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Original Research

Assessment of Jordanian Pharmacists' Knowledge and Awareness of Liraglutide Injection and their Practice in Counseling Obesity Patients

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Abstract

Background: The purpose of this study was to examine how pharmacists in Jordan perceive and make use of antidiabetic drugs, particularly Glucagon-like peptide-1 receptor agonists (e.g., Saxenda®), for body weight loss. **Method:** A reliability-validated online survey was created and sent out to the pharmacist's community in Jordan to fill out and get knowledge about the use of Liraglutide injection. Social media was used to extend the survey to facilitate contact among pharmacists from multiple parts of the community. **Results:** A total of 395 pharmacists were involved in the study, with 70.9% being from the central area of Jordan. A considerable number of the participants (52.4%) had bachelor's degrees and were mostly female. Their average age was 29 ± 7.44 years. Our results showed that many pharmacists dispense 3 mg Liraglutide injection for weight loss and 93% of pharmacists saw a real improvement in the weight loss of patients using the drug. However, our study revealed that many pharmacists(62.3%) were agreed to dispense the drug over-the-counter without a medical prescription and unaware of the risks and side effects of injecting Liraglutide including vitamin D deficiency (21%), hypoglycemia (16%), fatigue (10%), pancreatitis (7%), and hyperthyroidism (5%). Furthermore, the study showed the importance of pharmacists' awareness in preventing and controlling the side effects of Liraglutide injection.

Keywords: GPL-1 receptor agonists; Saxenda®; Liraglutide injection 3 mg; Obesity; Pharmacists; Knowledge; perception; practice

INTRODUCTION

Obesity, defined as a body mass index (BMI) exceeding 30 kg/m², is correlated with an elevated susceptibility to chronic diseases such as hypertension and type II diabetes mellitus.[1] These conditions pose a significant threat to global health.[2,3] In Jordan, obesity has increased alarmingly, with obese individuals having a 2.7-fold increased risk of developing type 2 diabetes compared to those of normal weight.[2] To reduce the risk associated with obesity, patients in Jordan use body weight management techniques including, surgical procedures, dietary supplements, herbal remedies, and more recently applying novel injectable hypoglycemic medications like glucagon-like peptide-1 receptor agonists (GLP-1).[4]

Liraglutide, an acylated long-acting human GLP-1 receptor agonist, has been effectively synthesized through the utilization of recombinant DNA technology. It increases insulin secretion, decreases glucagon secretion, slows gastric emptying, and promotes satiety, among other beneficial properties.[5, 6,7,8,9] The FDA approved Saxenda, an injectable medication, in 2010 for the management of obesity and associated conditions such as hypertension, elevated cholesterol, type 2 diabetes, and excessive adiposity.[6,10] Consistent with reduced caloric intake and heightened physical activity, Liraglutide injection regulates appetite, food consumption, and blood glucose levels; administration via daily subcutaneous injections is necessary.[10] A large randomized controlled trial has found that Liraglutide 3 mg leads to 5.6 kg (5.4%) weight loss over placebo after one year.[11,12]

Previous studies have raised concerns regarding the potential adverse effects of GLP-1 receptor agonists, including but not limited to gastrointestinal disorders, renal disease, pancreatitis, biliary issues, thyroid tumors, and cancer.[13] In this age of pervasive social media, recommendations from peers and acquaintances on social media platforms such as Facebook, Instagram, Twitter, and WhatsApp exert a greater impact on users' purchasing decisions.[14]

Pharmacists, being integral components within the healthcare system, have a critical responsibility in overseeing patients' compliance with prescribed medication regimens. Despite this, the knowledge and level of instruction of injectable Liraglutide among Jordanian pharmacists is inadequately investigated. In order to fill this void in knowledge, we conducted an exhaustive survey of pharmacists in Jordan to determine their level of familiarity with Liraglutide Injection, an effective weight-loss medication. In addition, the manner in which pharmacists offer counseling services to their overweight clients will be investigated. The main purpose of this study is to assess the current state of pharmacists' participation in obesity treatment through the identification of possible deficiencies and the proposal of alternative remedies.

The principal objective of this exhaustive investigation is to analyze the viewpoints, methodologies, and proficiency of

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Jordanian pharmacists concerning the Liraglutide injection as a therapeutic approach for obesity. The objective of this study is to determine the extent to which pharmacists comprehend Liraglutide injection, the manner in which they prescribe and administrate the medication and the influence of work environment and education level on their evaluations. The principal objective of this research endeavor is to conduct an exhaustive examination of the current degree of pharmacist involvement with Liraglutide injection in Jordan. The principal aim of this research endeavor is to generate substantial advancements in the domain of obesity management and potential therapeutics.

MATERIALS AND METHODS

Study Design and Participants

In all governorates of Jordan, this cross-sectional research aimed to gather data on the use of Liraglutide Injection by licensed pharmacists working in pharmacies community or chain communities from September to October 2023. Google Forms, developed and owned by Google (Menlo Park, CA, USA), was used to create and disseminate an online survey. Furthermore, all individuals who took part in the research did so voluntarily. In an effort to reach a wider range of pharmacists, the poll was enhanced by using social media channels such as Facebook and WhatsApp.

Ethical Considerations

The research followed all ethical requirements and was authorized by the Scientific Research Committee of Al-Balqa Applied University (reference number: **71/29/5**). The online survey included an informed consent form and emphasized voluntary participation. The privacy of all information gathered was guaranteed.

Sample Size

There are over 31,725 licensed pharmacists in Jordan, according to statistics acquired from the Jordan Pharmacists Association. The Raosoft online sample size calculator [15,16] was used to establish a minimum representative sample size of 96. The study took into account a 10% error margin, a 95% confidence interval, and a 50% response distribution.

Questionnaire

An in-depth survey was used, which was created after a thorough examination of PubMed articles and then verified by an expert panel. The questionnaire's appropriateness, clarity, and relevance were confirmed in a web-based pilot research that included 20 community pharmacists who were randomly chosen. A total of 52 questions were asked in the survey, which was divided into an introduction interface and three major parts. Participants were reassured of the confidentiality of their data, and the study's goal was outlined in the first section. Section two collected demographic information, while section three discussed the scientific details of Liraglutide Injection. This study concluded with an examination of the views, findings, and knowledge of community pharmacists in Jordan about patient education on Liraglutide Injection, including its use, potential side effects, and adverse occurrences.

Statistical analysis

Data retrieved from the online survey were entered into Microsoft Excel and then imported into the Statistical Package for Social Sciences (SPSS) version 22 (SPSS Inc, Chicago, IL, USA). The descriptive analysis was undertaken using mean and standard deviations (SD) for continuous variables and then, percentages for qualitative variables. Checking for data normality was carried out using the Shapiro-Wilk test with a p-value less than 0.05 indicating normally distributed continuous variables. The differences between the various groups were evaluated using the Chi-square test. P- 0.05 was considered significant.

Table 1. Socio-demographic details of Questionnaire Participants, (N=395)

Parameter	Mean (±SD)	N (%)
Age in yea	29.22 ± 7.44	
▪ 23-29		316 (80.0%)
▪ 30-39		47 (11.9%)
▪ 40-49		18 (4.6%)
▪ 50-59		12(3.0%)
▪ 60-65		2(0.5%)
Gende		
▪ Female		277 (70.1%)
▪ Male		118 (29.9%)
Education level		
▪ Middle Diploma		175 (44.3%)
▪ Bachelor pharmacy		207 (52.4%)
▪ Postgraduate		13(3.3%)
Place of residenc		
▪ Middle area		280(70.9%)
▪ North area		60(15.2%)
▪ South area		55(13.9%)
Pharmacy type		
▪ Independent pharmacy		245(62.0%)
▪ Pharmacy chain		150(38.0%)
Pharmacy Position		
▪ Staff pharmacist		373(96.9%)
▪ Pharmacy owner		22(3.1%)
Pharmacy locatio		
▪ Pharmacy located in a shopping mall		161(40.8%)
▪ Pharmacy located in a private clinic		18(4.6%)
▪ Pharmacy located in a private hospital		19(4.8%)
▪ Pharmacy located in a gas station		9(2.3%)
▪ Pharmacy located in other places		188(47.6%)
Average number of pharmacists in working shif		

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Table 1. Socio-demographic details of Questionnaire Participants, (N=395)		
Parameter	**Mean (±SD)**	**N (%)**
▪ 1		168(42.5%)
▪ 2-3		227(57.5%)
Average number of daily prescriptions	30.15 ± 68.31	
Experience as community pharmacists	7.89 ± 4.96	

RESULTS

Sociodemographic Characteristics of the Study Subjects

The research analysis includes 395 individuals who completed the online survey. Table 1 shows that the participants' average age was 29 ± 7.44 years, with men making up 29.9% of the group and females 70.1%. There was a wide range of educational attainment; 52.4% had bachelor's degrees, 44.3% had intermediate diplomas, and 3.3% had graduate degrees. Almost three-quarters of those who took the survey called the Jordanian central region home.

The majority of them were working in a single pharmacy (62%), while a minority (38%), and were part of a chain. Almost half (47.6%) were in different areas, whereas 40% were in shopping centers or big supermarkets, and around 5% were in close proximity to private medical facilities. The average number of prescriptions distributed per day by the pharmacies was about 30, and according to Table 1, 57% of participants reported that two or three pharmacists were present throughout a one shift.

Pharmacists' knowledge about Liraglutide Injection uses for weight reduction

The pharmacists' inquiries regarding the pharmacology of Liraglutide injection, encompassing aspects such as dosage considerations, mechanism of action, and potential drug interactions, yielded an intriguing revelation. With a range of 75.5% to 92.4%, approximately two-thirds of the practicing pharmacists were well-versed in all aspects of Liraglutide Injection. However, an intriguing discovery surfaced, indicating that more than 63% of pharmacists held the belief that Liraglutide injections are employed for the management of type 1 and type 2 diabetes despite the fact that such applications are not approved for diabetes type 1 (Table 2).

Table 2. The participant's (N=395) Knowledge about Liraglutide Injection.

Variables		**Scale responses**					**Statistical Significance**	
(Statements of questionnaire		**Strongly agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly disagree**	**Mean ± SD**	**% Correct answer***
1. Liraglutide injection (Saxenda) is a new injectable drug used to treat obesity.	N	140	193	33	21	8	4.1 ± 0.91	84.3
	%	35.4	48.9	8.4	5.3	2		
2. A drug approved by the Jordanian Food and Drug Administration (JFDA) for weight loss	N	130	176	49	26	14	3.97 ± 1.02	77.5
	%	32.9	44.6	12.4	6.6	3.5		
3. "Liraglutide" stimulates beta cells in the pancreas to secrete insulin.	N	137	216	29	8	5	4.19 ± 0.76	89.4
	%	34.7	54.7	7.3	2	1.3		
4. It works on the receptors in the brain that control and reduce appetite.	N	120	191	50	26	8	3.98 ± 0.94	78.8
	%	30.4	48.4	12.7	6.6	2		
5. Liraglutide works by binding to GLP-1 hormone receptors and activating them, to reduce the feeling of hunger and reduce body weight.	N	145	195	39	11	5	4.17 ± 0.81	86
	%	36.7	49.3	9.9	2.8	1.3		
6. To be effective, this medication should be used in combination with a healthy low-calorie diet and increased physical activity.	N	144	211	32	6	2	4.24 ± 0.71	89.9
	%	36.5	53.4	8.1	1.5	0.5		
7. It is considered a treatment for patients with type 1or 2 diabetes	N	108	156	62	44	25	3.7 ± 1.17	17.4**
	%	27.3	39.5	15.7	11.1	6.3		
8. Liraglutide injections are generally prescribed to adults 16 years of age or older who have not been able to lose weight through a healthy diet and exercise.	N	110	188	60	28	9	3.92 ± 0.96	75.5
	%	27.9	47.6	15.2	7.1	2.3		
9. Liraglutide injections are prescribed for adults with a body mass index (BMI) of 30 or more (obesity).	N	130	206	50	8	1	4.15 ± 0.73	85.1
	%	32.9	52.2	12.7	2	0.25		
10. Liraglutide injections are prescribed for adults with BMI of 27 or more and who also have health problems related to being overweight, such as diabetes, high blood pressure, high blood fat levels, or breathing problems during sleep.	N	139	180	52	20	4	4.09 ± 0.88	80.8
	%	35.2	45.6	13.2	5.1	1		

% correct answer *, % Strongly agree + % agree.

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Table 2. The participant's (N=395) Knowledge about Liraglutide Injection.

Variables		Scale responses					Statistical Significance	
(Statements of questionnaire)		Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	Mean ± SD	% Correct answer*
11. If the medication is effective, at least 5% of the initial weight should be lost 16 weeks after the initiation of use.	N	124	178	79	12	2	4.04 ± 0.83	76.5
	%	31.4	45.1	20	3	0.5		
12. The dose increases by 0.6 mg each week until the recommended dose of 3 mg is reached once a day.	N	137	197	41	15	5	4.13 ± 0.84	84.6
	%	34.7	49.9	10.4	3.8	1.3		
13. The injection is made under the skin in the following places: the upper arm, the front part of the abdomen, and the front of the thighs.	N	168	197	27	3	0	4.34 ± 0.64	92.4
	%	42.5	49.9	6.8	0.8	0		
14. It is recommended to change the injection site periodically (do not inject in the same area every day).	N	187	177	23	8	0	4.37 ± 0.69	92.2
	%	47.3	44.8	5.8	2	0		
15. The patient is advised to put a new needle in for each injection, and the pen cap must be put on after completing each injection in order to protect the medicinal substance from light.	N	196	162	31	5	1	4.38 ± 0.71	90.6
	%	49.6	41	7.8	1.3	0.3		
16. Advise the patient not to use this medication if the solution in the pen is not clear or if the solution is not transparent or nearly colorless.	N	187	168	29	6	5	4.33 ± 0.78	89.9
	%	47.3	42.5	7.3	1.5	1.3		
17. Once you begin using the medication, the patient is advised to keep the pen for 3 days when stored at a temperature below 3 °C or in the refrigerator (not up to 8 °C).	N	178	181	23	12	1	4.32 ± 0.74	90.9
	%	45.1	45.8	5.8	3	0.3		

% correct answer *, % Strongly agree + % agree.

The results presented in Table 2 illustrate the level of comprehension that the participants had regarding Liraglutide Injection in the context of obesity management. The participants demonstrated a commendable level of understanding regarding the drug's approval by the Jordanian Food and Drug Administration (JFDA), its function as an intramuscular treatment for obesity, its mechanism of action involving beta cell stimulation, and its ability to suppress appetite. However, a mere 17.4% of the participants accurately identified Liraglutide Injection diabetes treatment status, indicating a substantial deficiency in knowledge.

Pharmacists' perceptions and observation of Liraglutide Injection Counseling

This year, a significant 80% of pharmacists saw an increase in the demand for Liraglutide Injection, a medicine mostly used for weight reduction. Half of those pharmacists reported administering the prescription one to three times weekly. Endocrinologists and diabetologists accounted for 36.2% of Liraglutide injectable prescriptions, followed by gastroenterologists and obesity physicians at 32.4%, clinical nutrition experts at 18.7%, and internists at 12.7% (Figure 1).

For individuals with chronic diseases and obesity, 34% of respondents said that Liraglutide injections, more especially the injection of Saxenda, are available as prescribed drugs only. On the other side, 61% of patients said they took their medication exactly as directed. It is worth mentioning that 44.1% of participants verified that Liraglutide injection is consistently available on the market. In addition, 41.44 % of

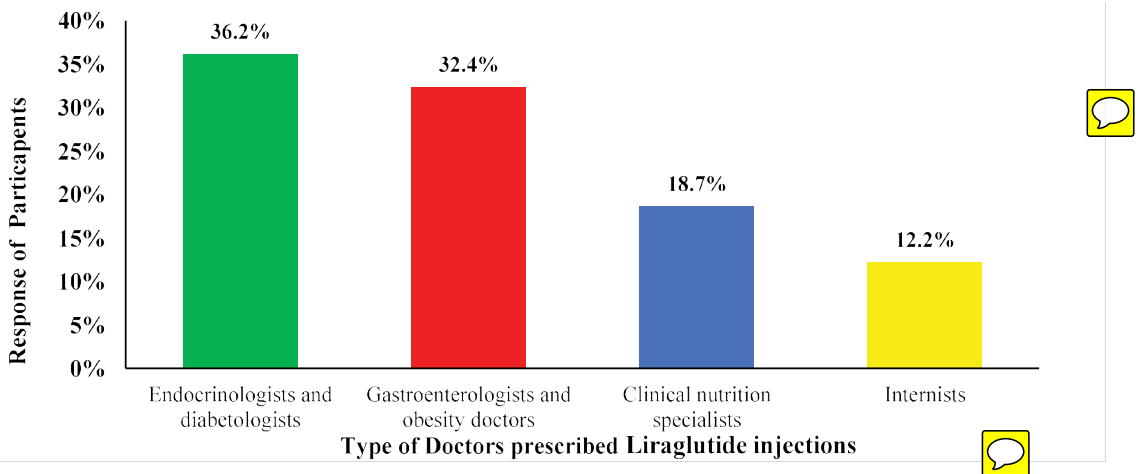

Figure 1. The type of doctors prescribed the Liraglutide Injection.

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people who used it also continued to take their type 2 diabetes medicine as prescribed, and 65% of those who took the drug also saw an increase in demand for it from people with long-term health conditions. 73.9% of the pharmacist's community noticed that the workers in the medical and health sector have increased their interest in buying or asking about the Liraglutide injection, 38% saw an uptick in the prescription of Xenical® (Orlistat6) for patients using Liraglutide Injection at the same time. 77% of pharmacists noticed an increase in demand for weight loss supplements, vitamins, and medicinal herbs for people who use Liraglutide injections (Figure 2A). Additionally, dietary supplements most sold were vitamin D, vitamin B12, and multivitamin B complex preparations (43.7%, 29.0%, and 21.1%, respectively), as shown in Figure 2B. The least demanded supplements were iron and selenium, with percentages of 1.0%. The most requested herbal preparations bought were Green Coffee Extract, Pollen vinegar pills, Cinnamon extract, and Matcha tea/Green tea (28.7%, 26.0%, 26.0%, and 23.7%). On the other hand, the least sold herbal preparations ordered or questioned were Alpha lipoic acid, and Brewer's yeast (0.5% and 1.3%, respectively).

Pharmacist perceptions and practice in providing Liraglutide Injection counseling

Weight management consultations with Liraglutide injection were performed in more than 80% of the pharmacies studied. Especially for patients using Liraglutide Injection, 93% of pharmacists saw a real improvement in the weight loss of patients using the drug. In addition, 43.3% routinely asked patients for their opinions, 28% tracked their weight, and 26.3% evaluated their physical attractiveness.

Regarding the safety opinions of Liraglutide Injection for weight reduction, 37.7% of pharmacists said it was okay to give out over-the-counter. However, the findings showed that many pharmacists were unaware of the risks and benefits of injecting Liraglutide. In addition, many were hesitant to prescribe or dispense Liraglutide Injection, with worries about adverse effects being the main reason. It should be noted that 75.2% of pharmacists provided various advice regarding the safe use of the drug, side effects, the necessity of follow-up with a specialist doctor, and compliance with the prescribed doses and the instructions of the doctor and pharmacists (Table 3).

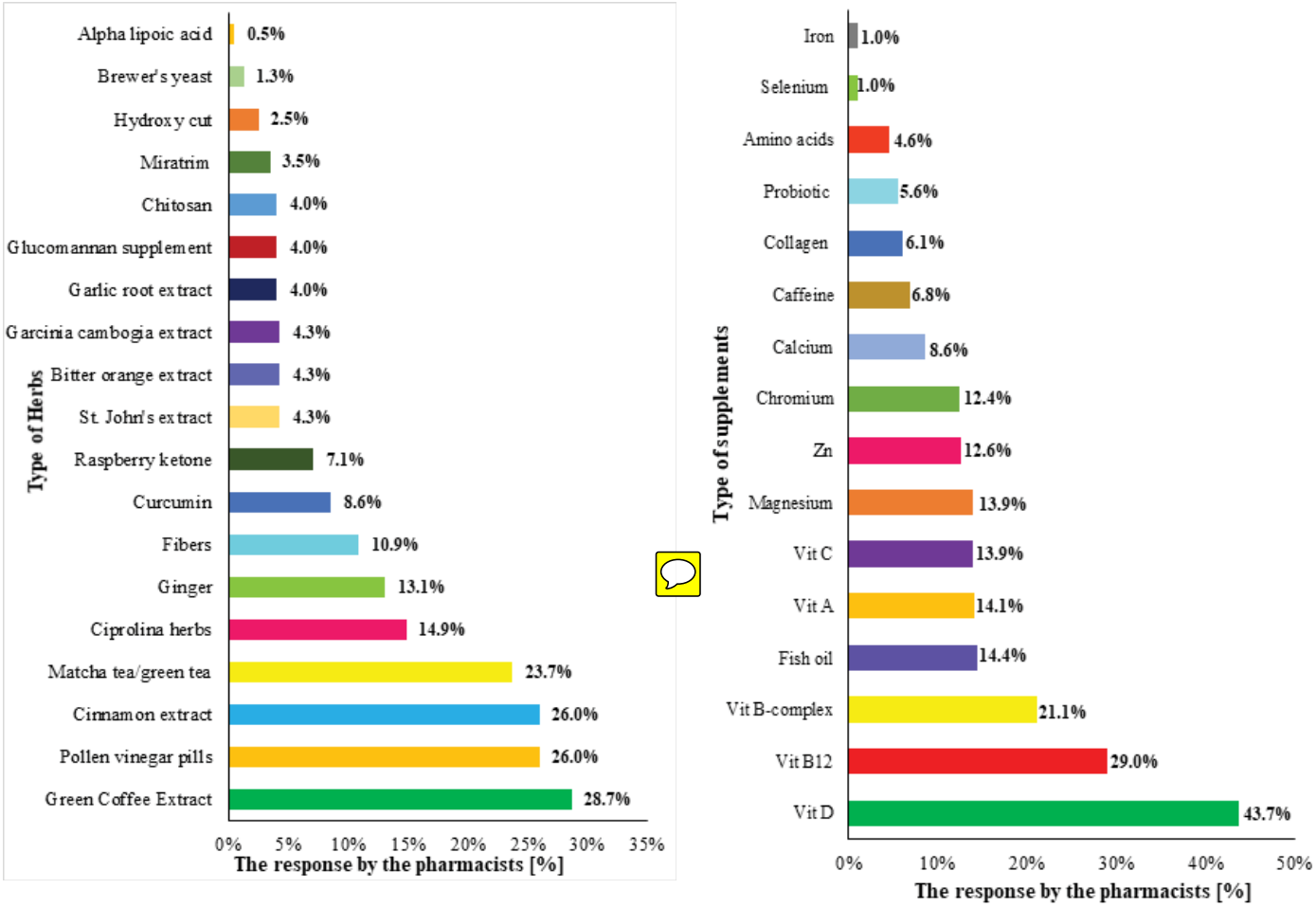

Figure 2. (A) The herbal preparations that customers bought ordered or asked about their usefulness while using Liraglutide injection, and (B) Types of dietary supplements that the customers most purchased while using Liraglutide injections

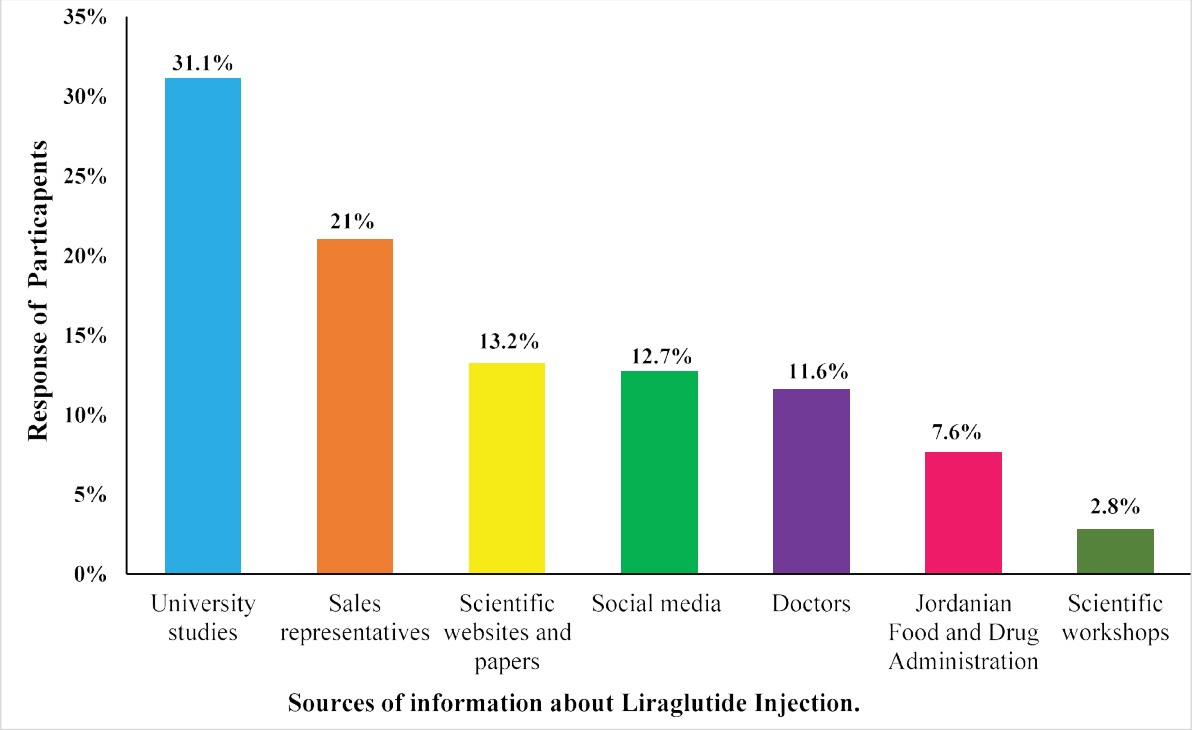

Figure 3. Shows the source of information about Liraglutide Injection.

Table 3: The participant's (N = 395) perceptions and observations about Liraglutide injection.

Questions	**N (%)**
Have you noticed an increase in the Liraglutide injection demand as a drug for weight loss during the current year?	
Yes	**316(80%)**
No	**79(20%)**
On average, how many times a week does the pharmacy deliver Liraglutide injection medications for weight loss?	
0	**114(28.9%)**
1-3	**216(54.7%)**
4-6	**50(12.7%)**
7-9	**10(2.5%)**
10 or more	**5(1.3%)**
On average, how many weight management consultations using Liraglutide injection?	
0	**82(20.8%)**
1	**218(55.2%)**
2	**79(20%)**
3 or more	**16(4.1%)**
Did you notice/do you think that the patient can benefit from using the medication to lose weight?	
Yes	**367(92.9%)**
No	**28(7.1%**
How did you notice weight loss in those receiving the medication?	
Personal experience	**8(2.0%)**
I outwardly judged the patient's appearance.	**104(26.3%)**
Feedback from the patient	**171(43.3%)**
Monitor the patient's weight	**112(28%)**

Table 3: The participant's (N = 395) perceptions and observations about Liraglutide injection.

Questions	N (%)
On average, how often do you perform weight management activities in your pharmacy by medication recipients?	
0	**82(20.8%)**
1	**218(55.2%)**
2	**79(20%)**
3 or more	**16(4.1%)**
Have you noticed that Liraglutide injection recipients follow up with their type 2 diabetes medications?	
Yes	**226(57.2%)**
No	**169(42.8%)**
Have you noticed an increase in the prescription of Xenical® (Orlistat) for patients taking Liraglutide injection?	
Yes	**153(38.7%)**
No	**242(61.3%)**
Have there been an increase in the dispensing of supplements, vitamins, or medicinal herbs that can be used with Liraglutide injection for weight loss?	
Yes	**304(77%)**
No	**91(23%)**
Have you noticed that citizens who suffer from chronic diseases have increased their demand for Liraglutide injections?	
Yes	**256(64.8%) (64.8%)**
No	**139(35.2%)**
Who is the most popular category for the drug Liraglutide injection?	
Body mass index (BMI) greater than 30.	**120(30.4%)**
Patients with serious health problems associated with obesity, such as diabetes, and high blood pressure.	**122(30.4%)**
Women for cosmetic reasons	**84(21.3%)**
Obese people in the age group of 18–50 years	**61(15.4%)**
Patients with "sleep apnea"	**6(1.5%)**
Those who are financially capable and want to lose weight	**2(0.5%)**
Which of the following supplies related to weight loss are given in conjunction with the drug Liraglutide injection?	
Fat-burning medications	**169(41.3%)**
Diet foods	**94(23%)**
Step counting devices	**65(15.9%)**
Cellulite massage	**46(11.2%)**
Fat burning devices	**35(8.6%)**
Have you noticed that the drug Liraglutide injection is only requested by those who have financial means because its price is relatively high?	
Yes	**296(74.9%)**
No	**99(25.1%)**
Is Liraglutide injection always available in the pharmacy?	
Yes	**174(44.1%)**
No	**221(55.9%)**
Have you noticed other uses for Liraglutide injection?	
Yes	**115(29.1%)**
No	**280(70.9%)**
Did you dispense Liraglutide injection through prescriptions only?	
Yes	**135(34.2%)**
No	**260(65.8%)**

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Table 3: The participant's (N = 395) perceptions and observations about Liraglutide injection.

Question	N (%)
Have you noticed that workers in the medical and health sector have increased their interest in buying or asking about Liraglutide injection?	
Yes	**292(73.9%)**
No	**103(26.1%)**
What is the nature of the questions asked by Liraglutide injection and their effects?	
Questions related to adherence to medication use	**68(17.2%)**
Questions about the correct use of the medication	**67(17%)**
Questions related to gaining weight after stopping the medication	**38(9.6%)**
Questions related to side effects	**203(51.4%)**
Questions related to the groups that can use the medicine	**12(3%)**
All things about medication	**7(1.8%)**
Do you think that what was studied during your university years on this type of medication is sufficient?	
Yes	**128(32.4%)**
No	**267(67.6%)**
Have you taken any courses or workshops specialized in this type of medication to increase your knowledge and safe practice?	
Yes	**77(19.5%)**
No	**318(80.5%)**
Do you think that Liraglutide injection is safe and can be dispensed without a prescription for weight loss?	
Yes	**246(62.3%)**
No	**149(37.7%)**
Do you think there is a need to educate patients about the uses of Liraglutide injections and their side effects, and the need for patients to consult their doctors or pharmacists?	
Yes	**388(98.2%)**
No	**7(1.8%)**
What are the most important tips you give to patients who use the drug Liraglutide injection?	
Follow up with the doctor or pharmacist	**77(19.7%)**
Do a healthy diet	**59(15.1%)**
Use as directed by a specialist physician	**97(24.5%)**
Use medications that reduce side effects	**7(1.7%)**
Advice on how to use it, when to use it, and the necessity of changing injections and storing it	**24(6.0%)**
Monitor sugar levels	**21(5.3%)**
Conducting periodic lab examinations to monitor side effect	**30(7.7%)**
Adhering to the specified doses	**8(1.9%)**
Commitment to sports	**9(2.2%)**
Reviewing the pharmacy in case of any side effects of the medication or any questions about the drug	**13(3.4%)**
Monitor weight loss	**8(1.9%)**
Everything mentioned above	**42(10.8%)**

Source of information about Liraglutide injection and continuous education and training

Regarding the source of knowledge and information about Liraglutide injection Figure 3 shows that the majority of respondents (31.1%) cited academic studies, medical professionals (21%), scientific websites, and articles (13.2%), social media (12.7%), the Jordanian Food and Drug Administration (7.6%), and scientific workshops (2.8%).

The majority of pharmacists (67.6%) believe that the studies on Liraglutide injection during your university years were not sufficient to give all information about this medication. Regarding attending training workshops specialized on Liraglutide injection knowledge, using side effects, and safe practice vast majority of the participants (80.5%) did not attend any awareness workshops specialized in dealing with patients' inquiries related to the Liraglutide injection, compared to 19.5% who attended only one workshop (Table

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3). More than two-thirds of pharmacists (75.2%) noticed that pancreatitis, vitamin D deficiency, and Hyperthyroidism are the most common dangerous side effects of Liraglutide injection, followed by fatigue due to hypotension, diarrhea, headache, and gastric upset, based on observations of drug users' side effects, some were forced to stop taking the drug as a result. Figure 4 illustrates the most reported adverse effects by the pharmacists. Most community pharmacists (98%) stressed that there is a need to educate the patients about the uses and the side effects of Liraglutide injection and the necessity for patients to refer to their physicians or pharmacists.

Interestingly, female pharmacists who work only one shift notice more than others that Liraglutide injection recipients follow up with their type 2 diabetes medications ($p < 0.04$), moreover, new pharmacists (experience less than 5 years) noticed more than experienced pharmacists that increased in dispending of supplements, vitamins, or medicinal herbs that can be used with Liraglutide injection for weight loss ($p < 0.034$).

For more correlation between participants' characteristics observations, practices, and advice regarding Liraglutide injections see Table 4.

DISCUSSION

Liraglutide was recently approved for weight management as an adjunct to diet and physical activity.[17] It can be given independently of meals as a subcutaneous injection into the abdomen, thigh, or upper arms.[12] This research emphasizes the significance of healthcare professionals, particularly pharmacists, in ensuring the proper administration of GLP-1 receptor agonists Liraglutide injection for weight loss. The findings underscore the necessity for pharmacists to engage in targeted educational initiatives aimed at enhancing their knowledge of Liraglutide injection and its associated advantages. Regulations ought to be implemented to mandate pharmacists participate in continuing education programs, given that a subset of them exhibit hesitancy in prescribing or administering Liraglutide injections, potentially signifying inadequate training.

Table 4: Correlation between participants' characteristics observations, practices, and advice regarding Liraglutide injections.

Statements	Gender	Age	Education level	Pharmacy location	Place of residence	number of daily prescriptions	Experience as pharmacists	Number of pharmacists during shift
	P-value*							
1. Have you noticed an increase in the Liraglutide injection demand as a drug for weight loss during the current year?	0.207	0.358	0.302	0.927	0.461	0.412	**0.030**	**0.004**
2. Have you noticed that Liraglutide injection recipients follow up with their type 2 diabetes medications?	**0.044**	0.986	0.639	0.754	0.412	0.186	0.344	**0.012**
3. Have you noticed an increase in the prescription of Xenical® (Orlistat) for patients taking Liraglutide injection?	0.658	0.871	0.418	0.466	0.885	**0.031**	0.377	0.553
4. Increase in dispensing of supplements, vitamins, or medicinal herbs that can be used with Liraglutide injection for weight loss.	0.051	0.261	0.772	0.439	0.142	0.121	**0.034**	0.618
5. Have you noticed that citizens who suffer from chronic diseases have increased their demand for Liraglutide injection?	0.513	0.862	0.149	0.404	0.786	0.239	**0.042**	0.846
6. How often do you perform weight management activities in your pharmacy by medication recipients	0.965	**0.017**	0.055	0.274	0.004	0.097	0.211	**0.024**
7. Have you noticed that workers in the medical and health sector have increased their interest in buying or asking about Liraglutide injections?	0.718	0.159	0.920	0.706	0.732	0.144	0.088	0.573
8. Notice that the patient benefited from using the medication to lose weight	0.673	0.133	**0.001**	0.508	**0.001**	0.671	**0.011**	0.048
9. What are the most important tips you give to patients who use the drug Liraglutide injection?	0.633	**0.006**	0.396	0.247	**0.034**	0.245	**0.023**	0.100
10. Is Liraglutide injection always available in the pharmacy?	0.569	0.072	0.412	0.079	0.703	**0.022**	0.658 658	0.521
11. You noticed that the drug Liraglutide injection is only requested by those who have financial means because its price is relatively high?	0.266	0.168	0.345	0.329	0.267	0.100	**0.017**	0.398
12. Did you dispense Liraglutide injection through prescriptions only?	0.462	**0.012**	0.585	0.664	0.938	0.382	0.285	**0.024**
13. Do you think that Liraglutide injection is safe and can be dispensed without a prescription for weight loss?	0.736	0.280	0.214	**0.013**	0.569	0.257	**0.047**	0.195

* Based on chi-square calculation.
** Statistically significant differences between gender ($p = 0.05$).

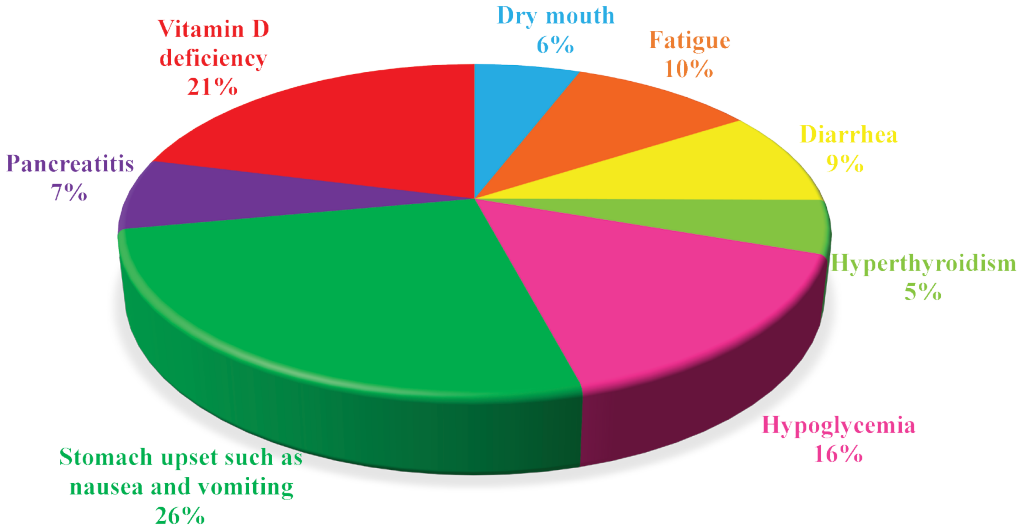

Figure 4. Adverse events reported by pharmacists based on Liraglutide Injection user responses

The research sample consisted of 395 individuals representing a diverse range of educational backgrounds. Among the participants, females comprised the majority (70.1%), and the mean age was 29 ± 7.44 years. A majority of the pharmacists (52.4%) in the central region of Jordan held bachelor's degrees. Employed by independent pharmacies, the majority of participants (62% of the total) dispensed an average of thirty prescriptions of Liraglutide injection per day. GLP-1 receptor agonists are often recommended as part of combination therapy for type 2 diabetes when oral medication alone does not provide sufficient glycemic control.[6] Liraglutide has been shown to improve glucose tolerance and weight loss in individuals with type 2 diabetes.[9,18] An investigation into the pharmacists' comprehension of Liraglutide Injection for weight loss revealed that while a considerable proportion possessed a general understanding of the medication, a concerning 63% mistook it for a treatment for type 1 and type 2 diabetes management.[19,20] This agrees with results that indicate a substantial knowledge deficit exists regarding the permitted applications of Liraglutide Injection in Jordan.

Furthermore, an increase in the utilization of Liraglutide Injection for weight loss has been observed by 80% of pharmacists, which aligns with their perceptions and assessments of the medication's escalating market demand. Prescriptions were primarily authored by endocrinologists and diabetologists (36.2%). Surprisingly, 34% of survey respondents believed that individuals with obesity and chronic conditions could obtain Liraglutide Injection, specifically Liraglutide injections, without a prescription. A significant amount of interest in Liraglutide Injection was noted among medical and health sector workers in the 2018 study conducted by Federici et al. Among those who participated in the survey, 61% showed that they followed their doctors' orders to the letter.[21] Surprisingly, 80% of pharmacists noticed an increase in the sales of Lirglutide, especially the new pharmacists ($p < 0.030$) who worked in a group of 3 pharmacists during one shift ($p < 0.004$) noticed an increase in sales of Saxenda more than others. Utilization of these drugs has largely been driven by social media influencers, in the study conducted in the US showed more than 41% of adults identified as obese by the CDC and increased the demand for GLP-1 a drug for weight loss.[22] This information showed the lack of knowledge of patients for the proper use of Liraglutide Injection as relayed on social media for information. This points out the request of applying of comprehensive guidance for pharmacist in Jordan for administrate the proper dispensing process and use of Liraglutide Injection adhere to prescriptions provided by physicians and educate the patients about the side effects.

This study indicated that the new pharmacists (< 5 year experience) noticed an increase in the consumption of herbal preparations and dietary supplements with Liraglutide Injection, as the demand increased for a number of herbs, such as green coffee extract, apple Vinger pills, cinnamon ($p < 0.034$). As for the dietary supplements, vitamin D was the highest in demand, then vitamin B12. This means that users of Liraglutide injections are educated on its action and the side effects of using this type of medication, so they use many nutritional supplements and support the medication with many herbal extracts that are used to reduce weight in order to increase the effectiveness of the medication and obtaining a good result. Surprisingly, most respondents were new pharmacists ($p < 0.034$) more believed than others that the reason for this, was because a new medicine was recently approved, pharmacists with little experience have more information and observations, especially since they recently finished their studies are more informed than others about everything related to the Liraglutide injection medicine.

The most striking result of this study is that there are significant differences between pharmacists' characteristics observations, practices, and advice regarding Liraglutide injections, especially in the duration of experiences, location of pharmacy, and age of the pharmacist. Most participants were female ($P < 0.044$) who only worked one shift ($P < 0.01$) and observed more than

others that Liraglutide Injection recipients continued to use their type 2 diabetes medications in addition to Liraglutide Injections. This may be because Liraglutide injection is relatively new and has also been approved by the US Food and Drug Administration under the FDA Act Brand name Saxenda® in 2014 for chronic weight management in adults and again in 2020 for chronic weight management among pediatric patients aged 12 years and older who are obese.[23]

The survey revealed that more than 80% of pharmacies utilized Liraglutide injections in consultations regarding weight control. This data offered valuable insight into the approaches employed by pharmacists when providing Liraglutide Injection counseling. Significantly, 93% of pharmacists reported that patients who took Liraglutide Injection experienced a reduction in their percentage of body fat, demonstrating the apparent efficacy of the drug. The majority of pharmacist's who had a bachelor's degree believe and little experience more than others that that the patient benefited from using the medication for weight loss ($p < 0.001$, $p < 0.011$, respectively). Moreover, the pharmacists in Amman, the capital of Jordan, more believe than others in this thing. Some pharmacists were apprehensive about the potential for adverse effects when it came to prescribing or dispensing Liraglutide injections. Furthermore, there is a difference in opinion among the participating pharmacists regarding the safety of Liraglutide injection and its ability to be dispensed without a prescription, as there are inexperienced pharmacists ($p < 0.047$) who worked in separate pharmacies located in different places ($p < 0.013$) that believe more than others that Liraglutide Injection should be dispensed with a prescription for weight loss only due to the presence of serious side effects, and isn't safely to dispensed without a prescription. Similarly, younger pharmacists ($p < 0.044$) who only worked one shift ($p < 0.01$) observed more than others who dispensed Liraglutide Injection through prescriptions only. Fresh pharmacists (expertise < 5) ($p < 0.017$) notice more than others that the drug Liraglutide Injection is only requested by those who have financial means because its price is relatively high price, According to the latest study issued regarding Liraglutide Injection, net prices range between $717 and $761 per month.[24]

The prevailing sentiment among pharmacists regarding their understanding of Liraglutide injection and the necessity for ongoing education was that their collegiate education was inadequate. The inadequate participation rate of 19.5% at specialized seminars indicates a potential necessity for additional educational opportunities within this domain. Additionally, the survey revealed that the majority of Liraglutide injection-related information originated from medical professionals and scholarly articles.

The research ultimately illuminates the comprehension, perspectives, and conduct of pharmacists with regard to Liraglutide Injection. The report draws attention to significant domains of misinterpretation, including the erroneous belief that Liraglutide injection treats diabetes. It further proposes the implementation of targeted educational initiatives to rectify these misunderstandings. In addition, the results demonstrate that pharmacists must pursue continuing education to increase their understanding of novel pharmaceuticals and their proper application.

Irrespective of this, the majority of Liraglutide Injection users were also aware that it was most effective when used in conjunction with other healthy behavior's, such as a more balanced diet and increased physical activity. This means that lifestyle modification is the key [9] that most advice is given to Liraglutide Injection users. The findings underscore the positive and negative perceptions that individuals hold regarding Liraglutide Injection while also identifying potential avenues for knowledge expansion, particularly with regard to its broader therapeutic applications.

This study further represents the inaugural investigation of its kind to examine the attitudes, convictions, and behaviors of pharmacists in Jordan concerning the administration of Liraglutide intravenously for the intent of weight loss. For the development of tailored strategies that effectively address the specific needs of pharmacists in this context, this comprehension is vital.

For the integration of Liraglutide injection into clinical practice, pharmacists must prioritize staying informed about the latest research, recommendations, and best practices pertaining to weight control. It is critical to possess a comprehensive understanding of the pharmacology, mechanism of action, dosage considerations, and potential interactions of Liraglutide. With this knowledge, pharmacists are more capable of engaging in informed dialogues with their clients, enabling them to collaborate on the development of personalized treatment plans that align with the patient's particular health goals.

The significance of a patient-centered approach and the intricate nature of weight control are underscored by the research. Pharmacists, in their capacity as healthcare professionals, are obligated to engage in sensitive discussions with patients regarding the advantages and disadvantages of Liraglutide injection. For the purpose of optimizing the efficacy of Liraglutide injection, pharmacists and patients should collaborate in order to enhance patients' overall health.

A request has been made for pharmacists to receive additional training on Liraglutide injection in order to address any knowledge gaps, despite the fact that not all pharmacies in Jordan engage in weight control programs. In order to optimize patient care and manage inquiries pertaining to Liraglutide injection, it is recommended that pharmacists engage in supplementary educational initiatives and seminars.

Information dissemination regarding Liraglutide injection's efficacy as an obesity treatment is substantially dependent on physicians, pharmacists, and patient participation. To improve the utilization of Liraglutide injectable in Jordan, provider and patient awareness of the medication's benefits and availability at local pharmacies must be increased.

Notwithstanding this, the shortcomings of the study must be acknowledged. The generalizability of the findings to the pharmacy profession at large may be limited by the cross-

sectional design of the study and the potential for selection bias toward younger pharmacists who possess more extensive social media experience. The inclusion of participants from every province in Jordan enhanced the study's depiction of findings, suggesting that broader implementation across community pharmacies in Jordan is necessary despite the limited size of the sample.

CONCLUSION

In summary, the findings of this research indicate that pharmacists in Jordan are significantly good in knowledge regarding the administration of Liraglutide injection. All Jordanian healthcare practitioners must acquire more comprehensive knowledge regarding Liraglutide injections through the findings of forthcoming studies that address the existing knowledge deficits. It is of the utmost importance to address these deficiencies in order to facilitate informed decision-making and deliver optimal patient care, thereby facilitating Saxenda's seamless integration into the healthcare system of Jordan. The key to assisting Jordanian pharmacists in promoting patients' about safe using of Liraglutide injection is education. Furthermore, it is necessary to conduct long-term studies to determine how education affects participants' perspectives and levels of engagement.

DECLARATION AND STATEMENTS

AUTHORS' CONTRIBUTION

Jumanah D. Al-Shawabkeh contributed to study design, project administration, funding acquisition, methodology, investigation, critical revising and editing of the original draft, and review and editing of the final manuscript.

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CONFLICT OF INTEREST

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References

1. Al-Shawabkeh, J. D., Al-Nadaf, A. H., Dahabiyeh, L. A. & Taha, M. O. Design, synthesis and structure-activity relationship of new HSL inhibitors guided by pharmacophore models. Med. Chem. Res.2014; 23:127–145. https://doi.org/10.1007/s00044-013-0616-2
2. Hendricks EJ. Off-label drugs for weight management. Diabetes, metabolic syndrome and obesity: targets and therapy. 2017;10:223-34. https://doi.org/10.2147/dmso.s95299
3. WHO. Malnutrition 2020. Available from: https://www.who.int/news-room/questions-and-answers/item/malnutrition
4. Rabkin S, Campbell H. Comparison of reducing epicardial fat by exercise, diet or bariatric surgery weight loss strategies: a systematic review and meta-analysis. Obesity reviews. 2015;16(5):406-15. https://doi.org/10.1111/obr.12270
5. Dahlqvist S, Ahlén E, Filipsson K, Gustafsson T, Hirsch IB, Tuomilehto J, et al. Variables associated with HbA1c and weight reductions when adding liraglutide to multiple daily insulin injections in persons with type 2 diabetes (MDI Liraglutide trial 3). BMJ Open Diabetes Research and Care. 2018;6(1):e000464. https://doi.org/10.1136/bmjdrc-2017-000464
6. Matza LS, Boye KS, Currie BM, Paczkowski R, Lando LF, Mody R, et al. Patient perceptions of injection devices used with dulaglutide and liraglutide for treatment of type 2 diabetes. Current Medical Research and Opinion. 2018;34(8):1457-64. https://doi.org/10.1080/03007995.2018.1465903
7. Overgaard RV, Petri KC, Jacobsen LV, Jensen CB. Liraglutide 3.0 mg for weight management: a population pharmacokinetic analysis. Clinical pharmacokinetics. 2016;55:1413-22. https://doi.org/10.1007/s40262-016-0410-7
8. Whitten JS. Liraglutide (Saxenda) for weight loss. American family physician. 2016; 94(2):161-6. https://doi.org/10.1001/jama.2016.2083
9. Zhang P, Liu Y, Ren Y, Bai J, Zhang G, Cui Y. The efficacy and safety of liraglutide in the obese, non-diabetic individuals: a systematic review and meta-analysis. African Health Sciences. 2019;19(3):2591-9. https://doi.org/10.4314/ahs.v19i3.35
10. Almandoz JP, Lingvay I, Morales J, Campos C. Switching between glucagon-like peptide-1 receptor agonists: rationale and practical guidance. Clinical Diabetes. 2020;38(4):390-402. https://doi.org/10.2337/cd19-0100
11. Pi-Sunyer, X. et al. A Randomized, Controlled Trial of 3.0 mg of Liraglutide in Weight Management. *N.* Engl. J. Med.2015; 373:11–22. https://doi.org/10.1056/NEJMoa1411892
12. Bruun, J. M. Pharmacotherapy for obesity. Ugeskr. Laeger.2016; 178: 472–477. PMID: 27808050.
13. Mehta A, Marso SP, Neeland I. Liraglutide for weight management: a critical review of the evidence. Obesity science & practice. 2017;3(1):3-14. https://doi.org/10.1002/osp4.84
14. Abutaima R, Barakat M, Sawan HA, ALomari S, Mhaidat N. Jordanian Population Knowledge, Attitude and Practices on the Uses of Antidiabetics for Weight Loss Purposes: A Cross Sectional Study.Research Square; 2023. https://doi.org/10.21203/rs.3.rs-3325697/v1
15. Alhomoud FK, Basil M, Bondarev A. Knowledge, attitudes and practices (KAP) relating to dietary supplements among health

sciences and non-health sciences students in one of the universities of United Arab Emirates (UAE). Journal of clinical and diagnostic research: JCDR. 2016;10(9):JC05. https://doi.org/10.7860/jcdr/2016/19300.8439
16. Al-Shawabkeh, J. D., Laban, N. A., Husein, N. & Jaber, D. Knowledge and practice in Jordan regarding the outbreak and prevention of COVID-19: a questionnaire-based study. *Trop. J. Pharm. Res.* 2023;22:847–857. http://doi.org/10.4314/tjpr.v22i4.X
17. Apperley, L. J., Gait, L., Erlandson-Parry, K., Laing, P. & Senniappan, S. Liraglutide combined with intense lifestyle modification in the management of obesity in adolescents. J. Pediatr. Endocrinol. Metab.2021;34: 613–618. http://doi.org/10.1515/jpem-2020-0714.
18. Blonde, L. The safety and efficacy of liraglutide with or without oral antidiabetic drug therapy in type 2 diabetes : an overview of the LEAD 1 – 5 studies.2009;11(5): 26–34. https://doi.org/10.1111/j.1463-1326.2009.01075.x.
19. Yu, J., Lee, J., Lee, S. H., Cho, J. H. & Kim, H. S. A Study on Weight Loss Cause as per the Side Effect of Liraglutide. *Cardiovasc. Ther.* 2022;1:1-8. https://doi.org/10.1155/2022/5201684
20. Garvey, W. T. *et al.* Efficacy and safety of liraglutide 3.0 mg in individuals with overweight or obesity and type 2 diabetes treated with basal insulin: The SCALE insulin randomized controlled trial. *Diabetes Care.* 2020; 43:1085–1093. https://doi.org/10.2337/dc19-1745
21. Federici MO, McQuillan J, Biricolti G, Losi S, Lebrec J, Richards C, et al. Utilization patterns of glucagon-like peptide-1 receptor agonists in patients with type 2 diabetes mellitus in Italy: a retrospective cohort study. Diabetes Therapy. 2018;9:789-801. https://doi.org/10.1007/s13300-018-0396-2
22. Myshko, D. NoTitle. Myshko, Denise. 'Real-World Study Finds Low Patient Adherence Weight Loss Drugs.' Formul. Watch. 14 July 2023, p. NA. Gale Acad. OneFile, link.gale.com/apps/doc/A776920967/AONE?u=anon~b8a9c843&sid=googleScholar&xid=7b2c35ad. Accessed 21 Feb. 2024.
23. Barnard-Kelly, K. et al. Liraglutide and the management of overweight and obesity in people with severe mental illness: qualitative sub-study. BMC Psychiatry. 2022; 22:1–8. https://doi.org/10.1186/s12888-021-03666-5
24. Hernandez, I. & Sullivan, S. D. Net prices of new antiobesity medications. Obesity. 2024; 32:472–475. https://doi.org/10.1002/oby.23973