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Knowledge Concerning Obesity as A Risk Factor for Blindness: Association with Body Mass Index

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ABSTRACT

The prevalence of obesity is increasing worldwide. Obesity is associated with several eye diseases. This study assess whether knowledge regarding obesity as a risk factor for blindness is associated with the Body Mass Index (BMI). This is a correlative descriptive, cross-sectional study, in one of Branch Area of community organization "X", Pondok Kelapa, East Jakarta. With a questionnaire, we assessed knowledge regarding obesity and the risk of blinding eye diseases. Subjects completed the questionnaire, and then height (m), weight (kg), waist circumference (cm) were measured and BMI values were calculated. Of the 44 subjects, 54.5% were women, 36.4% aged 51-60 years, 45% had high school education, and 31.8% were housewives. Based on BMI and waist circumference, 27% of subjects were overweight, 45% were obese, and 86% were with central obesity. There were 14 subjects (31.8%) with poor knowledge, 22 (50%) with sufficient knowledge, and 8 (18.2%) with good knowledge. The results of correlation analysis (Pearson Correlation) showed a significant relationship between knowledge and BMI ($r=0.457$, $p = 0.002$). As a conclusion, knowledge that obesity as a risk factor for blindness is associated with BMI ($p = 0.002$)

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1. INTRODUCTION

Overweight and obesity have become a global health problem, including in Southeast Asia. Over the past 35 years, the prevalence of obesity has increased by 80%. In 1980, the prevalence of obesity was only 7%, to 12.5% in 2015. [1] This condition is experienced by all age group. According to WHO, there are currently more than 1 billion obese people worldwide, (650 million adults, 340 million adolescents and 39 million children). This number is expected to increase by 2025, by 167 million people (adults and children). In Indonesia (2018), the Basic Health Research (Riskesdas) report states that in the period 2007-2018, the increase in the rate of overweight has reached an alarming level, from 8.6% (2007) to 13.6% (2018). As for obesity, the increase was even higher, from 10.5% (2007) to 21.8% in 2018. [2]

Several factors contribute to this, including food, activity and other factors. Food factors, such as an unhealthy diet, i.e. eating large portions, high in calories, sugar and fat. Activity factors, such as sedentary life style or lack of movement and lack of exercise. Other factors, such as genetics, hormonal disorders, therapy with certain drugs (corticosteroids and oral contraceptives), psychological disorders (stress), and other medical conditions contribute to obesity. [3] Drastic lifestyle changes during the Covid-19 pandemic (2020-2022) contributed to the higher rates. Social distancing requires people to engage in online activities, increasing screen time and stress. Stress triggers consumption of unhealthy food and disturbed sleep patterns. [4]

Obesity has been recognized as a risk factor for various non-communicable diseases (NCDs), even death. BMI and waist circumference values are used as a reference to determine whether an adult is obese or not. Adults with a BMI ≥40 are at risk of developing 7.37 times diabetes and 6.38 times hypertension, as well as various other health problems. Seventy percent of deaths in obesity are caused by these NCDs. When BMI is high, macro and microvascular dysfunction occurs, resulting in decreased capillar density and tissue perfusion. Hyperglycemia also damages the vascular endothelium through oxidative stress and consequent free radical production. Not only on major organs (such as the brain, heart, kidneys), obesity also negatively affects the eyes. It manifests as impaired visual function (visus, visual field) and structural disorders of the eye. Glaucoma, age-related macular degeneration, diabetic retinopathy, cataract, arterial vein occlusion, all of which can lead to blindness, have been reported in association with obesity.[5] Blindness as the impact of obesity is not widely known to the public. Even though blindness will reduce productivity and quality of life. In 2010 in the UK, the Eyecare Trust reported that only 8% of the British public knew that obesity could cause blindness, even though more than half of the adults in the country were overweight and 23% were obese [6]

Since the increase in obesity prevalence is alarming, preventive measures are needed. Zabia Research (2020) states that prevention is an effective method to reduce obesity rates in Malaysia.[10] One way is by raising public awareness of obesity and its complications. The Indonesian government through Kemkes has socialized the prevention of obesity through the Healthy Society Movement. (GERMAS). People are encouraged to be physically active for 30 minutes a day, eat fruit and vegetables and have regular health checks. This policy is efficient, but not effective because it requires motivation and the ability to read and recognize the contents of food.[11] The study aims to identify the spread of knowledge about obesity as a risk factor for blind eye disease and identify a relationship between the level of knowledge and the IMT values of "X" ormas citizens in the "X" Ormas Ranting Region of Kelurahan Pondok Kelapa East Jakarta.

2. METHOD

This is a descriptive analytical study with a cross-sectional design. The research was carried out March 2023, in the branch area of one of the Community Organization (Ormas) in Pondok Kelapa. The target population is the entire Ormas citizen "X" in the Ranting Pondok Kelapa East Jakarta and as an affordable population are the Ormas Citizen "X" as the Jamah of Al Mukminun mosque. The inclusion criterion is age ≥35 years old , whereas the exclusion criteria are subjects aged ≥ 35 years old who refuse to participate in the study. The elderly mosque congregation (jamaah) is 70 people. The number of samples determined using the Slovin formula, 44 subjects were obtained. The stage of the research is first to collect the data using questionnaire, and then to measure height, weight, waist circumference and then BMI calculation with the formula (BMI) = BB (kg): TB $(m)^2$. Questionnaire instruments are used to assess knowledge about obesity and eye health risks. Informed consent is given before filling out the questionnaire. Data analyzed using Statistical Package for Social Sciences (SPSS v.26). Regression analysis is used to see the relationship and correlation between dependent and independent variables.

3. RESULTS AND DISCUSSION

The results of the distribution of subjects based on their characteristics can be seen in Table 1.

Table 1. Distribution of Subjects Based on Characteristics

Variables	Number (%)
Gender:	
▪ Male	20 (45.5%)
▪ Female	24 (54.5%)
Age	
▪ <40	4 (9.1%)
▪ 41-50	8 (18.2%)

▪ 51-60	16 (36.4%)
▪ 61-70	12 (27.3%)
▪ >70	4 (9.1%)
Education	
▪ Elemantary	2 (4.5%)
▪ Junior High School	2 (4.5%)
▪ Senior High School	20 (45.%)
▪ D2/D3/S1	12 (27.3%)
▪ S2	8 (18.2%)
Job	
▪ Self-employed	6 (13.6%)
▪ PNS	2 (4.5%)
▪ Housewife	14 (31,8%)
▪ Unemployed	10 (22.7%)
▪ Miscellaneous	12 27.3%)
Body Mass Index	
▪ 17-18.4	2 (5%)
▪ 18.5-25	10 (23%)
▪ 25.1-27	12 (27%)
▪ >27	20 (45%)
Waist Circumference	
▪ Normal	6 (14%)
▪ Central Obesity	38 (86%)
Knowledge Level	
▪ Poor	14 (31.8%)
▪ Sufficient	22 (50%)
▪ Good	8 (18.2)

The distribution of BMI in the subjects was further grouped by age (Table 2). The overweight and obese categories were most prevalent at the age of 51-60 years.

Table 2. Distribution of Subjects Based on BMI and Age

BMI	**Age**				
	<40	**40-50**	**51-60**	**61-70**	**>70**
Underweight	0	2	0	0	0
Normal	2	2	2	2	2
Overweight	2	2	4	2	0
Obesity	0	2	10	8	2

This study showed that of the 44 subjects, 24 (54.5%) were female, 16 (36.4%) were in the age group 51-60 years. The inclusion criteria in this study were ≥35 years old and in accordance with the description of the mosque congregation, so that the highest number was obtained in the age group 51-60 years. Based on obesity indicators (BMI and waist circumference) in Table 1, there were subjects with overweight of 27% and obesity of 45%. Of all subjects, 86% had central obesity. This finding is in accordance with the WHO report on the increasing prevalence of overweight and obesity. In 2015 WHO has estimated that there are 2.3 billion adults with overweight and 700 million of them are classified as obese. Along with the development of the times and the ease of availability of fast food and sedentary activities, people will tend to get fatter. [7]

Ayuningtyas (2022) reported that the prevalence of obesity in Indonesia in adults aged 25-59 years was 23.8% and the highest compared to other age groups. [8]The majority of the subjects in this study were in the age group at risk of obesity (>40 years). The productive age group has undergone many economic changes (improvements). Industrialization also brings this group to urbanization, thus changing their lifestyle. Unhealthy lifestyle, which mainly increases the risk of obesity and

cardiovascular disease. [9] Table 3 shows that more male subjects had BMI in the obese category. This result is different from most studies that report that the female gender is more obese. However, when based on waist circumference indicators, it can be seen that more female subjects (n=22, 91.6%) have central obesity than men (n=16) 90%).

Table 3. Distribution of Subjects Based on Obesity Indicators

Indicator	Gender	
	Male	**Female**
BMI		
• Underweight	0	2
• Normal	4	6
• Overweight	2	8
• Obesity	14	8
Waist Circumference		
• Normal	4	2
• Central Obesity	16	22

WHO data in 2016 obtained the same results. Globally 15% of women are obese, while men are only 11%. [1] Research in Indonesia found that women are indeed at higher risk for obesity. This is also in accordance with the results of Riskesdas in 2018, where the obesity rate for women was 32.9%, while for men it was 19.7%. [2] Several studies have highlighted gender differences in the prevalence of overweight and obesity. Women are more centrally obese than men. This difference is more pronounced in developing countries. Explanations for this are complex, including differences in biological and social factors, such as physical activity levels, sociocultural beliefs, and urbanization. The main biological factors triggering obesity in women are pregnancy and childbirth. This is coupled with the misconception that during these two processes, women should eat more. In developing countries with economic improvement, an increase in post-natal weight has been reported, which in turn leads to an increase in BMI. [10]

As the number of children increases, so does the weight and fat deposition under the skin. Compared to men, women's bodies naturally have more fat tissue than muscle mass. Women's fat is 18-24%, while men's is 12-18%. Women require lower energy, as their basal metabolism also decreases, which is 5% lower than men. If there is no balance between energy intake and expenditure, there will be an accumulation of fat in the body. [11]

With age, the Basal Metabolic Rate of both men and women decreases. Physical activity also decreases along with the less energy the body has, and the declining health conditions. Actually, metabolism starts to decline at the age of 25- 30 years. However, this is not realized until the point where the weight starts to increase, namely in the 30s. After the age of 30, metabolism decreases every year and slows down to around 200 calories. This continues as we age, until beyond the age of 40. Finally, the risk of excess weight and complications also increases. [12]

Sociocultural factors and urbanization also explain gender differences in obesity prevalence. For example, the assumption that fat women are a sign that they are more fertile and have a better welfare life. It is also about marital status, where married women tend not to care about maintaining their bodyweight because they feel that they already have spouse. The urbanization factor brings changes to living habits, including eating habits and the types of food consumed. [11]

Knowledge about obesity and as a risk factor for blindness were assessed from a questionnaire. The results obtained knowledge data, namely the minimum score = 4; maximum score = 21; (M = 12.5; SD = 2.83). Knowledge was categorized as poor (score 15.3), sufficient (9.7-15.3) and good (>15.3).Table 4 shows that the total number of female with sufficient and good knowledge was more (16 subjects) than male (14 subjects).

Table 4 shows the distribution of subjects based on the level of knowledge. A total of 50% had sufficient knowledge. Currently, information related to obesity and its health effects is easily accessible. Media, including social media, plays a role in increasing knowledge of this

information.[13] Ignorance of the bad impact of obesity on health, especially impacts individuals to be negligent to maintain body weight to be normal. This is in accordance with the results of several studies that knowledge, for example about food nutrition, will be inversely proportional to BMI. The more an individual knows, the lower the BMI will be. The majority of respondents understood the knowledge about BMI. Access to information about obesity, including its indicators, which is easily obtained in online media, explains why respondents already know about BMI. Another study reported that women are the most social media user, and their aim is to access information that can increase knowledge. (Weiser 2000) The increasing prevalence of obesity in Indonesia has become a concern of the Ministry of Health, and Gentas (Gerakan Nusantara Tekan Angka Obesitas) has even been formed. Through Gentas, it is hoped that knowledge about obesity can be disseminated in the community. [16]

Table 4. Distribution of Subject Knowledge Based on Gender

Knowledge	Gender	
	Male	Female
Poor	6	8
Sufficient	8	14
Good	6	2

The distribution of subject's obesity knowledge level associated with BMI can be seen in Table 5. There were 14 subjects who did not know the impact of obesity on blindness. Of these, 10 were obese. Subjects with sufficient knowledge (n=22), 54% of them (n=12) were in normal and underweight. The combined results of subjects with sufficient and good knowledge were 30 subjects (68.2%).

Table 5. Relation Subject's Knowledge Level with BMI

Knowledge	BMI				Total
	Underweight	Normal	Overweight	Obesity	
Poor	0	0	4	10	14
Sufficient	2	10	4	6	22
Good	0	0	2	6	8
Total	2	10	10	22	44

Data analysis was used to determine the relationship between the knowledge level with Body Mass Index (BMI). Previously, the normality test was carried out as a requirement, then continued with the linearity test and correlation test. The Pearson Correlation (Table 6), shows that there was a significant correlation between the two ($r(42) = 0.457$, $p < 0.05$).

Table 6. Correlation between knowledge level and BMI

		BMI	Knowledge Level
Pearson Correlation	BMI	1.000	.457
	Knowledge Level	.457	1.000
Sig. (1-tailed)	BMI	.	.001
	Knowledge Level	.001	.

Simple linear regression analysis was conducted (Table 7) to evaluate the extent to which knowledge can predict BMI values and there was a significant effect ($R^2 = 0.209$, $F(1, 42) = 11.106$, $p < 0.05$). This indicates that knowledge can explain the increase in BMI by 20.9%. The remaining 79.1% is explained by other variables. The regression model obtained is as follows:

$$BMI = 2.087 + 0.096 \text{ Knowledge}$$

This means that as knowledge increases, BMI values increase, but the increase is relatively small at 0.096 (95% CI [0.038;0.153]).

Table 7. F test

Model	Sum of Squares	df	Mean Square	F	Sig.
1Regression	8.061	1	8.061	11.106	.002[b]
Residual	30.484	42	.726		
Total	38.545	43			

b predictors

Several studies have shown that increased knowledge does not always lead to changes in attitudes and behaviors. [17] However, healthy behavior is influenced by a lifestyle that has become a habit. This study found a positive correlation between knowledge and BMI, that is, the more knowledge increases, the more BMI value increases, although the increase is relatively small at 0.096. This result is different from several other studies that show that the better the knowledge about nutrition, obesity or its impact, the BMI will decrease. This could be because the respondents in this study were older, so there are metabolic factors engaging. The age of the subjects was predominantly 51-70 years old, where the body's metabolic work began to slow down. [18] The difference in results could also due to the indirect relationship between knowledge and BMI, while the direct cause of BMI values is food intake. Another possible explanation is the questionnaire perception bias factor or prestige bias. This bias occurs because subjects tend to answer in a way that makes the subject feel better.

4. CONCLUSION

The level of knowledge has a significant correlation with the subject's BMI with (r=0.457, p value=0.002). Knowledge still requires a repetition process so that the knowledge that has been obtained becomes a healthy habit and lifestyle. Repetition can be done in the form of providing education periodically.

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