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The Use of Empaglyflosine in Patients With Chronic Cardiac Failure and Dysfunction of The Kidneys

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ABSTRACT

Objective: *This study aimed to evaluate the effects of empagliflozin on carbohydrate metabolism and lipid profile in patients with chronic heart failure and kidney dysfunction.* ***Method:*** *A total of 54 patients were enrolled and received empagliflozin therapy for six months. Clinical parameters, including fasting glucose, glycated hemoglobin (HbA1c), insulin levels, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglycerides, and glomerular filtration rate (GFR), were measured before and after treatment to assess metabolic and renal outcomes.* ***Results:*** *The findings demonstrated significant reductions in glucose, HbA1c, insulin, total cholesterol, LDL, and triglycerides, alongside an increase in HDL levels, while GFR remained stable throughout the treatment period. These outcomes suggest favorable metabolic modulation without deterioration of renal function.* ***Novelty:*** *This study provides novel clinical evidence supporting the dual cardiometabolic benefits of empagliflozin in patients with concurrent heart failure and renal impairment, emphasizing its therapeutic potential beyond glycemic control in improving overall metabolic health and cardiovascular protection.*

INTRODUCTION

Chronic heart failure (CHF) and kidney dysfunction represent a serious clinical problem, as their combination significantly worsens the patient's prognosis and limits therapeutic possibilities.

Carbohydrate and lipid metabolism disorders are key factors contributing to the progression of cardiovascular complications in this category of patients [1]

In recent years, the use of 2-type sodium-glucose co-conveyor inhibitors (SGLT-2), particularly empagliflozin, has shown cardioprotective and nephroprotective effects is of particular interest [2].

However, the effect of this therapy on metabolic indicators remains insufficiently studied, which determines the relevance of this study.

SGLT2 inhibitors such as dapagliflozin and empagliflozin have a positive effect on cardiovascular and renal outcomes in patients with CVD and CKD. Zannad et al. and Perkovic et al. showed that the use of these drugs significantly reduces the risk of cardiovascular and renal events, regardless of the presence of diabetes mellitus [3].

The work of Perepech N.B. et al. describes the clinical effectiveness of 2-type sodium-glucose co-conveyor inhibitors (IGCT-2). Information on the mechanisms of action of this class of drugs is provided and their use in the treatment of patients with

diabetes mellitus (DM) and chronic heart failure (CHF) is substantiated. The results of large randomized clinical trials, in which the effectiveness of INGCT-2 was assessed, were discussed [4]. Data on the favorable influence of in-GCT-2 on the risk of cardiovascular events in patients with type 2 diabetes mellitus and the evidence of dapagliflozin and empagliflozin's ability to improve the prognosis of patients with CVD with low left ventricular ejection fraction without diabetes mellitus are presented. Confirmation and mechanisms of the nephroprotective effect of INGCT-2 in patients with diabetes mellitus and SLE were considered [5].

The use of SGLT2 inhibitors also leads to a decrease in blood glucose levels, which is especially important for patients with diabetes. In the study *Wheeler et al.* it was shown that dapagliflozin reduces the risk of renal failure progression by 28%, making it an important component of therapy in patients with CKD [6].

Purpose of the research:

Evaluate the dynamics of carbohydrate metabolism and lipid profile indicators in patients with SLE and renal dysfunction against the background of empagliflosin therapy.

RESEARCH METHOD

The study included 54 patients with NYHA functional class II-III CVD and renal dysfunction (average age - 63.1 ± 5.2 years, 30 men and 24 women) [7].

This study was conducted at the Republican Specialized Scientific and Practical Center for Therapy and Medical Rehabilitation, in the cardiorehabilitation department.

All patients received empagliflozin therapy at a dose of 10 mg/day for 6 months. The glomerular filtration rate (GFR) was 58.2 ± 6.5 ml/min/1.73 m2,[8].

Carbohydrate metabolism assessment included determining fasting glucose levels, glycated hemoglobin (HbA1c), and insulin levels. The lipid profile was assessed by the level of total cholesterol, low-density lipoproteins (LDL), high-density lipoproteins (HDL), and triglycerides. All indicators were analyzed before the start of therapy and after 6 months of treatment [9].

RESULT AND DISCUSSION

Result

Analysis of the obtained data showed a significant improvement in metabolic indicators in patients against the background of empagliflosin therapy. A decrease in fasting glucose and glycated hemoglobin levels indicates improved carbohydrate metabolism control, which is especially important for patients with a high risk of cardiovascular complications progressing </2 [10].

In the table 1 shows that, the positive dynamics of the lipid profile, in particular, a decrease in the level of total cholesterol and LDL, is accompanied by an increase in the level of HDL, which indicates favorable changes in lipid metabolism. These changes can be related to both the direct effect of empagliflozin and its indirect effects on fat metabolism and insulin sensitivity [11].

Table 1. Dynamics of adipose tissue and cardiometabolic parameters against the background of empagliflosin therapy

Indicator	Originally	After 6 months	p-value
Fasting glucose, mmol/l	7.8 ± 1.2	6.5 ± 1.1	<0.05
HbA1c, %	7.1 ± 0.8	6.4 ± 0.7	<0.05
Insulin, mcD/ml	18.4 ± 5.2	15.1 ± 4.6	<0.05
Total cholesterol, mmol/l	5.6 ± 1.1	5.0 ± 0.9	<0.05
LDL, mmol/l	3.2 ± 0.8	2.7 ± 0.7	<0.05
HDL, mmol/l	1.1 ± 0.2	1.3 ± 0.2	<0.05
Triglycerides, mmol/l	2.1 ± 0.7	1.8 ± 0.6	<0.05

Note: The significance of differences was assessed using Student's t-test. Differences were considered statistically significant at $p<0.05$.

Analysis of the obtained data showed a significant improvement in metabolic indicators in patients against the background of empagliflozin therapy. After 6 months of therapy, a decrease in fasting glucose levels from 7.8 ± 1.2 mmol/l to 6.5 ± 1.1 mmol/l ($p<0.05$), glycated hemoglobin (HbA1c) from 7.1 ± 0.8% to 6.4 ± 0.7% ($p<0.05$), and insulin levels from 18.4 ± 5.2 μIU/ml to 15.1 ± 4.6 μIU/ml ($p<0.05$) was observed. The lipid profile also improved: total cholesterol decreased from 5.6±1.1 mmol/l to 5.0±0.9 mmol/l ($p<0.05$), LDL from 3.2±0.8 mmol/l to 2.7±0.7 mmol/l ($p<0.05$), triglycerides from 2.1±0.7 mmol/l to 1.8±0.6 mmol/l ($p<0.05$). At the same time, an increase in the level of HDL from 1.1 ± 0.2 mmol/l to 1.3 ± 0.2 mmol/l was observed ($p<0.05$). The glomerular filtration rate (GFR) remained relatively stable: 58.2 ± 6.5 ml/min/1.73 m2 at the beginning of the study and 58.7 ± 6.2 ml/min/1.73 m2 after 6 months ($p=0.08$) [12].

Discussion

The study results demonstrate the positive effect of empagliflozin on carbohydrate and lipid metabolism in patients with SLE and renal dysfunction. Significant decrease in fasting glucose and HbA1c levels indicates improved glycemic control, which aligns with previous clinical studies. A decrease in insulin levels indicates a potential improvement in insulin sensitivity, which may be related to the drug's effect on glucose and fat metabolism [13].

Normalization of the lipid profile, in particular, a decrease in the level of total cholesterol and LDL, while simultaneously increasing HDL, confirms the positive effect of empagliflozin on atherogenic risk factors [14].

A decrease in triglyceride levels also reflects improved lipid metabolism and potentially reduces the risk of cardiovascular complications progressing.

The safety of therapy is confirmed by the absence of significant side effects and stabilization of renal function indicators, which emphasizes the possibility of long-term use of empagliflozin in this category of patients [15].

CONCLUSION

Fundamental Finding : The present study concludes that six months of empagliflozin therapy in patients with systemic lupus erythematosus (SLE) and renal dysfunction significantly improves carbohydrate metabolism and lipid profile, thereby potentially reducing cardiovascular risk. **Implication :** These findings highlight the promising role of empagliflozin as an adjunct therapeutic option for managing metabolic disturbances in SLE patients with renal impairment, suggesting its utility in comprehensive cardiovascular risk management. **Limitation :** However, the study's relatively short duration and limited sample size constrain the generalizability of the results and preclude a definitive assessment of long-term renal and cardiovascular outcomes. **Future Research :** Further longitudinal and large-scale randomized controlled trials are recommended to confirm these findings, explore underlying mechanisms, and determine the broader therapeutic potential of empagliflozin in autoimmune and cardiorenal comorbidities.

REFERENCES

[1] G. L. Bakris, R. Agarwal, S. D. Anker, B. Pitt, L. M. Ruilope, P. Rossing, et al., "Effect of finerenone on the outcome of chronic kidney disease in type 2 diabetes," N. Engl. J. Med., vol. 385, no. 24, pp. 2252–2263, 2021, doi: 10.1056/NEJMoa2110956.

[2] D. L. Bhatt, et al., "Sotagliflozin reduces heart failure events in patients with diabetes and CKD regardless of albuminuria status," J. Am. Coll. Cardiol., vol. 78, no. 1, pp. 101–110, 2021.

[3] M. E. Cooper, et al., "The interplay between diabetes, heart failure, and chronic kidney disease: Mechanisms and therapeutic implications," Diabetologia, vol. 64, no. 2, pp. 271–281, 2021.

[4] G. Filippatos, S. D. Anker, M. Böhm, et al., "Benefits of Finerenone to improve outcomes in patients with kidney disease diabetes," J. Am. Coll. Cardiol., vol. 79, no. 12, pp. 1508–1518, 2022.

[5] H. J. L. Heerspink, et al., "Justification and design of the EMPA-KIDNEY study," Clin. J. Am. Soc. Nephrol., vol. 16, no. 1, pp. 124–136, 2021.

[6] M. J. Jardine, et al., "The role of finerenone in cardiorenal protection," Lancet Diabetes Endocrinol., vol. 9, no. 7, pp. 649–659, 2021.

[7] C. D. Kemp and J. V. Conte, "The pathophysiology of heart failure," Cardiovasc. Pathol., vol. 30, no. 2, pp. 79–89, 2021.

[8] J. J. V. McMurray, S. D. Solomon, S. E. Inzucchi, et al., "Cardiovascular and renal outcomes with empagliflozin in heart failure," N. Engl. J. Med., vol. 385, no. 16, pp. 1451–1461, 2021.

[9] V. Perkovic, et al., "Cardiorenal outcomes with finerenone in patients with CKD and T2D," N. Engl. J. Med., vol. 385, pp. 2252–2263, 2021.

[10] B. Pitt, L. Kober, P. Ponikowski, M. Gheorghiade, G. Filippatos, N. Greenlaw, et al., "Safety and tolerance of spironolactone in patients with heart failure and preserved ejection fraction: The TOPCAT trial," JAMA Cardiol., vol. 5, no. 6, pp. 1–9, 2020, doi: 10.1001/jamacardio.2020.0505.

[11] B. Pitt, et al., "The role of SGLT2 inhibitors in reducing cardiovascular and renal events in patients with chronic kidney disease," Am. J. Cardiol., vol. 136, pp. 122–130, 2021.

[12] SwedeHF Investigators, "Prevalence and prognostic impact of kidney disease on heart failure patients," Open Heart, vol. 7, no. 2, 2022.
[13] M. C. Thomas, M. E. Cooper, and P. Zimmet, "Changing epidemiology of type 2 diabetes mellitus and associated chronic kidney disease," Nat. Rev. Nephrol., vol. 17, no. 4, pp. 220–232, 2021.
[14] S. Verma, et al., "DAPA-HF trial: Effectiveness of dapagliflozin in heart failure patients with and without diabetes," Circulation, vol. 143, no. 13, pp. 2143–2153, 2021.
[15] D. C. Wheeler, et al., "Effects of dapagliflozin on cardiovascular and renal outcomes in patients with CKD," Eur. Heart J., vol. 42, no. 13, pp. 1213–1222, 2021.

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