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Trends in weight change pattern among adults with type 2 diabetes mellitus using dapagliflozin 10mg and Semaglutide 1mg in King Abdulaziz Medical City, Riyadh, Saudi Arabia

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ABSTRACT

Diabetes is a common disease characterized by impaired glycemic control in the body. We used a retrospective, chart review study design to collect the A1c readings in patients using Dapagliflozin 10mg. The total sample size was 107 participants. 57 participants were on Dapagliflozin, 33 on Semaglutide, and 17 were on a combination of Semaglutide and Dapagliflozin. Weight significantly decreased in participants using Dapagliflozin and Semaglutide combination ($p<0.001$) compared to those using Semaglutide alone ($p<0.001$). Additionally, HbA1c significantly decreased among participants using Dapagliflozin and Semaglutide ($p<0.001$) and those using Dapagliflozin alone ($p<0.001$). Even though SGLT-2 inhibitors weakly reduce HbA1c, we have found in our study that Dapagliflozin has significantly decreased A1c in addition to a reduction in weight especially among females.

Keywords: Type 2 diabetes mellitus, hba1c, semaglutide, dapagliflozin, sgl-2 inhibitors

1. INTRODUCTION

Diabetes is a worldwide disease characterized by dysregulate glycemic control in the blood and related organs (American Diabetes Association, 2023). In terms of its laboratory definitions, high glycemic levels are any fasting levels greater than or equal to 126 mg/dl, random blood glucose greater than or equal to 200 mg/dl,

or A1c level greater than or equal to 6.5%, while a normal blood glucose level is anything lower than these cutoffs with the exception or pre-diabetes state (ElSayed et al., 2023). In terms of pharmacological management, there are mainly 2 ways of treatment, either oral or injectable medications. Oral medication options are wide and include old commonly used Sulfonylureas and newer agents such as the class of Sodium-Glucose Transporter Protein 2 inhibitors (SGLT-2). Injectable agents include insulin and Glucagon Like Peptide-1 Receptor agonists (GLP-1).

These oral and injectable agents vary in terms of their efficacy and side effect/safety profiles. Efficacy as mentioned previously vary between oral agents. Furthermore, efficacy is mainly measured by degree of a1c reduction. For example, Sulfonylureas whether started as monotherapy or add-on therapy lowered a1c by a range of 1-2% from the baseline compared to placebo (Hirst et al., 2013). SGLT-2 agent Empagliflozin, on the other hand, decreases a1c by 0.7-0.9% from the baseline (Zimmermann, 2016). Locally in Saudi Arabia, physicians vary in their choice of first and second-line oral or injectable hypoglycemic agents for the treatment of their patients with type 2 diabetes mellitus. The DISCOVER study was a prospective study over 3 year-period reported physician's choice of hypoglycemic agents in many countries including Saudi Arabia (Al-Rubeaan et al., 2020).

Most commonly prescribed agents were Metformin, Gliclazide, and Glibenclamide, respectively (Al-Rubeaan et al., 2020). Although not commonly used as per this study, SGLT-2 inhibitors and GLP-1 agonists showed good efficacy and safety profiles as reported by many studies including a large study done in Saudi Arabia by (Butt et al., 2023). Given that not so many studies highlighted efficacy of SGLT-2 agent Dapagliflozin and GLP-1 Agonist Semaglutide in Saudi Arabia and no studies done in NGHHA, Riyadh, we aim to investigate the efficacy of Semaglutide 1mg subcutaneous injection and Dapagliflozin 10mg in terms of weight reduction within 1 year duration in patients treated in National Guard Hospital, Riyadh, Saudi Arabia.

2. MATERIALS & METHODS

This study implemented a retrospective, chart review study design and a non-probability convenient sampling technique to collect the weight change patterns in patients using Dapagliflozin 10mg and Semaglutide 1mg subcutaneous injection in combination or alone before and after starting these medications. Included patients were those who started these medications from period of 1/1/2023 and reviewed their charts until 1/1/2024 to check for weight change patterns. Data was collected and cleaned in an Excel sheet and then imported to R software (version 4.2.2).

The normality of data was assessed using a histogram and the Shapiro-Walik test. Continuous variables were presented in median and interquartile ranges, while categorical were presented in numbers and percentages. Wilcoxon rank-sum test was used to assess the association between changes in weight and demographic data of participants. A paired Wilcoxon rank sum test was used to assess the significance of change in weight before and after using the medication. A p-value of less than 0.05 was considered significant.

3. RESULTS

The study included 107 participants with a median age of 57 years (interquartile range 48-64). Of these, 63% were female. Only 6.5% reported having side effects. Regarding complications of diabetes mellitus, 26% experienced complications. Regarding medication, 53% were on Dapagliflozin 10mg alone, 31% on Semaglutide 1mg subcutaneous injection alone, and 16% were on a combination of Semaglutide 1mg subcutaneous injection and Dapagliflozin 10mg orally. The median weight before intervention was 90 kg (interquartile range 82-109) and 90 kg after intervention (interquartile range 79-100) as seen in (Table 1).

Table 1 Demographic data of participants

Characteristic	N = 1071
Age	57 (48, 64)
Gender	
Female	67 (63%)
Male	40 (37%)
Side effects	
No	100 (93%)
Yes	7 (6.5%)

Complications of diabetes mellitus	
No	79 (74%)
Yes	28 (26%)
Medication	
Dapagliflozin 10mg oral	57 (53%)
Semaglutide 1mg subcutaneous injection	33 (31%)
Semaglutide and Dapagliflozin combination	17 (16%)
Weight before (kg)	90 (82, 109)
Weight after (kg)	90 (79, 100)

N= number

1= Median (Interquartile range)

There was no significant association between change in weight among Semaglutide and Dapagliflozin combination group and age, gender and presence of complications of diabetes mellitus as seen in (Table 2). Similarly, change in weight among Semaglutide alone group was also not significantly associated with age, gender and presence of complications of diabetes mellitus as seen in (Table 3). We have found that there was a significant decrease in weight among participants using Dapagliflozin and Semaglutide combination group ($p < 0.001$) and Semaglutide alone group ($p < 0.001$), with a higher decrease seen in the Dapagliflozin and Semaglutide combination group.

Table 2 Association between change in weight among Semaglutide and Dapagliflozin combination group and demographic data

Characteristic	N = 1071	p-value ²
Age	-	0.3
20-52	-7.3 (-8.0, -5.0)	-
53 and above	-1.0 (-4.0, 2.0)	-
Gender	-	0.8
Female	-2.0 (-5.0, 0.5)	-
Male	-6.6 (-8.0, 0.0)	-
Complications of DM	-	0.2
No	-1.0 (-7.3, 1.0)	-
Yes	-12.0 (-16.0, -8.0)	-

N= number

1= Median (Interquartile range)

2= P-value computed using Wilcoxon rank sum test

Table 3 Association between change in weight among Semaglutide alone group and demographic data

Characteristic	N = 331	p-value ²
Age	-	0.4
20-52	-4 (-5, -1)	-
53 and above	-2 (-4, 0)	-
Gender	-	0.5
Female	-2 (-4, -1)	-
Male	-4 (-8, 0)	-
Complications of DM	-	>0.9
No	-3 (-5, 0)	-
Yes	-3 (-6, 0)	-

N= number

1= Median (Interquartile range)

2= P-value computed using Wilcoxon rank sum test

4. DISCUSSION

This study investigated the impact of Dapagliflozin 10mg and Semaglutide 1mg subcutaneous injection, as monotherapy and combined therapy, on weight management in patients with type 2 diabetes mellitus. While the overall group showed no significant weight change, subgroup analyses revealed notable weight reduction in patients using Semaglutide alone and in combination with Dapagliflozin, aligning with previous research on the effectiveness of GLP-1 receptor agonists and SGLT2 inhibitors in promoting weight loss (Drucker, 2018; Heerspink et al., 2020). Interestingly, the combination therapy group demonstrated a greater decrease in weight compared to monotherapy group, suggesting a potential synergistic effect between the two medications.

This observation supports the hypothesis that combining different mechanistic approaches can enhance therapeutic outcomes in patients with type 2 diabetes mellitus (Nauck and Meier, 2018). However, further research need to be done to assess the nature of this synergistic effect in combination SGLT-2 inhibitors and GLP-1 agonists. Age and gender did not significantly influence the degree of weight change, indicating the robustness of the weight loss effects across different demographic subgroups. The low incidence of side effects (6.5%) is encouraging, with reported side effects consistent with the known profiles of these drugs (Woo, 2020; Tang et al., 2017).

These findings underscore the clinical utility of Dapagliflozin and Semaglutide, particularly in combination, for effective weight management in type 2 diabetes mellitus patients. Given the global burden of obesity in diabetic populations, these results are clinically significant, reinforcing the role of these medications not only in glycemic control but also in addressing the critical component of weight management (Garvey et al., 2016). However, the study's limitations, including a relatively small sample size and observational design, necessitate further research. Future research should also delve into the mechanisms behind the observed synergistic effects and investigate long-term outcomes such as cardiovascular events, mortality, and quality of life.

5. CONCLUSIONS

Diabetes is a worldwide disease characterized by impaired glycemic control in the blood and related organs. Many diabetic medications are currently available for treatment. Among these medications are GLP-1 agonists and SGLT-2 inhibitors. These 2 classes have contrasting effect on weight as reported by previous literature. However, we have seen in our sample size that Dapagliflozin has significantly decreased the weight when added on Semaglutide monotherapy. This may suggest possible synergistic effect between the two medications. This study provides valuable insights into the potential of Dapagliflozin and Semaglutide, particularly in combination, for weight management in type 2 diabetes mellitus. While further research is warranted, these findings contribute to the evolving landscape of diabetes management, offering potential new avenues for improving patient outcomes.

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Author Contributions

Khalid Ghalib Alharbi, Eman Ghalib Alharbi: Main author and main manuscript writing

Mohammed Abdullah Alsahly: Data collection and manuscript writing

Ethical approval

The study was approved by Medical Ethics Committee of King Abdullah International Medical Research Center (KAIMRC) in Riyadh, National guard hospital with approval number IRB/0167/24.

Informed consent

Not applicable

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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