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Assessment of Awareness Toward Glucagon-Like Peptide-1 Anti-Diabetic Medication in Madinah City, Saudi Arabia: A Cross-Sectional Study

Marwa M. Zalat[1,2] 🆔, Hanan G Alahmadi[3*], Malak A. Aljuhani[4], Taif N. Alahmadi[5]

[1]Department of Family, Community Medicine and Medical Education, Taibah University
[2]Department of Community, Occupational and Environmental Medicine, Zagazig University, Egypt
[3]Department of Family Medicine, Prince Mohammed Bin Abdulaziz Hospital, Ministry National Guard - Health Affairs, Almadinah Almunawwarah, KSA, MBBS, Faculty of Medicine, Taibah University, Saudi Arabia
[4]Department of Family Medicine, Prince Mohammed Bin Abdulaziz Hospital, Ministry National Guard - Health Affairs, Almadinah Almunawwarah, KSA, MBBS, Faculty of Medicine, Taibah University, Saudi Arabia
[5]MBBS, Faculty of Medicine, Taibah University, Saudi Arabia

*Corresponding author:** Marwa M. Zalat
Department of Family, Community Medicine and Medical Education, Taibah University

Abstract

Background: Glucagon-like peptide-1 (GLP-1) receptor agonists have emerged as an effective treatment for type 2 diabetes, offering glycemic control and additional health benefits, including weight loss. Despite their increasing clinical importance, public awareness regarding these medications and their potential risks and benefits remains unclear, particularly in Madinah, Saudi Arabia. This study aimed to assess awareness levels toward GLP-1 anti-diabetic medications among adults in Madinah. *Methods:* A cross-sectional study was conducted in Madinah City, Saudi Arabia using a semi-structured survey that included knowledge about obesity and GLP-1 medications, and perceptions regarding their use, efficacy, and safety. Participants were categorized based on their awareness levels (poor, moderate, or high). Statistical analysis was performed to examine the association between participants' characteristics and awareness levels, with significance determined at p < 0.05. *Results:* This study included 260 participants, with nearly half holding a bachelor's degree (n=129, 49.6%). Approximately a quarter had prior knowledge of obesity medications (n=64, 24.6%), with the internet being the most common source. Most respondents (75.4%) believed that not everyone could use anti-obesity medications, and 66.5% recognized that a specific BMI is required for their use, with 28.1% selecting body mass index (BMI) ≥ 30 as the threshold. A majority (74.6%) acknowledged that these medications work through multiple mechanisms, and 84.2% believed they could reduce 3–8 kg annually. Side effects were widely recognized (82.7%), with 73.1% associating them with pancreatitis and 61.9% with thyroid tumors. Additionally, 73.5% considered these medications ineffective without diet and exercise. When asked about personal use if recommended by a doctor, responses varied, with 23.5% willing, 23.1% unwilling, and 53.5% uncertainty. Awareness levels were not significantly associated with education (P=0.552), though those with a bachelor's degree showed the highest awareness. Prior knowledge of obesity medications showed a borderline association with awareness levels (P=0.061). *Conclusion:* Awareness regarding GLP-1 anti-diabetic medications in Madinah is moderate, with knowledge gaps concerning their safety and appropriate usage. Targeted educational initiatives are needed to improve public understanding and ensure informed decision-making, particularly addressing misconceptions about risks and benefits. This is crucial for optimizing therapeutic outcomes and minimizing potential misuse.

Keywords: Glucagon-like peptide-1 (GLP-1)**, Awareness**, Anti-diabetic medications**, Madinah, Saudi Arabia**, Cross-sectional study.

INTRODUCTION

Pharmacological treatments for type 2 diabetes and, on occasion, obesity include glucagon-like peptide-1 (GLP-1) agonists, incretin mimetics, GLP-1 analogs, and GLP-1 receptor agonists. The following drugs are part of this category: exenatide, lixisenatide, liraglutide, albiglutide, dulaglutide, and semaglutide [1]. Food and Drug Administration (FDA) has authorized semaglutide and liraglutide as potential treatments for people who are

overweight or obese [2]. The off-label use of tirzepatide to treat obesity has also been documented [3].

Lixisenatide and liraglutide are given twice daily, whereas exenatide, dulaglutide, albiglutide, and semaglutide are administered once weekly. There is now an authorized oral version of semaglutide that may be taken daily. It has shown clinical effectiveness that is like the injectable form, which is administered once weekly [4]. The small intestine secretes the incretin peptide hormone GLP-1 after food is digested. Several organs, including the gastrointestinal tract, pancreas, and brain, have GLP-1 receptors (GLP-1Rs), which they use to communicate among each other [5].

To increase insulin production and decrease glucagon release, GLP-1 receptor agonists work by mimicking the effects of the endogenous GLP-1 hormone at GLP-1 receptors in the pancreas, and this effect is glucose dependent [6]. Fasting glycemic index, hemoglobin A1c, and postprandial glycemic index are all positively affected by GLP-1RAs, making them useful in the management of hyperglycemia in type 2 diabetics [1]. To mimic the effects of natural GLP-1 in the pancreas, GLP-1 lowers glycosylated hemoglobin (HbA1c) by 1.0-1.5% [7].

The effects of GLP-1 RAs extend beyond the regulation of blood sugar levels; these drugs inhibit gastric emptying by binding to specific GLP-1 receptors in the intestines and affect obesity-related variables in the brain. Reduced energy intake, improved fullness perception, and improved control overeating are some of the benefits of GLP-1 RA brain activity, which also reduces appetite, cravings, and overall body weight [8].

For overweight and obese people, independent of diabetes status, prior research has shown that GLP-1 receptor agonists cause statistically significant reductions in weight, BMI, and waist circumference. Because of this discovery, GLP-1 receptor agonists are being considered as possible weight-loss medications [7]. Weight reduction of 5% or more and 10% or more in overweight or obese people with or without type 2 diabetes has been shown to be a beneficial side effect of GLP-1 receptor agonists, according to further research [9].

The cardiovascular effects of this class of medications include a decrease in total cholesterol and systolic and diastolic blood pressure. In addition, it improves endothelial function, cardiac output, myocardial contractility, coronary blood flow, and left ventricular ejection fraction. In addition to lowering the incidence of cardiovascular events generally, they reduce infarction size [10, 11].

The GLP-1RA drug has a low risk of thyroid C-cell neoplasia, pancreatitis, and transit gastrointestinal side effects, according to the medicine's safety profile.

Furthermore, nursing mothers and pregnant women should not take the medication [12]. Although type 2 diabetes is common in Saudi Arabia, few people are aware that GLP-1 receptor agonists (RAs) are available. Efforts to raise awareness of these drugs and their benefits are continuous, but there are still obstacles to overcome in terms of ensuring that they are widely understood and used to manage diabetes and obesity [13]. Consequently, the purpose of this research was to determine how well people in Madinah City, Saudi Arabia, are aware of the uses, advantages, and risks of antidiabetic GLP-1 receptor agonists.

METHODS
Study design & setting
A cross-sectional study was conducted among the population of Al Madinah, Saudi Arabia, from June 1 to July 30, 2024. Data was collected using an online semi-structured questionnaire designed on Google form and distributed through various social media platforms to reach a broad and diverse sample.

Study participants:
All Al Madinah residents aged 18 years or more who consented to participate in the study were included in the study. While those who refused to consent, non-residents of Al Madinah, less than 18 years, and medical field workers were excluded from the study.

Sample size
The required sample size was calculated using the OpenEpi statistical software (https://www.openepi.com/SampleSize/SSCohort.htm). The calculation was based on a 95% confidence interval, 80% power, and an anticipated 50% level of knowledge about glucagon-like peptide-1 (GLP-1) medications. This yielded an estimated sample size of 384 participants.

Sampling Technique
Participants were recruited using a combination of convenience sampling and the snowball sampling method. Recruitment was facilitated through the dissemination of the electronic questionnaire link via various social media platforms (e.g. WhatApps, Facebook, Instagram) enabling widespread participation.

Data Collection Tools
Data was gathered using a semi-structured online questionnaire adapted from previous similar study to evaluate participants' awareness of GLP-1 anti-diabetic medications [14]. The questionnaire comprised three main sections: (1) Participants characteristics such as education, and prior knowledge about obesity medication (2) GLP-1 awareness assessment: this section included 10 items designed to measure participants' awareness of GLP-1 medications uses, mechanism of action, side effects, effectiveness, and potential complications (3) Participants were also asked about their willingness to use medication, and open-

ended questions were used to explore their reasons for refusing anti0obesity medications. A scoring system was employed to quantify participants' awareness levels; correct responses were assigned one point each and Incorrect responses received zero points with total score 13. Scores were classified into three categories; poor awareness: ≤8 points, moderate awareness: 9–10 points, and high awareness: ≥11 points. The pilot questions were tested on 10 participants and questionnaire validity was ensured by reviewing them with a panel of three experts with all suggested changes and modifications applied until the final version of the questionnaire was created.

Data Management

Data was entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. A normality test was performed to determine the distribution of quantitative variables. Descriptive analysis was done by describing frequency and percentage for study variables. Chi-square Test was used to assess associations between categorical variables. The level of statistical significance was set at $P < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Scientific Research Ethics Committee at Taibah University (ID: TU-24-240) prior to initiating the study. The purpose of the study was explained to all participants, and informed consent was obtained electronically. Participants' privacy and confidentiality were strictly maintained, with all data anonymized. The study adhered to the ethical principles outlined in the Declaration of Helsinki for medical research involving human subjects.

RESULTS

The data collection process yielded 381 participants, after exclusion of participants who were less than 18 years, residing outside Madinah and medical professionals, the study included 260 participants.

Table 1: Characteristics of study participants (n=260)

Characteristic		Frequency	Percent
Education	High school	50	19.2
	University student	51	19.6
	Bachelor's degree	129	49.6
	Graduate studies	11	4.2
	Others	19	7.3
Prior knowledge about obesity medication	Yes	64	24.6
	No	196	75.4
Others: Illiterate and Primary school			

Nearly half of participants had bachelor's degree (n= 129, 49.6%). Moreover, about a quarter of participants had prior knowledge about obesity medications (n= 64, 24.6%). Most frequent source of this knowledge was from the internet (Table 1).

Table 2: Participants awareness toward GLP-1 in Medina Region, Saudi Arabia (n=260)

Question	Response Options	Frequency	Percentage
Q1: Do you think anyone can use anti-obesity medications?	Yes	64	24.6
	No	196	75.4
Q2: Do you think specific BMI permits use of medications?	Yes	173	66.5
	No	87	33.5
Q3: BMI percentage indicating medication use	BMI ≥ 25	57	21.9
	BMI ≥ 30	73	28.1
	BMI ≥ 35	66	25.4
	BMI ≥ 40	64	24.6
Q4: How do medications work?	Reduce appetite	21	8.1
	Enhance satiety	16	6.2
	Decrease fat absorption	29	11.2
	More than one option	194	74.6
Q5: Can medications reduce 3–8 kg per year?	Yes	219	84.2
	No	41	15.8
Q6: Side effects of medications	Nausea, vomiting	45	17.3
	More than one option	215	82.7
Q7: Do medications increase the risk of pancreatitis?	Yes	190	73.1
	No	70	26.9
Q8: Do medications increase the risk of thyroid tumors?	Yes	161	61.9
	No	99	38.1

Q9: Are GLP-1 medications effective without diet/exercise?	Yes	69	26.5
	No	191	73.5
Q10: If recommended by a doctor, would you use medication?	Yes	61	23.5
	No	60	23.1
	Maybe	139	53.5

Table 2 presents participants' awareness of GLP-1 medications in Medina, Saudi Arabia. Most respondents (75.4%) believe not everyone can use anti-obesity medications, and 66.5% recognize that a specific BMI permits their use. Awareness of BMI thresholds for medication use varies, with the highest proportion (28.1%) selecting BMI ≥ 30. The majority (74.6%) understand that these medications work through multiple mechanisms, and 84.2% acknowledge their potential to reduce 3–8 kg annually. Most respondents (82.7%) recognize multiple side effects, with 73.1% associating GLP-1 with pancreatitis risk and 61.9% with thyroid tumors. Additionally, 73.5% believe these medications are ineffective without diet and exercise. When asked about personal use if recommended by a doctor, responses were divided, with 23.5% willing, 23.1% unwilling, and 53.5% uncertain.

Regarding reasons for not using medication, the majority (81.2%) provided valid responses, with common concerns including fear of side effects, lack of necessity due to personal weight perception, and preference for natural methods like diet and exercise. Some respondents expressed distrust in newly developed medications, concerns about long-term safety, and potential risks to the pancreas and thyroid. Others cited high costs, lack of sufficient information, and previous unsuccessful experiences with similar treatments. A few responses also indicated general skepticism about medical interventions for weight loss.
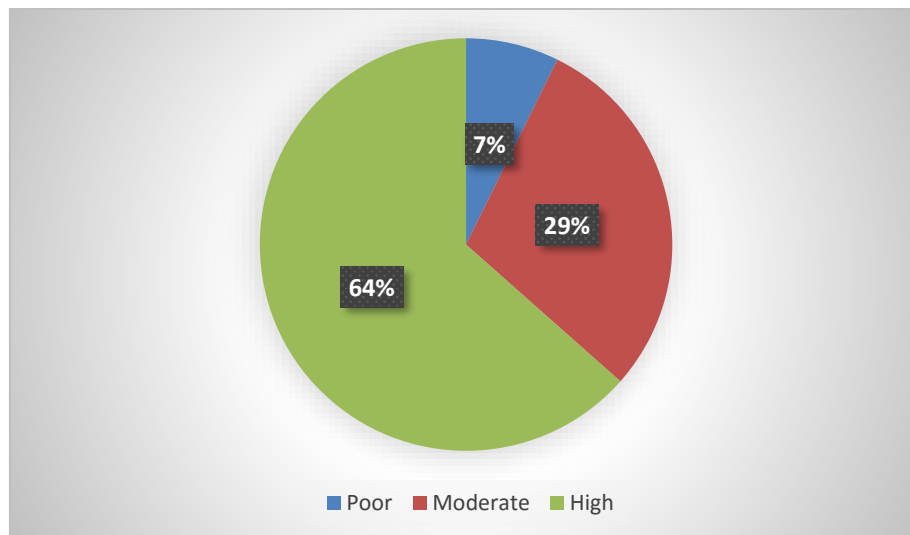

Figure 1: Overall awareness level among study participants

Figure 1 presents an overall awareness level among study participants. It is evident from the figure that most participants had a high awareness level (64%) while only 7% had a poor awareness level.

Table 3: Relationship between participants' characteristics and GLP-1 level of awareness

Characteristic		Level of awareness			P value
		Poor	Moderate	High	
Education	High school	6	13	31	0.552
	University student	3	14	34	
	Bachelor's degree	7	38	84	
	Graduate studies	0	5	6	
	Others	3	6	10	
Prior knowledge about obesity medication	Yes	3	26	35	0.061
	No	16	50	130	

Table 3 presents the relationship between participants' characteristics and their level of awareness regarding GLP-1 medications. Education level does not show a significant association with awareness (P = 0.552), though those with a bachelor's degree had the highest awareness. Similarly, prior knowledge about obesity medication shows a borderline association (P = 0.061), with individuals who had prior knowledge

exhibiting a slightly higher awareness compared to those without it.

DISCUSSION

This study explored public awareness and perceptions regarding GLP-1-anti-obesity medications among papulation of Madinah, Saudi Arabia. The findings reveal several important insights into the community's knowledge, attitudes, and concerns regarding these medications. Nearly half of the participants (49.6%) held a bachelor's degree, suggesting a generally well-educated sample. However, only 24.6% of respondents reported prior knowledge of obesity medications, indicating a gap between educational attainment and specific health literacy regarding pharmacological obesity management.

Despite limited prior knowledge, most respondents demonstrated a relatively high level of awareness about the indications and use of GLP-1 medications. Most participants correctly identified that these medications are not suitable for everyone and recognized BMI as a key factor in determining eligibility. A notable proportion correctly indicated BMI ≥30 as the threshold for considering pharmacologic intervention, which is consistent with clinical guidelines. In contrast to other study, I a gap was identified regarding the body mass index (BMI) that is eligible for these drugs [14].

Our study revealed that the internet was the most frequently reported source of information regarding GLP-1 medications among participants. This highlights the significant role of online platforms in shaping public understanding of medical treatments, and suggests a gap in structured, reliable educational resources regarding obesity pharmacotherapy. Consistent with previous study done in Jordan, research found that 51.4%of the participants learned about the use of antidiabetics for weight reduction via social media [15].

Knowledge of side effects was also considerable among participants, with most acknowledging potential risks such as pancreatitis and thyroid tumors. Additionally, the study revealed that a large portion of respondents did not believe that GLP-1 medications could be effective without diet and exercise, aligning with existing literature that underscores the role of lifestyle changes in managing diabetes. The most popular methods of weight loss when combined with medicine were dieting (87.5%, n = 42) and exercise (83.3%) [18]. Which is similar to a study that looked at the attitudes and behaviors of Saudi women on weight management [16].

Interestingly, despite this awareness, attitudes toward personal use of these medications were mixed. While 23.5% were willing to use GLP-1 medications if prescribed by a physician, a similar proportion (23.1%) were unwilling, and more than half (53.5%) expressed

uncertainty. This ambivalence may stem from common concerns identified in the study, including fear of side effects, a belief that medication was unnecessary due to personal weight perception, and a preference for natural approaches such as diet and exercise. Additional barriers included distrust in newly developed treatments, concerns about long-term safety, and financial limitations.

These findings are consistent with previous study reporting skepticism toward pharmacological solutions for obesity due to safety concerns [17]. Analysis of factors associated with awareness revealed no significant relationship with education level (P = 0.552), although participants with bachelor's degrees showed the highest levels of awareness. In another study found a significant association between higher educational level and better knowledge, attitudes, and practices [18]. Furthermore, study demonstrated that specific demographic factors—such as profession, educational background, and age—significantly influenced individuals' knowledge levels [12].

Prior knowledge of obesity medications had a borderline significant association with awareness levels (P = 0.061), suggesting that exposure to relevant information may influence awareness but is not the sole determinant. These results have important implications for public health and clinical practice. While general awareness is relatively strong, targeted educational initiatives are necessary to address misconceptions, build confidence in the safety and efficacy of GLP-1 medications, and support informed decision-making. Healthcare professionals play a crucial role in guiding patients through these choices and must be proactive in providing clear, evidence-based information.

CONCLUSION

In conclusion, the majority believed that anti-obesity medications are not suitable for everyone and should be restricted to individuals with specific BMI thresholds. Participants widely acknowledged the mechanisms of these medications, their potential to induce weight loss, and the associated risks, including pancreatitis and thyroid tumors. Interestingly, most respondents did not consider GLP-1 medications effective without diet and exercise, and only a quarter were willing to use the medications if prescribed. The level of awareness was higher among individuals with greater education and prior knowledge. These findings underscore the need for targeted education to improve understanding of obesity medications, emphasizing safety and efficacy.

Limitations

This study has several limitations that should be considered. Its cross-sectional design prevents the establishment of causal relationships, while the use of convenience and snowball sampling through social media may have introduced selection bias, limiting

generalizability. Self-reported data could lead to response bias, and the exclusion of medical professionals, though intentional, prevents comparisons with healthcare workers. Additionally, the final sample size (n=260) was slightly lower than the estimated requirement, potentially affecting statistical power. Despite expert validation, some participants may have misinterpreted questionnaire items, impacting response accuracy. Lastly, the study lacks longitudinal data to assess changes in awareness over time. Future research with larger, more representative samples and longitudinal designs is recommended to address these limitations.

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