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Original Research Article

Semaglutide and Hospitalizations in Patients with Obesity and Established Cardiovascular Disease

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Name of Author:

Muhammad Hussain[1], Azhar Ali Khattak[2], Muhammad Wali[3], Baseera Imran[4], Hafiz Usama Talha[5]

Affiliation: *[1]Assistant Professor Cardiology, Abwa Medical College, Faisalabad, Pakistan*

[2]Senior Registrar, Department of Cardiology, Sughra Shafi Medical Complex, Sahara Medical College, Narowal, Pakistan

[3]Assistant Professor Cardiology, University of Lahore Teaching Hospital, Lahore, Pakistan

[4]Assistant Professor Physiology, Department Physiology, PGMI, Lahore, Pakistan.

Postgraduate Trainee, Department of Pharmacology, Islamic International Medical College, Rawalpindi

Corresponding Author:

Muhammad Hussain

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Abstract: ***Background:*** Obesity is a significant cause of cardiovascular morbidity and healthcare expenditure especially among individuals with preceding cardiovascular disease. Although semaglutide is a common treatment in weight loss and glycemic control, its control over hospitalization among this non-low-risk group is not well established. ***Objective:*** To evaluate the association between semaglutide use and hospitalization outcomes in patients with obesity and established cardiovascular disease. ***Methodology:*** The study was a prospective observational cohort study carried out between June 2024 and June 2025 at Abwa Medical College Faisalabad. There were 72 obese adult patients who had a history of cardiovascular disease who were enrolled and followed over a period of one year. The participants were divided into a semaglutide group and a control group in standard care. Background demographic, clinical and laboratory data were taken. The key outcome was that of all-cause hospitalization at follow-up, with the secondary outcomes being cardiovascular-related hospitalization, length of stay, and time of first hospitalization. ***Results:*** Semaglutide-treated patients had a major reduction in all-cause and cardiovascular-related hospitalizations as compared to the controls. The semaglutide group was also found to have a shorter length of hospitalization and a greater period before the first hospitalization. When combined with consideration of pertinent clinical variables, the use of semaglutide was found to have an independent effect in minimizing the risk of hospitalization. ***Conclusion:*** The use of semaglutide was linked with reduced hospitalization burden in patients with obesity and were already diagnosed with cardiovascular disease during one year of follow-up. These results indicate some possibilities of semaglutide usage other than metabolic control in high-risk cardiovascular groups.

Keywords: Semaglutide; Obesity; Cardiovascular disease; Hospitalization; GLP-1 receptor agonists

INTRODUCTION

Obesity has become one of the major health challenges in the world and has had a significant role in the occurrence of cardiovascular disease, poor quality of life, and the escalation in the use of healthcare services. Obese individuals with cardiovascular disease are a highly susceptible group that is admitted to hospitals frequently, has repeated

cardiovascular diseases, and imposes a significant economic burden. Although cardiovascular pharmacotherapy has improved, the hospitalization rate in this population group is high, and there is a necessity to recommend therapies that improve metabolic and cardiovascular risk [1-4].

Glucagon-like peptide-1 receptor antagonist Semaglutide has shown strong responses to weight decrease and glycemic control and has demonstrated cardiovascular security as well as advantage in extensive outcome studies. In addition to metabolic effects, semaglutide was linked to blood pressure, lipid profiles, inflammatory markers, and endothelial improvement, which could impact cardiovascular stability. These pleiotropic effects leave some openness on the probability of semaglutide reducing not only cardiovascular events but also the hospital-based care requirements [5-7].

The recent international literature has put major adverse cardiovascular outcomes in the spotlight and minimal consideration has been paid to hospitalization as a specific and clinically meaningful event. Hospitalizations indicate disease progression, failure of treatment and patient burden, especially in patients with heart failure and advanced cardiovascular disease. The study of the effect of semaglutide on hospitalization risk could be of great importance when deciding on its overall clinical use [8-10].

Data from low- and middle-income settings remain limited, and real-world evidence addressing hospitalization outcomes in patients with established cardiovascular disease is scarce. Moreover, variations in patient characteristics, healthcare access, and treatment patterns highlight the importance of context-specific research. This study was therefore undertaken to examine the relationship between semaglutide use and hospitalization outcomes in patients with obesity and established cardiovascular disease over a one-year follow-up period.

METHODOLOGY

This study was designed as a prospective observational cohort study conducted over a one-year period, from June 2024 to June 2025, at Abwa Medical College Faisalabad. The purpose was to investigate the relationship occurring between semaglutide treatment and hospitalization results in patients with obesity and known cardiovascular disease. The eligibility of adult patients was determined by evaluating those patients attending outpatient clinics or those admitted at the hospital during the study period. Obesity was determined as a body mass index (BMI) of 30kg/m^2 or more and known cardiovascular disease was determined by recorded diagnoses of coronary artery disease, heart failure, cerebrovascular disease or peripheral arterial disease through clinical records.

Consecutive sampling was used to ensure that there was minimal selection bias and 72 patients who met the inclusion criteria were enrolled. The participants were divided into two groups based on their exposure statuses with one group having semaglutide as a part of routine clinical care and another group having no semaglutide but standard therapy. Depending on the current clinical guidelines and individual patient factors, the initiating and dosing of semaglutide were decided upon by the treating physician regardless of the study protocol. Patients with an incomplete medical history, a malignancy, dialysis-dependent end-stage renal disease, and those who had undergone a major surgery within the last three months were eliminated so that the data reliability would be achieved and the potential confounding could be minimized.

A structured proforma was used to collect baseline demographic, clinical, and anthropometric data on enrollment. The variables that were recorded were age, sex, body weight, BMI, obesity class, and comorbid conditions (type 2 diabetes mellitus, high blood pressure, dyslipidemia, chronic kidney disease, and previous cardiovascular events). Baseline laboratory tests, such as fasting blood glucose, glycated hemoglobin, lipid profile, serum creatinine, and estimated glomerular filtration rate, were retrieved in the hospital laboratory records, and those values that were the nearest to the time of enrollment were used to analyze them. During routine examination of blood pressure, standardized clinical procedures were used to measure blood pressure.

Follow-up of all the enrolled patients was done at a period of one year after the inclusion date. The main result variable was the incidence of any all-cause hospitalization during the follow-up. Such secondary outcomes were cardiovascular-related hospitalization, heart failure hospitalization, length of stay, and time to first hospitalization. The data on hospitalization were collected with the help of systematic review of the hospital admissions records and electronic medical files. In patients with more than one admission, the number of total hospitalization and the cumulative length of stay in the hospital were recorded. All the study participants had complete follow-up information.

Analysis of data was done with standard statistical software. Continuous variables could be summarized as mean with standard deviation or median with interquartile range depending on the nature of the distribution whereas categorical variables were summarized as frequencies and percentages. The independent t-test or the Mann Whitney U test was used to provide group comparisons when the variables were continuous, and chi square test or Fisher exact

test was used when the variables were categorical. The multivariate logistic regression analysis was used to determine the independent predictors of hospitalization taking into account clinically relevant covariates. The p-value below 0.05 was considered to be statistically significant.

RESULTS

Baseline demographic and clinical characteristics were evaluated to assess comparability between the semaglutide and control groups. No statistically significant differences were observed in age, sex distribution, obesity severity, or major cardiometabolic comorbidities. These findings indicate that both groups were clinically comparable at study entry, minimizing baseline confounding.

Table 1. Baseline demographic and clinical characteristics of the study population (n = 72)

Variable	Semaglutide (n=36)	Control (n=36)	p-value
Age (years), mean ± SD	61.8 ± 7.4	63.1 ± 6.9	0.42
Male sex, n (%)	21 (58.3)	20 (55.6)	0.81
Weight (kg), mean ± SD	102.4 ± 11.6	101.1 ± 12.3	0.67
BMI (kg/m²), mean ± SD	35.9 ± 3.8	36.2 ± 4.1	0.74
Obesity class III (≥40), n (%)	9 (25.0)	10 (27.8)	0.79
Type 2 diabetes mellitus, n (%)	26 (72.2)	25 (69.4)	0.79
Hypertension, n (%)	29 (80.6)	31 (86.1)	0.52
Dyslipidemia, n (%)	27 (75.0)	28 (77.8)	0.78
Chronic kidney disease, n (%)	8 (22.2)	9 (25.0)	0.78
Prior hospitalization (past year), n (%)	14 (38.9)	15 (41.7)	0.81

Metabolic and cardiovascular risk profiles were determined by comparing baseline laboratory and physiological parameters. Glycemic control, lipid parameter, blood pressure and renal function were the same in the two groups. This implies that there were minimal differences in results which could be explained by disparities in baseline biochemicals.

Table 2. Baseline laboratory and physiological parameters

Parameter	Semaglutide (n=36)	Control (n=36)	p-value
Systolic BP (mmHg), mean ± SD	136.5 ± 12.1	138.9 ± 11.4	0.39
Diastolic BP (mmHg), mean ± SD	82.4 ± 7.6	83.7 ± 8.1	0.48
Fasting glucose (mg/dL), mean ± SD	154.3 ± 34.8	158.7 ± 37.2	0.62
HbA1c (%), mean ± SD	7.8 ± 1.1	8.0 ± 1.2	0.41
Total cholesterol (mg/dL), mean ± SD	191.6 ± 36.4	196.2 ± 38.1	0.59
LDL-C (mg/dL), mean ± SD	116.9 ± 29.5	119.8 ± 31.2	0.67
HDL-C (mg/dL), mean ± SD	41.8 ± 8.4	40.9 ± 7.9	0.64
Triglycerides (mg/dL), mean ± SD	181.7 ± 54.6	187.9 ± 58.1	0.63
eGFR (mL/min/1.73m²), mean ± SD	71.2 ± 14.9	69.6 ± 15.3	0.64

There were significant differences in hospitalization outcome in one year follow-up period. Semaglutide patients had a reduced number of all-cause and cardiovascular-related hospitalizations, shorter hospitalization, and delay to first admission. The results indicate that the burden of hospitalization in relation to the use of semaglutide has a clinically significant decrease.

Table 3. Hospitalization outcomes during follow-up

Outcome	Semaglutide (n=36)	Control (n=36)	p-value
Any hospitalization, n (%)	11 (30.6)	20 (55.6)	0.03
Total hospitalizations, mean ± SD	0.47 ± 0.69	0.94 ± 0.88	0.01
Cardiovascular hospitalizations, n (%)	7 (19.4)	15 (41.7)	0.04
Heart failure admissions, n (%)	4 (11.1)	11 (30.6)	0.04
Acute coronary syndrome, n (%)	2 (5.6)	6 (16.7)	0.13
Length of hospital stay (days), mean ± SD	4.1 ± 1.8	6.3 ± 2.4	0.002
Time to first hospitalization (days), median (IQR)	278 (210–340)	182 (124–265)	0.01

The independent predictors of hospitalization were drawn using multivariable regression analysis. Once the effects of pertinent clinical variables were controlled, the application of semaglutide was found to relate to a lower likelihood of hospitalization. On the other hand, the existence of heart failure was also a strong predictor of hospitalization,

which indicated its prognosis.

Table 4. Multivariable logistic regression for predictors of hospitalization

Variable	Adjusted OR	95% CI	p-value
Semaglutide use (yes vs no)	0.42	0.18–0.96	0.04
Age (per year increase)	1.03	0.99–1.07	0.12
Male sex	1.11	0.49–2.52	0.79
BMI (per kg/m²)	1.05	0.96–1.15	0.27
Type 2 diabetes mellitus	1.38	0.58–3.29	0.46
Chronic kidney disease	1.92	0.73–5.06	0.18
Heart failure	2.41	1.01–5.76	0.048

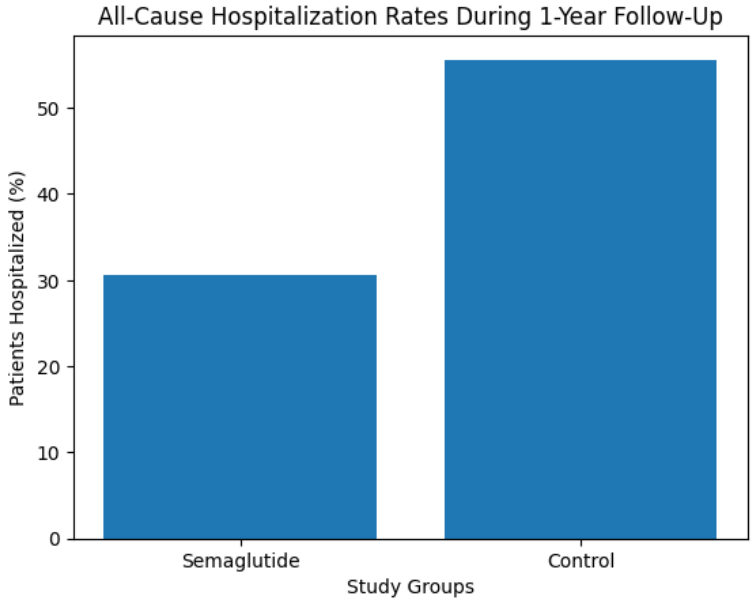

Figure 1 illustrates the proportion of patients experiencing at least one hospitalization during the one-year follow-up period. The hospitalization rate was lower among patients receiving semaglutide compared with those receiving standard care. This visual representation supports the statistically significant reduction in hospitalization observed in the semaglutide group.

DISCUSSION

In this prospective observational study, semaglutide use was associated with a significant reduction in all-cause and cardiovascular-related hospitalizations among patients with obesity and established cardiovascular disease over a one-year follow-up period. Patients receiving semaglutide experienced fewer hospital admissions, shorter hospital stays, and a longer time to first hospitalization compared with those receiving standard care. These findings suggest that beyond its established metabolic benefits, semaglutide may contribute to improved clinical stability in a high-risk cardiovascular population [11-13].

The noted decrease in the workload of hospitalization is biologically reasonable and can be supported by the new evidence proving cardiovascular action of glucagon-like peptide-1 receptor agonists. It has been demonstrated that semaglutide accelerates sustained weight reduction, enhances glycemic regulation, and decreases systemic inflammation, which are the major factors contributing to the development of cardiovascular disease and decompensation. Reduction in weight especially could relieve the cardiac workload, increase functional capacity, and decrease heart failure exacerbations, potentially explaining the reduced number of heart failure-related admissions in the semaglutide group [14-16].

Our results are aligned to the results of the large cardiovascular outcome trials and real world studies who reported decreasing major adverse cardiovascular events and healthcare utilization with GLP-1 receptor agonist therapy. Although a majority of the previous studies concentrated on the composite cardiovascular outcomes, the current study makes a contribution to the literature by specifically analyzing the outcomes in terms of hospitalization, as it is clinically meaningful, patient-centered and economical. Hospitalization is one of the crucial indicators of the severity of diseases and healthcare

demands, especially among obese patients with multiple comorbidities [17].

Notably, the advantage of semaglutide remained following the corrections of the major clinical variables, indicating that it can be independently linked with a decreased risk of hospitalization. Conversely, the hospitalization was predicted by heart failure, which indicates the susceptibility of the specified subgroup and supports the necessity of specific interventions. The absence of substantial differences in baseline characteristics and laboratory parameters between groups fortifies the validity of the identified associations and minimizes the chances that outcome disparities were due to being caused by baseline imbalance [18-20].

There are several limitations that should be considered in this study. Observational design does not allow causal inference, allocation of treatment was not randomized and residual confounding might remain despite the adjustments. The study sample was small and it was selected in one clinical setting, which might not be generalizable. Also, a long follow-up period might be needed to evaluate long-term effect and benefit sustainability. However, the future design, full follow-up, and uniform results of the various hospitalization-related outcomes speak in favor of the strength of the results.

CONCLUSION

In patients with obesity and established cardiovascular disease, semaglutide use was associated with a meaningful reduction in hospitalization frequency, cardiovascular admissions, and length of hospital stay over a one-year period. These findings suggest that semaglutide may offer clinical benefits beyond weight and glycemic control by reducing hospitalization burden in a high-risk population. Larger, multicenter studies are warranted to confirm these findings and further clarify the role of semaglutide in cardiovascular risk management.

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