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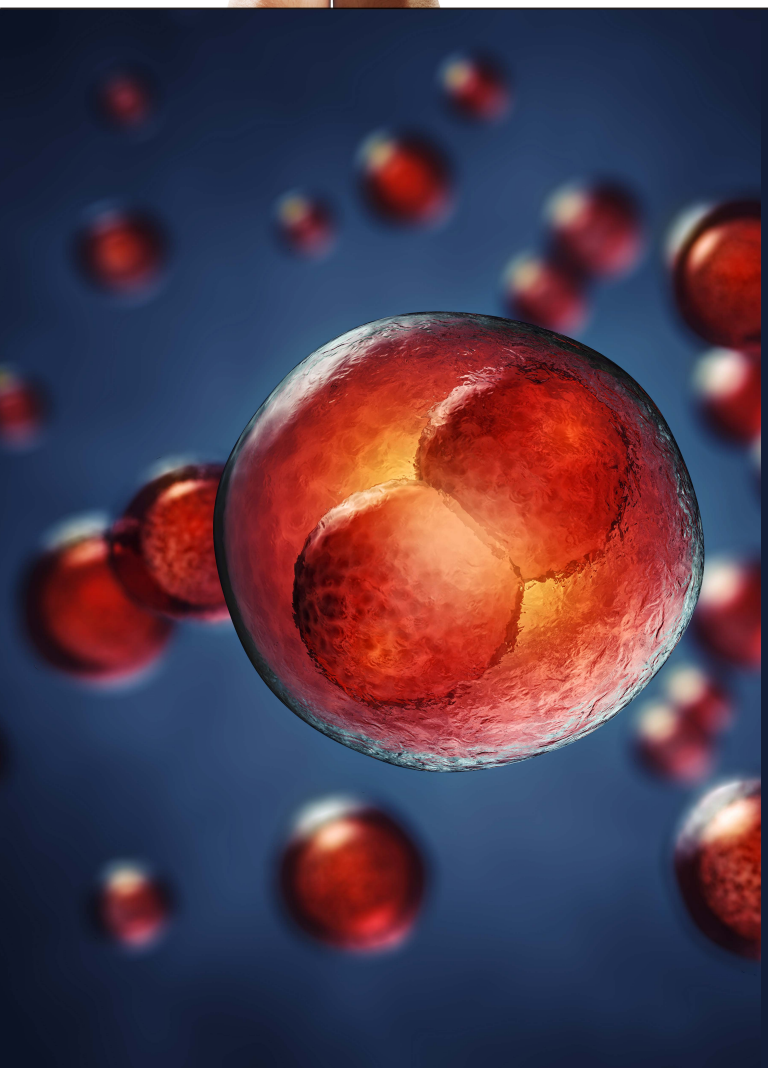

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A Study of Awareness Amongst Medical Students in Damascus Regarding the Efficacy and Safety of GLP-1 Receptor Agonists for Weight Loss in Non-Diabetic Individuals

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Abstract:
Background: The use of GLP-1 receptor agonists has increased markedly in recent years as an effective pharmacological option for weight loss in non-diabetic individuals. This has raised concerns regarding awareness of their efficacy and safety, particularly among medical students who will play a future role in clinical decision-making and patient guidance.
Methodology: This cross-sectional study was conducted on a sample of 300 medical students. Data were collected using a structured questionnaire covering demographic characteristics, body mass index, experience with GLP-1 receptor agonists, perceived efficacy, side effects, and awareness of safety and medical supervision requirements.
Results: The findings demonstrated widespread exposure to or experience with GLP-1 receptor agonists among students, with notable weight loss reported by most users. However, weight regain after discontinuation was common. All users reported side effects, predominantly gastrointestinal and mild to moderate in severity, yet the majority perceived these medications as safe and effective and were willing to recommend them.
Conclusion: The study highlights a high level of awareness and practical exposure to GLP-1 receptor agonists among medical students, alongside recognition of their benefits and limitations. These findings underscore the need for structured medical education regarding their appropriate use, strict medical supervision, and integration within a comprehensive lifestyle-based approach to achieve sustainable weight management outcomes.

Key Words:
GLP-1 Receptor Agonists; Weight Loss; Damascus: Pharmacotherapy for Obesity: Mounjaro

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Introduction

Obesity represents one of the most significant health challenges of the twenty-first century. Global statistics have demonstrated a continuous rise in its prevalence among both children and adults over recent decades, establishing it as a major risk factor for multiple chronic diseases, including type 2 diabetes, hypertension, cardiovascular diseases, and metabolic disorders. Beyond its health complications, obesity substantially impacts quality of life, affecting physical activity levels, mental health, and increasing the likelihood of social isolation.

Given this alarming increase, there is an urgent need for effective and safe weight-loss interventions that go beyond dietary modifications and physical activity, particularly for individuals with severe obesity or those who have not achieved satisfactory results with conventional approaches. Among these novel options, glucagon-like peptide-1 receptor agonists (GLP-1 Ras) have emerged as a promising therapy due to their ability to stimulate insulin secretion, inhibit glucagon release, slow gastric emptying, and enhance satiety.

Recent clinical studies have demonstrated the efficacy of these agents not only in patients with type 2 diabetes but also in non-diabetic individuals, showing significant weight reductions, sometimes up to 15% of baseline body weight over long-term follow-up. Furthermore, these medications are user-friendly, available as daily or weekly injections depending on the specific agent, which enhances adherence and improves outcomes.

With the increasing use of these drugs in the community, it has become essential to assess the awareness of medical students, as future healthcare providers, to ensure their ability to:

- Comprehend the precise pharmacological mechanisms of these agents.
- Recognize the correct dosing for diabetic and non-diabetic populations.
- Understand indications, contraindications, and potential side effects.
- Correct misconceptions regarding inappropriate or cosmetic use of these medications.

Accordingly, this study represents an important step in identifying knowledge gaps among students, promoting evidence-based clinical practice, and ensuring the safe and effective use of these agents in the future.

Statistical Analysis

Data from the paper-based questionnaires were entered into the statistical software SPSS version 25 for analysis and to obtain the results of this study. Descriptive analysis was performed for all variables included in the study, and the findings were presented as frequencies and percentages for categorical variables.

Results

Sample distribution by age and academic year:

The study sample consisted of 300 medical students. The largest proportion of students were aged 23–25 years, accounting for 42.1% (127 students), followed by those aged 20–22 years, comprising 41.4% (125 students). Students older than 25 years numbered 30 (9.9%), while those younger than 20 years were 18 (6%).

Regarding academic year, 84 students (27.8%) were in the sixth year, 57 students (18.9%) were in the fourth year, and 53 students (17.5%) each in the second and third years. Fifth-year students comprised 35 (11.6%), and first-year students 18 (6%).

Sample distribution by gender:

Male students accounted for 107 (35.4%), while female students were 193 (63.9%).

Sample distribution by body mass index (BMI):

Among the participants, 125 students (41.1%) were overweight (60% female, 40% male), 91 students (30.1%) had normal BMI (65% female, 35% male), and 84 students (27.8%) were classified as obese (70% female, 30% male).

Variable	Category	Frequency (n)	Percentage (%)
Age	<20years	18	6.0
	20-22 years	125	41.4
	23-25 years	127	42.1
	>25 years	30	9.9
Academic year	1st year	18	6.0
	2nd year	53	17.5
	3rd year	53	17.5
	4th year	57	18.9
	5th year	35	11.6
	6th year	84	27.8

Table 1: Sample distribution by age and academic year

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	107	35.4
	Female	193	63.9
BMI	Normal	91	30.1
	Overweight	125	41.1
	Obese	84	27.8

Table 2: Sample distribution by gender and BMI

BMI distribution by gender:
Normal: 65% female, 35% male
Overweight: 60% female, 40% male
Obese: 70% female, 30% male

Sample distribution by GLP-1 use for weight loss:
A total of 282 students (93.4%) reported having tried GLP-1 agonists or knowing someone who had, while 18 students (6%) had not.

Distribution by weight-loss medication used:
Eighty-six students (28.5%) used semaglutide, 112 students (37.1%) used liraglutide, and 84 students (27.8%) used tirzepatide.

Distribution by duration of medication use:
Seventy-one students (23.5%) used the medication for less than one month, 149 students (49.3%) for 1–3 months, and 62 students (20.5%) for more than three months.

Distribution by purpose of medication use:
The majority of students (274; 81.8%) aimed to lose excess weight, while 35 students (11.6%) sought to improve body shape.

Distribution by amount of weight lost:
Fifty-one students (16.9%) lost less than 2 kg, 88 students (29.1%) lost 2–5 kg, 94 students (31.1%) lost 6–10 kg, and 49 students (16.2%) lost more than 10 kg.

Distribution by weight regain after discontinuation:
Sixty-five students (21.5%) regained a significant amount of weight, 182 students (60.3%) regained a slight amount, and 35 students (11.6%) had not discontinued the medication.

Distribution by occurrence of side effects:
All participants (100%) reported experiencing side effects.

Distribution by specific side effects during treatment:
The most frequently reported side effects were nausea and vomiting (206 students; 73%), followed by loss of appetite (154 students; 54.6%), fatigue and dizziness (140 students; 49.6%), headache (133 students; 47.2%), diarrhea or constipation (137 students; 48.6%), abdominal pain (103 students; 36.5%), and psychological symptoms such as stress, anxiety, or mood changes (132 students; 46.8%). Urinary tract infections were reported by 36 students (12.8%), while hair loss and suicidal thoughts were not reported by any participants (0%).

Sample distribution by experience of using the medication under medical supervision:
A total of 224 students (74.2%) reported using the medication under medical supervision, while 58 students (19.2%) did not.

Sample distribution by students' perception of the safety and efficacy of the medication:
Two hundred and twelve students (70.2%) considered the medication safe and effective, whereas 88 students (29.1%) did not.

Sample distribution by students' willingness to recommend the medication to friends:
The same 212 students (70.2%) responded "yes," they would recommend it, while 88 students (29.1%) responded "no."

Variable	Category	Frequency (n)	Percentage (%)
GLP-1 use	Tried	282	93.4
	Never tried	18	6
Medication type	Semaglutide	86	28.5
	Liraglutide	112	37.1
	Tirzepatide	84	27.8
Duration of use	<1 month	71	23.5
	1-3 months	149	49.3
	>3 months	62	20.5
Purpose of use	Weight loss	274	81.8
	Body shape improve-ment	35	11.6

Table 2: Sample distribution by GLP-1 use, medication type, and duration

Variable	Category	Frequency (n)	Percentage (%)
Weight lost	<2 kg	51	16.9
	2-5 kg	88	29.1
	6-10 kg	94	31.1
	>10 kg	49	16.2
Weight re-gain after discontinuation	Significant	65	21.5
	Slight	182	60.3
	Still using drug	35	11.6
Occurrence of side effects	Yes	300	100
	No	0	0
Type of side effects	Nausea & vomiting	206	73
	Loss of appetite	154	54.6
	Fatigue & dizziness	140	49.6
	Headache	133	47.2
	Diarrhea / Constipation	137	48.6
	Abdominal pain	103	36.5
	Psychological (stress, anxiety, mood changes)	132	46.8
	Urinary tract infection	36	12.8
	Hair loss	0	0
	Suicidal thoughts	0	0

Table 4: Sample distribution by weight change and side effects

Variable	Category	Frequency (n)	Percentage (%)
Medical supervision	Yes	224	74.2
	No	58	19.2
Safety & efficacy perception	Safe / Effective	212	70.2
	Not Safe / Effective	88	29.1
Recommendation to friends	Yes	212	70.2
	No	88	29.1

Table 5: Sample distribution by medical supervision, perception, and recommendation

Sample distribution by benefit from dietary interventions alongside medication use:
One hundred and seven students (35.4%) reported significant benefit, 139 students (46%) reported limited benefit, 19 students (6.3%) reported no benefit, and 35 students (11.6%) had not followed any diet previously.

Sample distribution by benefit from physical activity alongside medication use:
One hundred and four students (34.4%) reported significant benefit, 141 students (46.7%) reported limited benefit, and 19 students (6.3%) reported no benefit.

Sample distribution by the most effective method for weight loss:
When asked about the most effective weight-loss approach, 129 students (42.7%) considered dietary intervention most effective, 54 students (17.9%) considered physical activity most effective, and 117 students (38.7%) considered GLP-1 receptor agonists the most effective.

Sample distribution by awareness of the necessity of prescribing medication under medical supervision:
A total of 262 students (86.8%) agreed that prescription under supervision is necessary, while 38 students (12.6%) disagreed.

Sample distribution by students' sources of information about GLP-1 receptor agonists and their usage patterns:
Survey results indicated that social media was the most common source of information for students (45.7%), followed by advice from friends (24.7%). Eighteen-point six percent (18.6%) of students cited consulting physicians as their source, and the least common source was dietitians (11.0%).

Sample distribution by the perceived necessity of teaching GLP-1 receptor agonists in medical curricula:
Two hundred eighty-one students (93%) considered it necessary to include these medications in the curriculum, while 19 students (6.3%) did not.

Variable	Category	Frequency (n)	Percentage (%)
Benefit from diet	Significant	107	35.4
	Limited	139	46
	None	19	6.3
	Did not follow diet	35	11.6
Benefit from exercise	Significant	104	34.4
	Limited	141	46.7
	None	19	6.3
Most effective weight-loss method	Diet	129	38.7
	Exercise	54	17.9
	GLP-1 medication	117	42.7

Table 6: Sample distribution by benefit from diet and exercise and the most effective weight-loss method

Variable	Category	Frequency (n)	Percentage (%)
Awareness of medical supervision necessity	Yes	262	86.8
	No	38	12.6
Source of information	Social media	137	45.7
	Friends	74	24.7
	Physicians	56	18.6
	Dietitian	33	11
Necessity of teaching in medical curricula	Yes	281	93
	No	19	6.3

Table 7: Awareness, sources of information, and perceived necessity of GLP-1 receptor agonists

Discussion

The results of our study indicated that the majority of the sample consisted of young medical students aged between 20 and 25 years, a group characterized by high health awareness and knowledge of medical updates, as well as increased concern for appearance and a healthy lifestyle. A clear predominance of female students was observed, which may partly explain the higher rate of weight-loss medication use, as previous studies suggest that females are more likely to seek medical and cosmetic interventions to control body weight and shape. The distribution across different academic years, with a predominance of students in clinical years, enhances the reliability of the results due to increased medical experience and clinical exposure during these stages.

Our findings revealed that a significant proportion of participants were overweight or obese, consistent with the global increase in obesity rates among young adults, including within medical circles. This may explain the high interest in GLP-1 receptor agonists, with over 90% of students reporting either personal experience or knowledge of someone using them. This widespread use indicates that these medications are no longer limited to traditional medical indications but have become part of the weight-loss culture among medical students, driven by reports of their rapid efficacy and noticeable effects on appetite and weight.

Regarding the type of medication, liraglutide and semaglutide were the most commonly used, followed by tirzepatide, aligning with their availability and the pre-existing knowledge of their clinically proven efficacy. The duration of use was generally short to moderate (less than three months), which may reflect limited tolerance due to side effects or discontinuation after achieving initial weight-loss goals, subsequently impacting weight regain results.
The study demonstrated the clear effectiveness of these medications in weight reduction, with most users losing between 2–10 kg, while fewer participants lost more than 10 kg. These findings are consistent with international literature on GLP-1 receptor agonist efficacy in non-diabetic individuals. However, a majority experienced partial or complete weight regain after discontinuation, underscoring that the positive effects of these medications heavily rely on continuity, and use without long-term lifestyle changes may lead to unsustainable outcomes.

In terms of safety, all users reported side effects of varying degrees, predominantly gastrointestinal symptoms such as nausea, vomiting, and loss of appetite, followed by fatigue, dizziness, headache, and bowel disturbances—effects known to result from these medications' mechanisms on gastric emptying and appetite regulation. A notable proportion also reported psychological symptoms, including anxiety and mood fluctuations, highlighting the need for awareness of potential psychological impacts, especially in young adults. Despite the prevalence of side effects, serious adverse events such as hair loss or suicidal thoughts were not observed, which may explain the overall student perception of these medications as safe and effective.

Most participants used these medications under medical supervision, reflecting a positive level of medical awareness. Nevertheless, the presence of unsupervised use raises concerns regarding potential misuse, particularly given the ease of access in some settings. In this context, the majority of students recognized the necessity of prescription and

inclusion of these medications in medical curricula, indicating increased awareness of their clinical importance and implications.

Interestingly, students' opinions regarding the most effective weight-loss method favoured dietary interventions over medications and exercise, despite broad experience with GLP-1 receptor agonists, indicating awareness that pharmacological treatment is an adjunct rather than a replacement for lifestyle modification. While adherence to diet and exercise yielded variable benefits, most students acknowledged limited effect, possibly explaining the recourse to pharmacological interventions for faster and more noticeable outcomes.

Overall, the study reflects a high level of awareness and practical experience regarding GLP-1 receptor agonists among medical students, with a good understanding of efficacy, side effects, and limitations. The wide use among non-diabetic individuals highlights the urgent need for clear usage guidelines, enhanced medical education on rational use, and emphasis on sustainable lifestyle modification as the foundation for weight management.

The demographic characteristics of our sample align with previous international studies examining GLP-1 receptor agonist use in young adults, showing that young females constitute the largest proportion of users for weight-loss purposes. High BMI emerged as a key motivator for GLP-1 use among non-diabetics, particularly when conventional interventions such as diet and exercise alone fail. The widespread use of these medications among medical students mirrors recent reports of off-label weight-loss use beyond traditional diabetic indications.

Regarding efficacy, most users achieved weight loss of 2–10 kg, while fewer lost more than 10 kg. These findings are consistent with the STEP-1 trial, which reported average weight reductions of 10–15% in non-diabetic patients treated with semaglutide, and the SCALE study for liraglutide, demonstrating similar efficacy with significant metabolic improvements. Tirzepatide, as shown in the SURMOUNT studies, achieved relatively higher weight loss, explaining the positive outcomes reported by some participants.

Nonetheless, our study clearly showed weight regain after discontinuation for most users, consistent with long-term follow-up studies indicating gradual weight regain if sustained lifestyle changes are not maintained. Wilding et al. emphasized that continuous treatment or combination with long-term behavioural modifications is essential to maintain achieved results.

Regarding safety, all participants reported side effects, predominantly gastrointestinal, consistent with global data indicating these are the most common adverse effects of GLP-1 receptor agonists. Reported fatigue, dizziness, and headache fell within ranges reported in major clinical trials, while psychological side effects were mild to moderate, aligning with the literature without a clear causal linkage. No serious adverse events such as suicidal ideation were observed, consistent with studies showing no statistically significant increase in these risks.

Most usage occurred under medical supervision, in line with global medical society recommendations emphasizing prescription and monitoring. However, unsupervised use highlights the risk of misuse, particularly in cosmetic applications among young adults. The high awareness among medical students regarding prescription necessity and curriculum inclusion aligns with global initiatives to enhance medical education on modern obesity treatments.
Finally, participants indicated dietary intervention remains the most effective weight-loss method from their perspective, despite the proven efficacy of GLP -1 medications, consistent with global guidelines recommending pharmacotherapy as an adjunct to lifestyle modification. These findings support a multi -faceted approach to obesity management, combining pharmacological, behavioral, and physical activity interventions to achieve sustainable outcomes.

Conclusions

This study aimed to assess the awareness of medical students regarding the efficacy and safety of GLP-1 receptor agonists for weight loss in non-diabetic individuals. The results showed that most participants were young, predominantly female, and a significant proportion were overweight or obese. There was widespread exposure to or direct knowledge of GLP-1 medications, with common use of liraglutide, semaglutide, and tirzepatide. The medications were effective in weight reduction, though most users experienced weight regain after discontinuation, indicating limited sustainability without lifestyle modification. Side effects were common, but generally mild to moderate, predominantly gastrointestinal, and students generally considered the medications safe and effective, showing willingness to recommend them. The study highlights high awareness of medical supervision necessity, prescription requirements, and curriculum inclusion, emphasizing GLP-1 agonists as supportive in obesity management, with education on rational use and lifestyle modification being essential for sustainable results.

Declarations

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Availability of data and materials

All data related to this paper's conclusion are available and stored by the authors. All data are available from the corresponding author at reasonable request.

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) at the Syrian Private University (SPU). All Participants confirmed their written consent by signing the consent form. Participation in the study was voluntary, and participants were assured that anyone who was not inclined to participate or decided to withdraw after giving consent would not be victimized. All information collected from this study was kept strictly confidential.

Consent for Publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

TH, and NT all participated in the preparation for this study. RO was responsible for data analysis, SA participated in the literature search and write-up, and NR participated in the study design and reviewed the final draft.

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