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Knowledge and attitudes towards obesity among pharmacy students at a Malaysian public university: A cross-sectional study

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ABSTRACT

Pharmacists play a key role in obesity management through pharmacotherapy optimisation and patient education. As future healthcare providers, pharmacy students must develop positive professional attitudes towards individuals with obesity, as stigma can compromise patient engagement and treatment outcomes. This study evaluated attitudes towards obesity among pharmacy students in Malaysia, alongside their obesity-related knowledge. A cross-sectional survey was conducted among 286 undergraduate pharmacy students at a Malaysian public university using a structured, self-administered questionnaire assessing attitudes (13 items across anti-fat bias, counselling propensity, and self-efficacy) and knowledge (15 items). Descriptive statistics, independent *t*-tests, one-way ANOVA with Tukey's post hoc analysis, and Pearson's correlation were applied. The mean attitude score was 43.6 ± 5.1 (maximum = 65). Most students demonstrated neutral attitudes (81.5%), with 14.3% negative and 4.2% positive. Stigmatising beliefs were common, with 61.2% agreeing that people with obesity are lazy and 88.5% attributing healthy eating behaviour solely to personal choice. The mean knowledge score was 9.4 ± 2.7 (maximum = 15), with 24.8% classified as good, 39.9% moderate, and 35.3% poor. Knowledge was not correlated with attitude ($r = 0.057$, $p = 0.338$). Older students and those in later academic years had significantly higher knowledge scores, while gender, grades, race, and religion showed no differences. Pharmacy students demonstrated predominantly neutral attitudes, with stigma persisting despite moderate knowledge. Pharmacy curriculum needs to emphasize the multifactorial aetiology of obesity—spanning genetic, neuroendocrine, socioeconomic, and environmental determinants—alongside dedicated weight-bias training to dismantle stigmatising beliefs and prepare graduates for equitable, patient-centred care.

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1. INTRODUCTION

Obesity is a complex, multifactorial chronic disease characterised by excessive accumulation of adipose tissue that significantly increases the risk of morbidity and mortality. Globally, the prevalence of obesity has increased by 155% since 1990, with an estimated 2.21 billion adults classified as overweight or obese, a figure projected to encompass more than half of the world's adult population by 2050 (Ng et al., 2025). This escalating trend constitutes a critical public health crisis, as obesity is a modifiable risk factor for multiple non-communicable diseases—including type 2 diabetes, cardiovascular disease, and certain cancers—thereby compounding global disease burden and driving substantial healthcare expenditure and economic losses (Ng et al., 2025).

Management of obesity requires a multi-disciplinary approach integrating lifestyle modification, pharmacological therapies, psychological and behavioural interventions, and, when indicated, bariatric surgery, with treatment individualised according to patient-specific factors (Clements et al., 2021; Ministry of Health Malaysia, 2023; Tham et al., 2023; Wharton et al., 2020). Lifestyle modification remains the cornerstone of therapy. Clinical practice guidelines recommend a balanced, calorie-restricted diet in conjunction with a minimum of 150 minutes of moderate-intensity physical activity per week (Ministry of Health Malaysia, 2023; Tham et al., 2023). Pharmacotherapy such as orlistat, liraglutide, semaglutide, phentermine, and naltrexone-bupropion is indicated for individuals with a BMI $\geq$30 kg/m² or $\geq$27 kg/m² in the presence of obesity-related comorbidities (Tham et al., 2023; Wharton et al., 2020). Optimal outcomes are achieved through collaborative patient-centred care involving physicians, pharmacists, dietitians, and other healthcare professionals.

Pharmacists are uniquely positioned within this care continuum, leveraging their expertise in pharmacotherapy and accessibility. Pharmacists contribute to obesity management by conducting comprehensive anthropometric assessments, optimising pharmacological and non-pharmacological interventions, monitoring comorbid conditions, preventing medication-related weight gain, and providing patient education (Clements et al., 2021). A systematic review demonstrates that pharmacist-led interventions in weight management can achieve clinically significant weight loss (Alhomoud et al., 2024). Moreover, pharmacists frequently counsel patients on nutrition and lifestyle, underscoring their potential to contribute substantially to obesity management beyond pharmacotherapy (Alhomoud et al., 2024; Clements et al., 2021).

However, healthcare providers' negative attitudes towards people with obesity and inadequate obesity-related knowledge remain barriers to effective care (Phelan et al., 2015; Supsongserm et al., 2023). Meanwhile, negative attitudes undermine the quality of patient-centred care and may deter patients from engaging with healthcare services (Phelan et al., 2015). Within pharmacy practice specifically, implicit and explicit weight bias exist, compromising the delivery of respectful and non-judgmental weight management service (Murphy & Gardner, 2016). Furthermore, weight bias and stigma can harbour mistrust of healthcare providers and poor adherence to weight management (Phelan et al., 2015). Inadequate knowledge and the absence of structured, locally relevant training guidelines were identified as barriers to providing obesity care (Supsongserm et al., 2023; Verma et al., 2021).

Previous studies across healthcare disciplines demonstrate knowledge deficits and negative attitudes among healthcare students. A study involving 84 pharmacy students in the United States showed an average level of fat phobia and a mainly neutral attitude towards people with obesity (Clements & Akins, 2021). Among medical students, attitudes were slightly more positive (Ip et al., 2013). In Norway, final-

year medical students (n = 226) achieved a mean obesity knowledge score of 60%, reflecting significant gaps in understanding of treatment, etiology, and diagnosis (Martins & Norsett-Carr, 2017).

The lack of obesity-related knowledge and stigma towards individuals with obesity may be attributed to a lack of obesity core competencies in the curriculum (Phillips et al., 2023). A review of the PharmD curricula in the United States highlighted substantial gaps in obesity-related competencies, with weight stigma and discrimination receiving the least attention (Phillips et al., 2023). Addressing this deficiency requires an integrated approach that ensures pharmacy graduates possess both the factual knowledge to deliver evidence-based interventions and the professional attitudes necessary to provide stigma-free, patient-centred care. To date, however, no published study in Malaysia has evaluated pharmacy students' clinical knowledge and professional attitudes related to obesity. Additionally, existing studies assessed general knowledge and personal attitudes towards obesity, lacking clinical perspectives. This study aimed to assess obesity-related knowledge and attitudes towards individuals with obesity among undergraduate pharmacy students and examine their associations with sociodemographic factors.

2. MATERIAL & METHODOLOGY

2.1 Study design

A descriptive, cross-sectional study was conducted among a convenience sample of undergraduate pharmacy students at a public university in Malaysia. Data were collected via a validated, self-administered online questionnaire. The questionnaire was administered between February 4 and April 28, 2025. This research project was approved by the Research Ethics Committee of Universiti Teknologi MARA (UiTM) REC (PH)/UG/181/2024 (MR). Informed consent was secured from all participants before data collection.

2.2 Study population

The target population consisted of undergraduate pharmacy students from all academic years at Universiti Teknologi MARA (UiTM). Inclusion criteria were students aged 18 years or older, currently enrolled in an undergraduate pharmacy program at UiTM, and able to read and understand English. Students who did not meet these criteria or submitted incomplete responses were excluded from the study.

The required sample size was determined using the Raosoft Sample Size Calculator (Raosoft, Inc, 2004) with a 95% confidence level, a 5% margin of error, and an assumed 50% response distribution. Based on an estimated total population of 796 students, as reported by the academic program coordinator, the minimum required sample size was calculated to be 260. To account for potential non-response or incomplete data, an additional 10% was added, yielding a final target sample size of 286 participants.

2.3 Study instrument

A structured, self-administered questionnaire was developed based on previously published instruments assessing healthcare students' and healthcare professionals' obesity-related knowledge, and attitudes towards obesity (Ip et al., 2013; Martins & Norsett-Carr, 2017; Moyo & Felix, 2024; Sebiany, 2013; Wynn et al., 2018) and a local clinical practice guideline on the management of obesity (Ministry of Health Malaysia, 2023) to ensure contextual relevance. Permission to use the respective questionnaires was obtained from the original authors prior to data collection.

The questionnaire consisted of three sections. The first section is about the sociodemographic profile (8 items). The second section evaluated obesity-related knowledge (15 items), and the third section assessed attitudes towards obesity (13 items). Sociodemographic variables included gender, age, body weight, height, year of study, CGPA, race, and religion. The knowledge section assessed evidence-based understanding of diagnostic criteria, etiology, pharmacological management, non-pharmacological therapy, health complications, and treatment outcomes and goals of obesity. The attitude items pertain to anti-fat attitude, self-efficacy, and propensity to provide counseling to individuals with obesity.

The knowledge items used categorical responses (True/False), except for 2 items that utilised a multiple-choice format. One mark is assigned for a correct answer and zero for a wrong answer, with a maximum of 15 marks. For the multiple-choice format, one mark was allocated only if all correct options were identified. The attitude items used a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) with a maximum score of 65. Reverse scoring was used for negative-coded items.

Content validity and clarity of the items were evaluated by five clinical pharmacy lecturers using a four-point Likert-type scale (1 = not relevant to 4 = highly relevant). The content validity index (CVI) was calculated as the proportion of reviewers assigning a score of 3 or 4 to each item. Only items with a CVI score of 1 were retained. Of the 43 items evaluated, 15 were omitted, and 28 items were retained. Items were revised based on experts' comments to improve clarity. Both knowledge and attitude scores were converted to percentages and classified using Bloom's cut-off points: high/positive (≥80%), moderate/neutral (60–79%), and low/negative (≤59%) (Bloom, 1968). A pilot test was conducted with 10 pharmacy students to assess comprehensibility. Minor revisions were made based on their feedback. Data from the pilot test were excluded from the analysis.

2.4 Data collection

Study participants were enrolled through convenience sampling techniques. Data collection utilised web-based questionnaires distributed electronically through institutional email systems and WhatsApp messaging platforms via Google Forms. The survey instrument included preliminary sections describing research purposes, participant selection criteria, and consent procedures. Engagement in the study was completely voluntary without any financial or material incentives provided. A qualifying question at the survey beginning filtered responses to include only eligible participants. Prior to survey commencement, participants reviewed study details and provided electronic consent acknowledgment.

Data protection and quality assurance protocols were implemented during the collection phase. Google Form configurations restricted individual participants to single submissions to prevent response duplication. Participants remained anonymous throughout the survey and no sensitive or personally identifiable information, such as student names, student identification numbers, or other unique identifiers, was collected. Response data was automatically stored in protected Google Sheets with access limited to the primary researcher and designated team members. Subsequently, data were transferred to Microsoft Excel for cleaning and validation procedures under stringent privacy safeguards.

2.5 Data analysis

Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means with standard deviations. Comparisons of knowledge and attitude scores across

sociodemographic subgroups were conducted using independent-samples t tests and one-way ANOVA, with Tukey's post hoc procedure applied to identify pairwise differences where overall significance was observed. The relationship between knowledge and attitude scores was examined using Pearson's correlation analysis. A p-value of <0.05 was considered as statistically significant for all analysis.

3. RESULTS

3.1 Sociodemographic characteristics

Table 1 presents the sociodemographic characteristics of the participants. A total of 286 undergraduate pharmacy students participated. The majority were female (83.6%), Malay (92.7%), Muslim (96.2%), and aged between 21-23 years (55.9%). Most respondents had a normal BMI (47.9%) or were overweight (23.1%), while 16.8% were underweight and 12.2% obese. Academic year distribution was balanced across cohorts (24.5-26.2%). Regarding academic performance, 60.8% reported a cumulative grade point average (CGPA) of 3.00–3.49, whereas only 9.4% achieved ≥3.50.

Table 1. Sociodemographic characteristics (n=286) and differences in knowledge and attitude towards obesity by sociodemographic characteristics

		Knowledge score*		Attitude score*	
Variable	**n (%)**	**Mean ± SD**	**p value**	**Mean ± SD**	**p value**
Age			0.002‡		0.035‡
18-20	65 (22.7)	8.94 ± 2.67[a]		42.32 ± 5.26	
21-23	160 (55.9)	9.13 ± 2.70[a]		43.76 ± 4.75	
24-26	61 (21.3)	10.41 ± 2.42[b]		44.62 ± 5.60	
Gender			0.241†		0.874†
Male	47 (16.4)	8.94 ± 3.17		43.51 ± 5.52	
Female	239 (83.6)	9.44 ± 2.58		43.64 ± 5.03	
BMI			< 0.001‡		0.324‡
Underweight	48 (16.8)	8.25 ± 3.00[a]		42.40 ± 4.74	
Normal	137 (47.9)	9.15 ± 2.79[ac]		43.82 ± 5.08	
Overweight	66 (23.1)	10.23 ± 2.02[b]		44.06 ± 6.03	
Obese	35 (12.2)	10.03 ± 2.32[bc]		43.66 ± 3.40	
Year			< 0.001‡		0.240‡
Year 1	71 (24.8)	8.93 ± 2.62[a]		42.90 ± 5.29	
Year 2	75 (26.2)	8.77 ± 2.57[a]		43.69 ± 4.99	
Year 3	70 (24.5)	8.96 ± 2.73[a]		43.30 ± 5.13	
Year 4	70 (24.5)	10.81 ± 2.34[b]		44.59 ± 4.94	
CGPA			0.322‡		0.072‡
2.00 - 2.99	85 (29.7)	8.99 ± 2.68		42.73 ± 5.09	
3.00 - 3.49	174 (60.8)	9.51 ± 2.52		44.17 ± 5.12	
3.50 - 4.00	27 (9.4)	9.52 ± 3.61		42.85 ± 4.66	
Race			0.769†		0.214†
Malay	265 (92.7)	9.37 ± 2.70		43.51 ± 5.18	
Sabah/ Sarawak	21 (7.3)	9.19 ± 2.54		44.95 ± 3.81	
Religion			0.902†		0.943†
Islam	275 (96.2)	9.35 ± 2.69		43.61 ± 5.15	
Christian	11 (3.8)	9.45 ± 2.70		43.73 ± 3.66	

*Maximum scores for the knowledge and attitude sections were 15 and 65, respectively. SD denotes standard deviation. †Independent t-test. ‡One-way analysis of variance (ANOVA) with Tukey post hoc analysis. Different superscript letters within the same column indicate statistically significant differences between groups at p-value < 0.05.

3.2 Knowledge and attitude towards obesity

Most students had either moderate (39.9%) or poor (35.3%) knowledge, with only 24.8% having good knowledge. The overall mean knowledge score was 9.4 ± 2.7 (out of 15). Table 2 presents the item-level response distribution for each knowledge item, illustrating the proportion of students who answered correctly and incorrectly. Most participants were aware of the need for psychological and behavioral therapy integration (93.4%), obesity screening frequency (86.7%), minimum duration of physical activity (89.5%) and caloric restriction (78%) recommendations, genetic factors in obesity development (82.2%), Asian-specific BMI thresholds (76.9%), and weight loss benefits for blood pressure (71%). Conversely, knowledge deficits were most evident in the domains of pharmacotherapy and recognition of obesity-related health risk, with only 7.0% correctly identifying anti-obesity drugs approved in Malaysia and 12.2% correctly recognizing the the health conditions for which obesity is a risk factor.

Table 2. Knowledge of obesity

		Response, n (%)	
Item		**Correct**	**Incorrect**
1.	Psychological (e.g., counselling) and behavioural (e.g., diet or exercise) therapy should be integrated with the treatment of obesity.	267 (93.4%)	19 (6.6%)
2.	Obesity screening should be done yearly using body mass index (BMI) measurements.	248 (86.7%)	38 (13.3%)
3.	A minimum of 150 minutes/week of moderate-intensity physical activity is recommended in people with obesity.	256 (89.5%)	30 (10.5%)
4.	Genetic factors play a role in the development of obesity.	235 (82.2%)	51 (17.8%)
5.	Reducing daily calorie intake by 500–750 kcal from the usual amount is recommended for people with obesity.	223 (78.0%)	63 (22.0%)
6.	Obesity is defined in Asian adults as BMI ≥27.5 kg/m² (CPG 2023).	220 (76.9%)	66 (23.1%)
7.	Anti-obesity treatment should only be used in addition to lifestyle intervention.	216 (75.5%)	70 (24.5%)
8.	A weight loss of 5% to 10% is associated with improvement in blood pressure.	203 (71.0%)	83 (29.0%)
9.	People with obesity can have a life expectancy similar to those without obesity.	190 (66.4%)	96 (33.6%)
10.	The target weight loss is around 5 to 15% of baseline body weight.	157 (54.9%)	129 (45.1%)
11.	In Asian adults, excess abdominal fat is defined as waist circumference: ≥90cm for men, and ≥80 cm for women.	147 (51.4%)	139 (48.6%)
12.	Pharmacotherapy for obesity is indicated for BMI ≥30 without comorbidities or ≥27 with comorbidities.	137 (47.9%)	149 (52.1%)
13.	Abdominal fat is a better parameter than total body fat alone.	123 (43%)	163 (57%)
14.	Obesity is a risk factor for (tick all that apply): ☐ Type 2 Diabetes Mellitus ☐ Dyslipidemia ☐ Obstructive Sleep Apnoea (OSA) ☐ Osteoarthritis ☐ Some cancers	35 (12.2%)	251 (87.8%)
15.	Anti-obesity drugs approved in Malaysia are: (tick all that apply): ☐ Orlistat ☐ High-dose liraglutide ☐ Sibutramine ☐ Semaglutide ☐ Phentermine	20 (7.0%)	266 (93.0%)

Table 3 summarises the attitude score for each item. The majority of students demonstrated neutral attitudes (81.5%), whereas 14.3% expressed negative attitudes and only 4.2% positive attitudes. The overall mean attitude score was 43.6 ± 5.1 (out of 65). Within the anti-fat attitudes and bias domain, 88.5% endorsed the stereotypical belief that adopting a healthy diet is solely a matter of choice, and 61.2% agreed that people with obesity are lazy about exercise. Conversely, most respondents rejected stigmatizing beliefs, with 63.6% affirming that nutritional counselling can influence behavioural change and 69.6% considering advice to patients with obesity worthwhile. Favourably, in the self-efficacy domain, 74.1% believed weight loss could be maintained, 67.8% anticipated adherence to weight management programs, and 64.0% regarded patients as motivated to change their lifestyle. Additionally, 64.7% anticipated comfort in having weight-related discussion. Correlation analysis revealed no significant linear association between knowledge and attitude scores ($r = 0.057$, $p = 0.338$) (Table 4).

Table 3. Attitude towards obesity (n=286)

Items		Response, n (%)		
		Disagree/ Strongly disagree	**Neutral**	**Agree/ Strongly agree**
Domain anti-fat attitudes/bias				
1.	There is no excuse for a person to be overweight/obese	47 (16.4)	98 (34.3)	141 (49.3)
2.	People can eat a healthy diet if they choose to do so.	12 (4.2)	21 (7.3)	253 (88.5)
3.	Counseling about nutrition does not change behaviour	182 (63.6)	47 (16.4)	57 (19.9)
4.	People with obesity tend to be lazy about exercise	31 (10.8)	80 (28)	175 (61.2)
5.	The person and not the weight is the focus of weight management counselling.	35 (12.2)	119 (41.6)	132 (46.2)
Domain 2: Self-efficacy				
6.	People with obesity are likely to follow an agreed upon plan to increase their exercise.	41 (14.3)	119 (41.6)	126 (44.1)
7.	I believe people with obesity can maintain weight loss.	19 (6.6)	55 (19.2)	212 (74.1)
8.	I think people with obesity are motivated to change their lifestyle	21 (7.3)	82 (28.7)	183 (64.0)
9.	In the future (when I become a pharmacist), I believe that people with obesity will follow through with a weight management program.	13 (4.5)	79 (27.6)	194 (67.8)
Domain 3: Propensity to provide counseling to individuals with obesity				
10.	In the future (when I become a pharmacist), I think I will feel a bit disgusted when advising people who is obese.	227 (79.3)	27 (9.4)	32 (11.2)
11.	In the future (when I become a pharmacist), I think I will feel awkward discussing weight with people with obesity.	185 (64.7)	53 (18.5)	48 (16.7)
12.	In the future (when I become a pharmacist), even if I advise them, people with obesity will continue their poor exercise habits.	124 (43.4)	102 (35.7)	60 (20.9)
13.	I think advising people with obesity is not worth the time	199 (69.6)	50 (17.5)	37 (12.9)

Table 4. Correlation between knowledge and attitude

Variables	Correlation coefficient	p-value
Knowledge – Attitude	0.057	0.338

Correlation is significant at the 0.01 level (2-tailed). Correlation interpretation: 0.00–0.10 = negligible, 0.10–0.39 = weak, 0.40–0.69 = moderate, 0.70–0.89 = strong, 0.90–1.00 = very strong

3.3 Sociodemographic differences in knowledge and attitude

The sociodemographic differences in knowledge and attitude are also presented in Table 1. Students aged 24-26 years had significantly higher knowledge and better attitudes compared to younger cohorts (10.41±2.42 and 44.62 ± 5.60 for knowledge and attitude scores, respectively). Students with overweight BMI and obesity (10.23±2.02, 10.03±2.32) had significantly higher knowledge than underweight students ($p<0.001$). Academic year revealed marked knowledge differences, with Year 4 students demonstrating superior performance (10.81±2.34, $p<0.001$) compared to Years 1 to 3 (8.93±2.62, 8.77±2.57, 8.96±2.73, respectively). Gender, CGPA, race, and religious affiliation demonstrated no significant knowledge or attitude score differences.

4. DISCUSSION

The present study evaluated the knowledge and attitude towards obesity across multiple domains among pharmacy students in Malaysia. Fewer than one-third demonstrated good knowledge of obesity, with knowledge gaps most evident in pharmacotherapy and health complications of obesity. Although overtly negative attitudes were identified in only 14.3% of respondents, the predominance of neutral responses indicates attitudinal ambivalence and a lack of confidence in addressing obesity within professional practice.

The moderate knowledge scores observed in this study are consistent with prior studies reporting inadequate obesity-related knowledge among healthcare students. A cross-sectional study in Norway involving 226 medical students found an overall mean score of only 60% on an 18-item obesity knowledge test, with substantial knowledge gaps in etiology, diagnosis, and treatment domains (Martins & Norsett-Carr, 2017). Comparable findings were observed in the United States, where 26 medical students achieved a moderate obesity knowledge level with a mean score of 45.7 out of 75 (61%) (Olson et al., 2024). This suggests that inadequate coverage of obesity is not limited to pharmacy programs but reflects a broader challenge across healthcare education. While the Obesity Medicine Education Collaborative in the United States has outlined comprehensive core competencies for obesity education (Kushner et al., 2019), no equivalent guideline currently exists in Malaysia. This absence highlights the need for a structured, contextually tailored framework to facilitate the systematic integration of obesity-related content into the Malaysian pharmacy curriculum.

Individual item analysis revealed substantial knowledge gaps in anti-obesity pharmacotherapy options and obesity-related health complications. Limited awareness of the approved anti-obesity medications and obesity-associated health complications likely reflects insufficient coverage of these topics in the current curriculum. For pharmacy students, such knowledge deficit may affect their readiness to manage obesity. As future pharmacists, they are expected to be able to counsel patients on the appropriate use, potential side effects of anti-obesity medications, and adherence to anti-obesity medications (Phillips et al., 2023). Therefore, strengthening undergraduate pharmacy education in pharmacological treatment of obesity, and obesity-related complications may better prepare future pharmacists to contribute to the safe, effective, and integrated management of individuals living with obesity. Furthermore, a good understanding of obesity-related health complications is essential for recognising the clinical consequences of obesity and appreciating the influence of comorbidities on treatment selection and management. Strengthening these areas within the undergraduate pharmacy curriculum may better prepare future pharmacists to support the safe and appropriate pharmacological management of obesity.

Having a positive professional attitude that is stigma-free is imperative to ensuring equitable quality of care for all patients. The majority of students demonstrated neutral attitudes (81.5%), indicating ambivalence or uncertainty about the potential bias in weight management. This finding is consistent with a study involving 84 pharmacy students in the United States, which similarly reported predominantly neutral attitudes (Clements & Akins, 2021), but contrasts with findings from a study of medical students that demonstrated overall positive attitudes towards individuals with obesity (Ip et al., 2013). The observed disparity may be attributable to methodological differences, including variations in the attitude instruments employed and the scoring calculations applied, which limit direct comparison across studies. The neutral stands held by the majority might be influenced by social desirability bias, with students attempting to conform to expectations. Neutrality towards obesity can be detrimental, as it reflects an undecided stance that risks disengagement from proactive and quality patient care.

Despite this overall neutrality, stigmatizing beliefs persisted within certain domains. More than half of the students agreed that people with obesity are lazy about exercise, and that adopting a healthy diet is solely a matter of choice. Such reductionist views disregard the complex interplay of socioeconomic, environmental, and structural barriers that limit opportunities for regular exercise and access to nutritious foods (Guerra et al., 2021). Stigma has been shown as a barrier to care among people with obesity (Phelan et al., 2015). Weight stigma can adversely affect the quality of healthcare by impairing patient–provider communication and undermining patient-centred care (Bannuru, 2025). Healthcare professionals who hold weight-stigmatising attitudes have been reported to spend less time with patients with obesity and may attribute symptoms predominantly to body weight, potentially resulting in inadequate diagnostic assessment and limited consideration of alternative causes (Phelan et al., 2015). Such practices may compromise shared decision-making regarding treatment options and contribute to patients feeling judged or disrespected. Consequently, patients may delay or avoid seeking healthcare, potentially hindering timely diagnosis and appropriate management (Bannuru, 2025; Phelan et al., 2015).

Unsurprisingly, older and more senior students demonstrated significantly higher knowledge scores compared with their younger counterparts. This finding likely reflects cumulative learning and increased curricular exposure, and more patient-facing training as they advance through successive academic years. However, knowledge was not correlated with attitude, implying that greater factual understanding does not necessarily translate into reduced stigma. This result is consistent with that of Wynn et al. (2018), who found no correlation between obesity stigma and knowledge of obesity among 436 medical students and healthcare professionals. Consequently, it is essential that weight bias and professionalism be addressed as explicit competencies within the curriculum, rather than assumed outcomes of clinical knowledge alone.

To the best of our knowledge, this is the first study to investigate both knowledge and attitudes towards obesity in a clinically focused manner among pharmacy students. Although previous studies have explored these domains among healthcare students (Clements & Akins, 2021; Khairul Azhan et al., 2024), they employed instruments that assessed general knowledge or personal perceptions rather than clinical-level knowledge and bias from the perspective of future healthcare providers. In contrast, the present study evaluated clinically relevant knowledge domains and assessed attitudes within the context of patient care, thereby generating insights directly applicable to professional practice. Assessing attitudes from a clinical perspective provides more nuanced data, as students may hold dual positions—distinguishing between personal perceptions and their professional responsibilities. This distinction is illustrated by a study of medical students demonstrated mildly positive professional attitudes towards obesity care, contrasting with prior reports of negative views, with the authors suggesting that the clinical focus of the assessment

instrument—and students' commitment to providing quality care—may override personal bias (Ip et al., 2013). By situating obesity within a healthcare provider framework, this study offers a practice-oriented evaluation of both knowledge and stigma, highlighting the critical competency gaps that must be addressed to ensure effective and respectful obesity management.

This study has several limitations that should be acknowledged. The single-centre study limits extrapolation of the results to other pharmacy students nationwide. Participants may have social desirability bias for the attitude items, potentially underestimating the prevalence of negative attitudes. As the questionnaire was administered online, it was not possible to control or verify whether participants consulted external references or other sources when answering the knowledge questions. This may have influenced their responses and potentially affected the accuracy of the knowledge scores as a measure of their actual knowledge. Future research should consider involving multiple institutions and students from other healthcare disciplines. Longitudinal designs can be conducted to evaluate the change of knowledge and attitude over time.

5. CONCLUSION

This study assessed obesity-related knowledge, attitudes towards individuals with obesity, and their associations with sociodemographic factors among undergraduate pharmacy students at a Malaysian public university. Overall, only one-fifth of students had good knowledge of obesity. The most pronounced knowledge gaps were observed in anti-obesity pharmacotherapy and obesity-related health complications. Attitudes were predominantly neutral, although stigmatising beliefs persisted. Knowledge scores were significantly higher among older students, and students who were overweight or obese, while older students also demonstrated more favourable attitudes. No significant correlation was observed between knowledge and attitude scores. These findings support strengthening undergraduate pharmacy education through greater emphasis on clinically relevant obesity knowledge and explicit education addressing weight bias, to better prepare future pharmacists for evidence-based and non-stigmatising obesity care.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

NAM: Investigation, formal analysis, data curation, writing – original draft; project administration, visualisation. **NANNMS:** Conceptualisation, methodology, formal analysis, investigation, writing – original draft, writing – review and editing, project administration, supervision.

DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation of this work, the authors used ChatGPT (OpenAI) solely for language refinement and improvement of manuscript readability. The authors reviewed and edited all generated content.

ETHICS STATEMENT

This research project was approved by the Research Ethics Committee of Universiti Teknologi MARA (UiTM) REC (PH)/UG/181/2024 (MR). Participation in the survey was voluntary, and informed consent was obtained from all participants prior to data collection.

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