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A Cross Sectional Study of Attitude Towards Obesity Among Medical Undergraduates

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Abstract

Obesity is one of the major risk factors for a number of chronic diseases like type 2 diabetes, heart diseases and cancer. Based on the World Health Organization (WHO), a person whose BMI is ≥ 30 (kg/m^2) is considered obese. Medical students should have a positive attitude toward obese person in order to provide an effective and good quality of health care. The objective of this study is to assess the attitude towards obese people, the knowledge of obesity risks and also to study the factors influencing the attitude towards obese people among medical students in Melaka-Manipal Medical College, Malaysia (MMMC). A cross sectional study was conducted from June 2020 until July 2020 in MMMC. Purposive sampling was done to enroll participants and they were asked to respond to Attitude Towards Obese Persons (ATOP) scale, Belief About Obese Persons (BAOP) scale and Obesity Risk Knowledge (ORK) scale in Google Form. Analysis included frequency, percentages, means, standard deviation, maximum and minimum value, Chi-square test and correlation were calculated using Epi Info software version 7.2. Level of significance was set at p≤0.05. A total of 145 undergraduate medical students participated; study has shown statistically significant in comparison of attitude towards obese persons between Chinese and Malays students. The odds of having positive attitude were 13.0 times more likely in Chinese than Malays (95%CI 1.57-107.71; x2 8.214; p-value 0.004). In conclusion, the participants have a positive attitude towards obese persons. However, most of the students have a poor knowledge regarding obesity risk. Therefore, a lot of efforts need to be carried out to improve their attitude towards obese individuals and obesity risk knowledge.

Keywords

Obesity, Attitude Towards Obese Persons, Medical Students

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1. Introduction

Obesity is one of the major risk factors for a number of chronic diseases like type 2 diabetes, heart diseases and cancer. [1-3] Moreover, obesity can increase the incidence of musculoskeletal disorders such as lower back injury and a number of mental health conditions like depression. [4-7] Based on the World Health Organization (WHO), a person whose BMI is ≥ 30 (kg/m^2) is considered obese. Overweight is defined as a person of BMI ≥ 25.0. [8] The BMI of a person is calculated by weight in kilograms divided by square of height in metres. [9]

According to global burden of disease, 4 million people die every year due to being overweight or obese in 2017. [8] Malaysia has the highest rate of overweight and obesity in Asia with 64% males and 65% females being either overweight or obese. [10]

Stigma and discrimination are one of the reasons contributing towards the attitude against obese people which usually will affect their physical and psychological health. [11] Study shows that the incidence of weight discrimination in the United States increased noticeably by 66% over the past

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decades. [12] Discriminatory behaviour towards obese people give unpleasant consequences on their education, health care and employment. [13]

Among undergraduates and registered nurse in Hong Kong, majority of them perceived that obese individuals liked food, overate, and were unattractive, shapeless and slow. [14] Moreover, more than half of them believed that obese inpatient should be put on a diet during the stay. [14] Around 47% of the population found physical difficulties in handling obese patients. [14]

In view of ethnicity and gender effects, African American women is less likely to have negative attitude towards obese people compared to white women whereas African American men show no difference compared to white men. [15] Men also have stronger anti fat attitude compared to women. [15, 16]

One's own weight is not related to the anti-fat attitude as overweight people were no less than normal weight people in stigmatising obesity. [15] Overweight and obese people do not show in-group favoritism as they also hold negative attitudes among themselves. [17, 18] However, thin people are most likely to exhibit lazy stereotype towards obese people as they believe that thinner people are more motivated and obese people are lazier. [19]

In contrast, based on a study conducted in Hong Kong and Taiwan, self-perceived overweight persons have a lower ATOP score compared to self-perceived normal weight group. [20] Meanwhile, significantly higher BAOP score obtained by self-perceived underweight group than self-perceived normal weight and self-perceived overweight groups. [20]

A study was done in 2001 showing that children were strongly prejudice against obese child and this bias became worsened in 2001 compared to how it was in 1996. [21] Children are more likely to have negative attitude towards their obese peers compared to adults. [15] Parents influential effects on their children is one of the causes of this problem. Bacardi-Gascón et al suggest that mother's negative attitude towards obese child has direct influence to their children bias behaviour. [22]

A survey was done in one of university in United Kingdom showing nursing students had poor knowledge regarding obesity risk and demonstrated neutral attitudes towards overweight and obese persons. [23] Among those nursing students, Mental Health students group revealed a statistically significant higher knowledge than Adult students group based on Mann-Whitney Test. [23] Generally speaking, the outcomes demonstrated just insignificant measurably critical contrasts with respect to sexual orientation, field of training, or year gatherings. [23]

In a Swiss University Hospital, almost 46% of the physicians declared that having never received initial training related to obesity in an online survey. [24] Surprisingly, almost one third of the healthcare professionals did not know BMI calculation and the cut-off value for overweight or obesity. [24] Results demonstrated a low degree of negative mentalities towards obese persons, and featured a poor knowledge for diagnosing obesity in adults and kids, as well as confidence and training to care of obese patients. [24]

To our knowledge, no research to assess the attitude towards obese persons and knowledge about obesity risk has been conducted in our setting. Obesity, is a common and serious disease, there would be cases no matter urban or rural area and it is spreading widely over the globe. With that in mind, we would like to view responses from medical students in MMMC comprising of multi-races for the topic above, obesity. The objectives of conducting the research is to study the attitude of medical students in MMMC towards obese people, the knowledge of obesity risks in medical students of MMMC, and also to assess the factors influencing the attitude towards obese people.

2. Method

2.1. Study Design, Population, Time and Place

A cross sectional study, conducted from June to July 2020 via online among our medical undergraduate students of Melaka Manipal Medical College, Melaka, Malaysia. Melaka Manipal Medical College (MMMC), a private institution located in Malaysia which consists of two campuses, in Muar, Johor and Bukit Baru, Melaka was part of this study. This campus consists of 3 courses, Foundation in Science (FIS), Bachelor of Dental Surgery (BDS), and Bachelor of Medicine and Bachelor of Surgery (MBBS). The Muar campus offer MBBS semester 6 and 7, while Melaka campus offer MBBS semester 8, 9, 10, BDS and FIS.

2.2. Sample Size

The sample size for this research (n) was calculated using following formula

$$n = \frac{N\sigma^2 z^2_{1-\frac{\alpha}{2}}}{d^2(N-1) + \sigma^2 z^2_{1-\frac{\alpha}{2}}}$$

Where,

Sample size (n) Population (N) = 667 Z=1.96

Standard deviation (σ) =16.23

Estimation error (d) = 2.4 α= 0.05

Based on previous research that was conducted on Nursing, Education, and Social Work students, the standard deviation of ATOP scale among 20-30 years old participant is 16.23 and estimation error (d) is 2.4. [25] The population size of MBBS students in Melaka Manipal Medical College, Malaysia, is 667 students. The result after the calculation was a minimum sample size of 140. The non-response percentage taken into consideration was 20% and the final sample size is calculated as below:

$$n\ final = n\ calculated / 1 - non\ response\ (\%)$$

$$= 140 / 1\text{-}0.2\ (20\%)$$

$$= 175$$

2.3. Sampling Method

Purposive sampling which is a non-probability sampling method was utilized while conducting the study. The inclusion criteria were MBBS students who voluntarily consented to participate in the study and the questionnaires must be completed to be considered valid for the research after they filled up the consent form via online. Exclusion criteria included those who did not give consent, not available when the questionnaires were distributed, incomplete questionnaires and irrelevant responses. Our questionnaires were circulated to MBBS students of semester 6 and 7 from Muar Campus and semester 8, 9 and 10 from Melaka campus.

2.4. Data Collection Method

The independent variables of our study were age, gender, semester of study, religion, ethnicity, self-perceived BMI, obese family and obese friends.

Data were collected from participants using an online Google Form platform with structured questionnaires. The questionnaire consists of four parts; (I) socio-demographic information, (II) beliefs about obese people scale, (III) attitudes toward obese persons scale, (IV) obesity risk knowledge scale.

In the first part, participants had to fill their socio-demographic information such as gender, age, ethnicity, nationality, religion, semester of study, body mass index, and question asking if any of their friends or family are obese.

Part II was Beliefs About Obese Persons Scale (BAOP) which measures the degree of individual believes that obesity is under the control of obese people. [23] Consists of 8 items rated on six-point Likert scale (−3 = strongly disagree to +3 = strongly agree). Items number 2 and number 7 were positively worded items and the other 6 were negatively worded items. Total score for this scale was obtained by multiplying-1 into the negatively worded items, summing all 8 items scores then adding 24 into the summated score. Higher score shows stronger beliefs that obese people cannot control their weight status.

For part III, Attitudes Toward Obese People scale (ATOP) consists of 20 items rated on six-point Likert scale (−3 = strongly disagree to +3 = strongly agree). [25] Items number 1-3, 8-9 and 13 assessed opinion on self-esteem of obese people whereas item number 4, 6, 11-12, 14-15, 17, and 20 assessed opinion on different personalities of obese people. Item number 5, 7, 10, 16 and 18-19 assessed opinion on social difficulties of obese people. Items number 1, 7-9, 13 and 17-18 were positively worded items whereas items number 2-6, 10-12, 14-16 and 19-20 were negatively worded items. Total score for this scale was obtained by multiplying-1into all the negatively worded items, summing the 20 items score then adding 60 into the summated score. Lowest score shows more negative attitude towards obese people. Attitude towards obesity were assessed by recoding ATOP scale into quartiles very negative attitude (0.00-30.00), negative attitudes (30.01-60.00), positive attitudes (60.01-90.00) and very positive attitudes (90.01-120.00). [23]

In part IV, Obesity Risk Knowledge scale (ORK-10) consists of 10 questions with response options “True”, “Don’t know”, and “False”. This scale assessed knowledge of participants on health risks associated with obesity. [26] This includes items such as “Obesity increases the risk of getting breast cancer after the menopause” and “A person with a ‘beer-belly’ shaped stomach has an increased risk of getting diabetes”. 1 point given to correct responses and 0 point given to incorrect responses. Score range of ORK-10 scale is between 0 and 10. Higher score indicates higher levels of knowledge. Level of knowledge regarding obesity risk was categorized into very poor (0.00-2.50), poor (2.51-5.00), good (5.01-7.50) and very good (7.51-10.00) based on ORK score. [23]

2.5. Data Processing and Analysis

Collected data was fed into Microsoft Excel and compiled. By using Epi Info version 7.2, the data was statistically analyzed.

In this cross-sectional study, the independent variables were age, gender, semester of study, religion, ethnicity, self-perceived BMI, presence of obese family or/and friend(s) and knowledge regarding obesity risk. Meanwhile, the dependent variable was attitudes towards obesity. We calculated the frequency and percentage for categorical data such as age, gender, semester of study, religion, ethnicity, self-perceived BMI and presence of obese family and/or friend(s). For quantitative variable which were knowledge regarding obesity risk, belief towards obese persons and attitudes towards obesity, means and standard deviations (raw score) were calculated. ATOP and BAOP means score were calculated.

The statistical tests which were used to investigate any association between independent and dependent variables

were tabulated below. The level of significance was 0.05.

Table 1. Statistical tests used in this study.

Independent variables	Dependent variable	Statistical tests
Age	Attitude	Chi-square test
Gender	Attitude	Chi-square test
Semester of study	Attitude	Chi-square test
Religion	Attitude	Chi-square test
Ethnicity	Attitude	Chi-square test
Self-perceived BMI	Attitude	Chi-square test
Obese family or/and friend(s)	Attitude	Chi-square test
Knowledge	Attitude	Chi-square test
Belief	Attitude	Correlation

2.6. Ethical Consideration

Informed consent form with all of the important details of the study was provided to all participants. The participants were given the option to take part or not to involve themselves in this study, no individual was forced to take part in this study. We ensure that the participants' personal information will be kept confidential and is used solely for the purpose of this research. Their anonymity and privacy will also be protected. This research has gotten the approval by the Research Ethics Committee, Faculty of Medicine, Melaka Manipal Medical College, Malaysia.

3. Results

Table 2. Socio-demographic of the medical students that participated in the study (n=145).

Variables	n (%)
Age	
<22	12 (8.28)
22-23	98 (67.59)
>23	35 (24.14)
Mean (SD)	22.86 (1.08)
Minimum-Maximum	21.00-27.00
Gender	
Male	49 (33.79)
Female	96 (66.21)
Year of study	
4	104 (71.72)
5	41 (28.28)
Obese friends/ family members	
Yes	99 (68.28)
No	46 (31.72)
Ethnicity	
Malay	36 (24.83)
Chinese	24 (16.55)
Indian	67 (46.21)
Others	18 (12.41)
Nationality	
Malaysian	140 (96.55)
Non-Malaysian	5 (3.45)
Religion	
Islam	42 (28.97)
Buddhist	19 (13.10)
Christian	22 (15.17)
Hindu	56 (38.62)
Others	6 (4.14)
Self-perceived BMI	
Underweight	13 (8.97)
Normal	95 (65.52)
Overweight	31 (21.38)
Obese	6 (4.14)

Description of sample

Most of the participants were females (n=96; 66.21%) and males (n=49; 33.79%). Participants were predominantly in their 22-23 age group (n=98; 67.59%), followed by >23years (n=35; 24.14%), then <22 years old (n=12; 8.28%). The mean age of the participants is 22.86 with the SD of 1.08. 71.72% of the participants were in year 4 of study (n=104) and 28.28% were in year 5 of studies (n=41). Participants were predominantly Malaysians (n=140; 96.55%), and non-Malaysians (n=5; 3.45%). In this sample, majority of the participants were Hindu (n=56; 38.62%), followed by Islam (n=42; 28.97%), Christian (n=22; 15.17%), Buddhist (n=19; 13.10%) and Others (n=6; 4.14%). For the ethnicity majority of the participants were Indians (n=67; 46.21%), followed by Malays (n=36; 24.83%), Chinese (n=24; 16.55%) and then Other ethnicities (n=18; 12.41%). 65.52% (n=95) perceive themselves to be normal weight, 21.38% (n=31) were overweight, 8.97% (n=13) were underweight, 4.14% (n=6) were obese. Of the respondents, 68.28% (n=99) had a friend or family member who was perceived as obese.

Table 3. Attitudes and Beliefs about Obese persons, and Knowledge about obesity risk of medical undergraduates. (n=145).

Variables	n (%)
Beliefs about obese persons (0-48)	
Mean (SD)	14.52 (4.96)
Minimum-Maximum	0.00-28.00
Attitudes towards obese persons (0-120)	
Very positive attitude	14 (9.66)
Positive attitudes	94 (64.83)
Negative attitudes	36 (24.83)
Very negative attitudes	1 (0.69)
Mean (SD)	70.46 (15.28)
Minimum-Maximum	29.00-109.00
Knowledge about obesity risk (0-10)	
Very good	7 (4.83)
Good	58 (40.00)
Poor	68 (46.90)
Very poor	12 (8.28)
Mean (SD)	5.15 (1.77)
Minimum-Maximum	0.00-9.00

BAOP results

Scores for BAOP ranges from 0-48. In our study BAOP scores range from 0-28.00. The mean score was 14.52 (SD= 4.96).

ATOP results

The range of score of ATOP is 0-120. In our study ATOP score ranges from 29-109. The mean ATOP score in our study is 70.46 (SD=15.28). Majority of the participants have positive attitudes (n=94; 64.83%), with negative attitude

(n=36; 24.83%), very positive attitude (n=14; 9.66%), and very negative attitude (n=1; 0.69%).

ORK-10 results

The range of score for ORK-10 is 0-10. In our study, the score ranges from 0-9. The mean score for ORK-10 is 5.15 (SD=1.77). 46.90% (n=68), had poor knowledge about obesity risk, 40% (n=58) have good knowledge, 8.28% (n=12) have very poor knowledge, 4.83% (n=7) have very good knowledge.

Table 4. Chi-square analysis of the association between social demographic profile of students and their knowledge regarding obesity risk on Attitude towards Obese Persons.

Independent Variables	Attitude		OR (95% CI)	Chi-square	P value
	Positive n (%)	Negative n (%)			
Sex					
Male	36 (73.5)	13 (26.5)	Reference		
Female	72 (75)	24 (25.0)	1.08 (0.49, 2.37)	8.21	0.842
Ethnicity					
Malay	**23 (63.9)**	**13 (26.1)**	**Reference**		
Chinese	23 (95.8)	1 (4.2)	13 (1.57, 107.71)	8.214	0.004
Indian	49 (73.1)	18 (26.9)	1.54 (0.65, 3.67)	0.951	0.329
Others	13 (72.2)	5 (27.8)	1.47 (0.43, 5.06)	0.375	0.540
Year Of Study					
Year 4	79 (76.0)	23 (24.0)	Reference		
Year 5	29 (70.7)	12 (29.3)	1.31 (0.58, 2.94)	0.423	0.515
Religion					
Islam	28 (66.7)	14 (33.3)	Reference		
Christian	17 (77.3)	5 (22.7)	1.70 (0.52, 5.56)	0.778	0.377
Buddhist	17 (89.5)	2 (10.5)	4.25 (0.86, 21.0)	3.516	0.061
Hindu	40 (71.4)	16 (28.6)	1.25 (0.53, 2.97)	0.256	0.613
Others	6 (100.0)	0 (0.0)	undefined	2.824	0.093
Age					
>23	23 (65.7)	12 (34.3)	Reference		
22-23	76 (77.5)	22 (22.5)	1.80 (0.78, 4.19)	1.899	0.168
<22	9 (75.0)	3 (25.0)	1.57 (0.36, 6.89)	0.355	0.552
Knowledge					
Good	50 (76.9)	15 (23.1)	1.26 (0.59, 2.70)	0.369	0.543
Poor	58 (72.5)	22 (27.5)	Reference		
Nationality					
Malaysian	105 (75.0)	35 (25.0)	2.00 (0.32, 12.46)	0.572	0.450
Non-Malaysian	3 (60.0)	2 (40.0)	Reference		
Obese friends/family members					
Present	75 (75.8)	24 (24.2)	1.23 (0.56, 2.71)	0.267	0.605
Absent	33 (71.7)	13 (28.3)	Reference		
Self-perceived BMI					
Obese	4 (66.7)	2 (33.3)	Reference		
Normal	69 (72.6)	26 (27.4)	1.33 (0.23, 7.68)	0.100	0.752
Underweight	12 (92.3)	1 (7.7)	6.00 (0.42, 85.25)	2.030	0.154
Overweight	23 (74.2)	8 (25.8)	1.48 (0.22, 9.41)	0.144	0.704

Table 4 describes the association between the sociodemographic profiles toward attitude on obese persons among undergraduate students in a medical college. According to our study, it was found that the odds of a female having positive attitude was 1.08 times more likely than males. However, findings were not significant (95%CI 0.49-2.37; x2 8.21; p-value 0.842).

The odds of having positive attitude were 13.0 times more likely in Chinese than Malays. Findings were statistically significant (95%CI 1.57-107.71; x2 8.214; p-value 0.004). In comparison with Malays, the odds of having positive attitude were 1.54 times more likely in Indians. The findings were not significant (95%CI 0.65-3.67; x2 0.951; p-value 0.329). The odds of having positive attitude was 1.47 times more likely in others compared to Malays. However, findings were not significant (95%CI 0.43-5.06; x2 0.375; p-value 0.540). The odds of having positive attitude in 5th year students was 1.31 times more likely than 4th year students. However, findings were not significant (95%CI 0.58-2.94; x2 0.423; p-value 0.515). The odds of having positive attitude was 1.70 times more in Christs group than the Muslims group. Findings were not significant (95%CI: 0.52-5.56; x2 0.778; p-value 0.377). The odds of having positive attitude was 4.25 times more likely in the Buddhists group compared to Muslims group. However, findings were not significant (95%CI 0.86-21.0; x2 3.516; p-value 0.061). As for the Hindu group, the odds of

having positive attitude was 1.25 times more likely compared to the Muslims group and these findings were not significant as well (95% CI 0.53-2.97; x2 0.256; p-value 0.613). It was found that the odds of having positive attitude was undefined in other religion compared to Muslims group. Findings were not significant (95% CI undefined; x2 2.824; p-value 0.093).

Based on age grouping, the odds of having positive attitude was 1.57 more likely in the less than 22 years old age group compared to the more than 23 years old group. Findings were not significant (95%CI 0.36-6.89; x2 0.335; p-value 0.552). In comparison to 22-23 years age group, it was found that the odds of having positive attitude were 1.80 times more compared to the students above 23 years of age. Findings were not significant (95%CI 0.78-4.19; x2 1.899; p-value 0.168). Participants were categorized based on their knowledge regarding obesity risk: good and poor knowledge. The odds of having positive attitude was 1.26 times more likely in participants with good knowledge compared to poor knowledge group. Findings were not significant (95%CI 0.59-2.70; x2 0.369; p-value 0.543). The data showed that the odds of having positive attitude are 2.00 times more likely in Malaysian students as compared to International students. Findings were not significant (95%CI 0.32-12.46; x2 0.572; p-value 0.543).

The students were further categorized based on the presence if obese friends and/or family members. The odds of having positive attitude was 1.23 times more likely in the group with the presence of obese friends and/or family members compared to the group without obese friends and/or family members. However, findings were not significant (95%CI: 0.56-2.71; x2 0.267; p-value 0.605). As for self-perceived BMI grouping, data showed that the odds of having positive attitude was 1.33 times more likely in normal BMI students as compared to obese students. Findings were not significant (95%CI 0.23-7.68; x2 0.100; p-value 0.752). The odds of having positive attitude was 6.00 times more likely in the underweight group compared to the obese group. However, findings were not significant (95%CI 0.42-85.25; x2 2.030; p-value 0.154). Whereby the odds of having positive attitude was 1.48 times more likely in the overweight group compared to the obese group but the findings were not significant too (95%CI 0.22-9.41; x2 0.144; p-value 0.704).

Table 5. Linear regression analysis of association between Belief About Obese Person and Attitude Towards Obese Person.

Independent variable	Correlation, r	P value
Belief	0.14	0.089

Table 5 shows the association between belief about obese persons and attitude toward obese persons. The association between knowledge and awareness was a positive one with r value of 0.14. However, the magnitude of correlation is little. This association was not significant (p-value 0.089).

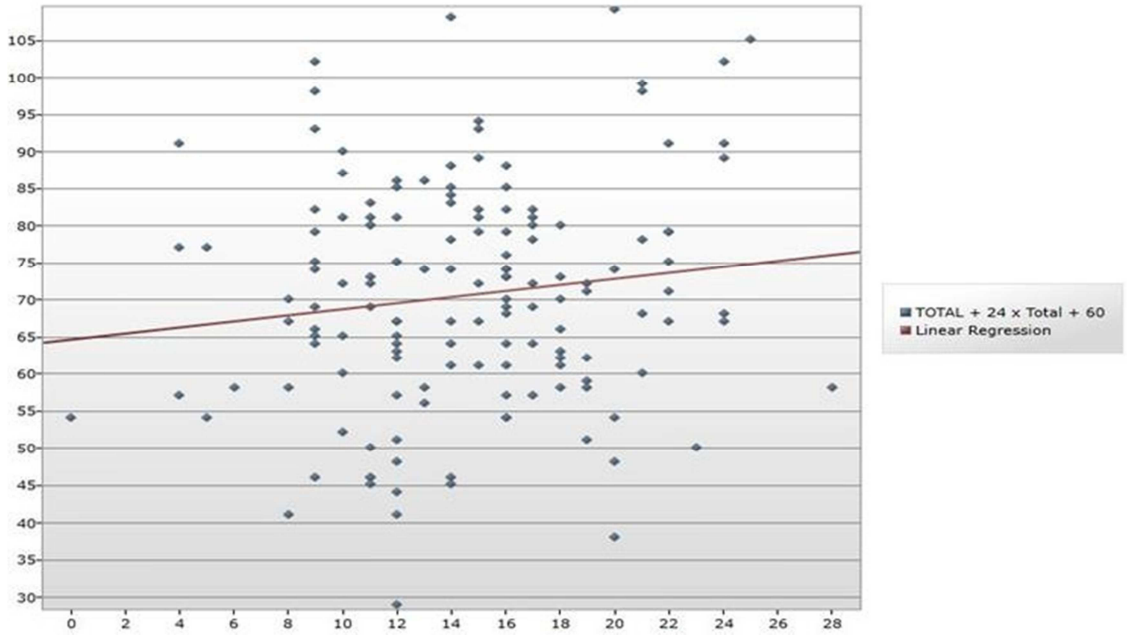

Figure 1. Correlation between the participants' knowledge regarding obesity risk and their attitude towards obese individuals.

4. Discussion

We conducted this research to study the attitude of medical students in MMMC towards obese people, assessing knowledge of MMMC students about obesity risk. Lastly, to assess if there are any factors influencing the attitude of MMMC students towards obese people. In our study, it

shows that out of 145 respondents, 9.66% of them show very positive attitude towards obese people, 64.83% of them responded with positive attitude towards obese person. 24.83% of the respondents responded with negative attitude towards obese people, and only 0.69% (1 respondent) responded with very negative attitude towards obese people. As for ATOP, our study shows that the mean was 70.46 meanwhile previous study done among university students in Hong Kong showed 71.76 ± 13.70 and 72.71 ± 13.13 for Taiwan population. [20] The mean BAOP in our study was 14.52 whereby for Hong Kong was 20.16 ± 5.56 and Taiwan 21.59 ± 6.41. [20]

In our study, we found that the mean of ORK score is 5.15, and it showed that only 4.83% of the respondents have very good knowledge about obesity risk, while 40% have good knowledge about obesity risk. 46.9% of the respondents have poor knowledge and 8.28% have very poor knowledge about obesity risk. According to a cross-sectional study that was done in one of the nursing schools in the UK, it showed that 13.2% of their students have very good knowledge about the obesity risk, while only 4.83% of our respondents have very good knowledge. [23] This might be because of the difference in education systems that take place in two different settings.

Our study revealed that there was statistically significant association between ethnicity particularly in Chinese's attitudes toward obese people in comparison to Malays. But, it is unfortunate to find that there is no significant association between gender, year of study, religion, age, self-perceived BMI, knowledge about obesity risk and the presence of obese friends and/or family members on the attitude towards obese persons. Chinese showed more positive attitudes toward obese people compared to Malays. Whereas Indians and other ethnicities in Malaysia did not show significant difference from Malays on their attitudes toward obese people. There were no differences of attitudes observed between genders in our study, which was consistent with the result of a previous study that involved college students at a university in Virginia. [27] However, previous studies showed that women have less negative attitudes toward obese people than men. [15-16] Previous study among a large group of medical doctors also revealed that male medical doctors had more implicit weight bias than female medical doctors. [28]

In our study, it showed that there were also no significant associations between age, year of study and the attitudes toward obese people. [29] In contrast, older age categories had significantly more positive attitudes than younger age group in the study among undergraduate students in New York and also in different setting in Mexico. [25, 29] Our findings also showed that there was no association between knowledge of obesity and attitudes toward obese people. Unlike the evidence from past study in France, where most of the general practitioners knew that obesity is health-threatening but approximately 30% of them had negative attitudes toward obese patients. [30] In our study, we found that there was no significant relation of self-perceived BMI and attitudes toward obese people, which was found to be consistent with those observed in medical and psychology students in Mexico and college students at a large state university. [15, 29] In contrast, based on a study conducted in Hong Kong and Taiwan, self-perceived overweight undergraduates have a lower ATOP score compared to self-perceived normal weight group. [20] Meanwhile, significantly higher BAOP score obtained by self-perceived underweight group than self-perceived normal weight and self-perceived overweight groups. [20]

We could not find any significant association between having a family member or friend who is perceived as overweight or obese and attitude. Meanwhile a study in University in Upstate New York among graduate and undergraduate nursing students, graduate education students and graduate social work result in statistically significant more positive attitudes toward obese persons with the presence of obese friends or family members. [25] This could be because the previous study has included graduated students, while our studies' population is only medical students. Graduated students tend to be more understanding and hold more empathy towards obese people because they often deal with obese people in the hospital setting.

Throughout this study, we encounter a few limitations. First of all, the sample was selected from a single medical college in Malaysia. Thus, the results cannot be generalized to other settings. Secondly, we did not take the participants' weight on our own, this might have affected the analysis of participants' attitudes based on their personal BMI. Thirdly, we included only medical students in our study, so there might be a possibility that the participants may be reluctant to express highly negative attitudes towards obese person because of their professional role. Lastly, in the ORK scale, the only option was "true", "false" or "I don't know", there is a possibility that an average knowledge student might have just guessed most of the answers correctly.

Through this study, we came into a conclusion that medical students of MMMC had slightly poor knowledge of obesity risk, but they do have a positive attitude towards obese people. That being said, the college may have to pay more attention in emphasizing this topic and plan some interesting events such as inviting college alumni to give speech about obesity to further educate our students on this topic as it is a fairly common disease that we often neglect. Besides that, the college could also include obesity as a bedside teaching

topic, this could further increase students' knowledge about this disease as they were more exposed to the topic. Lastly, the health community could also hold a "poster-making challenge". By making colorful and interesting posters, students could learn about obesity much easier, and the winning poster could be placed in a spot in the college for students to read and learn. This will definitely result in a sky-rocket increase of knowledge in medical students of MMMC.

5. Conclusion

In conclusion, this study has shown that undergraduate students of Melaka Manipal Medical College, MBBS programme, had slightly poor knowledge of obesity risk, but they are unlikely to attribute negative characteristics to obese individuals. The mean for BAOP, ATOP and ORK scores were 14.52, 70.46, and 5.15 respectively. Now is a better time than ever to make sure medical students are well educated to have good attitudes toward obese individuals as they are surely going to treat obese patients in the future.

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Appendix

A Cross Sectional Study on Attitude Towards Obesity Among Medical Undergraduates.

: Nur Hidayahtun Najihah binti Yahaya (161303599)

: Azriq bin Airul Faizili (161303608)

: Nursyafikah binti Jasman (161303611)

: Ooi Yee Jie (161303616)

: Thava Prasha a/p M.Selvakumaran (161303623)

You are being invited to take part in a research project which aims to determine the attitude towards obese people, and knowledge about obesity risk among medical undergraduates. It will ask for basic information without breaking anonymity. Data will be collected by using self-administered questionnaire and this will take about 10-15 minutes. Participation in this study is voluntary and you have the right to deny and/or withdraw from the study at any time, no need to give any reason, and this will not have negative impact on you. Any information you provide is anonymous. Results of the study will be reported as total picture and not individually.

Consent

I consent to participating in the study as titled above of my own free will. I further understand that I have the freedom to choose not to participate in the study. No reward or inducement has been offered to me to participate as a volunteer in the study.

Roll number:_____

Signature:_____

Date:_____

Thank you so much for your participation.

Part I: Sociodemographic information

1) Roll Number:_____

2) Age:_____year-old

3) Gender: o Male o Female

4) Ethnicity: o Malay o Chinese o Indian o Others

5) Nationality: o Malaysian o Non-Malaysian

6) Religion: o Islam o Buddhist o Christian o Hindu o Others

7) Semester: 6 / 7 / 8 / 9 / 10

8) BMI: o Underweight o Normal o Overweight o Obese

9) Any obese family member(s) or friend(s): o Yes o No

Part II: Belief About Obese Persons (BAOP) Scale

BAOP: Beliefs About Obese Persons Scale

Please mark each statement below in the left margin, according to how much you agree or disagree with it. Please do not leave any blank. Use the numbers on the following scale to indicate your response. Be sure to place a minus or plus sign (-or +) beside the number that you choose to show whether you agree or disagree.

-3	**-2**	**-1**	**+1**	**+2**	**+3**
I strongly disagree	I moderately disagree	I slightly disagree	I slightly agree	I moderately agree	I strongly agree

1) _____Obesity often occurs when eating is used as a form of compensation for lack of love or attention.

2) _____In many cases, obesity is the result of a biological disorder.

3) _____Obesity is usually caused by overeating.

4) _____Most obese people cause their problem by not getting enough exercise.

5) _____Most obese people eat more than nonobese people.

6) _____The majority of obese people have poor eating habits that lead to their obesity.

7) _____Obesity is rarely caused by a lack of willpower.

8) _____People can be addicted to food, just as others are addicted to drugs, and these people usually become obese.

Allison, D. B., Basile, V. C., & Yuker, H. E. (1991). The measurement of attitudes toward and beliefs about obese persons. International Journal of Eating Disorders, 10, 599-607.

Part III: Attitude Towards Obese Persons (ATOP) scale

Attitudes Toward Obese Persons Scale

Please mark each statement below in the left margin, according to how much you agree or disagree with it. Please do not leave any blank. Use the numbers on the following scale to indicate your response. Be sure to place a minus or plus sign (-or +) beside the number that you choose to show whether you agree or disagree.

-3	**-2**	**-1**	**+1**	**+2**	**+3**
I strongly disagree	I moderately disagree	I slightly disagree	I slightly agree	I moderately agree	I strongly agree

1) _____Obese people are as happy as nonobese people.

2) _____Most obese people feel that they are not as good as other people.

3) _____Most obese people are more self-conscious than other people.

4) _____Obese workers cannot be as successful as other workers.

5) _____Most nonobese people would not want to marry anyone who is obese.

6) _____Severely obese people are usually untidy.

7) _____Obese people are usually sociable.

8) _____Most obese people are not dissatisfied with themselves.

9) _____Obese people are just as self-confident as other people.

10)_____Most people feel uncomfortable when they associate with obese people.

11)_____Obese people are often less aggressive than nonobese people.

12)_____Most obese people have different personalities than nonobese people.

13)_____Very few obese people are ashamed of their weight.

14)_____Most obese people resent normal weight people.

15)_____Obese people are more emotional than nonobese people.

16)_____Obese people should not expect to lead normal lives.

17)_____Obese people are just as healthy as nonobese people.

18)_____Obese people are just as sexually attractive as nonobese people.

19)_____Obese people tend to have family problems.

20)_____One of the worst things that could happen to a person would be for him to become obese.

Part IV: Obesity Risk Knowledge (ORK) Scale

Item	Correct Answer
1. A person with a 'beer-belly' shaped stomach has an increased risk of getting diabetes.	True
2. Obesity increases the risk of getting bowel cancer.	True
3. An obese person who gets diabetes needs to lose at least 40% of their bodyweight for clear health benefits.	False
4. Obese people can expect to live as long as non-obese people.	False
5. Obesity increases the risk of getting breast cancer after the menopause.	True
6. Obesity is more of a risk to health for people from South Asia (e.g. India and Pakistan) than it is for white Europeans.	True
7. There is no major health benefit if an obese person who gets diabetes, loses weight.	False
8. Obesity does not increase the risk of developing high blood pressure.	False
9. It is better for a person's health to have fat around the hips and thighs than around the stomach and waist.	True
10. Obesity increases the risk of getting a food allergy.	False

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