

# **Impact Of Pandemic Covid 19 On Obesity in Adolescent: A Review Article**

Marisa, Dina Indah Fitriana, Aprienne Ade Pramesti, and Ria Qadariah Arief

*Department of Nutrition, Faculty Psychology and Health, UIN Sunan Ampel, Surabaya*

[ria.qadariah@gmail.com](mailto:ria.qadariah@gmail.com)

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**Abstract:** The COVID-19 pandemic has changed human life, including health-related lifestyles. This literature review aims to analyse the incidence of obesity in adolescents during the Covid 19 pandemic. This study used the article analysis method to obtain an overview of the incidence of obesity in adolescents during the Covid 19 pandemic. Of the ten articles that met the criteria for our analysis, we found that influencing obesity during the Covid 19 period is the problem of lack of activity, increasing sedentary lifestyle, high excessive calorie intake, and the emergence of anxiety factors. Therefore, in dealing with the problem of obesity in adolescents during the COVID-19 period, they are more likely to pay attention to shifting lifestyle conditions and mental health awareness in handling it.

## **1 INTRODUCTION**

Covid-19 or coronavirus is a disease caused by the SARS-CoV-2 virus. The disease was first detected in Wuhan, China, at the end of December 2019 and began to grow rapidly, spreading worldwide. Due to the uncontrolled development and spread of Covid-19, many people are easy to transmit. As a result, many experiences mild symptoms until the peak is many deaths. This urgency has prompted the World Health Organization (WHO) to declare a global pandemic in March 2020. Meanwhile, in Indonesia, Presidential Regulation No. 11/2020 on Public Health Determination on Corona Virus Disease (COVID-19) 2019 and Non-Natural Disasters was stipulated by Presidential Decree No. 12. the Year 2020 Determination of Non-Natural Disasters. As a result, cases of coronavirus disease 2019 (COVID-19) were declared a national disaster. The reason is that this pandemic affects almost all areas of life, not only in the medical field but also in the fields of economy, society, education, religion, and politics.

The government is taking all forms of prevention and control to limit the spread of Covid-19. Among them are implementing massive social restriction policies in the form of lockdowns, self-isolation, and school closures indefinitely to stop the spread of the coronavirus (COVID-19) so that teaching and learning activities are carried out online or at home

online. However, this situation causes physical and mental health problems, especially with changes in adolescent lifestyles, such as irregular eating patterns and reduced physical activity (PA).

In fact, in 2018, WHO showed that more than 80% of adolescents worldwide were inactive due to low physical activity. In Indonesia, there was an increase from 2013-2018 to a sedentary lifestyle or less physical activity in children aged ten, as much as 26.1% to 33.5% (Risksedas, 2018). The globalization of this pandemic has caused low physical activity to be assessed even lower-decreased physical activity and an irregular lifestyle, allowing the accumulation of fat to the peak of obesity.

Obesity in adolescents has become a serious problem, especially in middle and low-income countries (Abdelkarim et al., 2020). In 2016, globally, obesity in children and adolescents aged 5-19 was more than 340 billion (WHO, 2018). In Indonesia, the prevalence of obesity in adolescents in 2018 was 31.0%. This data shows that from 2013-2018, there was an increase of 4.4% (RISKESDAS, 2018).

Many factors trigger the occurrence of obesity, causing obesity is said to be a fairly complex disease. Obesity or being overweight is the accumulation of excessive fat tissue that can affect physical and

psychosocial health, known as Basal Metabolism Rate (BMR) disorders. In addition, research involves an imbalance between the caloric intake received and expended (Sahoo et al., 2015).

According to WHO, the method that can be used to determine the level of obesity is a body mass index (BMI) of 30 kg/m<sup>2</sup>. Meanwhile, measure central obesity using waist circumference (LP/WC), waist-to-hip ratio (LPP/WHR), WCR (waist chest ratio), and LP/TB (waist-to-height ratio). For example, in Asian countries, a person is said to be obese if LP is 90 cm in men and LP 80 cm in women.

Various studies have shown that obesity has many negative effects, including an increased risk of non-communicable diseases such as diabetes, hypertension, coronary heart disease, and liver disease. In addition, obesity also affects psychological conditions that cause adolescents to be prone to anxiety, depression, mood disorders, and emotional instability. The existence of stigmatization and bullying also reduces self-confidence, which results in a worsening quality of life.

The risk of obesity is also associated with COVID-19 patients, especially adolescents because obesity can lead to inflammation, chronic disease, weakened immune response, and cardiopulmonary disease. Obese adolescents have a weak immune response to fight infections, such as pneumonia, which is a dangerous complication in COVID-19 patients. It was also found that consuming high-fat foods increased the expression of ACE-2 in the lungs. Exacerbate COVID-19 symptoms in overweight/obese people. The high prevalence of obesity at a young age is so impactful that it can shift the COVID-19 mortality curve.

Therefore, it is important to examine the incidence of obesity in adolescents during the pandemic to understand the nutritional intake of obese adolescents, physical activity, and the risks and factors for increasing obesity in adolescents during the COVID-19 pandemic.

The purpose of this study is to examine the pandemic Covid 19 on obesity in adolescents. Moreover, to increase adolescents' awareness about the dangers of obesity by providing an overview of the risks of obesity faced by adolescents. During the covid-19 pandemic so that in this new normal period, obesity cases can experience a drastic decrease.

## 2 METHODS

The method study is a literature review for assessment of the available literature on theories and concepts by collecting some literature through Google Scholar sources using the keywords "obesity incidence," "pandemic," and "Adolescent," especially the problem of obesity during the pandemic, experienced by adolescents with a period of discussion in 2019-2022.

The formation of this paper uses about ten reference sources in the form of research journals, observational journals, and other forms. The reason for choosing these journals is because the material and content are by the discussion in this paper. The independent variables, in this case, were physical activity, sedentary lifestyle, calorie intake, and anxiety levels. In comparison, the dependent variable is the state of nutritional status and the risk of obesity. Then analyze the data by reading, reviewing, studying, and analyzing various qualitative and quantitative data and conceptual information from the literature to draw conclusions from the discussed problems.

## 3 RESULTS

The formation of this paper uses about ten reference sources in the form of research journals, observational journals, and other forms that state the relationship between obesity in adolescents, especially during the COVID-19 pandemic, to a sedentary lifestyle, lack of physical activity, calorie intake, and anxiety levels. will be attached in the following table.

No	Author	Year	Research methods	Results	Conclusion	Referensi
1.	Egy Haryati	2020	Analytical survey with cross-sectional time approach	Of the 22 provinces, adolescents who are obese and overweight have more sedentary lifestyle behaviors,	There is a significant relationship between physical activity, BMI, and	Welcome to DIGILIB UNISAYOGYA - DIGILIB UNISAYOGYA. (n.d.). Retrieved 23 October 2022, from

				namely 19 students (21.6%) and 28 students (31.8%).	the incidence of obesity in high school adolescents during the covid-19 period	<a href="http://digilib.unisayogya.ac.id/">http://digilib.unisayogya.ac.id/</a>
2.	Olivia Herliani	2021	Article collection then literature review	The incidence of obesity in children increased during the COVID-19 pandemic due to a lifestyle transformation related to physical activity and diet.	Changes in nutritional status and lifestyle, especially in terms of physical activity during a pandemic, increase the risk of an epidemic of overweight or obesity.	Herliani, O. (2021). <i>Obesitas Anak di Masa Pandemi Covid-19. Hang Tuah Medical Journal, 19(1)</i> , Article 1. <a href="https://doi.org/10.30649/htmj.v19i1.13">https://doi.org/10.30649/htmj.v19i1.13</a>
3.	Lulu' Badriyah	2022	Observational with cross sectional study	The percentage of overnutrition in adolescents that causes obesity and its relationship with Sedentary Lifestyle: Sleep duration >9 hours/day (36.4%) Sleep duration < 8 hours/day (19.1%) Screen time duration $\geq 4$ hours/day (21.0%) Screen time duration <4 hours/day (15.8%) Not doing sports every week (20.6%) Doing exercise every week (19.7%)	Sedentary lifestyle or lack of physical activity can lead to obesity, but sleep duration, screen time, and exercise activity are not associated with overnutrition.	Badriyah, L., & Pijaryani, I. (2022). <i>Kebiasaan Makan (Eating Habits) dan Sedentary Lifestyle dengan Gizi Lebih pada Remaja pada Saat Pandemi Covid-19. Jurnal Ilmiah Kesehatan, 21(1)</i> , Article 1. <a href="https://doi.org/10.33221/jikes.v21i1.1521">https://doi.org/10.33221/jikes.v21i1.1521</a>
4.	Pika Asyera Sinulingga	2021	The method used is quantitative research with a cross sectional design	110 people are respondents who have a sedentary lifestyle who are at risk of obesity around (41.2%), quite at risk of obesity as many as 137 people (51.3%), and (7.5%) not at risk of obesity as many as 20 people.	The existence of online learning has an impact on the emergence of sedentary lifestyle behavior. This can trigger obesity in adolescents. This is also related to the increasing sedentary lifestyle behavior which can also increase the incidence of obesity	Sinulingga, P. A., Andayani, L. S., & Lubis, Z. (2021). <i>Pengaruh Sekolah Secara Online terhadap Perilaku Sedentari yang Berisiko Obesitas pada Remaja Berumur 15-19 Tahun. Jurnal Kesehatan, 12(3)</i> , Article 3. <a href="https://doi.org/10.26630/jk.v12i3.2683">https://doi.org/10.26630/jk.v12i3.2683</a>
5.	Shiva Fitria	2021	Convenience sampling method	Lockdown does affect physical activity, especially sedentary behavior. The total hours of sedentary behavior increased more than before the pandemic, which was around 20.16%. And the results also show that there is no gender relationship with	Lockdown and Social distancing are implemented during the Pandemic. This causes the Sedentary Lifestyle to begin to increase due to a significant	Fitria, S., & Surya, D. (2021). <i>The Impact of Covid-19 Pandemic on Students' Sedentary Behavior in Indonesia. JURNAL SERAMBI ILMU, 22(1)</i> , Article 1. <a href="https://doi.org/10.32672/si.v22i1.2732">https://doi.org/10.32672/si.v22i1.2732</a>

				the duration of sedentary lifestyle behavior before and after the pandemic.	lifestyle change from active to passive life.	
6.	Anastasya Fortuna	2022	This type of research method used is an observational survey with a cross sectional approach.	<p>1. For gender, 51.9% are female and 48.1% are male. Most of the income of parents of students is less than the UMK Karawang by 73%. In this case, there is a relationship between consumption patterns in a family's parental income and parental income (Islami and Andrijanto, 2020)</p> <p>2. The frequency of intake in the fatty food group (60.1%) was higher than in other food groups.</p> <p>3. Students of SMK Negeri 1 Cikampek have a high physical activity of about 51.3% and about 16.5% are included in the category of low physical activity.</p> <p>4. Diet does not play a major role in nutritional status. Most of the students with poor eating patterns are still in good nutritional status. This shows that nutritional status is influenced not only by diet, but also by other factors such as the role of parents in fulfilling nutrition. Family situation, pocket money, nutritional knowledge, body image, eating habits, etc.</p>	That the frequency of physical activity and consumption patterns have little influence on the nutritional status of students. This illustrates that physical activity and consumption patterns are not the main factors that affect the nutritional status of students, but there are several other factors, either from intrinsic (self) or extrinsic (other) factors.	Fortuna, A., Fikri, A. M., & Elvandari, M. (2022). Hubungan Frekuensi Pola Konsumsi dan Aktivitas Fisik dengan Status Gizi Remaja Selama Pandemi Covid-19: <i>JURNAL GIZI DAN KESEHATAN</i> , 14(2), Article 2.
7.	Annisa Reza	2022	The method used is quantitative research with analytical descriptive research design using survey method	It was found that students at SMAN X mostly did moderate-intensity physical activity and a small proportion did high and light physical activity. Teenagers aged 16-18 years at SMAN X consumed the most foods with normal calories (54.5%), low calories (25.5%), and high calories (20.0%)	Moderate physical activity is mostly done by teenagers in SMA X than high and low activities. This affects the adolescent's eating patterns, namely adolescents with high-moderate activity consume normal calories, while adolescents with low-activity consume high calories.	Miranda, A. R., & Sari, A. K. (2022). Gambaran Aktivitas Fisik dan Pola Makan Selama Pandemi Covid-19 pada Remaja. <i>Jurnal Riset Kedokteran</i> , 21–26. <a href="https://doi.org/10.29313/jrk.vi.775">https://doi.org/10.29313/jrk.vi.775</a>
8.	Sara Herlina	2021	The method used is quantitative	1. The study was conducted on 355 respondents, 143 (42.7%) frequently consumed	That there is an influence between fast food	Herlina, S., Qomariah, S., Sartika, W., &

			with a cross sectional research design	fast food, and 192 respondents (57.3%) did not consume fast food. It was also found that respondents who frequently consumed fast food had a 2.8 times greater risk of experiencing overweight and obesity than those who rarely consumed fast food.	consumption and the incidence of overnutrition in adolescents during the COVID-19 pandemic	Juwita, S. (2021). PENGARUH FAST FOOD TERHADAP GIZI LEBIH PADA REMAJA DI ERA PANDEMI COVID-19. <i>JURNAL RISET KESEHATAN POLTEKKES DEPKES BANDUNG</i> , 13(2), Article 2. <a href="https://doi.org/10.34011/juriskesbdg.v13i2.1963">https://doi.org/10.34011/juriskesbdg.v13i2.1963</a>
9.	Charles Leonardo	2021	This research uses descriptive quantitative research method with cross section approach	1. From the research, it was found that the normal category was 71 people (78%) and the smallest (underweight category) was 2 people (2%). The results were obtained based on BMI/U 2. That the physical activity carried out by the youth of SMPN 2 light activity (49%) = 45 people, heavy activity (5%) = 5 people, very heavy activity (5%) = 5 people	Based on a survey of 91 teenagers at SMPN 2 Raren Batuah, Unsum Village, Kec. Raren Batuah (East Barito District, Central Kalimantan) it was concluded that the nutritional status of adolescents based on BMI/U was 78% in the normal category, the rest had nutritional problems. Approximately 49% of physical activity by category of light activity. Adolescents who do very light physical activity are prone to overweight and obesity nutritional status. On the other hand, adolescents with high or very high physical activity had normal nutritional status. The results show that the nutritional status and level of physical activity of adolescents may be related to the Covid-19 pandemic.	Leonardo, C., Dary, D., & Dese, D. C. (2021). Gambaran Status Gizi dan Aktivitas Fisik Remaja Selama Pandemi COVID-19. <i>Jurnal Keperawatan Muhammadiyah</i> , 6(4), Article 4. <a href="http://dx.doi.org/10.30651/jkm.v6i4.9621">http://dx.doi.org/10.30651/jkm.v6i4.9621</a>
10	Bachuroh Fasda	2021	This research is an analytic observational study using a	It is known that respondents who have a normal body mass index and are not anxious are 3 people (9.1%), while those	That there is a significant effect between body mass index and	Fasda, B., Romadhon, Y. A., Candrasari, A., & Herawati, E. (2021). Pengaruh Tempat

cross section research design.	who experience anxiety are 30 people (90.9%). Respondents who experience excess body mass index or obesity with a state of not experiencing anxiety are 25 people (37.3%) and those who experience anxiety are 42 people (62.7%).	adolescent anxiety. Obese adolescents are more likely to suffer from anxiety than adolescents with normal BMI.	Tinggal dan Indeks Massa Tubuh Terhadap Tingkat Kecemasan Remaja di Era Pandemi COVID-19. <i>Proceeding of the URECOL</i> , 1132–1137.
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## 4 DISCUSSIONS

Including social distancing and lockdowns. The existence of the Lockdown and restrictions on social interaction have caused all activities, be it work, learning, or other activities, to be carried out at home. Causes all forms of activities are not free and become limited. The existence of these limitations supports a decrease in physical activity due to changes in behavior from active to passive.

### Daily Lack of Activity

During adolescence, a transitional period begins marked by various physical changes and maturation of the reproductive organs, often called puberty. During this period, major changes occur in various metabolic systems, including hormonal regulation, changes in reproductive distribution, and body fat levels. In addition, lifestyle changes support diet, physical activity, and mindset changes. Adolescence is a period of growth and development. Therefore, physical activity is necessary for the body in this phase.

According to (Golshevsky, 2020), the prevalence of obesity among adolescents is increasing along with a decrease in physical activity behavior. This decline in activity has increased, especially during the COVID-19 pandemic, due to a shift from proactive behavior to passive behavior due to social distancing and lockdowns. According to the Ministry of Health of the Republic of Indonesia (2017), obesity is an excessive accumulation of fat due to an imbalance in the long term between energy intake (Energy Intake) and energy expenditure (Energy Expenditure).

In the past, obesity was considered only a problem in high-income countries. However, rates of overweight and obesity are now increasing dramatically in low- and middle-income countries, especially in urban areas (World Health Organization, 2020). Obese adolescents are associated with an increased risk of metabolic syndrome, including insulin resistance,

hyperinsulinemia, glucose intolerance, diabetes mellitus, dyslipidemia, hyperuricemia, fibrinolytic disorders, and hypertension. In addition, they can increase the risk of end-stage coronary heart disease in adulthood. Currently, cases of overweight or obesity are becoming a global epidemic, with a percentage of 2.8 million people dying each year. Therefore, healthy behavior is needed to prevent and treat obesity by doing physical activity and implementing a healthy diet.

### Sedentary Lifestyle

Reduced physical activity or a sedentary lifestyle is also associated with a sedentary lifestyle. The word sit comes from the Latin word "sistere", which means "to sit". Therefore, a sedentary lifestyle is used to describe the behavior associated with low energy expenditure in the body, which is less than 1.5 metabolic equivalents (MET) (Santos et al., 2020).

A sedentary lifestyle is negatively associated with many conditions. Lack of physical activity is a risk factor for chronic disease and increases mortality. Sedentary behavior has been reported to affect psychological conditions such as stress, anxiety and depression, physical health, and obesity. A previous Giurgiu (2019) study found that sedentary behavior had a significant effect on mood dimensions, and people would feel less healthy and energized.

### Calorie Intake

A healthy diet has several benefits, including Being a source of energy, can maintain immunity, regulating body metabolism, and improving both physical and spiritual health. Consumption of a balanced and nutritious diet is very important because it can increase immunity. Unbalanced fast food with high carbohydrates, fat, cholesterol, salt, and other components is not suitable for frequent consumption because it can affect growth and development, the digestive system, and cause overweight or obesity in adolescents.

Lifestyle changes in adolescents can affect food intake and needs. In a study by Scarmozzino and Francesco (2020), about 52.9% of teens experienced

more food consumption during the pandemic. Furthermore, the consumption of stress-reducing foods such as chocolate and ice cream has increased during the Covid-19 pandemic. The existence of social restrictions also causes people to go to the market/crowded places rarely, so some order food from online motorcycle taxis. The food in the online application is very varied, especially the type of fast food. Most teenagers will consume fast food because it is simpler, more delicious, and cheap. However, consuming fast food too often in the pandemic era risks causing problems.

The high-calorie content in fast food cannot be separated from energy sourced from fat and carbohydrates, significantly if the excess of these macronutrients can cause overnutrition and obesity. The amount of fat and carbohydrate consumption will indirectly increase energy intake in the body, while the body can store fat infinitely. This condition can cause degenerative problems. Therefore, it is important to maintain consumption patterns to avoid nutritional status problems, especially obesity.

### **Mental Health**

Stress is a problem that can happen to everyone. Usually, this situation generally comes from outside. These situations can cause all sorts of symptoms, including acute fatigue, anger, and peak anxiety. The definition of anxiety is a feeling of discomfort or fear accompanied by an autonomic response, usually as a form of self-anticipation of an unpleasant condition. Anxiety is a natural thing and can be seen in some parts of daily life, this condition makes a person feel insecure and sometimes the cause is not so clear. Anxiety is a normal reaction to situations that are stressful to the point of depressing a person's life.

Anxiety in adolescents occurs because adolescents are at a critical age to face unexpected things. Lack of information, too much news on social media, inability to read about the spread of Covid-19, and the prospect of contracting Covid-19 can all be factoring that cause anxiety among teenagers. Anxiety in adolescents can have a variety of effects, including difficulty sleeping, difficulty concentrating, forgetfulness, decreased appetite, and irregular eating habits. These effects can affect the nutritional status of adolescents (Efrizal, 2020). Because everyone's body responds differently, often teenagers who experience stress and anxiety increase their food consumption habits. Anxiety increases blood cortisol levels and activates fat-

storing enzymes. High levels of the hormone cortisol stimulate the body to secrete the hormones insulin, leptin, and the neuropeptide Y (NPY) system, stimulating the brain, causing hunger, and causing the desire to eat foods high in sugar and fat. If this keeps happening continuously, then Sustainability can cause a lot of excess energy to be stored in the form of fat resulting in weight gain which is a risk for obesity.

Persistent anxiety in adolescents is often associated with mental health disorders. That's because overweight or obese people are more likely to have poor mental health. This is very important to identify. If this is not treated properly, the condition can continue into adulthood. Therefore, it is important to conduct a review of the COVID-19 pandemic period on learning the factors that cause obesity in adolescents such as food intake patterns, sedentary lifestyles, physical activity, and feeling control of a condition to minimize feelings of anxiety. This is so that it does not continue in the future against things that are not expected, especially the incidence of obesity.

## **5 CONCLUSIONS**

There is a basic relationship between a sedentary lifestyle, daily lack of activity, excessive calorie intake, and levels of anxiety about obesity in adolescence during the COVID-19 pandemic. It is hoped that adolescents can increase awareness of the importance of maintaining body condition and health by paying attention to lifestyle, diet, and daily activities to have good nutritional status and avoid obesity.

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