RESEARCH ARTICLE

The efficacy and safety of once weekly injectable semaglutide (Ozempic) among patients with Type 2 diabetes in tertiary care hospital: A Retrospective Study

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Abstract

Objective: To assess the efficacy and safety of weekly injectable semaglutide in obese type 2 diabetes mellitus patients.

Method: The retrospective, cross-sectional study was conducted at the Endocrinology Department, Shifa International Hospital, Islamabad, Pakistan, and comprised data from January 1, 2021, to January 31, 2023, of adult type 2 diabetes mellitus patients of either gender who had been prescribed weekly injectable semaglutide. Efficacy assessment was based on measuring the changes in glycated haemoglobin, bodyweight and body mass index at 3, 6, 9 and 12 months. The incidence of adverse events was also noted. Data was analysed using SPSS 26.

Results: Of the 102 patients, 57(56%) were females and 45(44%) were males. Overall mean age was 50±11.17 years, and the mean diabetes duration was 8.13±6.67 years. Mean values for glycated haemoglobin, bodyweight and body mass index were significantly different at 3, 6, 9 and 12 months post-intervention compared to baseline. Nausea was reported by 26(25.5%) patients. The most common reason for stopping semaglutide was no further benefits in 37(47%).

Conclusion: Injectable semaglutide was found to be quite effective in managing type 2 diabetes mellitus. The treatment was well tolerated, establishing semaglutide as a valuable addition to diabetes care in Pakistan.

Keywords: Semaglutide, Type 2 diabetes mellitus, Obesity. (JPMA 76: 709; 2026)

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Introduction

Type 2 diabetes mellitus (T2DM) has a complex aetiology, leading to a number of consequences that shorten life expectancy and reduce the quality of life (QOL).[1] Body mass index (BMI) >25kg/m^2 raises the risk of T2DM dramatically, and by 2025, obesity-related diabetes has been estimated to affect 300 million people worldwide.[2] Therefore, it is important to use treatment regimens that address both glycaemic management as well as reducing diabetic complications when managing T2DM patients.[3]

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs), synthetic analogues of the body's natural incretin hormone, efficiently treat diabetes while also providing pleiotropic benefits, such as weight-loss and lower cardiovascular risk.[4] These medicines improve glycaemic control by increasing insulin secretion, decreasing glucagon, and slowing stomach motility. Furthermore, they enhance satiety, and reduce food intake via receptor-dependent and independent pathways.[5]

Semaglutide, a once-weekly human GLP-1 analogue, was linked to better, clinically significant improvements in bodyweight (mean reduction of up to 6.5kg) and glycaemic control (mean reduction in glycated haemoglobin [HbA1c] of up to 1.8% point across the trials) compared to placebo or active comparators in randomised controlled trials (RCTs), with safety profile similar to other GLP-1 agonists.[6,7]

There is a scarcity of reliable evidence endorsing the advantages of semaglutide in Pakistani cohorts.[8] The current study was planned to fill the gap on literature by assessing the effectiveness and safety of weekly semaglutide in T2DM patients.

Materials and Methods

The single-centre, observational, retrospective study was conducted at the Endocrinology Department, Shifa International Hospital, Islamabad, Pakistan, and comprised data from January 1, 2021, to January 31, 2023. After approval from the institutional ethics review committee, data was retrospectively collected from the electronic medical record system from 1st July 2023 and December 2023.

Data was collected for all patients aged >18 years diagnosed with T2DM for at least 3 months who had been prescribed semaglutide as part of their treatment in line with standard clinical practice, and had been taking semaglutide for at least 3 months. Patients with type 1 diabetes, history of acute pancreatitis, liver disease, an

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estimated glomerular filtration rate (eGFR) of <30ml/min, and those who had used semaglutide intermittently.

Baseline was considered to be the first visit on which the patient had received the semaglutide (Ozempic) injection, and follow-up was done at 3, 6, 9 and 12 months.

Data collected included age, gender, duration of diabetes, recorded baseline doses of semaglutide, oral hypoglycaemic agents (OHAs), insulin therapy, and other GLP-1 agonists as well as HbA1c, weight and BMI. Additionally, side-effects and reasons for discontinuation of semaglutide were also documented.

Primary endpoint was the change in mean HbA1c, weight and BMI values from the baseline to 12 months. Secondary endpoints included change in the dose of OHAs and insulin from baseline till the last follow-up, along with evaluation of comparative change in mean HbA1c, weight and BMI from baseline to 12 months in patients who were using GLP-1 RA other than semaglutide at baseline.

The sample size for the study was 102 subjects. As this was a real-world retrospective study, the sample size was not pre-calculated; participants were selected based on predefined inclusion and exclusion criteria. Data was analysed using SPSS 26. Descriptive statistics of mean ± standard deviation, and unit reduction for all the variables at every time-point were noted. The outcomes were presented as estimated mean differences from baseline (T0), along with their corresponding standard deviation. Intragroup comparisons were done using a non-parametric test (ANOVA Paired sample *t*-test) for related samples. P<0.05 was taken as statistically significant.

Results

Of the 102 patients, 57(56%) were females and 45(44%) were males. Overall mean age was 50±11.17 years, and the mean diabetes duration was 8.13±6.67 years. Baseline mean HbA1c was 8.28±1.78%, mean bodyweight was 99.64±16.22kg, and mean BMI was 36.78±6.06kg/m^2.

Of the total, 71(69.6%) patients had no previous experience with GLP-1 RAs, while 31(30.4%) had received different forms of GLP-1 agonists;5(4.9%) were on liraglutide (Victoza 1.2mg daily), 4(3.9%) on liraglutide (Victoza 1.8mg daily), 3(2.9%) on liraglutide (Saxenda 1.8mg daily), and 19(18.6%) on Dulaglutide (Trulicity 1.5mg weekly).

The patients who were already on different GLP-1 agonists before switching to semaglutide were given different starting doses of semaglutide. Among the patients initiated on semaglutide at a weekly dose of 0.25mg, 71(95.9%) were treatment-naïve, while 3(4.05%) had previously been on Victoza 1.2mg daily. Those who were started directly on the 0.5mg weekly dose included 2(13.3%) patients previously on liraglutide 1.2mg, 4(26.6%) on liraglutide 1.8mg, 3(20%) on Saxenda 1.8mg, and 6(40%) on Trulicity 1.5 mg weekly. Additionally, among those who were titrated to a 1mg dose of semaglutide, 13(100%) patients had been switched from prior treatment with Trulicity 1.5mg weekly (Table 1).

Changes in HbA1c, bodyweight and BMI over the study period were significant (Table 2). Statistically significant reduction was noted in the dose of Metformin (1588±658.48mg to 1511.39±727.87mg; p=0.01) and insulin (64.51±42.78 units at baseline to 55.85±33.56 units; *p*=0.006). No significant trends were observed in the doses of other hypoglycaemic agents, including sodium-glucose co-transporter 2 (SGLT2) inhibitors, pioglitazone and sulfonylureas (*p*>0.05).

Table-1: Demographic characteristic and semaglutide dosage (n=102).

Characteristics	Mean± SD
Mean Age (years)	50±11.17
Duration of Diabetes(years)	8.13±6.67
HBA1c at baseline (mg/dl)	8.28±1.78
Weight at Baseline (kg)	99.64±16.22
BMI Baseline (kg/m^2)	36.78±6.06
	n (%)
Dose at Baseline	
0.25 mg	74 (72.5)
0.5 mg	15 (14.7)
1 mg	13 (12.7)
Dose at End of Study	
0.25 mg	1 (1)
0.50 mg	15 (14.7)
0.75 mg	1 (1)
1.00 mg	83 (81.4)
1.50 mg	1 (1)
2.00 mg	1 (1)

HbA1c: Glycated haemoglobin; BMI: Body mass index; SD: Standard deviation.

Table-2: Changes in primary endpoints.

Change	Visits	n	Mean±SD	Unit Reduction	*p*-value
HbA1c (mg/dl)	Baseline	102	8.28±1.78		
	3 months	54	6.77±0.94	1.50	0.00
	6 months	77	7.01±1.21	1.27	0.00
	9 months	23	6.75±1.32	1.52	0.001
	12 months	13	6.86±1.07	1.42	0.007
Weight (kg)	Baseline	102	99.64±16.22		
	3 months	54	94.33±17.50	5.31	0.000
	6 months	77	94.29±15.80	5.35	0.000
	9 months	23	91.69±15.76	7.94	0.000
	12 months	13	94.69±13.56	4.94	0.001
BMI (kg/m^2)	Baseline	102	36.78±6.06		
	3 months	54	35.45±6.29	1.32	0.000
	6 months	77	34.95±5.91	1.83	0.000
	9 months	23	33.14±6.20	3.64	0.000
	12 months	13	34.45±5.55	2.33	0.001

p<0.05=significant ANOVA Paired sample t-test; HbA1c: Glycated haemoglobin, BMI: Body mass index, SD: Standard deviation.

Table-3: Reasons for discontinuation.

	3 Months	6 Months	9 Months	12 Months
Total Patients followed	54	77	23	13
Patients That stopped semaglutide	11	54	10	4
Reasons of Discontinuation				
No further benefits (Reduction in weight/HbA1C or both)	3	25	7	2
No benefits (No reduction in weight/HbA1C or both)	1	15	2	1
Side effects	6	5	1	0
Others*	1	9	0	1

* Pregnancy 2, Fasting 2, Non-availability 4, Financial issues 1, Bariatric surgery 2; HbA1c: Glycated haemoglobin.

In patients with prior GLP-1 RA treatment, HbA1c decreased from 7.69% to 7.02% at 3 months (0.66-unit reduction; p=0.019) and to 6.96% at 12 months (0.72-unit reduction; p=0.172). Bodyweight dropped significantly by 7.36kg at 9 months (p=0.041), but increased by 2.77kg at 12 months (p=0.027). BMI showed an initial improvement, peaking at 6 months with a 0.90-unit reduction (p=0.021), but results were not significant over the entire period (p>0.05). In GLP-1 RA-naïve patients, HbA1c decreased from 8.54% to 6.77% at 3 months (1.50-unit reduction; p<0.001) and to 6.75% at 9 months (1.52-unit reduction; p=0.001). Bodyweight dropped by 5.31kg at 3 months (p<0.001) and 7.94kg at 9 months (p<0.001), while BMI decreased from 36.78kg/m^2 to 33.14kg/m^2 over the same period (p<0.001).

A total of 79(77%) patients discontinued semaglutide during the study period for various reasons. Among these, 37(47%) stopped treatment after achieving the desired results and choosing not to continue, while 19(24%) discontinued due to a lack of perceived benefit. Gastrointestinal side-effects accounted for 12(15.1%) discontinuations, and 11(14%) were attributed to other uncommon reasons, such as pregnancy, fasting or bariatric surgery (Table 3).

Nausea was the most common side-effect, affecting 26(25.5%) patients, followed by vomiting 13(12.7%), diarrhoea 9(8.8%), flatulence 5(4.9%), constipation 3(2.9%) and abdominal pain 2(2%). There were no reported cases of hypoglycaemia, cholelithiasis, acute pancreatitis or dizziness.

Discussion

The current study demonstrated the significant impact that weekly injectable semaglutide could have on glycaemic control and weight loss in a real-world clinical setting from Pakistan. The results are consistent with prior research.[9]

The current study validated the efficacy and tolerability of once weekly (OW) semaglutide in a high cardio vascular (CV) risk group of patients with uncontrolled T2DM. Starting OW semaglutide resulted in significant reduction in HbA1c (approximately 1.52% drop after 9 months). The outcome was consistent with earlier trials in patients receiving 0.5mg.[6,10-13] The reduction in HbA1c noted in the current cohort is, which was a little more significant at the 9-month follow-up, may have been coincidental and simply represent better adherence due to the more vigilant monitoring that would happen in a tertiary care setting. What is significant about these findings is that they are clinically meaningful because the clinical benefit of a decrease by 1% reduction in HbA1c has been associated with significant reductions in microvascular complications, including retinopathy and nephropathy.[14]

The incidence of weight loss and BMI in the current study, with a maximum loss of 7.94kg and 3.64kg/m^2 by the 9th month further cemented the efficiency of semaglutide in obesity management in patients of T2DM. Prior studies have reported weight loss around 6-10% in T2DM patients using semaglutide.[15] It is therefore particularly useful in a population in whom obesity plays a major role in insulin resistance and cardiovascular risk. Greatest weight loss occurred at 9 months, concurrent with the peak reduction in HbA1c, indicating that the dual action of semaglutide on glycaemic control and weight management remains strong during the first year of treatment. The gradual decline of BMI in the cohort is a reflection of the effects of semaglutide on adipose tissue as well as its effect on the regulation of appetite that has been reported in clinical trials.[16-19]

There was also a decline in the need for concomitant anti-diabetes therapy in the form of Metformin and insulin. This finding was in line with a larger body of literature that depicts GLP-1 agonists, such as semaglutide, which minimise the need for continuing the maintenance of insulin therapy due to their insulinotropic effects.[20]

Concerning safety, gastrointestinal side-effects found in the current study, such as nausea (25.5%), are consistent with clinical trials and a meta-analysis.[21] However, the side-effects were mild and well tolerated in the current study. Also, no severe hypoglycaemic episodes occurred, which further supported semaglutide's safety profile. The low discontinuation rate due to adverse events also alluded to the fact that semaglutide was not only effective, but also acceptable for long-term use in Pakistani population.

The current study has limitations of being a retrospective study owing to which data collection and patient selection had inherent biases. Besides, data related to a single centre, and the sample size was relatively small with variable number of patients at each follow-up, affecting the generalisability of the findings. Larger, multi-centre studies are needed to validate the current findings, and to explore

long-term benefits of semaglutide in diverse populations.

However, the current study is the first from Pakistan evaluating the effects of semaglutide over a one-year period. The study also compared outcomes between treatment-naïve patients and those with prior exposure to other GLP-1 agonists. Additionally, the study analysed reasons for discontinuing semaglutide at various intervals.

Conclusion

Injectable semaglutide, administered once weekly, was found to be quite effective in managing T2DM in a real-life Pakistani scenario. Patients attained a profoundly decreased level of HbA1c over 12 months, with a maximum reduction of 1.52% observed at 9 months. Additionally, semaglutide triggered meaningful weight loss, up to 7.94 kg, along with a reduction in BMI. The treatment was well tolerated, with few adverse events, primarily nausea, and no severe hypoglycaemic episodes were reported.

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MJ: Concept, design, data acquisition, drafting and revision.
UYR: Concept, design and supervision.
OI: Final approval and agreement to be accountable for all aspects of the work.
IF: Data analysis, interpretation, revision, proof reading and final approval.