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Obesity Among Female Lecturers During the Covid-19 Pandemic in Aceh, Indonesia: A Retrospective Study

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Abstract
The Covid-19 pandemic has led to changes in uncontrolled consumption patterns and decreased physical activity among female teaching staff members. Therefore, they tend to gain weight, leading to non-communicable diseases (NCDs) and comorbidities. In support of the government's efforts, the prevalence of obesity must be reduced through healthy behavioral changes. This study aimed to identify the cause of obesity among female lecturers in Aceh during the Covid-19 pandemic. This study used a case-control design and was conducted in Aceh Province from March to June 2021. The sample consisted of 65 female lecturers (obese) and 65 controls (non-obese), obtained by purposive sampling. Physical activity, NCDs history, anthropometric, BMI, and blood pressure data were collected and analyzed using the chi-square test at a 95% confidence interval (CI). Results found that Female lecturers in Aceh had a higher prevalence of obesity (55.4%). This was because of age > 45 years (p= 0.013; AOR= 2.42), junk food consumption (p= 0.017; AOR= 2.33), not on a diet (p= 0.034; AOR= 2.13), and less physical activity (p= 0.012; AOR= 2.79). During the Covid-19 pandemic, neither income nor pickle consumption were risk factors for obesity (p > 0.05). However, arthritis (p= 0.034; AOR= 2.12) and hypertension (p= 0.003; AOR= 2.93) were present in a high proportion of obese female lecturers (p < 0.05). Additionally, the risk of obesity during the Covid-19 pandemic in Aceh was unrelated (p > 0.05) to diabetes, high cholesterol, and heart disease. In conclusion, obesity among female lecturers in Aceh was caused by risk factors such as age, junk food consumption, and lack of physical activity during the Covid-19 pandemic. It is also associated with NCDs including arthritis and hypertension. It is hoped that avoiding obesity will prevent the emergence of non-communicable diseases.

Keywords: Arthritis, Consumption, Hypertension, Obesity, Physical Activity.

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1. INTRODUCTION

The coronavirus Disease 2019 (Covid-19) pandemic is ongoing despite being less severe than it was three years ago, and the global trend of infection and spread has begun to decline (Fang et al., 2020). After implementing lockdown policies (Karin et al., 2020), strict regional quarantine (Taghrir et al., 2020), and the positive influence of community cooperation through the stay-at-home strategy (Engle et al., 2020). Several countries implementing this strategy, including Europe, Asia, and Southeast Asia, have reported declining Covid-19 infections (Lescure et al., 2020; Ng et al., 2020). As a replacement for Covid-19, the existence of health risks that are difficult to prevent remains a concern for health professionals worldwide (Cuevas et al., 2020). The Covid-19 pandemic has altered lifestyle patterns in numerous sectors, including uncontrolled activities and consumption patterns such as being sedentary and consuming fast food (Di Renzo et al., 2020). If these factors persist, the likelihood of obesity will increase.

In developed and middle-income nations, overweight and obesity are regarded as major public health problems (Bhurosy & Jeewon, 2014). In 2021, the World Health Organization (WHO) reported that one in six adults is obese and that approximately 2.8 million people die annually from being overweight or obese (WHO, 2021). Indonesia, as a middle-income country, has experienced a significant increase in the prevalence of obesity in people aged over 18 years, which is worrying because it can reduce the development index (Rachmi et al., 2017). It has been determined that 44.4% of the population in Indonesia over 18 years of age is overweight, and that women are obese. Some regions in Indonesia have a high prevalence of overweight and obesity, including North Sulawesi (46.5%), DKI Jakarta (45.4%), East Kalimantan (44.2%), and Aceh Province in tenth place (38.3%) (Badan Penelitian dan Pengembangan Kesehatan, 2019).

The profession of lecturing has demanded gender equality, so many women have chosen to become lecturers and teachers (Sumar, 2015). This has resulted in many women choosing these professions to improve their families' status (Tuwu, 2018). Consequently, lecturers and educators are among the most important occupations in both developed and developing nations (Monica & John, 2018).

The Covid-19 pandemic has changed the life patterns of various sectors, including uncontrolled activities and consumption patterns (Di Renzo et al., 2020). During the pandemic, lecturers are often overwhelmed by multiple tasks such as teaching, conducting online meetings, and career development, which can cause stress (Govind et al., 2014). Often, their health is affected by their dual role of being part of the family and working in their profession but staying at home. According to Elmajnoun et al., (2020), due to the Covid-19 pandemic, people have rarely performed physical activity and experienced changes in life patterns in various sectors, including uncontrolled consumption patterns. This is certainly exacerbated by the implementation of working hours at home (Work From Home). Furthermore, their uncontrolled consumption patterns increase lecturer weight (Monica & John, 2018). They are generally susceptible to non-communicable diseases (NCDs) or comorbidities such as heart disease, diabetes, and hypertension (Karikatti et al., 2016). The severity of these comorbidities will increase proportionately to the severity of obesity, worsening their symptoms and possibly aggravating their condition (Riyadina et al., 2022).

To support the government's efforts as outlined in the indicators of the Ministry of Health's strategic plan for 2020-2024, the prevalence of obesity in Indonesia must remain constant. Numerous efforts, such as routine health screenings, smoking bans, and increased fission activity, have been made to prevent and control obesity in the community. However, it has not successfully reduced the obesity rate in Indonesia. The prevalence of non-communicable diseases or comorbidities has been facilitated by the high prevalence of obesity in Aceh, particularly among adults aged > 18 years. It is necessary to identify the risk factors

that lead to obesity, because the lecturer is one of the most important workforce elements in enhancing the human development index. Severe obesity can hinder national and state development. This study aimed to identify risk factors for obesity among female lecturers in Aceh during the Covid-19 pandemic.

2. RESEARCH METHOD

This study used a case-control design, which was analytically conducted descriptively. The samples were collected based on the results of purposive sampling. Sixty-five female lecturers who were obese (case) and 65 female lecturers who were not obese (control) were selected. This study was conducted between March and June 2021 in Aceh. The selected sample resulted from willingness to participate, as evidenced by completing the questionnaire to identify obese and non-obese teaching staff. The inclusion criteria were 25–55 years old, active as teaching staff (lecturers), and able to cooperate well during the study. At the same time, the exclusion criteria are that those who were not civil servants were excluded. This study conducted an ethical feasibility test, which stated that the research does not violate the procedure and does not conflict with the values of human norms. Ethical approval was obtained from the Health Research Ethics Commission of the USU Faculty of Nursing (2181/VI/SP/2021).

Approval and permission were obtained from the university for this study. The questionnaire was designed by the researcher and deemed appropriate based on the results of a questionnaire test on multiple samples. Characteristics, consumption patterns (junk food), diet type, level of physical activity, and a brief history of non-communicable diseases were gathered through the completion of an online Google form questionnaire. Physical activity data were collected using the Global Physical Activity Questionnaire (GPAQ), and non-communicable disease history data were collected based on the symptoms/results of the most recent measurement/diagnosis by a physician or health worker. Anthropometric and blood pressure data were measured by participants who filled out the questionnaire sheets. The questionnaire link was shared on Facebook, WhatsApp, and other social media platforms.

Body weight (kg) was measured using a digital scale placed on a flat surface, and height (cm) was measured using a tape measure attached to the parallel wall and flat surface. Both measurements were obtained with the subjects wearing minimal clothing and barefoot. Body mass index (BMI) was used to measure overweight and obesity, which was calculated using the equation $BMI = \frac{w}{h^2}$, where weight (w) is in kg and height (h) is in meters. The obesity category is based on the Ministry of Health and WHO reference if the BMI is > 27.0 kg/m^2. Blood pressure data were categorized into two categories: hypertension (> 140 mmHg) and normal (< 140 mmHg (Badan Penelitian dan Pengembangan Kesehatan, 2019).

After data processing was completed, statistical analysis was performed. All data were analyzed using IBM SPSS Statistics (version 25.0). The completeness and consistency of each variable's data were evaluated univariately to describe the distribution of each variable. The frequency distribution, mean, and standard deviation are examples of statistics. In addition, a bivariate analysis was conducted using the chi-square test at a significance level of 95% to compare risk factors for the incidence of obesity.

3. RESULTS AND DISCUSSION

The characteristics of the participants in this study related to obesity risk issues included age, income, education level, and teaching experience. Based on the results of the study (Table 1), it is known that the characteristics of the respondents are based on age. In the case group, the dominant age was above 36 years (55.4%), and in the control group, it was 35–45 years (40.0%). Socioeconomic status refers to social status based on the income value from BPS, namely, the Provincial Minimum Wage (PMW), measured as the total income from their monthly profession. In general, the income of teaching staff is above IDR 7,000,000 per month,

with the standard PMW of Aceh Province in 2021 being IDR 3,165,031. Related to educational qualifications, all of them are postgraduate college graduates requiring them to pursue a higher education level, so most lecturers are postgraduates. Furthermore, regarding teaching experience, respondents in the case group had more experience (21-30 years) than those in the control group, with experience–11-20 years.

Table 1. Distribution of female lecturers based on characteristics

Characteristics of Female Lecturers	**Participants**	
	Cases (%)*	**Controls (%)****
Age		
< 35 years	9 (13.8)	17 (26.2)
35 - 45 years	20 (30.8)	26 (40.0)
> 45 years	36 (55.4)	22 (33.8)
Income (IDR)		
< 5,000,000	7 (10.8)	12 (18.5)
5,000,000 - 7,000,000	23 (35.4)	20 (30.8)
> 7,000,000	35 (53.8)	33 (50.8)
Education Level		
Undergraduate	10 (15.4)	18 (27.7)
Postgraduate	48 (73.8)	44 (67.7)
Doctorate	7 (10.8)	3 (4.6)
Teaching Experience		
1 - 10 years	15 (23.1)	12 (18.5)
11 - 20 years	17 (26.2)	20 (30.8)
21 - 30 years	23 (35.4)	16 (24.6)
> 30 years	10 (15.4)	17 (26.2)
Blood pressure		
> 140 mmHg	39 (60.0)	22 (33.8)
≤ 140 mmHg	26 (40.0)	43 (66.2)

Description:
** Obese group of participants*
*** Group of participants who were not obese*

Table 1 presents the distribution and proportion of blood pressure among female teaching staff in Aceh. It can be seen that 60.0% of the patients had blood pressure measurements above 140 mmHg. Meanwhile, more respondents in the control group (66.2%) had a blood pressure below 140 mmHg. It is indicated that respondents in the case group, the female lecturer in Aceh Province, had a very high history of hypertension.

Table 2. Risk factors for obesity in female lecturers in Aceh

Predictors and NCDs as Comorbidities	**The incidence of obesity**		**p-value**	**OR (95% CI)**
	Obese (%)	**Non-obese (%)**		
Age				
> 45 years	36 (55.4)	22 (33.8)	0.013*	2.42 (1.19 – 4.93)
35 - 45 years	20 (30.8)	26 (40.0)	0.461	1.45 (0.54 – 3.93)
< 35 years	9 (13.8)	17 (26.2)	ref	
Income (IDR)				
> 7,000,000	35 (53.8)	33 (50.8)	0.453	1.13 (0.57 – 2.25)
5,000,000 - 7,000,000	23 (35.4)	20 (30.8)	0.226	1.97 (0.65 – 5.97)
< 5,000,000	7 (10.8)	12 (18.5)	ref	

Predictors and NCDs as Comorbidities	The incidence of obesity		p-value	OR (95% CI)
	Obese (%)	Non-obese (%)		
Junk Food Consumption				
Yes	42 (64.6)	29 (43.9)	0.017*	2.33 (1.15 – 4.71)
No	23 (35.4)	37 (56.1)	ref	
Consumption of Pickles				
Yes	38 (58.5)	30 (46.2)	0.160	1.64 (0.82 – 3.28)
No	27 (41.5)	35 (53.8)	ref	
Diet Type				
Non-vegetarian	35 (53.9)	23 (35.4)	0.034*	2.13 (1.05 – 4.30)
Ovo-vegetarian	23 (35.4)	26 (40.0)	0.185	2.02 (0.71 – 5.78)
Vegetarian	7 (10.8)	16 (24.6)	ref	
Physical Activity				
No	17 (26.2)	8 (12.3)	0.012*	2.79 (1.36 – 5.73)
Less	28 (43.0)	21 (32.3)	0.028*	2.40 (1.09 – 5.27)
Moderate	20 (30.8)	36 (55.4)	ref	
History of NCDs as Comorbidities				
Diabetes Mellitus				
Yes	17 (26.2)	14 (21.5)	0.537	1.29 (0.57 – 2.89)
No	48 (72.8)	51 (78.5)	ref	
Hypertension				
Yes	39 (60.0)	22 (33.9)	0.003*	2.93 (1.44 – 5.99)
No	26 (40.0)	43 (66.1)	ref	
Cholesterol				
Yes	15 (23.1)	21 (32.3)	0.239	0.63 (0.28 – 1.37)
No	50 (76.9)	44 (67.7)	ref	
Arthritis				
Yes	36 (55.4)	24 (36.9)	0.034*	2.12 (1.05 – 4.27)
No	29 (44.6)	41 (63.1)	ref	
Heart Disease				
Yes	10 (15.4)	16 (24.6)	0.188	0.56 (0.23 – 1.34)
No	55 (84.6)	49 (75.4)	ref	

Description:
** Significant ($p < 0.05$) at 95% CI*

According to the bivariate analysis results using the chi-squared test (Table 2), lecturers older than 45 years had a higher percentage of obese lecturers (55.4%). Additionally, eating junk food (64,6%) and not dieting (53,9%) by eating fruit and vegetables. Additionally, the high prevalence of obesity among female lecturers can be attributed to their low physical activity levels (69.2%). According to the statistics, age, junk food consumption, diet program/type, and physical activity were risk factors for obesity among female lecturers ($p < 0.05$). Nevertheless, during the Covid-19 pandemic, neither income nor pickle consumption was a risk factor for obesity ($p > 0.05$).

This study also assessed the relationship between the risk of obesity among female lecturers in Aceh during the implementation of social isolation in the form of stay-at-home and work-from-home (WFH) activities. According to the study's findings (Table 2), arthritis and hypertension were present in a high proportion of obese female lecturers ($p < 0.05$). This is because arthritis and hypertension do not always lead to obesity. This can lead to both arthritis and hypertension. Therefore, it is hoped that avoiding obesity will prevent the emergence of

non-communicable diseases. Additionally, the risk of obesity during the Covid-19 pandemic in Aceh is unrelated to diabetes, high cholesterol levels, and heart disease.

According to the findings of this study, the risk factors for obesity in female lecturers include age, fast food intake, diet type, and physical activity during the Covid-19 pandemic in Aceh. However, the incidence of obesity in this study appeared to correlate with income or pickle consumption ($p > 0.05$). Based on the respondents' age group, the prevalence of obesity was higher in those over 45 years of age. Additionally, based on past consumption, obese people typically consume junk food, sometimes even frequently, exacerbated by a lack of diet or the consumption of vegetables and fruits. Individuals with little to no physical activity are also susceptible to obesity.

As women age, it is possible to increase the risk of several NCDs such as diabetes, hypertension, cardiovascular disease, and obesity (Monica & John, 2018). Several studies have shown that obesity generally occurs at 40–50 years of age, similar to the results of Trisna & Hamid (2009), who found that central obesity in women was more prevalent in the group between 40 and 50 years of age (55.8%). According to Hong et al. (2018), women in Southeast Asia between the ages of 40 and 59 years have a higher risk of obesity than younger women. This condition is due to the slow process of metabolism in the body of women aged 40–59 years, presumably due to low physical activity and unbalanced consumption patterns. Buch et al. (2016) argue that women with older age will experience a decrease in muscle tissue and some hormonal changes in the body that can trigger fat accumulation in the abdomen. The weight of each individual is highly dependent on several variables, including genetic, ethnic, behavioral, lifestyle, and socioeconomic variables (Khotibuddin, 2017). In this study, the prevalence of obesity (BMI > 27.0 kg/m^2) among female schoolteachers was 38.9%. According to Rocha et al. (2015), obesity is a significant health issue among female lecturers, with a prevalence of 47.2% for overweight and obesity.

During the Covid-19 pandemic, being overweight (BMI 25 to 26.9 Kg/m^2) or obese (BMI > 27 Kg/m^2) was considered a significant risk factor for several chronic illnesses, including coronary heart disease, hypertension, cholesterol, and diabetes (Almandoz et al., 2020). The health issues caused by staying at home during the COVID-19 pandemic are further exacerbated by the rising prevalence of several non-communicable diseases due to rising BMI (Engle et al., 2020). Therefore, maintaining healthy weight is necessary to reduce the risk of obesity and prevent the development of chronic diseases. The coronavirus Virus (Covid-19) pandemic has altered the structure and routine of people's lives, affecting both the health and wellness industries (Di Renzo et al., 2020). The numerous tasks that must be completed at home as teaching professionals and generally as housewives enable teachers to deal with stress during the pandemic (Govind et al., 2014). Generally, they are more susceptible to non-communicable illnesses such as heart disease, diabetes, and hypertension (Karikatti et al., 2016). People with diabetes have a high chance of contracting respiratory infections, which can aggravate their blood sugar levels (Gupta et al., 2020). Complications of diabetes with covid-19 are among the largest comorbid contributors to patient mortality due to covid-19 in Indonesia, after tuberculosis and hypertension (Widyawati, 2020). Several studies in Wuhan, China, state that 42.3% of deaths due to covid-19 are patients to diabetic complications (Deng & Peng, 2020). Another study in Wuhan showed that comorbidities were a significant predictor of patient mortality in 150 patients (68 deaths and 82 patients recovered) (Ruan et al., 2020). Therefore, maintaining fitness by maintaining an ideal body weight in women during the Covid-19 pandemic is crucial to avoid the risk of degenerative diseases. It can be accomplished by maintaining a balanced diet, limiting junk food consumption, and performing moderate or light activities inside and outside the home.

This study found no correlation between income and consumption of pickles and obesity among female lecturers in Aceh. According to Min et al. (2018), certain urban social groups

have a good income, which permits changes in consumption or diet that can potentially increase NCDs, including obesity. In addition, Rawal et al. (2018) reported in their study conducted in Nepal that adults from middle- to low-income groups were also susceptible to overweight and obesity if they had an unhealthy lifestyle. Therefore, income is not a direct factor in obesity, and unhealthy patterns or behaviors are typically blamed. Similarly, Canaud et al. (2019) noted that the high sodium content of pickles could cause the extracellular fluid to increase and bind to water, thereby increasing the risk of NCDs. However, a few teachers in this study consumed pickles and were obese (32.4%), and they consumed pickles infrequently. During the pandemic, consumption of junk food was the most prevalent.

Studies have shown that overweight and the high prevalence of obesity have become endemic globally owing to the numerous health problems and risks associated with obesity and its link to several NCDs. According to this study, health issues, such as hypertension and arthritis, cause obesity in female educators. Other studies have demonstrated that joint inflammation, particularly in the knee, is a risk factor for obesity (Kulkarni et al., 2016). Additionally, as BMI increases with age, obese individuals develop more severe arthritis than normal-weight individuals, with a higher prevalence in women than in men. The study revealed a correlation between BMI and hip and knee osteoarthritis risk (Wills et al., 2012). The pandemic has rendered many individuals sedentary, which is correlated with the prevalence of arthritis. During the Covid-19 pandemic, practicing social isolation, exercising at home and in the backyard, and maintaining a healthy diet have been recommended (Mobasheri, 2020).

The prevalence of obesity, particularly adult obesity, has always been linked to hypertension and its relevance to several cardiovascular diseases (Zennaro et al., 2015). Two-thirds of the prevalence of hypertension is directly related to obesity (Jiang et al., 2016). Due to their hectic schedules and stress-inducing factors, teachers are susceptible to hypertension, which can severely impact cardiovascular disease (Greiw et al., 2010). According to Mahamood et al. (2013), the prevalence of obesity among teachers is strongly correlated with their blood pressure, which is typically greater than 130 mmHg. However, male teachers had a higher incidence of hypertension than female teachers. A study conducted in Indonesia found that hypertensive disease is linked not only to obesity but also to the pathogenesis of numerous NCDs, including stroke, heart failure, cholesterol, and diabetes (Simbolon et al., 2019). Thus, hypertension leads to an increase in the number of NCDs. During the Covid-19 pandemic, adopting a healthy lifestyle, including regular physical activity to keep the body healthy and fit, maintaining a balanced diet, and reducing junk food consumption, is likely to reduce cardiovascular diseases and other NCDs (Driggin et al., 2020; Rios et al., 2020).

In middle-income countries, especially in Southeast Asia, such as Indonesia, the increased risk of obesity results from factors such as urbanization, excessive consumption of junk and processed foods, and lack of physical activity (Misra et al., 2010). Obesity is closely related to the increasing popularity of fast and processed foods. A study revealed that consuming Western-style foods, such as French fries, sausages, processed or canned meat meals, and grilled meat, resulted in significant weight gain and obesity (Mozaffarian et al., 2011). Consuming junk food can result in loss of essential nutrients and increased body fat. Low in nutrients and high in substances that the body does not require, such as trans fats, sugar, and salt, are characteristics of junk food. If junk food is not high in carbohydrate content, it is almost certainly high in fat content (Manolis, 2016). Therefore, it can increase the waist circumference, which is exacerbated when women engage in little physical activity. Therefore, the diet of lecturers must be regulated to ensure sufficient stamina and energy during the Covid-19 pandemic through balanced nutrition and regular exercise.

This study has several strengths. First, it utilizes a well-defined case-control design, which is effective in identifying risk factors for obesity. Second, the sample size was adequate, and purposive sampling ensured that the selected participants were representative of the

population under study. Third, ethical approval and proper permission were obtained, ensuring that the study adhered to ethical standards.

However, this study had some limitations. The reliance on self-reported data for certain variables, such as dietary habits and physical activity levels, may introduce bias owing to inaccurate reporting. Additionally, the study was limited to female lecturers in Aceh, which may limit the generalizability of the findings to other populations or regions. Future studies should consider using more objective measures for certain variables and expanding the scope to include a more diverse sample

4. CONCLUSION

The problem of obesity among female lecturers in Aceh is a result of several risk factors, such as age > 45 years, habit of consuming junk food, not going on a diet, and lack of physical activity during the Covid-19 pandemic. In addition, obesity in female lecturers is associated with several NCDs, including arthritis and hypertension. Suggestions, nutrition, and health education programs are needed for female and male schoolteachers that focus on healthy lifestyles, balanced food consumption, physical activity activities, and periodic health checks to keep the body healthy and fit. These activities can be carried out through webinars, training, and health promotion efforts in the new era while still paying attention to and implementing health protocols. These efforts are expected to reduce lecturers' risk of developing chronic diseases and comorbidities.

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