

Risk Factors Causing Overweight and Obesity in Children and Adolescents

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ABSTRACT

Child and adolescent obesity is an increasing global health problem. It has long-term impacts, including an increased risk of non-communicable diseases such as diabetes, hypertension and cardiovascular disorders in adulthood. This study aims to identify risk factors that contribute to obesity in children and adolescents. The meta-analysis used was a literature review through Science Direct, Pubmed, and Google Scholar databases. A total of 59 articles were identified and 18 articles published between 2018 and 2024 that met the inclusion and exclusion criteria were included in this study. The data obtained showed that the main risk factors included unhealthy eating habits, minimal physical activity, as well as the influence of genetic factors, excessive use of electronic devices, and unsupportive social and family environments. In addition, economic and cultural factors also play an important role in influencing eating habits and physical activity. In conclusion, childhood and adolescent obesity is caused by a complex interaction between individual, environmental and social factors. Prevention efforts require a multidisciplinary approach that focuses on education, promotion of healthy lifestyles, and support from the social environment .

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INTRODUCTION

Obesity or known as being overweight, is the accumulation of excess fat in the body that can increase the risk of health problems (Theresa et al., 2023) . Obesity can increase the likelihood of developing various chronic diseases, including diabetes mellitus 2, dyslipidemia, hypertension, and coronary heart disease (CHD), which can be fatal (Sukohar, et al., 2018). Overweight and obesity in children and adolescents are one of the health issues that are increasingly being considered in Indonesia. Based on data from Riskesdas (Basic Health Research) in 20 23, the prevalence of obesity in children aged 5-12 years reached 19.7%, while in adolescents aged 13-18 years it reached 16% (Ministry of Health of the Republic of Indonesia, 2023). This figure shows an increasing trend compared to previous years and is a major challenge for efforts to improve public health. Obesity not only impacts physical health, but also contributes to various psychological problems, such as body image disturbance, anxiety, and depression, which can affect the quality of life of children and adolescents (Sutomo et al., 2019).

The various factors that contribute to obesity in children and adolescents are complex and involve interactions between lifestyle, environment, and socio-economic factors. Unhealthy eating habits, such as consuming fast food, drinks with high sugar content, and lack of fruit and vegetable intake, are among the factors that cause obesity. Research by Widiyanti et al. (2020) revealed that children who frequently consume fast food have a risk of obesity that is twice as high compared to those who rarely consume it. In addition, sedentary activities, such as watching television or playing gadgets, are also the main causes. A study in Surabaya by Pramono et al. (2020) found that more than 70% of obese children spend more than three hours a day on passive activities.

The family environment also influences the risk of obesity. Children from families with permissive parenting, where parents do not limit the consumption of high-calorie foods or do not encourage physical activity, are more likely to be obese (Indrawati & Santoso, 2021). In addition, modern technology, such as social media and digital games, contribute to a sedentary lifestyle that reduces children's physical activity (Puspitasari et al., 2021).

In addition, social and economic factors have a significant influence. Children from low-income families more often consume cheap food with low nutritional quality but high calories (Sari et al., 2019). Cultural perceptions, such as the assumption that fat children are considered healthy and prosperous, are also still widely found in Indonesian society (Putri et al., 2020).

Based on the complexity of the problem, this study aims to identify and analyze the main risk factors that contribute to obesity in children and adolescents in Indonesia. This study is expected to be a reference for families, schools, and policy makers in designing effective intervention strategies to prevent and overcome obesity in Indonesia.

RESEARCH METHODS

This study uses a literature review method to identify and analyze various risk factors that cause overweight and obesity in children and adolescents. The article search process was carried out using three main bases, namely Science Direct, PubMed, and Google Scholar. Keywords used in the search include "childhood obesity," "adolescent obesity," "risk factors," "overweight in children," and "lifestyle and obesity prevention." To ensure data relevance, the search focused on articles published between 2018 and 2024.

Articles included in the study must meet several inclusion criteria, namely original research or systematic reviews that are relevant to the topic, published within a specified time frame, written in English or Indonesian, and specifically focusing on obesity risk factors in children and adolescents. Conversely, articles that do not have complete information, are not relevant to the research topic, or are not fully accessible, are excluded from the review.

The selection process was carried out in stages to ensure that only relevant articles were further analyzed. Of the total 59 articles found in the initial search stage, 26 articles were selected after passing the selection stage according to the inclusion and exclusion criteria. The selected articles were then analyzed using a descriptive approach to identify the main risk factors that play a role in childhood and adolescent obesity.

The risk factors analyzed in this study include unhealthy diet, lack of physical activity, genetic factors, excessive use of electronic devices, and the influence of the social and family environment. In addition, this analysis considers social, economic, and cultural factors to understand how the environment influences children and adolescents' eating and activity. This approach provides a comprehensive picture of obesity risk factors, which can be the basis for developing more effective intervention strategies.

DNA RESULTS DISCUSSION

Lack of Physical Activity

Lack of physical activity is a significant risk factor for obesity in adolescents. Research shows that low physical activity has a significant relationship with obesity.

Table 1. Risk Factors Associated with Lack of Physical Activity in the Literature

Writer	Sample	Type of Study	Results
Hafid, W., & Hanapi, S. (2019).	This study involved all high school students in Gorontalo Regency as the population, totaling 275 students.	The study used an analytical observational approach designed cross-sectionally.	The results of the study revealed a significant relationship between the level of physical activity ($p = 0.027$) and fast food consumption ($p = 0.002$) with the incidence of obesity in adolescents in Gorontalo Regency.
Istanti, N., Ernawati, Y., & Antara, AN (2024).	This study involved 38 teenagers as the population, with 30 teenagers selected as samples.	Quantitative with a cross-sectional approach.	The results of the analysis showed that there was a significant relationship between the level of physical activity, sleep quality, and diet (carbohydrate and fat intake) with the risk of obesity ($p = < 0.05$). Sleep quality is the most dominant factor influencing the risk of obesity in adolescents.
Suha, GR, & Rosyada, A. (2022).	The study used secondary data from Riskesdas 2018 with a total of 54,914 respondents aged 13–15 years.	Cross-sectional design.	Most respondents were not obese (95.6%), had light physical activity (53.9%), rarely consumed simple sugar (57%) and fat (62.3%), regularly consumed protein (53.6%), and minimally consumed fruits and vegetables (98.7%). There was a relationship between age,

Writer	Sample	Type of Study	Results
Telisa, I., Hartati, Y., & Haripamilu, AD (2020).	This study involved 118 students from grades X and XI .	Analytical observation with cross-sectional design.	gender, physical activity level, and fat intake ($p < 0.05$). The main factors that are related to obesity in adolescents are energy, protein, fat, carbohydrate intake, fast food consumption, physical activity levels, pocket money, and hereditary factors ($p < 0.05$).
Pradigdo, SF, Nugraheni, SA, & Putri, RN (2023).	The research was conducted on 372 adolescents aged 15–18 years in DKI Jakarta, selected from a population of 996 adolescents.	Observational with cross-sectional design.	Risk factors for overweight in adolescents are frequently consuming drinks with high sugar content ($p = 0.044$; OR = 1.582) and having a higher education ($p = 0.040$; OR = 1.847).

Excessive Fast Food Consumption

Consumption of fast food triggers obesity in children because it is high in calories, sugar, and salt, and low in fiber and nutrients. This eating pattern replaces healthy food, while advertising and easy access further encourage excessive consumption.

Table 2. Risk Factors Associated with Excessive Fast Food Consumption

Writer	Sample	Type of Study	Results
Hafid, W., & Hanapi, S. (2019).	This study involved all high school students in Gorontalo Regency, with a total sample of 275 people.	Analytical observation with cross-sectional design.	The results of the study showed that there was a significant relationship between physical activity ($p = 0.027$) and fast food consumption ($p = 0.002$) with the incidence of obesity in adolescents in Gorontalo Regency.
Ali, R., & Nuryani. (2018).	The study involved 670 adolescents from high schools/vocational schools in Gorontalo City, consisting of 335 case groups (obese) and 335	Case control study design.	Adolescent obesity is influenced by low parental education, history of obesity, lack of knowledge, and consumption of fast food (>3 times/week). Housewife work

Writer	Sample	Type of Study	Results
Suha, GR, & Rosyada, A. (2022).	control groups (non-obese). The study took secondary data from Riskesdas 2018 by involving 54,914 adolescents aged 13–15 years as respondents.	Cross-sectional design.	is protective, while mother's work is the dominant factor. Most of the study subjects were not obese (95.6%), did little physical activity (53.9%), rarely consumed simple sugars (57%) and fats (62.3%), often consumed protein regularly (53.6%), but consumed less fruits and vegetables (98.7%). Age, gender, physical activity, and fat consumption were significantly associated with obesity prevalence ($p < 0.05$).
Telisa, I., Hartati, Y., & Haripamulu, AD (2020).	This study involved 118 students from grades X and XI.	Analytical observation with cross-sectional design.	The main factors that are related to obesity in adolescents are energy, protein, fat, carbohydrate intake, fast food consumption, physical activity levels, pocket money, and hereditary factors ($p < 0.05$).

Parental Obesity History

A history of obesity in parents can influence the risk of obesity in children through genetic factors, unhealthy eating patterns, and inactive family habits.

Table 3. Risk Factors Associated with Parental Obesity History

Writer	Sample	Type of Study	Results
As Syifa, ED, & Djuwita, R. (2023)	This study involved grade X and XI students from SMAN 4, SMAN 6, and SMAN 12 in Pekanbaru City.	Using analytical quantitative methods with cross-sectional design.	Obesity status in parents (OR=3.12) is the main factor that increases the risk of obesity in adolescents, followed by low knowledge (OR=2.62) and the habit of consuming sweet drinks (OR=2.34).

Writer	Sample	Type of Study	Results
Ali, R., & Nuryani. (2018).	The study involved 670 adolescents from high schools/vocational schools in Gorontalo City, consisting of 335 case groups (obese) and 335 control groups (non-obese).	Case control study design.	Adolescent obesity is associated with low parental education, history of obesity, lack of knowledge, and fast food consumption (>3 times/week). Housewife occupation is protective, while mother's occupation is the dominant factor.
Riany, P., Ahmad, A., & Ismail, N. (2021).	The study involved 174 adolescents, consisting of 87 obese adolescents (cases) and 87 non-obese adolescents (controls).	Case control design.	Factors that have a significant relationship with obesity in adolescents are a history of obesity in parents (OR=19.2) and parental opinion (OR=5.3).
Telisa, I., Hartati, Y., & Haripamulu, AD (2020).	The research involved 118 students in grades X and XI.	Analytical observation with cross-sectional design.	Significant factors associated with obesity in adolescents are influenced by energy, protein, fat, and carbohydrate intake, as well as fast food consumption habits, physical activity levels, amount of pocket money, and hereditary factors ($p < 0.05$).

Lack of Nutritional Knowledge

Lack of nutritional knowledge in children and parents triggers the selection of high-calorie foods and unhealthy eating patterns, leading to an increased risk of obesity.

Table 4. Risk Factors Associated with Lack of Nutritional Knowledge

Writer	Sample	Type of Study	Results
Sugiatmi, & Handayani, DR (2018).	The study involved 131 students of SMAN 7 Tangerang Selatan.	Cross-sectional survey.	Obesity is caused by low physical activity (OR=2.39), lack of nutritional knowledge (OR=2.89), and high consumption of fast food (OR=2.74), with the main

Writer	Sample	Type of Study	Results
Ali, R., & Nuryani. (2018).	The study involved 670 adolescents from high schools/vocational schools in Gorontalo City, consisting of 335 case groups (obese) and 335 control groups (non-obese).	Case control study design.	factor being nutritional knowledge. Obesity in adolescents is influenced by low levels of parental education, history of obesity, lack of understanding, and the habit of consuming fast food more than three times a week. Meanwhile, work as a housewife is protective, while the type of mother's work is a dominant factor.
Pradigdo, SF, Nugraheni, SA, & Putri, RN (2023).	The study was conducted on 372 adolescents aged 15–18 years in DKI Jakarta, selected from a population of 996 adolescents.	Observational with cross-sectional design.	Risk factors for overweight in adolescents are frequent consumption of sweet drinks (p = 0.044; OR = 1.582) and having a higher education (p = 0.040; OR = 1.847).

Other Risk Factors

Other risk factors that influence obesity in children are consumption of sweet drinks and high income or socioeconomic status. Children from high-income families have easier access to instant foods and sugary drinks that contain high calories, thus increasing the risk of obesity if not balanced with a healthy lifestyle.

Table 5. Other Risk Factors in the Literature

Writer	Sample	Type of Study	Results
As Syifa, ED, & Djuwita, R. (2023)	This study involved students in grades X and XI from SMAN 4, SMAN 6, and SMAN 12 in Pekanbaru City.	Using analytical quantitative methods with cross-sectional design.	Obesity status in parents (OR=3.12) is the main factor that increases the risk of obesity in adolescents, followed by low knowledge (OR=2.62) and the habit of consuming sweet drinks (OR=2.34).
Riany, P., Ahmad, A., & Ismail, N. (2021).	The study involved 174 adolescents, consisting of 87 obese adolescents (cases)	Case control design.	Factors that have a significant association with obesity in adolescents are a history of parental obesity (OR=19.2) and parental opinion (OR=5.3).

Writer	Sample	Type of Study	Results
	and 87 non-obese adolescents (controls).		

Discussion

Lack of Physical Activity

The results of the study revealed that low physical activity consistently acts as a significant risk factor for obesity in adolescents. Low physical activity reduces daily energy burning, so if accompanied by excess calorie intake, the risk of weight gain becomes greater.

Hafid and Hanapi's (2019) research identified a significant relationship between low physical activity (p value 0.027) and fast food consumption (p value 0.002) with obesity in adolescents in Gorontalo. This is in line with the research of Istanti, Ernawati, and Antara (2024), which showed that low physical activity, poor sleep quality, and an unbalanced diet (high carbohydrates and fat) significantly increase the risk of obesity, with sleep quality being the dominant factor.

Suha and Rosyada's (2022) research used 2018 Riskesdas data and this study involved 54,914 adolescents, and the results revealed that the majority of respondents had low activity levels (53.9%), this activity showed a significant relationship with obesity (p value less than 0.05). In addition, this study also highlighted the low consumption of fruits and vegetables as a supporting factor for obesity.

Telisa, Hartati, and Haripamulu (2020) this study confirmed that low physical activity, high energy intake, fast food consumption habits, and genetic factors are the main causes of adolescent obesity. This is reinforced by the research of Pradigdo, Nugraheni, and Putri (2023), which found that adolescents with the habit of consuming sweet drinks and low physical activity are at higher risk of being overweight.

Overall, low physical activity is one of the factors that plays an important role in the incidence of obesity in adolescents. Interventions through increasing awareness and promoting regular physical activity, accompanied by healthy eating patterns, are very important to prevent obesity.

Excessive Fast Food Consumption

The habit of consuming fast food excessively is a major factor contributing to childhood obesity. Fast food that is high in calories, sugar, fat, and salt, but low in fiber and nutrients, can trigger excessive weight gain, especially when combined with low physical activity. Hafid and Hanapi's (2019) research shows that fast food consumption has a significant relationship with obesity in adolescents in Gorontalo Regency (p value 0.002). Ali and Nuryani's (2018) research also supports this finding, where consuming fast food more than three times a week can contribute to obesity, especially in adolescents with low nutritional knowledge and a family history of obesity.

Similar results were obtained by Suha and Rosyada (2022), indicating a relationship between fat intake and obesity (p value less than 0.05). Although the majority of respondents were not obese, an unbalanced diet, including the habit of consuming fast food, is a major risk factor.

Telisa, Hartati, and Haripamilu (2020) emphasized that fast food consumption significantly contributes to obesity, especially when combined with high energy intake and low physical activity. This study also highlighted that obesity is more common in adolescents with a high-carbohydrate and high-fat diet.

Overall, excessive fast food consumption is a major risk factor for obesity in children. Interventions in the form of nutritional education, limiting fast food consumption, and promoting healthy foods are needed to prevent the spike in obesity prevalence among children and adolescents.

Parental Obesity History

A history of parental obesity is a major risk factor for childhood obesity, both through genetic factors and parenting. Children who have obese parents tend to inherit a genetic predisposition to obesity, in addition to being influenced by unhealthy eating patterns and habits in the family, such as lack of physical activity.

Research by As Syifa and Djuwita (2023) stated that the risk of obesity in children increases significantly due to obese parents (OR 3.12), accompanied by the influence of low nutritional knowledge and consumption of sweet drinks. Similar research by Ali and Nuryani (2018) supports this finding, citing a history of parental obesity as a significant factor in cases of adolescent obesity, especially when combined with high consumption of fast food.

Riany, Ahmad, and Ismail (2021) found that a history of parental obesity greatly influences the risk of obesity in children (OR 19.2), making it the most significant risk factor. This finding also states that parental perceptions of eating patterns also influence children's habits in consuming unhealthy foods.

Research by Telisa, Hartati, and Haripamilu (2020) confirms that one of the main causes of obesity is genetics or heredity, especially when combined with unhealthy eating patterns, such as fast food consumption and excessive energy intake. In conclusion, the risk of obesity in children is greater if their parents are obese. Interventions in the form of nutritional education to families and promotion of healthy lifestyles need to be carried out to break the chain of intergenerational obesity.

Lack of Nutritional Knowledge

Low nutritional knowledge in children and parents is an important factor that increases the risk of obesity. Lack of understanding of the composition of healthy food often leads to the selection of foods high in calories, sugar, and fat, as well as unhealthy eating patterns.

Sugiatmi and Handayani's (2018) research shows that low nutritional knowledge is the main factor of obesity in students of SMAN 7 Tangerang Selatan (OR 2.89), in addition to being influenced by low physical activity and high fast food consumption. This shows that nutritional education is very necessary to reduce the risk of obesity.

Ali and Nuryani (2018) also revealed that limited knowledge about nutrition, especially in parents, plays a role as an influential factor. This factor, coupled with high fast food consumption, increases the risk of obesity in adolescents. The mother's job that does not support active involvement in regulating the child's diet also plays a role in this case.

Pradigdo, Nugraheni, and Putri's (2023) research added that although higher education is also a risk factor for overweight in adolescents, the lack of practical knowledge related to

nutrition remains the main cause of unhealthy food choices. Overall, comprehensive nutrition education for children and parents is essential to raise awareness of the importance of healthy eating patterns and prevent obesity early on. Schools and families can work together to provide better nutrition education, both through formal curricula and outreach activities.

Other Risk Factors

Consumption of sugary drinks and high socioeconomic status also play a significant role in increasing the risk of obesity in children. Sugary drinks that are rich in calories can replace the consumption of nutritious foods, while easier access to fast food among high-income families exacerbates the problem.

Research by As Syifa and Djuwita (2023) showed that the habit of consuming sweet drinks (OR 2.34) is a significant factor contributing to adolescent obesity. High consumption of sweet drinks is associated with high calories entering the body without providing sufficient satiety, thus increasing the potential for weight gain.

In addition, high income or better socioeconomic status often makes it easier for children to access fast food with high calories, sugar, and fat. This factor can worsen unhealthy eating patterns that are at risk of causing obesity, especially if not balanced with an active lifestyle or awareness of the importance of a balanced diet.

The study by Riany, Ahmad, and Ismail (2021) indicated that the history of obesity in parents and their opinions played an influential factor (OR 5.3) also contributing to the risk of obesity in adolescents. Overall, higher socioeconomic factors often influence eating patterns and unhealthy eating habits in children, which in turn increases the risk of obesity. Therefore, it is important to educate families, especially those with higher socioeconomic status, about the sustainability of healthy eating patterns and the implementation of an active lifestyle plays a very important role in preventing obesity in children.

CONCLUSION

Obesity in adolescents is influenced by factors such as low levels of physical activity, excessive consumption of fast food, a history of overweight in parents, low nutritional knowledge, and consumption of sugary drinks and high socioeconomic status. Lack of physical activity and unhealthy eating patterns, including consumption of fast food, increase the risk of obesity. In addition, a history of parental obesity and low nutritional knowledge also contribute to increased weight in children. Children from high-income families are more likely to access foods that contain high calories, which worsens the possibility of obesity. Prevention of obesity needs to involve education on eating habits and physical activities that involve physical movement, as well as changes in habits at the family and school levels.

REFERENCES

- Ali, R., & Nuryani. (2018). Sosial Ekonomi, Konsumsi Fast food dan Riwayat Obesitas sebagai Faktor Risiko Obesitas Remaja. *Media Gizi Indonesia*, 13(2), 123–132.
- As Syifa, E. D., & Djuwita, R. (2023). Faktor-faktor yang Berhubungan dengan Status Gizi Lebih/Obesitas pada Remaja Siswa SMA Negeri di Kota Pekanbaru. *Jurnal Kesehatan Komunitas*, 9(2), 368–378.

- Hafid, W., & Hanapi, S. (2019). Hubungan Aktivitas Fisik dan Konsumsi Fast food dengan Kejadian Obesitas Pada Remaja. *Kampurui Jurnal Kesehatan Masyarakat*, 1(1).
- Hamalding, H., Risna, & Susanti, R. S. (2019). Hubungan Gaya Hidup terhadap Overweight dan Obesitas pada Remaja Putri di SMA Negeri 11 Makassar. *Jurnal Komunitas Kesehatan Masyarakat*, 1(1).
- Hanum, A. M. (2023). Faktor-Faktor Penyebab Terjadinya Obesitas pada Remaja. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*, 9(2).
- Istanti, N., Ernawati, Y., & Antara, A. N. (2024). Faktor-Faktor yang Mempengaruhi Risiko Obesitas pada Remaja di Panti Asuhan Darun Najah Sleman Yogyakarta. *Jurnal Keperawatan*, 12(2), 206–217.
- Juliatin, & Hasniar. (2024). Faktor-Faktor Penyebab Terjadinya Obesitas pada Remaja. *Student Research Journal*, 2(6).
- Mauliza, & Nashirah, A. (2022). Faktor yang Mempengaruhi Obesitas dan Penanganannya pada Anak. *GALENICAL: Jurnal Kedokteran dan Kesehatan Mahasiswa Malikussaleh*, 1(3), 77.
- Nugroho, P. S. (2020). Jenis Kelamin dan Umur Berisiko terhadap Obesitas pada Remaja di Indonesia. *An-Nadaa: Jurnal Kesehatan Masyarakat*, 7(2), 110–114.
- Oktaviani, S., Mizutani, M., Nishide, R., & Tanimura, S. (2023). Factors Associated with Overweight/Obesity of Children Aged 6–12 Years in Indonesia. *BMC Pediatrics*, 23(484).
- Pradigdo, S. F., Nugraheni, S. A., & Putri, R. N. (2023). Lifestyle as a Factor for Overweight in Adolescents: Lifestyle Sebagai Faktor Risiko Overweight Remaja. *Amerta Nutrition*, 7(2SP), 232–237.
- Puspitasari, N. (2018). Faktor Kejadian Obesitas Sentral pada Usia Dewasa. *HIGEIA Journal of Public Health Research and Development*, 2(2).
- Putri, R. N., Nugraheni, S. A., & Pradigdo, S. F. (2022). Faktor-Faktor yang Berhubungan dengan Kejadian Obesitas Sentral pada Remaja Usia 15–18 Tahun di Provinsi DKI Jakarta (Analisis Riskesdas 2018). *Media Kesehatan Masyarakat Indonesia*, 21(3).
- Qatrunnada, R. D. (2022). Faktor Penyebab Kejadian Kelebihan Berat Badan dan Obesitas pada Anak-anak dan Dewasa. *Media Gizi Kesmas*, 11(1), 318–326.
- Riany, P., Ahmad, A., & Ismail, N. (2021). Faktor Risiko Obesitas Pada Remaja: Studi Case-Control. *Nasuwakes: Jurnal Ilmiah Kesehatan*, 14(1), 80–86.
- Sugiatmi, & Handayani, D. R. (2018). Faktor Dominan Obesitas pada Siswa Sekolah Menengah Atas di Tangerang Selatan Indonesia. *Jurnal Kedokteran dan Kesehatan*, 14(1).
- Suha, G. R., & Rosyada, A. (2022). Faktor-faktor yang Berhubungan dengan Kejadian Obesitas pada Remaja Umur 13–15 Tahun di Indonesia (Analisis Lanjut Data Riskesdas 2018). *Ilmu Gizi Indonesia*, 6(1), 43–56.
- Sukohar, A., Gigih, S., Chicy, W. M., Risti, G., Riyan, W., & Cantika, T. S. (2018). The Effect Of Kemuning Leaves Infusion (*Murraya Paniculata* (L.) Jack) on the Lipid Profile of Obese Patients. *Biomedical & Pharmacology Journal*, 11(1). 417-422.

Telisa, I., Hartati, Y., & Haripamilu, A. D. (2020). Faktor Risiko Terjadinya Obesitas pada Remaja SMA. *Faletehan Health Journal*, 7(3), 124–131.

Theresa, A., Asep, S., & Muhammad Fitra, W. (2023). Nutrasetikal dalam Pengelolaan Obesitas. *Medula (Medical Profession Journal Of Lampung)*, 13(4), 472–478.