ORIGINAL ARTICLE

Knowledge, Attitude and Practice Among Overweight Patients in General Medical Clinic, Hospital Queen Elizabeth

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ABSTRACT

Obesity is a complex and an epidemic disease distributed among all age groups. Knowledge, attitude and practice (KAP) studies are largely used to understand the disease burden in a certain population. Thus, the aim of this study is to evaluate KAP of overweight patients in an urban tertiary centre setting and test the validity of the questionnaire used to assess the KAP. This hospital-based cross-sectional study involves 113 overweight patients based on Asia Pacific Body Mass Index (BMI) scale aged 12 to 50 years old attending the general medical clinic in Hospital Queen Elizabeth, Sabah. Patients were chosen based on convenience sampling with a calculates sample size of 93. Sociodemographic details and BMI awareness were gathered after obtaining patient's consent. For the assessment of attitude and preparedness level of patient to lose weight, a modified Likert scale questionnaire was used. Sociodemographic data and the stage of readiness were analysed based on the mean distribution and standard deviation. Chi-square tests, Fisher exact tests and One-Way ANOVA tests were used to see the correlation between basic sociodemographic data namely age, gender, race, education level, and BMI with awareness. Subsequently, Chi-square test and One-Way ANOVA tests was used to assess the correlation of BMI classification, BMI awareness level and their preparedness to enrol to weight loss program based on stage of readiness. In addition, to find out the influence of BMI awareness level and BMI classification

on response to each question from the Likert scale questionnaire, analysis using Chi-square test was done. Finally, the reliability and validity of the questionnaire was tested from two statistical validity point of view with the first using predictive validity via multiple regression (Criterion Validity) and second calculating the Cronbach's alpha coefficient (reliability) as well as the convergent and discriminant validity (Construct Validity). Predominant involvement of female participants and obesity class 2 stage were observed overall. Only 53% of the obese class respondents were aware of their BMI with all the pre-obese class patients being unaware of their BMI signifying the poor awareness. Statistically, only BMI and gender has a significant correlation with awareness. (p<0.001, p=0.048) Majority of the patients were grouped under the stage of preparation and above but no significant association analysed towards BMI awareness level. (n:109, 96%) Notably, significant correlations were found between question 4 and BMI awareness level (F=4.485, p=0.036) as well as question 3 and BMI class (F=3.364, p=0.0038). The questionnaire used was deemed valid and reliable by confirming the internal consistency using Cronbach's alpha (α=0.69) and assessing the convergent and discriminative validity (0.3<r<0.7). All the questionnaire variables were statistically significant, marking the predictive validity of the questionnaire. F (5, 107) = 59.928, p < 0.001, R^2 = 0.737. This study identifies most of the patient in an urban setting belongs to obese class with poor awareness on their BMI scale despite majority of them being prepared to lose weight. Applying the validity of the questionnaire, this small-scale study concludes the need of awareness teaching to aid in obesity prevention.

INTRODUCTION

Obesity is a chronic and a complex disease with influence of varied factors ranging from genetics to nutrition to physical activity. Unfortunately, this debilitating disease has been on the rise at an alarming rate globally with 2.5 billion adults (18 years and older) being overweight with 890 million out of the former living in obesity (Global Burden of Disease Study, 2024). Focusing nationally, a review on Obesity in the Asia-Pacific Region in 2024 reveals that Malaysia was the leading ASEAN nation with greatest obesity extent (Lui et al., 2024). Focusing on the issue of overweight, which is a precursor to obesity, it has also been on the rise with Malaysia showing a prevalence of 50.1% in 2023 (Chong et al., 2023).

The definition of overweight and obesity is based on the body mass index (BMI). The measurement of a BMI is an indirect calculation of the nutritional status of a person which more often than not correlates with the accumulated total body fat (Mandal, 2023). Asia-Pacific BMI classification was initially introduced in 2000 by World Health Organization Western pacific Region after considering the health risk associated with obesity occurring at a lower BMI in Asian population (World Health Organization, 2000). It was then modified according to the individual Asian countries based on local data (WHO Expert Consultation, 2004). Even though the Asia-Pacific BMI's implication on the health and economy were vastly studied, the awareness on this is poorly investigated. It is crucial to understand the weightage that overweight and obesity carries as a local study done in University Putra Malaysia highlights the disease burden of overweight being 2728 person years and 2951 person years for obesity (Foo et al., 2018).

Focusing on Sabah a Borneo state, a study on obesity prevalence was done by National Health and Morbidity Survey (NHMS) back in 2023 with Sabah having the lowest rates of obesity (9.7%) (Institute for Public Health, 2024). However, study on awareness of obesity was not done extensively. Focusing on that, a recent study done in a rural area from Kudat, Sabah did assess awareness level as a part of their study in which there was a significant correlation between body

weight perception and actual body weight (p< 0.0005) (Yi et al., 2022). Self-awareness of body weight is a crucial assistant to maintain or lose weight, research in these areas is least explored (Park et al., 2019). KAP studies are a useful method to assess nutrient-related knowledge and targeting activities specifically designed to tackle nutrition related diseases. (Food and Agriculture Organization of UN, 2014). In view of limited available data on KAP studies in Sabah, this study was conducted evaluating the KAP of overweight patients attending tertiary clinic in an urban setting with the aim of initiating obesity clinic with multidisciplinary involvement. Likert scale questionnaire is a very useful and reliable tool used in assessing KAP (Koo et al., 2005). Thus, Likert scale questionnaire was used to assess the stage of readiness for weight loss programme. In order for a valid and reliable assessment, internal consistency, criterion validity and construct validity were assessed.

MATERIALS AND METHODS

Study Area, Study Population and Setting

This was a hospital based cross-sectional study carried out in Hospital Queen Elizabeth, a tertiary hospital in Kota Kinabalu. Data collection was started from mid-May till mid-August 2024. The study participants were males and females aged 50 years and below attending the clinic. Consent was taken from each participant prior to the start of the study. The inclusion criteria for this study were patients age 50 years old and below with lower age limit of 12 years old attending general medical clinic with body mass index (BMI) of 23 and above in accordance to classification of overweight from Asia pacific BMI scale reference. Stated are the reference based on the BMI scale used which are underweight (< 18.5kg/m2), normal (18.5 – 22.9kg/m2), overweight (23.0 – 24.9kg/m2) and obese (> 25kg/m2). Exclusion criteria are those patients who are bed bound or mobility restricted patients and patients with serious comorbid of ischemic heart disease or/and stroke and

patients who are mentally incapacitated. Participants were recruited using convenience sampling, with random selection applied among patients attending the General Medical Clinic who met the predefined inclusion criteria.

Questionnaire Design and Data Collection

A questionnaire was developed and used to interview patients on the awareness of obesity and readiness to lose weight. Originally, the questionnaire was primarily used in obesity clinic to test their readiness to lose weight. Awareness level was added to the questionnaire and assessed based on a Yes/No question on perceiving the difference of participants actual BMI compared to Asia Pacific Body Mass Index (BMI). The questionnaire exploring the stage of readiness for weight loss program was further modified based on the journal on 'The Transtheoretical Model of Health Behaviour Change' by Prochaska JO and Velicer WF. Permission was obtained for their usage in this study. A total of 5 questions were listed with each questions score varying from 1 (less likely) to 5 (most likely) was attributed. Question 1 'How ready are you to lose weight', Question 2 'How certain are you that you will stick with the program for the time it will take to lose the weight you want to', Question 3 'With all the stressors in your life, how possible will it be for you to stick to a healthier way of eating', Question 4 'How confident are you in your ability to decrease the amount of food you eat', Question 5 'Are you ready to add more physical activity to your routine (e.g more walking or more stair climbing)'. Cumulative score was then calculated and graded into stages of change. A total score of 5 and below was staged as precontemplation, score of 6-10 staged as contemplation, score of 11-15 staged as preparation, score of 16-20 staged as action level 1, and finally score 21-25 staged as maintenance. Patients in stages of action level 1 and maintenance were concluded to be ready for weight loss initiation program. Since the questionnaire was modified for the use of this study, the validity of the questionnaire was

investigated. The questionnaire also contains questions relevant to demography data and body mass index (BMI). Demographic data that were included namely age, gender, race, and education level. Another set of questionnaires translated in local Malay language was prepared and given to participants for better understanding.

For measurement of body mass index, manual weighing scale and a stadiometer were used. Zero error was checked. The participants were asked to remove shoes, outer jacket and objects from their pockets for precise weighing. The weighing was done thrice and the average was taken as the final reading. The height measurement was done twice with participants heads positioned parallel to the baseboard and the average was taken as the final reading.

Sample Size Calculation and Statistical Analysis

The sample size was calculated using methodology for determining survey sample size with a Likert scale primary outcome published by Park and Jung (Park & Jung, 2009). A calculated sample size of at least 93 participants were needed to detect a medium-sized correlation coefficient between a 5-point scale used for each Likert item (k=5) with 80% power and a significance level of 0.05. A correlation coefficient of 0.3 was taken for moderate effect size with a relative tolerable error of 10% and correlation of variation of population (C=0.3). The sample size was calculated using G*Power software.

A total of 113 questionnaires were collected. All data collection were done manually and subsequently keyed in a MS Excel spreadsheet and subsequently analysed using SPSS 27 (IBM Corp.). Descriptive analysis of mean and standard deviation was used for sociodemographic data. The primary statistic test used were Chi- square, Fisher Exact test and One-way ANOVA test to analyse the correlations. The values of $P < 0.05$ were considered significant.

Questionnaire Validity

A Likert-scale questionnaire validity requires 4 different types of validity namely face validity, content validity, construct validity and criterion validity. In our study, we intend to measure two of the statistically relevant validity of the questionnaire by calculating criterion validity (predictive value) and construct validity (Cronbach's alpha, convergent and discriminative validity). A multilinear regression was used to find out predictive validity of questionnaire used to assess readiness level. The model included all the 5 Likert-scale questions from the questionnaire as the independent variables in relevance to the stage of readiness for weight loss. The assumptions for multilinear regression were tested. Scatterplots were done to confirm the linear relationship between the dependent and independent variables. Normality was assessed using Q-Q plot which showed the data were normally distributed. Homoscedasticity was assessed through residual plots where the values were randomly scattered around zero. Finally, variance inflation factors (VIFs) were ranging at 1.1-1.6 and tolerance were ranging at 0.6-0.8 confirming no multicollinearity observed. The values of $P < 0.05$ were considered significant. Cronbach's alpha coefficient was calculated and interpreted to be acceptable internal consistency if the value was > 0.5. Convergent and discriminative validity was tested using Pearson Correlation Coefficients(r). Values of $0.3 < r < 0.7$ were accepted to be valid since the measures were continuous and normally distributed.

This study was approved by Medical Research and Ethics Committee, Ministry of Health, Malaysia (NMRR ID-: 24-01453-ZXU) IIR.

RESULTS

Sociodemographic Characteristics

A total of 113 participants were included, with a mean age of 37 years (SD = 9.06). Slightly more than half were female (52%),

and the majority were in early adulthood (31-50 years, 79%). Based on the Asia-Pacific BMI classification, nearly half (49%) were in obese class 2 (≥ 30 kg/m2). Most participants had at least secondary education (96%) and the most represented ethnic group was Bajau (21%) as the study site was conducted in Kota Kinabalu city (Table 1).

Table 1: Sociodemographic study.

Parameters	N (%)
Age (groupings) **Mean (SD) - 37 (9.06)**	
12-18 (teenagers)	4 (3)
19-30 (young adulthood)	20 (18)
31-50 (early adulthood)	89 (79)
Gender	
Male	54 (48)
Female	59 (52)
BMI classification **Mean (SD) – 30.6 (6.04)**	
Pre-obese	18 (16)
Obese Class 1	40 (35)
Obese Class 2	55 (49)
Education Level	
Primary	5 (4)
Secondary	30 (27)
Diploma	42 (37)
Degree & above	36 (32)
Race	
Malay	8 (7)
Chinese	21 (19)
Indian	1 (1)
Kadazan	23 (20)
Dusun	20 (18)
Bajau	24 (21)
Brunei	5 (4)
Bisaya	1 (1)
Murut	3 (3)
Suluk	2 (2)
Sino-kadazan	1 (1)
Sungai	2 (2)
Bugis	2 (2)

Awareness of BMI

The first part of the study is divided into sections exploring the awareness and attitude towards losing weight. Thus, the initial component to be investigated would be awareness. It would be measured based on patient's knowledge (yes/no) on noticing the difference between their actual BMI compared to the Asia- Pacific body mass index (BMI) scale. Table 2 shows the correlation between awareness and sociodemographic parameters. Patients in early adulthood with male participants were noticed to be slightly more aware of their BMI classification than female participants. Additionally, the highest number of patients in the obese class 2 were aware of their BMI. However, all of the pre-obese class patients were not aware of their BMI index. The only significant correlations with awareness level were noticed with BMI classification and gender with p value of <0.001 and 0.048 respectively (OR 2.194; 95% CI 1.00-4.81).

Readiness to Lose Weight

The second section of the research then focuses on the stage of readiness of the patients to lose weight. Based on the questionnaire involving 5 different scale-based questions assessing patient's willingness and commitment for weight loss, a stage of change was formulated from the cumulative score. Action Level 1 and maintenance stage were classified as ready for weight loss program. Based on that, at least 96% of patients were ready for weight loss program. Majority of the patients in obese class (59%) were grouped under action level 1. Finally, even though most of the patient who were aware on their BMI level and under obese class BMI, there were no significant association noticed on the readiness level (Table 3).

Questionnaire Analysis

Each question from the questionnaire were focused to get a better outlook on their scoring on the readiness. The first question questions patients on their readiness on weight loss. The second question discusses on the certainty of patients to continue the weight loss program for time required. Third question tests patient's confidence in staying with the weight loss program with the stressors in their life. Fourth question tests on possibility of patients to reduce food intake. Final questions

discuss on willingness of patients to add physical activity on top of weight reduction. Question 3 showed a significant association with BMI classification, with the obese class 2 participants demonstrating greater confidence (F=3.364, p=0.0038) (Table 4). Question 4 was significantly associated with BMI awareness, with participants who were aware reporting greater readiness (F=4.485, p=0.036).

Questionnaire Validity and Reliability

The reliability of the stage of readiness for weight loss program Likert scale questionnaire was tested via the internal consistency using Cronbach's alpha. The Cronbach's alpha for the five-item scale was 0.69, suggesting good internal consistency within the items of the scale (N=113). No items were deleted during the analysis, and the scale is considered reliable

Table 2: BMI awareness.

Parameters	Yes N (%)	No N (%)	*P*-value	OR	95% CI
Age (groupings)					
12-18 (teenagers)	1 (1)	3 (3)	0.251[a]	0.288	0.006-11.7
19-30 (young adulthood)	14 (12)	6 (5)			
31-50 (early adulthood)	56 (50)	33 (29)			
Gender					
Male	39 (35)	15 (13)	0.048[a]	2.194	1.00-4.81
Female	32 (28)	27 (24)			
BMI classification					
Pre-obese	0 (0)	18 (16)	< 0.001[a]		
Obese Class 1	23 (11)	17 (15)			
Obese Class 2	48 (42)	7 (6)			
Education Level					
Primary	3 (2)	2 (2)	1.000[a]	0.868	0.125-6.138
Secondary	19 (17)	11 (10)			
Diploma	26 (23)	16 (14)			
Degree & above	23 (20)	13 (12)			
Race					
Malay	7 (6)	1 (1)	0.247[a]		
Chinese	10 (9)	11 (10)			
Indian	1 (1)	0 (0)			
Kadazan	17 (15)	6 (5)			
Dusun	12 (11)	8 (7)			
Bajau	17 (15)	7 (6)			
Brunei	2 (2)	3 (3)			
Bisaya	0 (0)	1 (1)			
Murut	1 (1)	2 (2)			
Suluk	2 (2)	0 (0)			
Sino-kadazan	0 (0)	1 (1)			
Sungai	1 (1)	1 (1)			
Bugis	1 (1)	1 (1)			

[a] Chi-square test/Fisher Exact Test- value p acceptance of null hypothesis p<0.05, OR: Odds Ration, CI: Confidence Interval

Table 3: Readiness to lose weight.

Parameters	Preparation	Action Level 1	Maintenance	P-value	OR	95% CI
BMI classification						
Preobese	2 (2)	13 (12)	3 (3)	0.182[a]	2.407	0.591-7.411
Obese Class 1	2 (2)	27 (24)	11 (10)			
Obese Class 2	0 (0)	40 (35)	15 (13)			
Awareness Yes No	 1 (1) 3 (3)	 49 (43) 31 (27)	 21 (19) 8 (7)	0.157[a]	0.61	0.25-1.48

[a] Chi-square test/Fisher Exact Test- value p acceptance of null hypothesis $p < 0.05$, OR: Odds Ration, CI: Confidence Interval

Table 4: Questionnaire analysis

QUESTION 1 – How Ready Are You to Lose Weight?

Parameters	N(μ)	df1,df2	F	*P*-value
Awareness Yes No	 71 (4.15) 42 (4.02)	1, 111	1.469	0.228a
BMI classification				
Preobese	18 (3.94)	2, 110	1.067	0.348a
Obese Class 1	40 (4.18)			
Obese Class 2	55 (4.11)			

[a] Chi-square test/Fisher Exact Test - value p acceptance of null hypothesis $p < 0.05$

QUESTION 2 – How Certain Are You That You Will Stick with The Program for The Time It Will Take to Lose the Weight You Want To?

Parameters	N(μ)	df1,df2	F	*P*-value
Awareness Yes No	 71 (3.85) 42 (3.74)	1, 111	0.896	0.346a
BMI classification				
Preobese	18 (3.83)	2, 110	1.647	0.197a
Obese Class 1	40 (3.68)			
Obese Class 2	55 (3.89)			

[a] Chi-square test/Fisher Exact Test - value p acceptance of null hypothesis $p < 0.05$

QUESTION 3 – With All the Stressors in Your Life, How Possible Will It Be for You to Stick to a Healthier Way of Eating?

Parameters	N(μ)	df1,df2	F	*P*-value
Awareness Yes No	 71 (3.63) 42 (3.55)	1, 111	0.357	0.551a
BMI classification				
Preobese	18 (3.39)	2, 110	3.364	0.038a
Obese Class 1	40 (3.45)			
Obese Class 2	55 (3.78)			

[a] Chi-square test/Fisher Exact Test - value p acceptance of null hypothesis $p < 0.05$

QUESTION 4 – How Confident Are You in Your Ability to Decrease the Amount of Food You Eat?

Parameters	N(μ)	df1,df2	F	*P*-value
Awareness Yes No	71 (3.89) 42 (3.62)	1, 111	4.485	0.036[a]
BMI classification				
Preobese	18 (3.72)	2, 110	0.152	0.859[a]
Obese Class 1	40 (3.78)			
Obese Class 2	55 (3.82)			

[a] Chi-square test/Fisher Exact Test - value p acceptance of null hypothesis p<0.05

QUESTION 5 – Are You Ready to Add More Physical Activity to Your Routine?

Parameters	N(μ)	df1,df2	F	*P*-value
Awareness Yes No	71 (3.93) 42 (3.88)	1, 111	0.161	0.689a
BMI classification				
Preobese	18 (3.89)	0.161	0.036	0.965a
Obese Class 1	40 (3.90)	0.689a		
Obese Class 2	55 (3.93)			

[a] Chi-square test/Fisher Exact Test - value p acceptance of null hypothesis p<0.05

for its intended use. The significant value of the Cronbach's alpha was based on a study conducted by Taber (2017), after comparing 69 references which categorizes each value to the reliability scale.

The validity of the questionnaire was assessed through calculating criterion validity (predictive value) and construct validity (Convergent and Discriminative validity). We inferred that this questionnaire had moderate validity as each item in the questionnaire had values between 0.3 and 0.7 using Pearson Correlation Coefficient ($0.3<r<0.7$). The threshold was taken as such based on a research paper conducted by Yusoff et al (2021) reviewing multiple references to formulate the needed value to be deemed acceptable. It was concluded that a value of 0.3 and below are not acceptable and the higher the value rises the better the correlation is.

A multiple regression was done to assess the predictive validity from the five scale questions listed with all the assumptions validated. These variables show statistically significantly predicted readiness level from all five questions, $F_{(5, 107)} = 59.928$, $p < 0.001$, $R^2 = 0.737$. Among them, question 3 contributing the most to predicting readiness ($t = 6.973$, $p < 0.001$) (Table 5).

DISCUSSION

Obesity is a global disease as the number of people affected by it is enormous with Asian countries leading the battle against it. In recent research done by WHO in 2024, both overweight and obesity shown a marked increase in the past four decades (World Health Organization, 2024). In Malaysia per se the last nationwide survey on obesity prevalence was done back in 2023 with a sample size of 9782 adults aged 18 and above. The results from the study shows that female, aged 30-59 years old, Malay race, married, adequate health literacy was significantly associated with overweight (Chong et al, 2023). In Sabah, the last obesity prevalence study was done in a rural community by Tan and team back in May 2022 showing a prevalence rate of 71.5% which is surprising. However, this study was focused in a rural community of Northern Borneo (Yi et al., 2022). Keeping that in mind, this study was

Table 5: Multiple regression on readiness

R	R square	F	df1	df2	Sig.
0.858	0.737	59.928	5	107	< 0.001

Coefficients

	Standardized Coefficient	t	Sig.
	Beta		
(Constant)		-6.089	< 0.001
Question 1	0.177	3.222	0.002
Question 2	0.198	3.742	< 0.001
Question 3	0.389	6.973	< 0.001
Question 4	0.286	4.515	< 0.001
Question 5	0.201	3.225	0.002

instead conducted to assess the knowledge on awareness of Asian Pacific body mass index (BMI) scale among the urban population in the state of Sabah. We also test their attitude by assessing their readiness to lose weight.

A total of 113 overweight patients participated in this research. Overall, the study shows female predominance of obesity rate which coincides with the world obesity statistics in 2022 and the local Malaysian statistics done in 2019 (World Obesity Federation, 2024; Institute for Public Health, 2019). Age group distribution form world statistics also matches with this study with patients in early adulthood (31-50 years) being affected the most but the distribution of age in world statistic is seen above 18 years old in general (World Obesity Federation, 2024). Comparing this to the local Sabah study, the age distribution was also noted to be between 35 and 50 years old (Yi et al., 2022). A conclusion can be made with distribution of age being fairly similar in urban and rural setting. Most of the patients in this study were grouped in obese class 2. This is an alarming situation, as Sabah in general was known to be one of the least obese populated states in Malaysia (NHMS, 2023). Besides, the general consensus based on National Health Screening Initiative 2023 54.4% Malaysians are overweight (32.6%) or obese (21.8%) (Institute for Public Health, 2024). The discrepancy on obesity preponderance could be due to the small sample size and the focus on overweight patients and not the general public. Sabah

being a multiethnic state, it has close to 42 different ethnic group dispersed along the state. However ethnic distribution in each district was not widely studied. In our study, Bajau and Kadazan ethnic forms the main bulk of ethnicity. In addition to that, since the study was conducted in Kota Kinabalu city, the literacy rate is relatively high compared to the other districts with majority of the patients having at least secondary level education. This is in comparable with the study done by Tan and team in a rural area where tertiary level education is about 25% compared to more than 50% in our study (Yi et al., 2022).

The introduction to Asia Pacific BMI index scale was done on February 2000 by World Health Organization Western Pacific Region (World Health Organization, 2000). Since the introduction, awareness study has not been widely conducted. In our study, we used the Asia Pacific BMI index as it is well studied and streamlined to understand patients' awareness. The result shows a significant inference between BMI and awareness. Point to note is that all the pre-obese patients are unaware of their BMI scale but at least half of obese patients are aware. This hovers towards lack in early exposure on overweight as this being the precursor for obesity. More awareness study is required to imply the importance of acknowledging pre-obesity class. One study that explains the impacts of pre-obesity, titled body mass index and all-cause mortality. In this study after analysing

a total of 10625411 participants, it was found that patients with BMI 20.0-25.0 kg/m2 had a minimal all-cause mortality while those who are out of this target BMI have a statistically increased risk (HR: 1.00, CI 0.98-1.02) (Global BMI Mortality Collaboration, 2016). The risk of all-cause mortality increases exponentially with the increase in the BMI as evidenced by their hazard's ratio, thus highlighting the importance of early identification and intervention. Interestingly male patients were more aware of their BMI compared to their female counterparts (72% vs 54%) despite having lower literacy rate. A number of studies done previously, reveals that females were more aware and perceptive of their BMI compared to males (Zapka et al, 2009, Jeinie et al, 2021). The awareness difference found compared to our study could possibly be due to more male obese class participants (80%) compared to females (90%), thus they perceived better. Besides, since males tend to accrue more visceral fat, leading to android body shape which is more visible compared to females (Palmer et al, 2015). this could also have influenced the outcome of our study. However, no studies were found implying the significance of this correlation thus concluding this as an incidental finding.

Moving on to stage of readiness level to lose weight, the general outlook was positive with most patients were in at least the stage of action level. The stage of readiness to lose weight varied across different regions across the world. An example, a study conducted in Boston, USA where 61% of the participants were at advanced stage of readiness to lose weight (Wee et al., 2005). However, there was a different finding on a survey conducted in Iran where majority of the patients were in the precontemplation stage of weight loss readiness (Ghannadiasl et al., 2014). The difference in the finding could be due to many factors mainly the study design. The striking difference was noted in the study location since the research group from USA did their study in a primary care clinic while the Iran

researchers conducted theirs in a nutrition clinic. Looking back at our study, since it was done in an urban tertiary hospital clinic, participants were patients who came to seek help. Thus, this could be the primary factor for the former mentioned result. Moving on, even though multiple factors were studied on their influence on stage of readiness, the distinct parameter to focus would be awareness. Since most of the patients in the study were aware of their BMI but it reflects moderately on their readiness level as a large portion of the patients were in action level. In addition, there was no significant correlation seen between awareness and BMI. This is in contrast to a study done in a clinic setting which shows patients perceiving weight as a health risk were more likely to be at advanced stages of readiness to lose weight (AOR 5.6; CI 2.5-12.5) (Wee et al, 2005). Again the difference in the study design and location could have influenced the result.

Questionnaire designed for this study was tailored to the basic understanding of the patient on the preparedness level. Question 4 focuses on the confidence level on decreasing food intake amount and it was the only item that had a significant correlation with awareness. The inclusion of food portion in assessing nutrition awareness is limited. However, one of study conducted by Wee et al (2005) included food portion reduction. Since it was an observational study, the conclusion derived was that obese patients in action stage were more inclined to reduce food portion compared to normal BMI patients. This can be inferred as patient who are aware of their weight are willing to reduce their food intake thus implying the same in our study. Nevertheless, the possibility of the other questions having no significant correlation with BMI awareness could be due to the subjective mannerism of the questions compared to an objective measure in question 4 in terms of food quantification. Following that, it was also noted that participants in Obese class 2 were more confident in sticking to a healthier diet despite stressors. Even though

the reporting was positive, the applicability in real world still remains a question. Based on a study conducted on obese participants on the limiting factors for adherence to weight loss intervention, absence of prescribed diet and boredom of dieting were two main factors identified (Trujillo-Garrido et al, 2022). This was observed in patients who had enrolled themselves in the weight loss program. Since our study focuses on patient's readiness to enrol in weight loss program, these limiting factors should be taken into account during the endorsement of a weight loss programme locally.

The Likert scale questionnaire validity was assessed primarily based on the construct validity and criterion validity as stated in the methods and results. Based on the book Weighing the Options: Criteria for Evaluating Weight-Management Program, a Likert scale stage of readiness for weight loss questionnaire can be validated using both construct and criterion validity (Institute of Medicine Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity, 1995). However, the inability to assess the correlation between this study and a gold standard study may not reflect the actual reflection of the validity weightage. Besides, the study was done in a small scale which again might not fully reflect the weightage of the validity. Nevertheless, all the five questions were still statistically significant in terms of predictive correlation with the third question which assesses patient's confidence in staying in the weight loss programme stand out most. This proved the predictive validity of the questionnaire which predicts the accuracy of future weight loss outcomes or engagement in a weight loss program.

This is the first study to be conducted in an urban tertiary centre in Sabah exploring the BMI awareness and weight loss readiness among overweight and obese patients in a clinic setting using a validated and reliable questionnaire. This study would be a stepping stone for an obesity clinic set up in Hospital Queen Elizabeth. As vast evidence gathered on the transtheoretical model in effective weight loss across Borneo, more detailed research on them has to be conducted in Sabah (Cheah et al, 2019, Chang, 2007). The study has several limitations. The relatively small sample size, selected through convenience sampling, restricts the generalizability on the findings to the wider population. Besides, the sociodemographic differences between urban and district of Sabah limit the applicability of the results to the broader Sabah population. In addition to that, involvement of a single centre being general medical clinic of Hospital Queen Elizabeth may not fully reflect the diversity of patients in Kota Kinabalu. Furthermore, data on readiness to lose weight were self-reported, which may be subject to social desirability or recall bias. Despite these limitations, the findings offer valuable insights and a foundation for future research and intervention development. Further studies with larger sample sizes and multicentre designs are recommended to validate these findings and better inform targeted public health strategies across Sabah and Malaysia.

CONCLUSION

This study is the first to explore BMI awareness and weight loss among overweight patients in an urban tertiary setting in Sabah. Most patients being in obese class had poor awareness of their BMI. Nevertheless, most of them were prepared to lose the weight as evidence by the state of readiness. These findings underscore the urgent need for structured obesity intervention programs with a focus on early education and personalized support. Thus, an obesity clinic focusing on weight loss programme is justified to be set up across Sabah.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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