RELATIONSHIP BETWEEN OBESITY RISK KNOWLEDGE AND BODY MASS INDEX AMONG SPORTS SCIENCE AND RECREATION STUDENTS BASED ON GENDER

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ABSTRACT

Knowledge is a powerful indicator for prevention of obesity where knowledge related to the risk of obesity may influence the rate of obesity, especially among students. Maybe students with high knowledge on the risk of obesity have a normal body fatness and vice versa. However, the association between knowledge and obesity rate among students is inconclusive. Therefore, the purpose of this study was to identify the relationship between knowledge on risk of obesity and body mass index (BMI) among Sports Science and Recreation (FSR) students based on gender. The correlational study involved n =257 were male and n=179 were female students from FSR. The Obesity Risk Knowledge-10 Scale (ORK-10) Questionnaire was used to measure the level of knowledge on risk of obesity and BMI was used as an indicator for obesity rate. Results showed male students mean score for knowledge was 4.78 ± 1.58 and 4.71 ± 1.68 for female students. Mean BMI for each gender was 23.64 ± 4.90 for male and 21.89 ± 3.4 for female students. There were negative and weak correlation between knowledge and obesity rate for male students r=-0.174, p <.005 and positive and very weak correlation among female students r=0.076, p >.005. These results showed both male and female students ware having poor knowledge on risk of obesity, but they have a normal body fatness. Hence, knowledge on risk of obesity doesn't influence the obesity rate among FSR students. Probably, FSR students actively engage in physical activity since it is part of academic program that demanding students to be physically active that indirectly maintain their BMI score. Conceivably, knowledge together with practice possibly will help for upkeep of normal body fatness.

keywords*: obesity risks knowledge, BMI, fatness, indicators.*

INTRODUCTION

Number of people with obesity is currently increase in low- and middle-income nations, especially in metropolitan areas, although it was long regarded to be an issue exclusive to high-income countries (World Health Organization, 2021). According to Mokdad et al., (2003) there is an increasing 5.6% of obesity rates within a year from 19.8% to 20.9% in 2000 until 2001. According to National Health and Nutrition Examination Survey, in 2011 until 2014, the prevalence among U.S adults was 36.5%, however in 2015 until 2016, there is 3.3% increment in obesity rates that bring the number increase to 39.8% (Hales et al., 2018; Ogden et al., 2011). Otherwise, according to NHS Information Centre, (2011), statistic on obesity in 2009 among adults in England 46% were classified as obese. Meanwhile, more than 135 million individuals were affected by obesity in India (Ahirwar & Mondal, 2019). Global Burden Disease Collaborators, (2017) reported in 2015, a total of 603.7 million adults worldwide were obese. The incremental of obesity rates worldwide continues in 2016, where over 650 million people were obese (World Health Organization, 2021; World Obesity Federation, 2021). The trend of the prevalence was increasing starting from 2% among men and 1% among women between 1999-2001 (Wardle et al., 2006) to 5.8% among men and 5.2% among women in 2014 (Peltzer et al., 2014) to 24.2% among men and 9.3% among women in 2017 (Peltzer & Pengpid, 2017). This is show, within a year, 46.3 million adults around the world become obesity. The prevalence of obesity in worldwide also affected by the number of obesities in Malaysia.

Malaysians have the highest rate of increase in obesity among Southeast Asian populations and ranked second in the world for the number of obese people in 2010 and 2014 (Hassan et al., 2014; Kasirye & Wahid, 2020). In comparison to the previous findings of the National Health Morbidity Survey (2011), the national prevalence of obesity, increased by 2.6% according to the National Health and Morbidity Survey (2015) in Malaysia. Meanwhile, in National Health and Morbidity Survey (2019) 19.7% of our adult population were reported to be obese. Previous study reported the increasing rate of obesity in Selangor from 2011 until 2019 with 17.1% and 19.3% (Institute for Public Health, 2015; National Health Instituted, 2019; Nor et al., 2018). According to Ministry of Health, (2016) the numbers increasing 4% in 2020 which affecting more than half population in Malaysia. This is shows an incremental of obesity rate that arising until worrying level and need quick prevention from increasing the consequences.

There were numerous studies reported the negative effect of obesity toward health, physical activity, mental health, and social activities. The common obesity-related diseases are diabetes, stroke, heart disease, hypertension, cancers, and osteoarthritis (Agha & Agha, 2017). Meanwhile, according to Djalalinia et al., (2015) obesity may lead to non-communicable disease, musculoskeletal disease and increase the risk of disability. According to Global Burden Disease Collaborators (2017) and Flegal et al., (2013) obesity is major cause of medical issues that degrade quality of life and, in turn, cause morbidity and early death. Previous study found obesity is associated with a number of metabolic abnormalities, and several of these have been proposed as a link to cancer risk (Pischon & Nimptsch, 2016). In a word, obesity is the major causes of fatal, non – communicable disease, musculoskeletal disease and reduce mental health status.

Since the prevalence of obesity is increasing yearly reported, preventive approached is important. According to Zabia et al 2020, preventive method is significant to reduce the obesity rate in Malaysia. One of the preventive methods is by enhancing level of knowledge on risk of

obesity. As reported by Omotola 2017, knowledge on risk of obesity may reduce the risk of obesity among adults. Knowledge may help to increase the awareness about obesity. People's lack of understanding of obesity and its repercussions leads to their exerting less effort to avoid or manage obesity since they are ignorant of the consequences and the knowledge on obesity will also motivate an individual to change their lifestyle and behaviour in daily life (Jajulwar, Meshram & Saji, 2017; Winston et al., 2014). Therefore, based on previous research studies, knowledge about obesity affects obesity rates worldwide including our country where low levels of knowledge will contribute to higher obesity rates.

There were many studies conducted to see the association between knowledge and obesity rate. Study by Oyewande (2019) showed there was an association between knowledge and obesity rate for both male and female. Those who are knowledgeable on risk of obesity, their body fatness is normal and those is low knowledge their tend to become obese. However, study by Ghazi et al (2018), it is reported there is no association between these two variables for both male and female. Those who were high knowledge also reported being obese and low knowledge were normal body fatness. It is showed there was inconclusive finding based on gender. Therefore, the purpose of this study was to identify the relationship between knowledge on risk of obesity and body mass index among male and female student in Faculty of Sports Science and Recreation.

METHOD

Study population

A subject of 436 students from Faculty of Sport Science and Recreation, UiTM Shah Alam, age between 18 to 26 years. Each gender was included in this study which male (n=257) and female (n=179). This study only targeted on Full-time Bachelor's Degree Students consisted of two department which were sports science and sport management students from FSR. All the subjects are free to participate and were informed regarding the methodology and benefit of the research. First, the recruitment of the students selected based on the inclusion and exclusion criteria that was set by a researcher. Students were recruited during October 2021 to February 2022 academic session from Faculty of Sports Science and Recreation. This research was approved by the UiTM ethic committee:600-TNCPI (5/1/6). The characteristics of the subject are listed in the table 1.

Table 1: Subject Characteristic

Variables	Mean (SD)
Number of subjects	436
Sex (M/F)	257/179
Age (M/F)	$21.9 \pm 1.31/21.8 \pm 1.474$

Table 2: Frequency of Variables According to Gender

	Male (n=260)		Female (n=179)	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Age				
18 – 20	32	12.5	23	12.8
21 – 23	199	77.4	136	75.9
24 – 26	26	9.9	20	11.2
Knowledge on risk obesity				
High knowledge	148	57.6	99	55.3
Low knowledge	109	42.4	80	44.7
BMI categories				
Underweight	20	7.8	32	17.9
Normal BMI	161	62.6	110	61.5
Overweight	54	21.0	26	14.5
Obese	22	8.5	11	6.1

Data collection procedure

The design used in this study were descriptive correlation design using self-administrative questionnaire to identify relationship between knowledge on risk of obesity and body mass index among male and female Sports science and recreation students. To evaluate subject's knowledge on risk of obesity, the ORK-10 questionnaire was used. Self-reported body weight and height was used to calculate the body mass index due to SOP covid-19. Data was collected online based using Google form, respondents were invited using WhatsApp application and email to self-answer the online survey. We provide a subject with the contact number for further clarification if needed. The google form was shared among students in the Faculty of Sport Science and Recreation Shah Alam only. First, subjects were given general information about this study which were the benefit and procedure of this study. Then subject was providing informed consent which subjects were informed that they are free to join, or no penalty given if they refuse to join. Then, subject fill up body weight and height data and after those subjects were then directed to a questionnaire.

Instrumentation

Obesity Risk Knowledge (ORK) Questionnaire

Obesity Risk Knowledge-10 (ORK – 10) Scale consists of 10 – item questionnaire assesses knowledge of obesity-related health risk. The overall scale's Cronbach's alpha was 0.83. (Swift et al, 2006). This self-completion requires the studnets to judge the statement either 'True' or 'False' and 'Don't know' for uncertainty about the statement. One point was given for the correct answer, and zero points were given for incorrect and uncertain answers. Thus, the minimum score can be achieved as zero, and the maximum is 10. Those who answered 5 or more questions correctly were consider high knowledge, whereas those who correctly answered less than 5 questions were low knowledge (Alasmari et al., 2017). The higher the score indicates good knowledge, and the lower the score indicates poor knowledge.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS 2.0). Descriptive analysis used to describe the demographic data. The Pearson correlation was used to identify the relationship between ORK and BMI. All data was presented in mean and standard deviation with significant level set at $p < 0.05$.

RESULTS AND DISCUSSION

Knowledge on risk of obesity was measured using ORK-10 questionnaire. 57.6% of male students have high knowledge and 42.4% of male students have low knowledge on risk of obesity. Meanwhile, 55.3% of female students have higher knowledge and 44.7% have low knowledge. Normal BMI classification among male students of Sport Science and Recreation was 62.6%. Meanwhile, underweight, overweight, and obese was 7.8%, 21% and 8.5% respectively. Otherwise, normal BMI classification among female students was 61.5%. The prevalence of underweight, overweight, and obese was 17.9%, 14.5% and 6.1%. The mean score for knowledge on risk of obesity shows both male and female have lower mean score which male (n= 257) 4.82 ± 1.54 and female (n=179) 4.71 ± 1.68. According to Alasmari et al., (2017) those who correctly answered less than 5 questions were consider as poor knowledge and this is reveal that male and female students in faculty of sports science and recreation have poor knowledge on risk of obesity. Meanwhile, the mean score of BMI among male was consider normal where 23.64 ± 4.90 and female 21.89 ± 3.40. From the data shows the BMI of male and female students were classified as normal and female have lower BMI compared to male students.

Table 3: Mean score Knowledge on risk of obesity and Body mass Index among gender

	Male (n=257)		Female (n=179)	
	Mean	(SD)	Mean	(SD)
Knowledge on risk of obesity	4.82	1.54	4.71	1.68
Body mass index	23.64	4.90	21.89	3.40

There was a negative and weak correlation between knowledge on risk of obesity and body mass index among male students (Table 2). The finding correlation between ORK and BMI was r (257) = -0.061, $p > 0.05$ (Figure 1). There was no significant correlation was found between ORK and BMI among male students which indicated the knowledge among the male students does not influence the BMI as higher knowledge is not associated with lowering the BMI among the male students. From the Figure 1 shows the lower knowledge, the BMI in normal range. The higher knowledge, the BMI is higher than the normal range. Contradict to a study done by Alasmari et al., (2017) and Ghazi et al (2018) which the researcher found direct relationship between knowledge and obesity. Based on the previous studies, researcher found there is no correlation between obesity risk knowledge and body mass index among the male students. This study also found high awareness among the male students, but the higher prevalence of obesity. However, in this current study found the lower knowledge, the lower the BMI which most of the male students have normal BMI. This is associated with the practice and their lifestyle in sports faculty as the requirement of the faculty to ensure the students is physically active. In addition, past literature also revealed that male have higher physical activity level comparing to female (Al-Ghabban, 2013; Senarath & Tennakoon, 2021). This is associated with the lower prevalence of obesity. Physically inactive lead to increase the risk of

obesity. This is also supported by study Haslam & James, (2005) and Molanorouzi et al., (2015) which reported the physical activity may lowering the risk of obesity. In this study mentioned the important of physical activities are associated with normal BMI and males with lower physical activity tend to obese.

Surprising finding in this current study among female students is the relationship between knowledge on risk of obesity and their body mass index does not exist (r=0.076, p>0.05). There was a negative and weak correlation between knowledge on risk of obesity and body mass index among male students (Table 2). There is lots of previous study conducted found the similar finding that reported there is no significant association between knowledge on obesity and body mass index (Ghazi et al., 2018; Mehanna et al., 2020; Rizvi et al., 2019). According to previous study by Hassan et al., (2015) mentioned that students in Malaysia have good knowledge on obesity however the practice and healthy eating were poor, thus this supported the current finding where female students have good knowledge related on obesity but their practice and attitude towards health eating is poor. This factor causes the significant correlation was not found in this study. In the other words, the knowledge among female students does not influences their body weight as they do not have a good practice and attitude towards the knowledge. In additional, previous studies mentioned female have a greater desire to be thinner or leaner and have a more negative attitude regarding their body weight (El Ansari et al., 2014; Lôbo et al., 2020) Ideally, this recent study proved that there is no significant relationship between knowledge on risk of obesity and body mass index among female sports science and recreation students. Meanwhile, Ghazi et al., (2018), Jajulwar, Meshram and Saji (2017) reported the correlation is does not exist in their studies due to lack of awareness about obesity and its implications that cause people to exert less effort to prevent or control obesity because they are unaware of the consequences. However, in this current study, female students are aware about the risk of obesity but in terms of their attitude and practice towards the knowledge might affected the result of this study. This supported by studies from Alves & Precioso (2020), El Ansari et al., (2014) and Hassan et al., (2015) which found the university students with good level of knowledge but poor practice on healthy eating habit. The attitude and practice in female student towards their knowledge on risk of obesity cause no relationship to exist. This is meaning the knowledge does not influence of the body mass index among the female students as they perceptive towards body image and concern about being skinny and thinner.

Table 4: Correlation between Knowledge on risk of obesity and Body mass Index among gender

Variables	Correlation	P value
Male	-0.061	0.332
Female	0.076	0.310

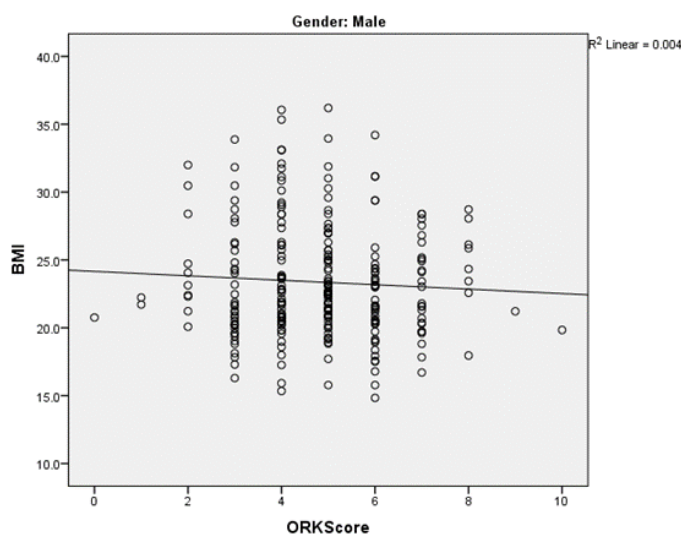Figure 1: Scatter plot of ORK and BMI
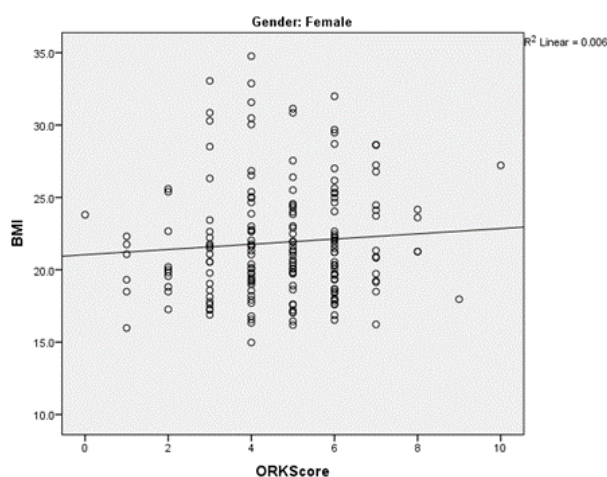
Figure 2: Scatter plot of BMI and PBF

Table 5: Sub- analysis on risk of obesity

Gender	BMI	Knowledge	
		High	**Low**
Male	Normal	95	66
	Underweight	12	8
	Overweight	33	21
	Obese	8	14
Female	Normal	62	48
	Underweight	17	15
	Overweight	17	9
	Obese	3	8

Since there no association between knowledge on risk of obesity and obesity, probably there are 4 outcomes which are high knowledge but normal BMI, low knowledge but normal BMI, high knowledge but abnormal BMI, low knowledge with low BMI. The table 5 showed 60.6% of male students had low knowledge but normal BMI, 39.4% had low knowledge and

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abnormal BMI, 64.2% had high knowledge and normal BMI, and 35.8% had high knowledge but abnormal BMI. Meanwhile, 60.0% of female students had low knowledge abut normal BMI, 40.0% had low knowledge and abnormal BMI, 62.6% of female students had high knowledge and normal BMI, and 37.4% had high knowledge but abnormal BMI.

Among 161 male students with normal BMI, 95 of them had high knowledge while 66 students had low knowledge. This is related with the practice and their way of life in sports faculties, since it is the faculty's responsibility to guarantee that the students participate in physical activity. In addition, previous research has indicated that males engage in more physical (Al-Ghabban, 2013; Senarath & Tennakoon, 2021). Obesity is more likely to occur when people practice a sedentary lifestyle. Haslam and James (2005) and Molanorouzi et al., (2015) have shown that physical exercise may help to reduce the risk of obesity in certain people and physical activities are associated with a normal BMI. Meanwhile, among female students in Faculty of Sports Science and Recreation 62 of them had high knowledge and 48 students had low knowledge but normal BMI. A study reveal as students may see a teacher's body fatness, leanness, or normal body, which allows for observational learning of body imaging (Aryal, 2020). In this study highlight that student influence by their observation to their surrounding especially teacher and parents. In this context, Sports Science and Recreation lecturers mostly is active and sports persons thus, their attitude and body image influence the student's knowledge which at the same time affected their BMI.

However, 53 male students had high knowledge but abnormal BMI as 43 male students had low knowledge and abnormal BMI. Despite having access to adequate knowledge and a good attitude toward obesity management, overweight and obese adults engage in physical exercise at a much lower rate than the general population (Bolarinde & Ibidunmoye, 2018). In addition, the study also reveals that exercise tiredness, difficulty to carve out time for exercise, interfering with their own daily routines, and incapacity to exercise during workdays are all common complaints among those who do physical activity. Otherwise, 37 female students had good knowledge and 32 students had low knowledge had abnormal BMI. According to Hassan et al. (2015), female students in Malaysia have strong understanding about obesity but poor practice and healthy eating habits. Females also aspire to be thinner or leaner and have a negative attitude towards their body weight (El Ansari et al., 2014; Lôbo et al., 2020). According to Ghazi et al. (2018), Jajulwar, Meshram, and Saji (2017), individuals do less to avoid or manage obesity because they are uninformed of the risks. Other studies have revealed that university students had strong knowledge but poor practice of healthy eating habits, such as Alves & Precioso (2020). Ideally, the knowledge possessed has no effect on the BMI level of male and female students in the Faculty of Sports and Recreation Science because they do not apply and practice the knowledge possessed properly because of the negative attitude held by the students, particularly towards their appearance and physical activities.

Therefore, the association was not significant since the data were in all four probabilities and the percentage of the four probabilities do not have much difference. The perception, awareness and practice towards knowledge is crucial in lowering the numbers of obesity especially among university students.

However, the possible limitation of this study is the use of BMI to categorize obesity especially in physically active individuals. BMI does not separate lean muscle from fat mass where people with normal weight but surplus body fat might not be categorized as overweight or obese while people with high lean muscle may be miscategorized as overweight or obese

(Cornier et al., 2011). Students from the sports faculty are active individuals and athlete that are muscular may have a high BMI because of extra lean mass (Okorodudu et al., 2010). Therefore, BMI might overestimate body fat in the physically active students which are more muscular and miscategorized them as obese. In addition, there is a need of study to reduce the limitations in the future study and this study also would be able to be conducted among general population to get the best prevention of obesity disease.

CONCLUSION

There is no significant correlation between knowledge and BMI. The practice and attitude towards knowledge are important as the prevention of obesity rate. This is because knowledge together with practice possibly will help for upkeep of normal body fatness.

Author's contribution

Farhanah Abdul Rahim – main author to conduct the research and involved ideas, data collection, interpretation and write out of this manuscript.

Noor Fatihah Illias – Corresponding author and data analyze, interpretation dan approval in write out .

Acknowledgment

Conflict of Interest

All authors declared that there is not self- interest in publishing this manuscript

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