OBESITY RISK ANALYSIS DURING THE COVID-19 PANDEMIC: A SYSTEMATIC REVIEW

Endang susilawati[1], Evawani Y Aritonang [2], Zulhaidah Lubis [3], Asfriyati,[4]
[1]Politeknik Kesehatan kementerian kesehatan Medan
[234]Universitas Sumatera Utara
Email : [1]philiendang2309@gmail.com

ABSTRACT

Obesity is a global health problem whose prevalence continues to increase from time to time, it is estimated that 400 million adults in the world were obese in 2011 and increased to 700 million in 2018. Quarantine at home, activity and social restrictions during the pandemic to prevent transmission during the Covid-19 pandemic is thought to have an effect on obesity. This study aimed to analyze the risk of obesity on changes in eating behavior, physical activity, sleep patterns, and stress due to quarantine at home during the Covid-19 Pandemic. It was a systematic review by reviewing journals about the risk of obesity during the Covid-19 pandemic. Search articles using databases on Pubmed, Worldcat, and BMC with certain keywords and inclusion criteria obtained 9 journals. It was found that the effects of quarantine at home, physical and social restrictions contributed to the majority of unhealthy eating behavior, decreased physical activity, increased stress and changed sleep times, these were at risk for the transition of weight at various levels to a higher body weight. People with obesity are more at risk of gaining weight compared to normal weight, have more unhealthy eating behavior, less physical activity, and higher stress levels than people with normal weight. Risk of severity or even death is increase if infected with Covid-19. Covid-19 pandemic with quarantine policies at home has negative implications for healthy behavior and contributes to weight gain, obesity affects the severity of Covid-19 disease.

Keywords: *Risk of obesity, Covid-19 pandemic, quarantine*

INTRODUCTION

Obesity is an increase in body weight as a result of excessive accumulation of body fat (Alamsyah A.at all.,2019) Obesity has become a global health problem whose prevalence continues to increase from time to time, it is estimated that 400 million adults in the world were obese in 2011 and increased in 2018 to 700 million. WHO (2018). In developed countries the health problems due to obesity exceed the health problems due to smoking and alcohol. Risk factors that can cause obesity are unhealthy behaviors including eating behavior, physical activity, unfulfilled sleep needs and stress experienced other cardiovascular diseases. With the Covid-19 pandemic that has hit almost all parts of the world, the risk is even worse. This is due to several government policies around the world to limit social mobility, regional quarantine, Stay at home, lockdown and the recent implementation of Community Activity Restrictions (PPKM) in Indonesia to limit the transmission of Covid-19. These policies lead to changes in behavior and lifestyles of people around the world where eating patterns become less healthy, physical activity decreases, stress levels increase, all of which cause weight transitions at all levels, from normal weight to overweight, from normal weight to overweight and overweight to obesity.

Research conducted by Alfawaz H in Saudi Arabia showed that, during the lockdown period, it had a significant impact on physical activity, unhealthy dietary behavior in some residents (Alfawaz H, at all,2021). Where during the pandemic the prevalence of the population who walked 4 times per week decreased significantly, followed by a significant increase in the prevalence of participants who did not walk every day. the prevalence of participants who consumed snacks between times increased during quarantine while the prevalence of participants who never ate fresh fruit and vegetables also increased. If this situation is not immediately anticipated, it will have a cumulative adverse effect on health and tend to increase the prevalence of obesity in the community. In addition, obese people are at risk for various non-communicable diseases and during the Covid-19 pandemic, if they are infected with this disease, they are more at risk for serious conditions and even death. Although not because of obesity, but because of the accompanying conditions that exist in people who are obese. In addition, the amount of fat tissue in the body results in an increase in the hormone leptin which is produced while the hormone functions in regulating appetite, body metabolism and regulating body cells against infection. When leptin levels increase, it can inhibit the body's ability to fight infection (Maurya R, at all,2021). This allows obese people to be more at risk for Covid-19 than non-obese people.

Therefore, further analysis is needed on how the impact of social activity restrictions, quarantine and stay at home on changes in people's lifestyles during the Covid-19 pandemic and how they contribute to obesity. The purpose of this article review is to analyze the risk of obesity on changes in eating behavior, physical activity, sleep patterns, and stress due to quarantine at home during the Covid-19 pandemic.

METHOD

This is a systematic review of articles related to the risk of obesity during the Covid-19 pandemic to identify various risks arising from restrictions on social activities, quarantine at home and so on to lifestyle changes that result in increased incidence of obesity. Search articles using databases on Pubmed, Worldcat, and BMC with certain keywords and the inclusion criteria of the selected articles are free full text, adult research respondents, written in English, relevant to the purpose and using an observational design. The literature search was limited to those published in 2021. Exclusion criteria were articles that were meta-analytical reviews or literature reviews. Screening of the selected articles according to the inclusion and exclusion criteria was carried out either by system or manually by reading the title, and the abstract obtained 9 articles.

RESULTS AND DISCUSSION

From the results of the search, 10 articles were found which were considered to be in accordance with the research objectives and the inclusion and exclusion criteria that had been set. Furthermore, screening is carried out whether the title of the research article is the same or not. After the screening, it was obtained that 1 of the same titles was obtained, so that one of them was removed and became 9 articles that were studied. The literature search strategy can be seen in table 1 below.

TABLE 1: LITERATURE SEARCH METHOD

Search Engine	PubMed	Word Cat	BMC
Free full text, 2021	360	316	8
Mature	116	19	3

English	97	19	3
Relevant	7	2	1
Observational design	7	2	1
Same Title	-	1	-
Result		9	

The selected articles are studies conducted in various countries and after an assessment of the quality of the study of 9 articles can be categorized as good, then proceed with data extraction using grid synthesis which includes research title, objectives, design, participants, parameters, samples and results.

A. General Description

The 9 research articles reviewed were each conducted in a different country, namely research conducted in the UK, Morocco, Jordan, USA, Australia, Canada, China, Germany, United Arab Emirates, Israel and Turkey. Most of the research conducted (66.6%) recruited respondents from the general public, 22.2% from the student community in colleges (2.6) and 11.1% of respondents from hospitals who participated in obesity treatment programs (9) and 1 article (11.1%) in the gym community at the training center (8).

Two studies were conducted on university students with an average age of 20.10 years and 23.4 years where one study recruited respondents from 1 university while the other recruited respondents from several state universities in the country. 7 other studies recruited respondents with a wider age range of 18 years.

Regarding the distribution by sex, all articles reviewed involved male and female gender, but the majority were female. Except for research conducted by Katsoulis M altogether, all respondents are female (Katsaulis M, at all., 2021). In a study conducted by Flanagan EW, which involved several respondents from various countries, namely the United States, Britain, Australia and Canada (Flanogan WE, at all.,2021).

B. Lifestyle Related to Diet and Obesity

The study used an online questionnaire, through the social networking site Facebook to measure the eating behavior of respondents during the Covid-19 pandemic (Mauray R at all., 2021, Katsoulis M,at al,2021, Zhu Q at all.,2021). For the rest of the research, questionnaires were used directly given to the respondents. Of the 9 articles reviewed, it was stated that the majority during the pandemic there was a change in unhealthy eating behavior where respondents tended to eat more at breakfast, lunch and dinner, increased consumption of sugary foods and drinks, unhealthy snacking habits and less consumption of fruits and vegetables. However, there is a finding by Flanogan WE as many as 20.7% of respondents stated that during quarantine their food was healthier, because they ate more at home which was prepared by themselves and reduced eating fast food restaurants from 1.98 per week to 1. 08 times per week. The frequency of cooking food at home increased from 4.49 to 5.18 days per week.[5] Zhu Qi's findings, that there was an increase in total food intake by 39 %, especially in food and soft drinks. The main factor that contributed to weight gain was food intake with a significant value (p=0.000) (Zhu Q at all.,2021).

Similarly, the findings of Radwan H that 31.8% of respondents experienced an ±increase in food intake, 62.1% of respondents experienced changes in 1-2 unhealthy behaviors and 9% of them experienced 3 unhealthy behavior where the value OR Obesity to less or unhealthy behavior is 2.06. This means that people who are obese are 2.06 times more likely to have unhealthy behavior than people who are not obese (Radwan H, at all.,2021). In addition, there was a significant increase in appetite for those who were overweight by 44.4%, 50.2% for those who were obese and for those with normal weight 40.4%. The behavior of eating a lot of both breakfast and dinner and increased appetite (Mauray R. at all.,2021)

Boukrim M said that being overweight was significantly associated with a balanced diet with a p value = 0.0001, where a balanced diet was protective or could prevent obesity (Boukrim M, at all., 2021).

The study submitted by Deger VB, to the community undergoing obesity therapy, it was found that during the pandemic and quarantine, participants in the FCQ 9 Food Craving Questionnaire result assessment that they experienced increased food cravings in quarantine compared to before quarantine, where the average individual score before was 134, 18 ±42.92 increased to 143, 40 ± 47.80. 80 points during the pandemic, with p value <0.05 (Denger VB, at all, 2021).

Similarly, Huber C.B at al found that gender, BMI, exercise, alcohol consumption, smoking and mental stress were associated with significant changes in the number of meals during lockdown.

People who experienced an increase in the amount of food consumed by 46.8% while eating less was only 18.6%. People who had a BMI > 25 kg/m² experienced an increase in the amount of food more by 34.4% and had a significant effect on changes in the number of meals with p value = 0.032 (Huber BC, at all.,2021)

C. Lifestyle Related to Physical Activity and Obesity

Physical activity is a risk factor that is also a major contributor to the incidence of obesity. From the articles reviewed during the Covid-19 pandemic, physical activity generally decreased. Based on the articles reviewed, the majority stated the results that during the Covid-19 pandemic the respondents' physical activity decreased, where 70% of Jordanians reported changes in physical activity, 39% of respondents who were overweight reported being inactive, during quarantine inactive behavior was dominated by them. who are overweight and obese (Mauray H, at all, 2021). The average physical activity decreased from 348.06 to 329.74 minutes per week 54.9% experienced a decrease in physical activity, especially in outdoor activities (Flanogan WE, at al, 2021, Zhu Q, at al., 2021, Boukrim M, at all. 2021). Meanwhile, those who are members of the gym community at the training center are also affected by the pandemic situation where 70% of respondents said that the exercise they did was less than usual by reducing the frequency of exercise where 37.18% exercised 4 times a week, 20.3% 3 times a week, 18.71 % 2 times a week, 14.30 % once a week and 9.40 % not exercising at all (Denger VB, at al 2021, Al-Domi H, at all, 2021). The article also stated that those who did high activity experienced a decrease in body weight. The results obtained from Katsoulis M that conditions at high risk for increasing diseases such as CVD, COPD and DM, are reduced for respondents who have normal weight by doing moderate physical activity with an OR of 0.55, mild with an OR 0.71, weight 0.74. For overweight with light physical activity OR 0.76, moderate OR 0.53 and heavy activity OR 0.50. For those who are obese, strenuous physical activity may have a lower risk of disease, namely the OR of 0.44 compared to moderate and light activities, respectively, OR of 0.64 and 0.78 (Katsaulis M, at all, 2021). Boukrim M's findings that being overweight is significantly associated with low physical activity with a p value of < 0.05 (Boukrim M, at al, 2021).

D. Sleep Patterns and Obesity

For the assessment of sleep adequacy, 1 paper uses an assessment of sleep onset and wakefulness before and during the Covid-19 pandemic, which is presented based on time in hours and minutes in 5-minute increments. Collecting data through filling out questionnaires through

social media with paid advertisements on the Facebook platform which respondents reported themselves related to sleep activities before and during the pandemic. The article showed that sleep onset and wake time changed significantly, with onset 42.41(1.61) and awakening 59.33(2.15) minutes later. Changes in sleep quality varied and the majority reported that the quality of sleep deteriorated as much as 43.8%. Most of them (75%) are worried about their physical health, family members and 87.5% are related to Covid-19. Individuals with obesity had a greater change in sleep onset time than individuals with normal weight 8.72 (0.07) minutes later, P=0.3, being overweight 8.14 (0.07) minutes later, p=0.04. Radwan H, at all also reported that 20.8 % of respondents experienced a decrease in sleep time during the quarantine period.[7] In the article presented by Flanogan EW obese individuals have greater changes in sleep onset time than normal and overweight individuals (Flanogan EW, at all 2021)

E. Stress and Obesity

In general, articles present the relationship between stress and obesity during the pandemic. Boukrim M found that overweight people were more stressed than those who were not overweight. The test results show that there is a relationship between excess body weight and the threat of stress with p value = 0.008. During the quarantine period, respondents experienced pressure due to loss of income (Baukrim M, at all, 2021). Flanogan EW at all stated that obese individuals experienced higher anxiety in the pre-pandemic period compared to overweight and normal weight individuals with p value < 0.001(Flanogan EW, at all 2021).

Similarly, obese individuals experienced a significant increase in anxiety compared to individuals who were overweight and normal weight. In addition, Qizhu at all also identified that psychological factors can cause an increase in a person's food intake, mainly due to loneliness and anxiety (Zha Q, at all,2021). The same thing was conveyed by Deger VB, that 78.2% stated that the lack of individual physical contact with friends, being at home continuously to reduce physical contact affects the psychology of people with obesity so that they consume more food and increase their FCQ (Food craving Quasioner) and ultimately interfere with obesity management (Denger Vb, at all, 2021).

In the article submitted by Flanogan EW, it was found that obese individuals experienced a significant increase in anxiety compared to normal weight and overweight individuals, namely 9.2, 7.88, and 8.14 with p value = 0.001 respectively (Flanogan WE, at all., 2021). Al - Domi at all also said that the quarantine policy caused pressure on respondents due to loss of income (Al - Domi at all, 2021)

F. Obesity and the Covid-19 Pandemic

The obesity criteria in this review article use the BMI (Body Mass Index) parameter which is categorized into 4 parts, namely if the BMI is 18.5-24.9 kg/m² normal weight, 25-29.9 kg/m² overweight, 30 kg /m² obese and 30-39.9 kg/m² very obese. Of the 9 articles reviewed, it was found that all of them reported that there was an increase in body weight during the pandemic, weight transition during the covid-19 pandemic at every level of body weight (BW). From normal weight to excess weight by 0.68%, from excess weight to obesity by 2.35% and from obesity to severe obesity by 3.52%. In the article submitted by Mohamad Bouk, 36% of respondents experienced being overweight and the excess weight experienced was significantly related ($p< 0.05$) with gender, personal expenses 273.54 USD/month, threat of stress, low physical activity , while a balanced diet is not a risk but a protective one. This weight gain is higher in those who have normal weight compared to those who are overweight and obese. As stated by Heyder at all in his research in Jordan that there is a significant increase in weight, it occurs by 12.9% for those who have a thin weight category, 28.5% normal weight, 36.4% overweight, 41.1% obesity during quarantine. This was followed by a significant increase in the percentage of those who consumed breakfast, lunch, and dinner in all BW categories, and found a difference in the increase in appetite for those who were overweight by 44.4% and obese by 50.2%. compared to normal BB at 40.4% with a p value of < 0.05.

The results of the research presented by Flanogan EW, with stay at home obese individuals have the greatest increase in healthy eating behavior compared to those who have normal weight and overweight. However, there is still a transition of weight gain in each BW group. Of all respondents 27.3% experienced weight gain and those who experienced weight gain were obese compared to those who had excess and normal weight, respectively 33.4%, 20.5% and 24.7% (Flanogan EW, at all, 2021). Similarly, the results obtained from Radwan H that 29.4% of respondents experienced an increase in weight and the majority of them had unhealthy behavior changes between 1-3 behaviors (Radwan H, at all, 2021).

However, in the article submitted by Deger VB in his research conducted in the city of Maradim on those undergoing obesity therapy in hospitals (hospitals), Turkey that the average BMI before the pandemic was lower (34.61 ± 4.64 kg/cm² than during the pandemic, which was 30.09 ± 3.74). kg/cm² with p value < 0.05.[9] While Dor-haim H at all reported research conducted on the gym training community in Israel, showing that 55% of respondents experienced weight gain, of which half experienced weight gain > 2 kg with a mean increase in weight. 1.2 kg (Dor-Haim H, at all, 2021).

Regarding how the increase in obesity during a pandemic due to quarantine contributes to an increased risk of non-communicable diseases, Katsoulis M said in his article. It was found that after 3 months of lockdown there was a risk of transition of weight from normal to higher levels, and the increase was higher at younger ages. In addition, it was also identified that there was an increased risk of getting non-communicable diseases such as cardiovascular disease (CVD), chronic obstructive pulmonary disease (COPD), diabetes melitus (DM), chronic kidney disease (CKD) in those who had normal weight with an OR of 1.07, excess weight with an OR of 1.44 and for those who were obese the OR was 1.50. After 1 year of lockdown and there is a transition from normal to overweight, the risk of developing the disease is 0.68%, 2.35% if the transition occurs from overweight to obesity and 3.52% for obese people transitioning to obesity. para. Meanwhile, the risk of increasing this disease is repeated if there is no BB transition at each level of 0.64% for normal weight, 1.65% for obesity and 2.39% for severe obesity. With a 3 month lockdown, the burden of chronic disease can lead to greater mortality. Individuals who are very obese are at risk of dying from Covid-19 2.27 times greater than individuals who are not obese. As for those who are not obese, 1.56. Increased risk associated with long-term chronic conditions such as: CVD, DM, COPD and CKD. High BMI causes 4 million deaths, 40% of them are in non-obese. Two-thirds of them are due to CVD.(1). However, the article also explains that although the prevalence of obesity and underlying conditions is high, the underlying cause of the increasing mortality rate due to Covid-19 is the underlying condition through comorbidities (Katsoulis M, at all, 2021).

From the 9 articles that have been submitted, it can be seen that the implementation of research in data collection is carried out indirectly, which is carried out by distributing questionnaires or by filling out via Facebook social media and involving quite a lot of respondents. This is probably because during the pandemic it is not possible to collect data directly because of the policy to limit social activities to prevent the transmission of Covid-19. Where 4 articles collect through social media so that it can involve quite a lot of respondents. In the 9 articles reviewed, generally both sexes involved, but the majority of respondents involved were women. The age of the respondents in this study ranged from 16-70 years old who came from the general public, students, training communities and communities undergoing obesity therapy in hospitals, but the largest respondents were the general public. Jordan, the United States, Australia, Canada, China, Germany, the United Arab Emirates, Israel and Turkey.

In general, due to quarantine during the Covid-19 pandemic, the articles reviewed show that the pandemic is not only how to deal with the Covid-19 virus infection that is faced but has an equally important impact on the health of the wider community, physically, mentally, social and emotional. As a result of quarantine at home and other terms used in the article, it causes changes in the joints of life in the community, including an unhealthy lifestyle. Changes in eating behavior include eating more sugary foods and drinks, consuming less vegetables and fruit, eating flour foods 3 times a day, especially for women, increasing absorption, lunch and dinner presentations, also increasing appetite and cravings for food. and an increase in total food intake. In addition, eating more snacks, increased eating of food and soft drinks eaten between meals, so there is a risk for a transition of body weight from normal weight to a higher weight (Alfawaz H, at al, 2021, Mauray R, at all, 2021, Zhu Q, at all, 2021).There is one article that says that during the Covid-19 Pandemic due to quarantine at home, they reported eating healthier food (20.7%) . Due to an increase in cooking their own food at home, the habit of eating fast food from restaurants decreased from 1.98 times per week to 1.08 times per week, but still more reported that they had 36.6% of unhealthy eating behaviors (Flonagen WE, at all, 2021).

This is possible because, restrictions on social activities outside the home, not meeting with friends result in boredom, stress and anxiety. As a result of anxiety almost 2 times causing unhealthy eating behavior. The main psychological factors that cause increased food intake are loneliness and anxiety (Alfawaz H, at all, 2021, Flanogan WE, at all, 2021, Ai- Domi h< at all, 2021). Deger VB said that as a result of quarantine, 78.2% of respondents who underwent obesity treatment lacked contact with friends, constantly being at home to reduce physical contact affects the psychology of obese people and increases FCQ scores so that they eat more and cause disruption of the treatment program (Denger VB, at all, 2021). In addition, quarantine causes stress due to loss of income (Mauray R, at all, 2021). The results also showed that excess weight was significantly associated with stress experienced with $p = 0.008$.

This change was followed by a decrease in physical activity, where due to the lockdown, they stayed at home more. The average time spent on sedentary behavior on weekdays during the pandemic increased by 190.79 mt per day while before the pandemic it was 169.55 mt per day. It is known that sedentary behavior is an activity that refers to all activities carried out outside of bedtime with very few calorie output characteristics, namely 1.5 METs (P2PTM Kemkes, 2019). This behavior needs to be limited because it can be a risk of obesity. It was identified that 70% of Jordanians experienced changes in physical activity, people who were overweight reported that they were not active (Maray R, at all, 2021, Flonagen WE, at all, 2021). It can be proven

that people with excess weight by doing hard physical activity can be at risk of being overweight by 0.50 times greater than those with moderate and light levels of physical activity. For those who do moderate and light physical activity, the ORs are 0.53 and 0.76, respectively. This means that the higher the implementation of physical activity, the lower the risk of excess body weight. Likewise, people who are obese with vigorous physical activity have a lower risk of obesity, which is 0.49 times compared to moderate and light physical activity, which are 0.64 and 0.78, respectively (Alamsyah A, at all, 2019). Other evidence suggests that physical activity is proven to be protective against the occurrence of excess body weight with a p value of < 0.05, during the quarantine period. Thus, it can be seen that strong physical activity is very beneficial in reducing the risk of obesity, but in fact during the Covid-19 pandemic there was a reduction in physical activity so that the risk of weight gain increased.

This is exacerbated by changes in sleep onset time, the article shows that sleep onset and wake time significantly change, where onset is 42.41 (1.61) and wake: 59.33 (2.15) minutes later. The majority reported that the quality of sleep deteriorated as much as 43.8%. It is known that the amount of sleep time and low quality of sleep can cause the production of the hormone ghrelin to be disturbed so that hunger is not controlled and tends to increase, and the production of the hormone leptin, the hormone that functions to control appetite, decreases. So that the time left to eat is longer causing a tendency to eat unhealthy food (SIE P2PTM & keswa, 2018). In addition, people with obesity have greater changes in the time of sleep onset compared to normal weight and overweight people. So that people who are already obese will tend to get worse because it is related to the hormonal imbalance. This situation is assumed to be due to psychological changes during the COVID-19 pandemic. Where with restrictions on social activities, and the recommendation to stay at home causes boredom and anxiety. As stated by Zhu qi et al, the main psychological factors that cause an increase in food intake are loneliness and anxiety (Zhu Q, at all, 2021). Anxiety itself can interfere with the time and quality of a person's sleep. This psychological condition is also related to the emotion of eating, where individuals tend to have excessive food habits, eating not because of hunger alone but because there is an urge to always eat. Usually this condition often eats unhealthy food. Therefore, individuals must be able to control the emotions of eating. This is in line with the submission of Deger VB's findings that FCG scores increased during the pandemic. This means that respondents experienced high food cravings or also called food cravings during quarantine (Denger VB, at all, 2021).

The above conditions cause the risk of increasing the incidence of non-communicable diseases is also higher. The findings in the articles reviewed, that the incidence of risk of non-communicable diseases such as CVD, COPD, DM, CKD also increased during the Covid-19 pandemic, as a result of the transition and BW increase at each BW level (Katsoulis M, at all., 2021). The increased risk of this disease is greater in individuals who are obese compared to those who have overweight and normal weight. The findings of Katsaulis M at all that individuals who have BW have an increased risk of experiencing this disease by 1.07 times, while being overweight is 1.44 times and those who are obese have 1.50 times the risk of experiencing this non-communicable disease (Katsoulis M, at all., 2021). This means that people who are overweight and obese have a higher risk of developing the disease, compared to people who have normal weight. Thus individuals with obesity when exposed to Covod-19 Virus infection will be in a worse condition and more at risk for death, although not because of their obesity condition but because of an underlying disease condition known as a comorbid. But people who are obese have more fat deposits than people with normal weight. It is known that excess fat increases the production of the hormone leptin, which functions to activate cells against infection. Excess hormones reduce the ability of cells to fight infection. Thus, they are more susceptible to infectious diseases, including infection with the Covid-19 virus. On the other hand, with a 3-month lockdown, there is a transition of BMI from normal to overweight by 5.4%, from overweight to obese 5% and from obesity to severe obesity by 1.3% is assumed to increase the risk non-communicable diseases as described above. The findings of the article also say that with a 3 month lockdown, the burden of chronic disease will lead to greater mortality.

With the above conditions, the quarantine policy, stay at home, lockdown, PPKM whatever is the term used to describe restrictions on community social activities to prevent transmission of the Covid-19 virus infection has no small impact on public health. This is due to the increased risk factors for the weight transition as previously described, namely unhealthy eating behavior, decreased physical activity, altered sleep time and onset and levels of stress and anxiety experienced. Therefore, it is necessary to find a solution to overcome this problem, so that even though they are in quarantine, they can still carry out sufficient activities at home so that food intake and energy expended will be balanced.

From the articles discussed, it is suggested that by avoiding an increase in BMI by doing physical activity as a priority. Of course, this is followed by a healthy diet, adequate sleep and good stress management during the Covid-19 pandemic.

CONCLUSION

The COVID-19 pandemic with a home quarantine policy aims to prevent disease transmission, but has negative implications for healthy behavior such as increased food intake due to increased stress and changes in time and decreased sleep quality and decreased physical activity. All of these contribute to weight gain and obesity. Higher body weight has a risk of increasing the prevalence of non-communicable diseases such as CVD, COPD, DM, CKD and Covid-19. This is through the contribution of an imbalance of hormone production in the body, excess body fat results in high hormone production and causes the body's ability to fight infection to decrease. Obesity affects the severity of Covid-19 disease and death, although not directly by obesity, but through underlying conditions, namely comorbidities.

Therefore, the implementation of the quarantine policy needs to be followed by other policies, during quarantine, you can continue to carry out physical activities at home and pay attention to the intake of nutritious and balanced food because it has been proven to prevent weight gain. But also need to manage stress well and adequate sleep time and quality.

ACKNOWLEDGEMENT

The researcher would like to thank the Direktor of the Medan Ministry of Health Polytechnic for Supporting the implementation of this research.

REFERENCES

Alamsyah A, Zaman MK, Septiani W. Determinan Kejadian Obesitas pada Masyarakat Dewasa di Wilayah Kerja Puskesmas Simpang Tiga Kota Pekanbaru. Jurnal Kesehatan Komunitas. 2019;5(1):23 - 28

Alfawaz H, Amer EO, Abdulaziz A, et al. Effects of Home Quarantine During COVID-19 Lockdown on Physical Activity and Diatery Habits of Adult in Saudi Arabia. Sci Rep. 2021 Mar 15;11(1):5904.

Al - Domi H, Al – Daleen A, Al – Rosan S, Batarseh N, Nawaiseh H. Healthy nutritional behaviour during Covid-19 lockdown: A crossectional study. Clin Nutr ESPEN.2021;42:132 - 137.

Boukrim M, Obtel M, Kasouati J, Achbani A, Razine R. Covid-19 and Convinement Effect on Weight Load, Physical Activity and Eating Behavior of Higher Education Student in Southern

Marocco, Ann Glob Health. 2021 Jan 6;87(1):7.

Deger VB. Eating Behavior Changes of people with Obesity During the COVID-19 Pandemic. *Diabetes Metab Syndr Obes*. 2021;14:1987-1997.

Dor-Haim H, Katzburg S, Revach P. *et al*. The Impact of COVID-19 locdown on physical activity and weight gain among active adultpopulation in Israel: A crossectional study. BMC Public Health. 2021.

Flanogan WE, Beil AR, Fearbach SN, Altayan AD, Martin CK, Redman LM. The impact of Covid-19 Stay-at-home Orders on Health behaviors in Adult. Obesity (Silver Spring). 2021 Feb;29(2):438-445.

Huber BC, Steffen J, Schlichtiger J, Brunner S. Altered nutrition behavior during COVID-19 pandemic lockdown in young adults. Eur J Nutr. 2021 Aug;60(5):2593-2602.

Katsoulis M, Pasea L, Lai AG, Dobson RJB, Denaxas S, Hemingway H, Banerjee A. Obesity during the COVID-19 pandemic: both cause of high risk and potential effect of lockdown? A population-based electronic health record study. Public Health. 2021 Feb;191:41-47.

Maurya R, Sabastian P, Namdao M, Devender M, Gertler A. Covid-19 Severity in obesity: Leptin and Inflamatory Cytokine interplay in the Link between High Morbidity and Mortality. Front immunol. 2021

P2PTM Kemkes RI. Mengenal apa itukegiatan sedentary. Article. P2PTM Kemkes RI. 2019.

Radwan H, Al Kitibi M, Hasan H, et all. Indirect Health effects of COVID – 19 : Unhealthy Lifestyle Behaviours during Lockdown in the United Arab Emirates. Int J Environ Res Public Health. 2021; 18(4):1964.

SIE P2PTM & Keswa. Gaya hidup sehat dengan gaya CERDIK melalui POSBINDU PTM. Article. Dinkes Kab. Demak.2018.

Zhu Q, Li M, Ji Y, Shi Y, Zhou J, Li Q, Qin R, Zhuang X. "Stay-at-Home" Lifestyle Effect on Weight Gain during the COVID-19 Outbreak Confinement in China. Int J Environ Res Public Health. 2021 Feb 12;18(4):1813.