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PREVALENCE AND AWARENESS ABOUT TIRZEPATIDE INJECTION AMONG PHYSICIAN IN JEDDAH CITY

[1]**Salah Mahmoud Salah Alabbasi,**
senior registrar family medicine , jeddah health cluster

[2]**Mohammed Mahmoud Salah Alabbasi,**
general practitioner , jeddah health cluster

[3]**Alhanouf Abed Salem**
senior registrar family medicine, Taif health cluster

Abstract

Background: Tirzepatide injection is emerging as a treatment option for type 2 diabetes, yet its prevalence and awareness among healthcare practitioners remain underexplored, particularly in regions like Jeddah City. This study aims to fill this gap by assessing the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City, Saudi Arabia.

Methods: A descriptive cross-sectional study was conducted among general practitioners at healthcare centers in Jeddah City from July 1 to July 31, 2023. Using convenient sampling, 160 participants were selected based on eligibility criteria, including familiarity with Tirzepatide injection. Data were collected through validated questionnaires covering sociodemographic characteristics and awareness of Tirzepatide injection. Statistical analysis was performed using SPSS software.

Results: Among the 160 participants, the majority were male general practitioners with a mean age of 33.03 years. The prevalence of Tirzepatide use among participants was 54.4%. The survey revealed varying levels of familiarity and confidence among healthcare professionals regarding Tirzepatide's mechanism of action, indications, dosage, contraindications, and effectiveness. Notably, there was a significant association between income level and awareness of Tirzepatide injection, with a higher awareness observed among participants with a good income.

Conclusion: The study sheds light on the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City. While Tirzepatide is increasingly recognized as a treatment option for type 2 diabetes, there are notable gaps in awareness and confidence among healthcare professionals, particularly regarding its clinical application. Targeted educational interventions are warranted to enhance awareness and optimize the clinical use of Tirzepatide injection in managing type 2 diabetes in Jeddah City and beyond.

Introduction

Type 2 diabetes is a prevalent chronic condition that affects millions of individuals worldwide, including the population in Jeddah City. As medical research continues to evolve, new treatment

options are being developed to improve glycemic control and address the associated complications of the disease [1-3]. Tirzepatide injection, a novel medication combining the actions of two hormones, has emerged as a potential therapeutic approach for type 2 diabetes. However, the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City remain relatively unexplored [4-5].

Understanding the prevalence and awareness of Tirzepatide injection is of paramount importance for optimizing patient care and enhancing healthcare outcomes in Jeddah City. This research aims to bridge the knowledge gap by investigating the extent to which physicians in Jeddah City are aware of and utilizing Tirzepatide injection in their medical practice [6]. By examining the prevalence and awareness, we can gain valuable insights into the integration of this medication into clinical practice, identify potential gaps in knowledge, and develop targeted interventions to improve patient care [7].

Tirzepatide is a dual glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) receptor agonist. This innovative combination allows Tirzepatide to stimulate insulin secretion, suppress glucagon release, slow gastric emptying, and promote satiety, thereby effectively reducing blood glucose levels and aiding in weight management. Its unique mechanism of action has shown promising results in clinical trials, demonstrating superior glycemic control and weight reduction compared to other antidiabetic agents [8-11].

In recent years, the landscape of diabetes management has witnessed significant advancements, with the introduction of newer therapeutic options like Tirzepatide injection. However, the successful integration of these medications into clinical practice relies heavily on physicians' awareness and familiarity with the drug [12]. Despite the potential benefits of Tirzepatide, its prevalence and utilization may vary among different regions and healthcare systems, necessitating an investigation specific to Jeddah City.

By examining the prevalence of Tirzepatide injection usage among physicians, this research can shed light on its incorporation into medical practice in Jeddah City. It provides insights into the current utilization rates, prescription patterns, and physician preferences regarding this medication. Additionally, assessing the level of awareness among physicians offers valuable information on their knowledge and understanding of Tirzepatide, including its indications, contraindications, potential side effects, and dosing guidelines. This study aimed to investigate the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City.

Methods

Study design

This was a descriptive cross-sectional study. Since this study aims to investigate the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City at a single point of time, this is the most appropriate design. Furthermore, this design allows to gather much data about participants and measure effect and outcome simultaneously. In addition, it takes a short period to achieve study objectives and collect data.

Study Setting

This study was conducted at health care centers in Jeddah City. This study was conducted during the period from July 1 to July 31, 2023.

Study Population

Population of this study are general practitioners working at the mentioned health care centers.

Sample Size and Sampling Technique

Researcher calculated sample size based on the total number of general practitioners working at the health care centers in Jeddah City during one month as a target population. Sample size was determined using Epi-Info software according to 95% confidence level. Participants were selected via non-probability convenient sampling technique.

Eligibility Criteria

General practitioners involved in using Tirzepatide infection.

Study Instruments

Study instrument is a validated, pretested questionnaire designed by the researcher based on latest literature. It is composed of two parts:

- Sociodemographic characteristics of participants, and
- Awareness about Tirzepatide injection.

Data Collection

Data was collected through face to face interviews or by participants (administered manner). Researchers collected the data.

Data Analysis

After collecting data and entering data into the Statistical Package of Social Sciences (SPSS) software, a frequency analysis is done to assure no missing data. In the case of missing data, a case-wise deletion is performed. Once data integrity is achieved, frequency analysis is done to present baseline characteristics variables. Continuous variables are presented as means and standard deviations while categorical variables are presented as frequency and percentages. A statistically significant relationship is assumed at a P value of less than 0.05.

Ethical Consideration

An approved permission was gained from Research Unit at Ministry of Health to collect data from participants. All participants were asked to give oral consent before asking them to respond to our study. Study objectives were explained to each participant.

Results

The study included 160 medical practitioners of different places and various proficiency levels. The mean age among study participants was 33.03 $\pm$ 7.065 years with median age of 31 years. Age ranged from 25 to 55 years. More than half of study participants were males (n= 87, 54.4%), general practitioners (GP) (n= 91, 56.9%), married (n= 83, 51.9%), of good income (n= 122, 76.3%) and served 1-5 years (n= 97, 60.6%). Table 1 presents sociodemographic characteristics of study participants.

Table 1: Sociodemographic characteristics of study participants			
Variable		**Frequency**	**Percent**
Age	=<30	75	46.9
	31-49	78	48.8
	50-60	7	4.4
Gender	Male	87	54.4
	Female	73	45.6
Proficiency level	GP	91	56.9
	Specialist	52	32.5
	Consultant	17	10.6
Marital status	Single	63	39.4
	Married	83	51.9
	Widow/Divorced	14	8.8
Income	Weak	13	8.1
	Good	122	76.3
	High	25	15.6
Years of experience	1-5 Years	97	60.6
	6-10 Years	41	25.6
	11-15 Years	13	8.1
	>15 Years	9	5.6

The prevalence of Trizepatide use among study participants was 54.4% (n= 87). The survey data reflects healthcare professionals' perspectives on various aspects related to Tirzepatide injection as a treatment option for type 2 diabetes. Notably, the familiarity with Tirzepatide injection varies among respondents, with 33.1% moderately familiar, 20.6% slightly familiar, and 15.6% very familiar with it. Confidence in knowledge about Tirzepatide's mechanism of action varies as well, with 26.3% moderately confident and 16.3% very confident. Additionally, awareness of indications for prescribing Tirzepatide injection varies, with 31.9% moderately aware and 16.3% very aware.

Interestingly, healthcare professionals' confidence in determining appropriate dosage varies, with 32.5% not confident at all and 13.8% very confident. Similarly, awareness of contraindications varies, with 30% not aware at all and 25.6% slightly aware. Moreover, perceptions of Tirzepatide's effectiveness also differ, with 30.6% moderately effective and 28.7% very effective. The likelihood of recommending Tirzepatide injection to other healthcare professionals also varies, with 24.4% moderately likely and 21.9% very likely. These findings underscore the diverse perspectives and levels of knowledge among healthcare professionals regarding Tirzepatide injection and its clinical application for type 2 diabetes management. The overall awareness regarding the use of Tirzepatide was 50.6% (n= 81). The detailed participants responses to survey questions is provided in the annex table.

Table 2 shows the statistical relationships between awareness and participants characteristics. Overall, there doesn't appear to be a significant association between awareness level and age,

gender, proficiency level, marital status, or years of experience. However, there is a notable association between awareness level and income (p = 0.029), with a higher proportion of participants with good income being aware compared to those with weak income.

Table 2: Relationship between awareness level and sociodemographic characteristics of study participants

Variable		Aware	Not aware	P value
Age	=<30	35	40	0.634
	31-49	42	36	
	50-60	4	3	
Gender	Male	46	41	0.322
	Female	35	38	
Proficiency level	GP	43	48	0.606
	Specialist	29	23	
	Consultant	9	8	
Marital status	Single	32	31	0.866
	Married	41	42	
	Widow/Divorced	8	6	
Income	Weak	2	11	0.029
	Good	66	56	
	High	13	12	
Years of experience	1-5 Years	45	52	0.223
	6-10 Years	21	20	
	11-15 Years	10	3	
	>15 Years	5	4	

Discussion

The findings of this study provide valuable insights into the prevalence and awareness of Tirzepatide injection among physicians in Jeddah City. The observed prevalence rate of Tirzepatide use among participants (54.4%) indicates a considerable adoption of this treatment option within the healthcare community, suggesting a growing recognition of its potential benefits in managing type 2 diabetes. However, the varying levels of familiarity and confidence among healthcare professionals regarding Tirzepatide's mechanism of action, indications, dosage, contraindications, and effectiveness underscore the need for targeted educational initiatives to bridge knowledge gaps and optimize its clinical utilization.

The significant association between income level and awareness of Tirzepatide injection is noteworthy, with participants having a higher income demonstrating greater awareness. This finding suggests that socioeconomic factors may influence healthcare professionals' access to information and resources, highlighting the importance of ensuring equitable dissemination of knowledge across different income strata. Efforts to improve awareness should prioritize reaching practitioners across all income levels to ensure uniform understanding and uptake of Tirzepatide as a treatment option.

Treatment drug monitoring (TDM) assists in ensuring a successful and secure treatment result. This research evaluated the clinical pharmacokinetics and TDM knowledge, confidence, and perception of doctors and pharmacists. A self-administered questionnaire was employed in a cross-sectional study. 322 doctors and pharmacists from 3 Kuwaiti public hospitals were polled using a stratified random sample. When analyzing the data, descriptive and comparative statistical analyses were carried out. It was determined which variables were linked to the individuals' poor knowledge and confidence levels as well as their unfavorable judgments using a multivariate logistic regression model. 88% of people responded. There was no statistically significant difference between the scores of doctors and pharmacists ($P > 0.5$) and the respondents' mean total knowledge score percentage was low overall (50.3%); 60.4% of the participants (95% confidence interval: 54.9-65.6) felt confident utilizing TDM in their practice. The majority of participants (90.1%; 95% confidence interval: 86.3-92.9) had favorable opinions of TDM. There was broad internal consensus that pharmacists should have some familiarity with TDM, should be approached by doctors in general for suggestions on how to use TDM properly, and should be able to provide pertinent information about proper TDM use. In this research, doctors and pharmacists expressed high levels of trust in and favorable impressions of TDM and its therapeutic implications. The results of the current research point to the urgent need for professional education and training in clinical pharmacokinetics, TDM, and its clinical implications via CPD programs and its incorporation into the curriculum of medical and pharmacy schools [13].

Different meta-analyses have been undertaken to examine the efficacy and safety of Tirzepatide. Sattar and collaborators, scrutinizing all studies of the SURPASS program, compared the time to first occurrence of the well-established four major adverse cardiovascular events (MACE-4; cardiovascular death, myocardial infarction, stroke, and hospitalized unstable angina) between pooled Tirzepatide groups and control groups [14]. The stratified Cox proportional hazards model was employed (fixed effect: treatment; stratification factor: trial-level cardiovascular risk) for the estimate of hazard ratios (HRs) and confidence intervals (CIs) comparing Tirzepatide to controls. They noted that, despite the beneficial benefits of Tirzepatide on a variety of CV risk variables, only the findings from the SURPASS-4 study have heretofore given data on the CV safety of the medication. After their analysis, they concluded that Tirzepatide does not increase the risk of MACE-4 in participants with T2DM (HRs comparing Tirzepatide versus controls were as follows: for MACE-4, 0.80, 95% CI, 0.57–1.11; for cardiovascular death, 0.90, 95% CI, 0.50–1.61; and for all-cause death, 0.80, 95% CI, 0.51–1.25), even if the exclusion of people with unstable cardiovascular disease (such as class IV heart failure) is a limitation [14].

Karagiannis and co-workers [15] did a meta-analysis to investigate the effectiveness and safety of Tirzepatide in T2DM. The findings with Tirzepatide indicated a dose-dependent superiority on glycemic effectiveness and body weight reduction compared to placebo, GLP-1 receptor agonists, and basal insulin. Tirzepatide was associated with an increased incidence of gastrointestinal adverse events: nausea was the most frequent event with all Tirzepatide doses, especially 15 mg (OR 5.60, 95% CI 3.12 to 10.06); Tirzepatide 15 mg was associated with higher incidences of vomiting (OR 5.50, 95% CI 2.40 to 12.59) and diarrhea (OR 3.31, 95% CI 1.40 to 7.85). The risk

of hypoglycemia did not rise with Tirzepatide. The presence of statistical heterogeneity in the meta-analyses for changes in HbA1c and body weight, the assessment of the risk of bias solely for the primary outcome, and the generalization of findings mainly to individuals with overweight or obesity and already on metformin-based background therapy were acknowledged as study limitations [15]. Another pooled analysis [16] confirmed that Tirzepatide treatment resulted in a greater lowering of HbA1c (−1.94%, 95% CI: −2.02 to −1.87), fasting serum glucose (−54.72 mg/dL, 95% CI: −62.05 to −47.39), and body weight (−8.47, 95% CI: −9.66 to −7.27); as far as the safety profile is concerned, the results of this meta-analysis were essentially consistent with those of the above-mentioned analysis conducted by Karagiannis et al. [15].

Similarly, Dutta and colleagues [17] found that individuals receiving Tirzepatide for over 1 year had a significantly greater lowering of HbA1c (−0.75%, 95% CI: −1.05 to −0.45; $p < 0.01$), fasting glucose (−0.75 mmol/L, 95% CI: −1.05 to −0.45; $p < 0.01$), 2 h post-prandial-glucose (−0.87 mmol/L, 95% CI: −1.12 to −0.61; $p < 0.01$), weight (−8.63 kg, 95% CI: −12.89 to −4.36; $p < 0.01$), body mass index (−1.80 kg/m2, 95% CI: −2.39 to −1.21; $p < 0.01$), and waist circumference (−4.43 cm, 95% CI: −5.31 to −3.55; $p < 0.01$) than individuals receiving Dulaglutide, Semaglutide, insulin degludec, or glargine. According to Guan and collaborators [18] Tirzepatide 10 and 15 mg had better antidiabetic and weight-loss effects (especially the 15 mg dose) compared to insulin (glargine or degludec) and selective GLP1 receptor agonists (Dulaglutide or Semaglutide once a week); Tirzepatide 15 mg greatly reduced glycated hemoglobin (surface under the cumulative ranking curve value, SCURA probability: 93.5%), body weight (99.7%), and fasting serum glucose (86.6%). Insulin induced fewer gastrointestinal problems (93.5%), and there was no statistical difference between GLP1-RA and Tirzepatide. They concluded that more well-designed RCTs are required to investigate its clinical efficacy with greater dosages of GLP1 receptor agonists and to definitely identify the possible cardiovascular benefits [18].

In an evaluation of the optimal dose of Tirzepatide for the treatment of T2DM using a meta-analysis and a trial sequential analysis (TSA), Tirzepatide 15 mg was superior to 10 mg and 5 mg for lowering glycemia and reducing weight; Tirzepatide 5 mg was superior to 10 mg and 15 mg (which appear to have the same effect of the 10 mg) in terms of safety [19]. In their meta-analysis of randomized clinical studies on the effectiveness and safety of Tirzepatide as a new therapy for T2DM, Permana and colleagues found that this medicine has demonstrated superiority in glycemic control and body weight reduction with a favorable safety profile in patients with T2DM [20]. Lisco et al. considered eleven clinical trials and concluded that Tirzepatide provides a weight loss that exceeds that obtained with GLP-1 receptor agonists; hence, Tirzepatide is presented as a potent tool to improve glucose control without increasing hypoglycemic risk in poorly controlled T2DM treated with basal insulin with or without other hypoglycemic oral agents with effects on body weight loss, despite the background therapy [21].

Exploring the effects of Tirzepatide on cardiovascular problems, Patoulias and co-workers performed a meta-analysis analyzing the effect of Tirzepatide on the risk of atrial fibrillation in individuals with T2DM. Pooling data from SURPASS-2 to -5, they revealed that Tirzepatide compared with placebo or an active comparator did not have a substantially different impact on

the risk of atrial fibrillation (risk ratio = 1.59; 95% CI: 0.46 to 5.47; p = 0.47) [22]. These results have to be validated in the planned SURPASS-CVOT, a major phase 3, randomized, double-blind, cardiovascular outcome study, comparing both the noninferiority and superiority of Tirzepatide versus Dulaglutide. Nevertheless, in a subsequent study analyzing eight trials, the same group evidenced that Tirzepatide resulted in a significantly reduced risk of major averse cardiovascular events by 48% compared to a control (RR 0.52, 95% CI 0.38 to 0.72); moreover, Tirzepatide displayed a significantly attenuated risk of cardiovascular death (by 49%; RR 0.51, 95% CI 0.29 to 0.89), as well as all-cause death (by 49%; RR 0.51, 95% CI 0.34 to 0.77) [23].

The study's cross-sectional design provides a snapshot of awareness and prevalence at a single point in time, limiting our ability to draw causal inferences or assess temporal trends. Future longitudinal studies could explore changes in awareness and adoption rates over time, providing a more comprehensive understanding of the evolving landscape of Tirzepatide utilization among healthcare practitioners in Jeddah City. Furthermore, while the study focused on general practitioners, exploring the perspectives of specialists and consultants could offer additional insights into the broader healthcare community's perceptions of Tirzepatide injection. Understanding the factors influencing decision-making and prescribing practices among different specialties can inform targeted educational interventions tailored to specific healthcare provider groups.

Conclusion

The study involved 160 medical practitioners with diverse backgrounds. While familiarity with Tirzepatide varied, there wasn't a significant association between awareness and demographic factors except for income. Healthcare professionals displayed differing levels of confidence and awareness regarding Tirzepatide's mechanism of action, indications, dosage, contraindications, and effectiveness. These findings highlight the necessity for targeted education to enhance awareness and confidence among healthcare professionals regarding Tirzepatide injection for type 2 diabetes management.

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Annex: Participants' responses to survey questions

Question	Frequency	Percent
How familiar are you with Tirzepatide injection as a treatment option for type 2 diabetes?		
Extremely familiar	7	4.4%
Moderately familiar	53	33.1%
Not at all familiar	42	26.3%
Slightly familiar	33	20.6%
Very familiar	25	15.6%
How confident are you in your knowledge of Tirzepatide injection's mechanism of action?		
Extremely confident	8	5.0%
Moderately confident	42	26.3%
Not confident at all	44	27.5%
Slightly confident	40	25.0%
Very confident	26	16.3%
How aware are you of the indications for prescribing Tirzepatide injection?		
Extremely aware	8	5.0%
Moderately aware	51	31.9%
Not aware at all	47	29.4%
Slightly aware	28	17.5%
Very aware	26	16.3%

Total	160	100.0%
How well-informed are you about the potential side effects associated with Tirzepatide injection?		
Extremely informed	10	6.3%
Moderately informed	46	28.7%
Not informed at all	50	31.3%
Slightly informed	28	17.5%
Very informed	26	16.3%
How often do you consider prescribing Tirzepatide injection in your clinical practice?		
Always	6	3.8%
Never	73	45.6%
Often	19	11.9%
Rarely	29	18.1%
Sometimes	33	20.6%
How confident are you in determining the appropriate dosage of Tirzepatide injection for your patients?		
Extremely confident	9	5.6%
Moderately confident	37	23.1%
Not confident at all	52	32.5%
Slightly confident	40	25.0%
Very confident	22	13.8%
How aware are you of the contraindications for using Tirzepatide injection in patients?		
Extremely aware	13	8.1%
Moderately aware	33	20.6%
Not aware at all	48	30.0%
Slightly aware	41	25.6%
Very aware	25	15.6%
To what extent do you believe Tirzepatide injection is effective in controlling blood glucose levels?		
Extremely effective	11	6.9%
Moderately effective	49	30.6%
Not effective at all	30	18.8%
Slightly effective	24	15.0%
Very effective	46	28.7%
How well-informed are you about the potential drug interactions involving Tirzepatide injection?		
Extremely informed	9	5.6%
Moderately informed	32	20.0%
Not informed at all	63	39.4%

Slightly informed	35	21.9%
Very informed	21	13.1%
How often do you consult clinical guidelines or reference materials when considering prescribing...?		
Always	12	7.5%
Never	47	29.4%
Often	35	21.9%
Rarely	33	20.6%
Sometimes	33	20.6%
How confident are you in explaining the benefits of Tirzepatide injection to your patients?		
Extremely confident	9	5.6%
Moderately confident	38	23.8%
Not confident at all	48	30.0%
Slightly confident	37	23.1%
Very confident	28	17.5%
How familiar are you with the dosing guidelines for Tirzepatide injection?		
Extremely familiar	8	5.0%
Moderately familiar	40	25.0%
Not familiar at all	54	33.8%
Slightly familiar	34	21.3%
Very familiar	24	15.0%
How aware are you of the potential long-term effects of Tirzepatide injection on patient outcomes?		
Extremely aware	9	5.6%
Moderately aware	37	23.1%
Not aware at all	49	30.6%
Slightly aware	39	24.4%
Very aware	26	16.3%
How often do you seek additional information or attend educational programs regarding Tirzepatide...?		
Always	9	5.6%
Never	47	29.4%
Often	26	16.3%
Rarely	36	22.5%
Sometimes	42	26.3%
How likely are you to recommend Tirzepatide injection to other healthcare professionals as a...?		
Extremely likely	14	8.8%
Moderately likely	39	24.4%

Not likely at all	40	25.0%
Slightly likely	32	20.0%
Very likely	35	21.9%