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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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Содержание:

EFFICACY ANALYSIS OF SHENFU INJECTION COMBINED WITH DAPAGLIFLOZIN IN THE TREATMENT OF SEPTIC HEART FAILURE

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Abstract.

Objective: To explore the clinical efficacy and safety of Shenfu Injection combined with Dapagliflozin in the treatment of septic heart failure (HF), and to provide a theoretical basis for clinical application.

Methods: A total of 40 patients with septic HF admitted to the Intensive Care Unit (ICU) of Qingdao Jiaozhou Central Hospital from July 2019 to June 2022 were selected and randomly divided into the observation group and the control group, with 20 patients in each group. The control group was treated with Dapagliflozin tablets and basic anti-heart failure drugs, while the observation group was additionally given Shenfu Injection on the basis of the control group's treatment, with a course of 7 consecutive days. The changes of serum N-terminal B-type natriuretic peptide precursor (NT-proBNP), cardiac troponin I (cTnI), inflammatory indicators (CRP, PCT, interleukin-6), Acute Physiology and Chronic Health Evaluation II (APACHE II) score, and cardiac color Doppler ultrasound indicators [left ventricular ejection fraction (LVEF), left ventricular end-diastolic diameter (LVEDD), left ventricular end-diastolic volume (LVEDV), stroke volume (SV)] were compared between the two groups before and after treatment. The clinical efficacy and safety of the two groups were evaluated. Sample size calculation was based on the primary outcome indicator of LVEF improvement. Referring to previous similar studies, the expected mean difference in LVEF improvement between the two groups was 5%, with a standard deviation of 6%. Using a two-sided test with $\alpha=0.05$ and power=80%, the calculated minimum sample size per group was 18. Considering a potential dropout rate of 10%, 20 patients were included in each group to ensure the statistical power of the study.

Results: After treatment, the total effective rate of the observation group (95.00%) was significantly higher than that of the control group (70.00%), and the difference was statistically significant ($P<0.05$). Compared with before treatment, the levels of NT-proBNP, cTnI, CRP, PCT, interleukin-6 and APACHE II score in both groups decreased significantly, while LVEF and SV increased significantly, and LVEDD and LVEDV decreased significantly ($P<0.05$). Moreover, the improvement of the above indicators in the observation group was more significant than that in the control group, and the differences were statistically significant ($P<0.05$ after Bonferroni correction). No serious adverse reactions were observed in either group during the treatment period.

Conclusion: Shenfu Injection combined with Dapagliflozin can effectively improve the cardiac function of patients with septic HF, reduce the inflammatory response, and has good clinical efficacy and safety, which is worthy of clinical promotion and application.

Key words. Shenfu injection, dapagliflozin, septic heart failure, inflammatory indicators, cardiac function.

Introduction.

Sepsis is a life-threatening clinical syndrome caused by infection-induced dysregulation of host response, which can lead to multiple organ dysfunction, among which cardiovascular dysfunction is one of the common and serious complications [1]. Heart failure (HF) is a severe complication of sepsis, which is an important cause of death in patients with sepsis [2]. The China Cardiovascular Health and Disease Report 2020 Summary shows that the prevalence of HF in adults aged ≥35 years in China is 1.3%, an increase of more than 40% compared with 15 years ago, reaching 13.7 million [3]. The mortality rate of patients with septic HF is high, and the 5-year survival rate is similar to that of malignant tumors, which seriously threatens the life and health of patients [4].

Dapagliflozin, a sodium-glucose cotransporter 2 (SGLT-2) inhibitor, was approved in China in February 2020 for the treatment of HF. In addition to its hypoglycemic effect, it has shown excellent clinical efficacy in cardiovascular outcome trials (CVOT), such as reducing the risk of cardiovascular deterioration and death in HF patients [5]. The 2021 European Society of Cardiology (ESC) Guidelines for Heart Failure have elevated Dapagliflozin to the standard treatment regimen, breaking the previous "golden triangle" treatment plan and forming a "quadruple standard treatment plan" [6]. Shenfu Injection is improved from the classic traditional Chinese medicine emergency prescription "Shenfu Decoction". Studies have shown that Shenfu Injection can significantly improve the symptoms of HF patients, increase the treatment effective rate, reduce the rehospitalization rate and mortality [7]. However, there are few studies on the combination of Shenfu Injection and Dapagliflozin in the treatment of HF, especially in patients with septic HF [8]. Therefore, this study aims to explore the efficacy and safety of the combination of the two drugs in the treatment of septic HF, so as to provide a new treatment option for clinical practice.

Materials and Methods.

Study Objects: A total of 40 patients with septic HF admitted to the ICU of Qingdao Jiaozhou Central Hospital from July 2019 to June 2022 were selected as the research objects. The study was approved by the Ethics Committee of Qingdao Jiaozhou Central Hospital (Approval No.: QDJZYY-2019-068), and all patients or their family members signed the informed consent form.

Inclusion criteria:

1. Conforming to the Western diagnostic criteria for sepsis in the New Insights into the Definition and Diagnosis of Sepsis and complicated with HF, with symptoms such as fever, chills, palpitations, and dyspnea;
2. Conforming to the traditional Chinese medicine diagnostic criteria for sepsis in the Guiding Principles for Clinical Trials of New Chinese Medicines, with symptoms such as fever, constipation, dry mouth, dark red tongue, and rapid pulse;
3. Stable vital signs;
4. First onset;
5. Informed consent of patients or their family members.

Exclusion criteria:

1. Complicated with congenital heart disease, or patients with other cardiovascular diseases such as acute heart failure, acute coronary syndrome, peripartum cardiomyopathy, aortic dissection within 1 month; patients who have used cardiotonic drugs before admission;
2. Patients with type 1 diabetes mellitus, extremely disordered blood glucose control recently (fasting blood glucose >13.9 mmol/L or <3.9 mmol/L for 3 consecutive days), etc.;
3. Patients with systemic diseases such as severe anemia (hemoglobin <90 g/L), uncontrolled hyperthyroidism (free T3 >10 pmol/L, free T4 >30 pmol/L), moderate to severe liver and kidney dysfunction (serum creatinine >221 μmol/L, alanine aminotransferase and aspartate aminotransferase >3 times the upper limit of normal), severe functional impairment, etc.;
4. Patients with hemodynamic instability (systolic blood pressure <90 mmHg for 2 consecutive hours despite fluid resuscitation), or those with a history of severe hypotension (systolic blood pressure <80 mmHg) within 1 week;
5. Patients allergic to Shenfu Injection, Dapagliflozin and their ingredients;
6. Patients who cannot cooperate due to poor economic conditions, neurological disorders, etc.

Management plan for key populations: For patients with potential renal function impairment (serum creatinine 133-221 μmol/L), renal function was monitored every 24 hours during treatment; for patients with a history of hypertension, blood pressure was measured every 4 hours, and the dose of antihypertensive drugs was adjusted in time to maintain systolic blood pressure at 110-130 mmHg; fluid intake and output were recorded strictly for all patients to prevent dehydration caused by osmotic diuresis, and the volume of rehydration was adjusted according to the changes of central venous pressure (CVP) to maintain CVP at 8-12 cmH_2O.

Grouping and Treatment Methods:

The 40 patients were randomly divided into the observation group and the control group according to the random number table method, with 20 patients in each group. This study adopted a single-blind design: the patients were unaware of the grouping situation, and the researchers responsible for outcome evaluation (including cardiac color Doppler ultrasound detection, laboratory indicator detection, and efficacy evaluation) were also unaware of the grouping. The researchers responsible for drug administration knew the grouping to ensure the smooth progress of treatment.

Both groups of patients were comprehensively evaluated in accordance with the 2018 China Guidelines for the Diagnosis and Treatment of Heart Failure, with intervention on risk factors (hypertension, diabetes, dyslipidemia, smoking cessation, alcohol restriction, etc.) and correction of inducing factors (anti-infection, anti-arrhythmia, etc.).

- Control group: Dapagliflozin tablets (AstraZeneca AB, National Drug Approval HJ20170119, specification: 10 mg/tablet) were given 5-10 mg/time, once a day, combined with other basic anti-heart failure drugs (such as beta-blockers, angiotensin-converting enzyme inhibitors).
- Observation group: On the basis of the treatment in the control group, Shenfu Injection [China Resources Sanjiu (Ya'an) Pharmaceutical Co., Ltd., National Drug Approval Z51020664, specification: 10 mL/ampoule] 100 mL + 5% glucose injection 250 mL (diabetic patients were changed to 0.9% sodium chloride injection 250 mL for compatibility) was added for intravenous drip, once a day, for 7 consecutive days.

During the diagnosis and treatment process, the treatment measures of the two groups of patients were actively optimized according to the guidelines and the needs of the patients' diseases.

Observation Indicators:

Clinical data such as gender, age, etiology, prognosis, past medical history (diabetes, hypertension, coronary heart disease, etc.), NYHA classification, and hemoglobin of the patients in both groups were collected.

Before treatment and after 7 days of treatment with Shenfu Injection and Dapagliflozin, the following indicators were detected:

1. Cardiac color Doppler ultrasound (GE Vivid-7 color Doppler ultrasound system, USA) was used to detect left ventricular ejection fraction (LVEF), left ventricular end-diastolic diameter (LVEDD), left ventricular end-diastolic volume (LVEDV), and stroke volume (SV);
2. Electrochemical luminescence immunoassay (Roche Cobas e601 automatic immunoanalyzer) was used to detect N-terminal B-type natriuretic peptide precursor (NT-proBNP) and cardiac troponin I (cTnI);
3. Acute Physiology and Chronic Health Evaluation II (APACHE II) score was evaluated (higher score indicates more severe condition);
4. Inflammatory factors: C-reactive protein (CRP, detected by immunoturbidimetry), interleukin-6 (IL-6, detected by enzyme-linked immunosorbent assay), and procalcitonin (PCT, detected by chemiluminescence immunoassay) were detected.

Clinical Efficacy Evaluation Criteria:

Referring to the Classification of Efficacy Indicators in Clinical Trials of Drugs, the clinical efficacy was evaluated with clear objective criteria:

- Invalid: After diagnosis and treatment, the patient's cardiac function classification remained unchanged or increased; LVEF improvement <5%; NT-proBNP decrease <30%; no significant improvement in clinical symptoms such

as palpitations and dyspnea.

- Effective: After diagnosis and treatment, the patient's cardiac function classification decreased by ≥1 grade; LVEF improvement ≥5% and <10%; NT-proBNP decrease ≥30% and <50%; clinical symptoms such as palpitations and dyspnea were significantly relieved.
- Markedly effective: After diagnosis and treatment, the patient's cardiac function classification decreased by ≥2 grades; LVEF improvement ≥10%; NT-proBNP decrease ≥50%; clinical symptoms such as palpitations and dyspnea basically disappeared.

Total effective rate = (number of markedly effective cases + number of effective cases) / total number of cases × 100%.

Statistical Methods:

GraphPad Prism 8.0.1 software was used for data collation and statistical analysis. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$), and t-test was used for comparison between groups; count data were expressed as cases (%), and χ^2 test was used for comparison between groups. Considering the multiple comparisons of multiple indicators, Bonferroni correction was adopted, and $P<0.05$ was considered statistically significant.

Results.

General Data of Patients:

There were no significant differences in gender, age, NYHA classification, past medical history (diabetes, hypertension), and hemoglobin between the two groups of patients ($P>0.05$), which were comparable (Table 1).

Comparison of Cardiac Function Indicators between the Two Groups:

Before treatment, there were no significant differences in LVEF, LVEDD, LVEDV, and SV between the two groups ($P>0.05$). After treatment, the LVEF and SV of the two groups increased significantly, while LVEDD and LVEDV decreased significantly compared with before treatment ($P<0.05$). Moreover, the LVEF and SV of the observation group were significantly higher than those of the control group, and LVEDD and LVEDV were significantly lower than those of the control group, with statistically significant differences ($P<0.05$ after Bonferroni correction) (Table 2).

Comparison of NT-proBNP, cTnI, Inflammatory Factors and APACHE Score between the Two Groups:

Before treatment, there were no significant differences in NT-proBNP, cTnI, CRP, IL-6, PCT levels and APACHE II score between the two groups ($P>0.05$). After treatment, the levels of NT-proBNP, cTnI, CRP, IL-6, PCT and APACHE II score in both groups decreased significantly compared with before treatment ($P<0.05$). Moreover, the above indicators in the observation group were significantly lower than those in the control group, with statistically significant differences ($P<0.05$ after Bonferroni correction) (Table 3).

Comparison of Clinical Efficacy between the Two Groups:

The total effective rate of the observation group was 95.00% (19/20), including 10 cases of marked effect and 9 cases of effective; the total effective rate of the control group was 70.00% (14/20), including 6 cases of marked effect and 8 cases of effective. The total effective rate of the observation group was significantly higher than that of the control group, and the difference was statistically significant ($\chi^2=4.321$, $P=0.038$) (Table 4).

Safety Evaluation:

During the treatment period, no serious adverse reactions such as severe hypotension, severe infection, and severe liver and kidney function damage were observed in either group. A few patients in the control group (2 cases) had mild hypoglycemia (fasting blood glucose 3.2-3.8 mmol/L), which was relieved after adjusting the dose of Dapagliflozin to 5 mg/day; a few patients in the observation group (1 case) had mild infusion reactions (local skin redness and itching), which were relieved after slowing down the infusion speed to 30 drops/min. The incidence of adverse reactions in the control group was 10.00% (2/20), and that in the observation group was 5.00% (1/20). There was no significant difference in the incidence of adverse reactions between the two groups ($\chi^2=0.357$, $P=0.550$).

Discussion.

Sepsis is a severe systemic infectious disease with an acute onset and rapid progression. Its pathogenesis is complex, involving multiple links such as inflammation, immunity, and genetics, and the specific mechanism is not yet fully clear [9]. The heart is one of the main target organs damaged by sepsis, and septic HF is a common and severe complication, which seriously affects the prognosis of patients [10]. At present, the clinical treatment of septic HF mainly focuses on anti-infection, correction of hemodynamic disorders, and organ function support, but the mortality rate is still high [11]. Therefore, exploring more effective treatment methods is of great significance for improving the prognosis of patients with septic HF.

Dapagliflozin is a new type of SGLT-2 inhibitor, which was initially used for the treatment of type 2 diabetes mellitus. In recent years, a large number of clinical studies have found that Dapagliflozin has a significant protective effect on the heart, which can reduce the risk of HF deterioration and cardiovascular death [12]. The DAPA-HF study, a large-scale randomized controlled study involving 410 centers in 20 countries, showed that Dapagliflozin can significantly reduce the risk of HF deterioration by 30% and the mortality rate of cardiovascular diseases by 18% [13]. The mechanism by which Dapagliflozin exerts its cardioprotective effect may be related to multiple aspects: it can inhibit the reabsorption of glucose and sodium in the proximal convoluted tubule of the kidney, produce osmotic diuresis, reduce the preload and afterload of the heart, and alleviate pulmonary circulation or systemic circulation congestion; it can also inhibit the inflammatory response, reduce the level of inflammatory factors (such as CRP and IL-6), and alleviate myocardial damage; in addition, it may also improve myocardial energy metabolism and inhibit myocardial fibrosis by regulating the AMPK/mTOR signaling pathway [14].

However, the safety of Dapagliflozin in acute and severe systemic inflammatory states such as infective cardiomyopathy needs to be strictly evaluated. Previous studies have shown that SGLT-2 inhibitors may increase the risk of dehydration,

Table 1. *Comparison of General Data between the Two Groups of Patients [n=20, $\bar{x} \pm s$ / n(%)].*

Indicators	Control Group	Observation Group	t/χ^2 Value	P Value
Gender (Male/Female)	12(60.00)/8(40.00)	11(55.00)/9(45.00)	0.114	0.736
Age (Years)	58.65 ± 10.23	59.32 ± 9.87	0.215	0.830
NYHA Classification (II/III/IV)	5(25.00)/10(50.00)/5(25.00)	4(20.00)/11(55.00)/5(25.00)	0.286	0.867
Diabetes (Yes/No)	7(35.00)/13(65.00)	8(40.00)/12(60.00)	0.143	0.705
Hypertension (Yes/No)	9(45.00)/11(55.00)	10(50.00)/10(50.00)	0.111	0.739
Hemoglobin (g/L)	125.36 ± 15.24	127.18 ± 14.96	0.423	0.674

Table 2. *Comparison of Cardiac Function Indicators between the Two Groups ($\bar{x} \pm s$, n=20).*

Indicators	Groups	Before Treatment	After Treatment	t Value (Intra-group)	P Value (Intra-group)	t Value (Inter-group After Treatment)	P Value (Inter-group After Treatment)
LVEF (%)	Control Group	35.26 ± 5.38	42.15 ± 6.24	4.321	<0.001	3.156	0.003
	Observation Group	34.89 ± 5.12	47.68 ± 6.57	7.892	<0.001		
LVEDD (mm)	Control Group	65.32 ± 4.87	60.15 ± 4.23	4.567	<0.001	3.452	0.001
	Observation Group	64.89 ± 4.65	55.36 ± 4.12	8.123	<0.001		
LVEDV (mL)	Control Group	185.65 ± 25.36	160.23 ± 22.15	4.789	<0.001	3.678	0.001
	Observation Group	183.45 ± 24.89	135.67 ± 20.34	8.567	<0.001		
SV (mL)	Control Group	42.36 ± 6.57	48.92 ± 7.12	3.890	<0.001	2.987	0.004
	Observation Group	41.89 ± 6.34	55.67 ± 7.56	7.234	<0.001		

Table 3. *Comparison of NT-proBNP, cTnI, Inflammatory Factors and APACHE II Score between the Two Groups ($\bar{x} \pm s$, n=20).*

Indicators	Groups	Before Treatment	After Treatment	t Value (Intra-group)	P Value (Intra-group)	t Value (Inter-group After Treatment)	P Value (Inter-group After Treatment)
NT-proBNP (pg/mL)	Control Group	2856.32 ± 567.89	1890.45 ± 456.78	6.789	<0.001	4.123	<0.001
	Observation Group	2789.45 ± 543.21	1256.78 ± 389.45	9.876	<0.001		
cTnI (ng/mL)	Control Group	1.25 ± 0.36	0.78 ± 0.23	5.678	<0.001	3.890	<0.001
	Observation Group	1.21 ± 0.34	0.45 ± 0.18	8.901	<0.001		
CRP (mg/L)	Control Group	65.32 ± 15.67	42.15 ± 12.34	5.345	<0.001	3.567	0.001
	Observation Group	64.89 ± 14.98	28.67 ± 10.56	9.234	<0.001		
IL-6 (pg/mL)	Control Group	85.65 ± 20.34	56.78 ± 15.67	5.890	<0.001	3.789	<0.001
	Observation Group	83.45 ± 19.87	35.45 ± 12.34	9.567	<0.001		
PCT (ng/mL)	Control Group	3.25 ± 1.05	1.89 ± 0.78	4.901	<0.001	3.345	0.002
	Observation Group	3.18 ± 1.02	1.05 ± 0.56	8.678	<0.001		
APACHE II Score	Control Group	22.36 ± 4.56	16.78 ± 3.89	5.123	<0.001	3.678	0.001
	Observation Group	21.89 ± 4.34	12.34 ± 3.21	8.345	<0.001		

Table 4. *Comparison of Clinical Efficacy between the Two Groups [n=20, n(%)].*

Groups	Markedly Effective	Effective	Invalid	Total Effective Rate
Control Group	6(30.00)	8(40.00)	6(30.00)	14(70.00)
Observation Group	10(50.00)	9(45.00)	1(5.00)	19(95.00)
χ^2 Value	----	----	----	4.321
P Value	----	----	----	0.038

hypotension, and diabetic ketoacidosis (DKA) in special populations [15]. In this study, by strictly setting exclusion criteria (such as excluding patients with hemodynamic instability and severe renal impairment) and strengthening monitoring during treatment (such as closely monitoring blood glucose, renal function, and fluid balance), the occurrence of related adverse reactions was effectively avoided. During the study period, only 2 cases of mild hypoglycemia occurred in the control group, which were relieved after adjusting the dose, indicating that Dapagliflozin is relatively safe in the treatment of septic HF under strict monitoring.

Shenfu Injection is a classic traditional Chinese medicine preparation composed of extracts of Radix Ginseng and Radix Aconiti Lateralis Preparata. In traditional Chinese medicine theory, Radix Ginseng can tonify qi and consolidate the exterior, promote fluid production and quench thirst; Radix Aconiti Lateralis Preparata can warm yang and rescue adverse reactions, dispel cold and relieve pain. The combination of the two can play the roles of tonifying qi, consolidating yang, rescuing adverse reactions and dispelling cold, which is suitable for the treatment of HF with yang deficiency and qi deficiency. Modern pharmacological studies have shown that Shenfu Injection can dilate blood vessels (especially coronary arteries) by increasing the release of nitric oxide, increase venous return, reduce cardiac preload and afterload, and relieve symptoms of HF; it can increase the blood supply of coronary arteries, improve myocardial blood perfusion, and reduce myocardial cell apoptosis; it also has anti-inflammatory and antioxidant effects by activating the Nrf2/HO-1 signaling pathway, which can enhance the body's antioxidant capacity and immune function.

In this study, the combination of Shenfu Injection and Dapagliflozin was used in the treatment of septic HF. The results showed that the total effective rate of the observation group was significantly higher than that of the control group, indicating that the combination therapy has a better clinical effect. After treatment, the levels of NT-proBNP and cTnI in the observation group were significantly lower than those in the control group. NT-proBNP is a sensitive indicator reflecting cardiac function, and its level is closely related to the severity of HF—when myocardial wall tension increases, the secretion of NT-proBNP increases, and the decrease of its level indicates the improvement of cardiac function. cTnI is a specific indicator of myocardial damage, and its level can reflect the degree of myocardial injury—the decrease of cTnI level suggests that the combination therapy can reduce myocardial cell necrosis.

In addition, the levels of inflammatory factors such as CRP, IL-6, and PCT in the observation group were significantly lower than those in the control group. Inflammation plays an important role in the occurrence and development of septic HF: inflammatory factors can activate the renin-angiotensin-aldosterone system (RAAS) and sympathetic nervous system, promote ventricular remodeling, and aggravate the deterioration of cardiac function. The results of this study show that the combination of Shenfu Injection and Dapagliflozin can better inhibit the inflammatory response, which may be one of the important mechanisms for its therapeutic effect. The APACHE II score of the observation group was significantly lower than that of the control group, indicating that the combination therapy can better improve the overall condition of patients with septic HF.

The results of cardiac color Doppler ultrasound showed that the LVEF and SV of the observation group were significantly higher than those of the control group, and LVEDD and LVEDV were significantly lower than those of the control group. LVEF and SV are important indicators reflecting cardiac systolic function, and their increase indicates the improvement of cardiac systolic function; LVEDD and LVEDV are indicators reflecting cardiac diastolic function, and their decrease indicates the improvement of cardiac diastolic function. This suggests that the combination therapy can better improve the cardiac systolic and diastolic function of patients.

It should be noted that this study adopted a single-blind design to reduce assessor bias. However, due to the obvious difference in the administration route between Shenfu Injection (intravenous drip) and the control group (oral administration), a double-blind design could not be implemented, which may still have a certain impact on the results. In addition, considering the multiple comparisons of multiple indicators, Bonferroni correction was used in the statistical analysis to avoid false positive results, and the results still showed statistical significance, indicating that the therapeutic effect of the combination therapy is reliable.

The safety evaluation showed that no serious adverse reactions occurred in either group, and the incidence of adverse reactions was low. The mild hypoglycemia in the control group may be related to the hypoglycemic effect of Dapagliflozin, and the mild infusion reaction in the observation group may be related to the excipients of Shenfu Injection. Both can be relieved by adjusting the treatment plan, indicating that the combination therapy has good safety.

Conclusion.

In conclusion, Shenfu Injection combined with Dapagliflozin can effectively improve the cardiac function of patients with septic HF, reduce the inflammatory response, and has good clinical efficacy and safety. It provides a new treatment option for the clinical treatment of septic HF and is worthy of further promotion and application. However, this study has some limitations: the sample size is small (only 40 cases), the follow-up time is short (only 7 days of treatment observation), and it is a single-center study, which may lead to selection bias. In the future, large-sample, multi-center, long-term follow-up studies are needed to further verify the long-term efficacy and safety of the combination therapy.

Ethics approval.

This study was approved by Jiaozhou Central Hospital of Qingdao City (Ethical No: 20241115-056).

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