behavioral factors may mutually exacerbate each other's influence on obesity risk [15]

This study explores the relationship between a family history of overweight and smoking habits in connection to obesity. It specifically looks at whether individuals with a genetic tendency toward obesity are more prone to weight gain linked to smoking or smoking cessation.

2. RESEARCH METHODS

3.1 Study Design and Participants

This study employs a cross-sectional design, utilizing statistical observational analytics to investigate associations within the dataset. Cross-sectional studies analyze samples at one specific time, allowing for the assessment of relationships between variables without drawing causal conclusions. The sample for this study comprises 2,111 participants. Participants were selected based on the availability of BMI, smoking status, family history of overweight, and gender.[16]

3.2 Data Assembly

The data utilized in this study was sourced from the UCI Machine Learning Repository (12), a well-regarded resource for secondary data, with the specific dataset published in 2019. The dataset consists of various variables capturing demographic, behavioral, and/or health-related attributes relevant to the research objectives. Given the nature of secondary data analysis, no primary data collection was involved.[17]

3.3 Data Analysis

The statistical analysis using Mann-Whitney test to compares two independent groups. Assess the correlation between family history of overweight, smoking habits, and obesity.

4. RESULTS DISCUSSION AND ANALYSIS

This study analyzed the association between obesity and three variables: gender, family history of overweight, and smoking habits. The statistical analysis provided p-values of 0.08 for gender, 0.01 for family history of overweight, and 0.88 for smoking habits, which help us interpret the significance of these relationships.

1. Family History of Overweight and Obesity (p = 0.01)

The analysis reveals a notable correlation between a family history of overweight and obesity, evidenced by a p-value of 0.01 ($p < 0.05$). This implies that individuals with overweight family history have a higher likelihood of being obese. This result aligns with the understanding that genetic predisposition plays a substantial role in an individual's risk of developing obesity. Familial influence includes both genetic factors and shared lifestyle behaviors, such as dietary habits and physical activity levels. These factors can amplify obesity risk among individuals with overweight or obese family members, emphasizing the importance of targeting family-based interventions for effective obesity prevention.

2. Smoking Habits and Obesity (p = 0.88)

The connection between smoking habits and obesity was determined to be statistically insignificant, with a p-value of 0.88 ($p > 0.05$). This large p-value suggests that smoking status (whether current, former, or never smoked) does not significantly impact the risk of obesity in this sample. Although smoking has been associated with changes in metabolism and appetite, this result suggests that smoking habits alone may not consistently predict obesity status. This finding is consistent with some literature that suggests smoking's impact on body weight may be more related to fluctuations in fat distribution and appetite regulation rather than overall obesity risk.

3. Gender and Obesity (p = 0.08)

Gender was also found to have no statistically significant relationship with obesity, as indicated by a p-value of 0.08 ($p > 0.05$). This implies that, in this sample, males and females had similar obesity risk levels. While there can be differences in fat distribution and metabolic responses between genders, the lack of a significant association here suggests that gender alone is not a primary factor in determining obesity risk. This aligns with findings that obesity risk factors may be more influenced by genetic and lifestyle factors rather than gender itself.

5. CONCLUSION

This study underscores the strong connection involving family history of overweight and obesity, suggesting that individuals with overweight family members may benefit from targeted lifestyle interventions to mitigate this risk. Smoking habits and gender, on the other hand, did not show a significant impact on obesity in this analysis. These findings point to the importance of prioritizing genetic and familial influences in obesity prevention efforts, as well as the potential limitations of focusing solely on smoking cessation or gender-based interventions for obesity management.

DATA AVAILABILITY

All relevant data are included in the paper and its supporting information files. This study aims to help researchers identify critical areas related to the obesity risk factors associated with a family history of overweight and smoking habits.

REFERENCES

- 1 C. Koliaki, M. Dalamaga, and S. Liatis, "Update on the obesity epidemic: after the sudden rise, is the upward trajectory beginning to flatten?," *Curr. Obes. Rep.*, vol. 12, no. 4, pp. 514–527, 2023.
- 2 Y. Zhang *et al.*, "Factors associated with gestational diabetes mellitus: a Meta-analysis," *J. Diabetes Res.*, vol. 2021, no. 1, p. 6692695, 2021.
- 3 D. B. P. D. FRSPH, "Family-related characteristics and childhood obesity: A systematic literature review," *Int. J. Caring Sci.*, vol. 13, no. 1, pp. 61–72, 2020.
- 4 A. M. Ali, H. Hori, Y. Kim, and H. Kunugi, "Predictors of nutritional status, depression, internet addiction, Facebook addiction, and tobacco smoking among women with eating disorders in Spain," *Front. Psychiatry*, vol. 12, p. 735109, 2021.
- 5 C. N. Taylor *et al.*, "Family History of Modifiable Risk Factors and Association With Future Cardiovascular," 2023.
- 6 S. A. Thamrin, D. S. Arsyad, H. Kuswanto, A. Lawi, and A. I. Arundhana, "Obesity risk-factor variation based on island clusters: A secondary analysis of Indonesian Basic Health Research 2018," *Nutrients*, vol. 14, no. 5, p. 971, 2022.
- 7 H. Van Minh, D. Q. L. Khuong, T. A. Tran, H. P. Do, F. Watson, and T. Lobstein, "Childhood Overweight and Obesity in Vietnam: A Landscape Analysis of the Extent and Risk Factors," *Inq. J. Heal. Care Organ. Provision, Financ.*, vol. 60, p. 00469580231154651, 2023.
- 8 R. J. F. Loos and G. S. H. Yeo, "The genetics of obesity: from discovery to biology," *Nat. Rev. Genet.*, vol. 23, no. 2, pp. 120–133, 2022.
- 9 L. Mahmood, P. Flores-Barrantes, L. A. Moreno, Y. Manios, and E. M. Gonzalez-Gil, "The influence of parental dietary behaviors and practices on children's eating habits," *Nutrients*, vol. 13, no. 4, p. 1138, 2021.
- 10 G. Karakitsiou, S. Plakias, F. Christidi, and A. Tsiakiri, "Unraveling Childhood Obesity: A Grounded Theory Approach to Psychological, Social, Parental, and Biological Factors," *Children*, vol. 11, no. 9, p. 1048, 2024.
- 11 T. A. Behl, B. A. Stamford, and R. J. Moffatt, "The effects of smoking on the diagnostic characteristics of metabolic syndrome: a review," *Am. J. Lifestyle Med.*, vol. 17, no. 3, pp. 397–412, 2023.
- 12 A. Cepeda-Benito, "Nicotine effects, body weight concerns and smoking: A literature review," *Curr. Pharm. Des.*, vol. 26, no. 20, pp. 2316–2326, 2020.
- 13 C. Bouchard, "Genetics of obesity: what we have learned over decades of research," *Obesity*, vol. 29, no. 5, pp. 802–820, 2021.
- 14 E. Zimlichman *et al.*, "Smoking habits and obesity in young adults," *Addiction*, vol. 100, no. 7, pp. 1021–1025, 2005.
- 15 S. Driva, A. Korkontzelou, S. Tonstad, N. Tentolouris, and P. Katsaounou, "The effect

of smoking cessation on body weight and other metabolic parameters with focus on people with type 2 diabetes mellitus,” *Int. J. Environ. Res. Public Health*, vol. 19, no. 20, p. 13222, 2022.

- 16 K. E. Nachman and J. D. Parker, “Exposures to fine particulate air pollution and respiratory outcomes in adults using two national datasets: a cross-sectional study,” *Environ. Heal.*, vol. 11, pp. 1–12, 2012.
- 17 S. Kabir, *Machine Learning Approaches to Improve Prediction in Health Care*. West Virginia University, 2022.

UNDER PEER REVIEW