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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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CARDIOPROTECTIVE EFFECT OF *GLYCYRRHIZA GLABRA* EXTRACT AND *GLYCYRRHIZA GLABRA* SILVER NANOPARTICLE AGAINST ALLOXAN AND NICOTINAMIDE INDUCED DIABETIC CARDIAC INJURY IN RATS

Abdulrahman A Abdulhamed*, Luma W Khaleel.

College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq.

Abstract.

Objective: To study the Cardioprotective effect of *Glycyrriza glabra* ethanolic extract and *Glycyrrhiza glabra* Silver nanoparticle against alloxan and nicotinamide-induced diabetic cardiac injury in adult female Rats. **Methods:** The current study was performed on 36 days in which the G. glabra extract and G. glabra extract loaded on Silver nanoparticles were given to alloxan and nicotinamide-induced diabetic cardiac injured rats. The Cardioprotective effect has been evaluated biochemically.

Results: The results of induction of diabetic cardiac injury for 36 days showed a significantly increased ($P<0.05$) serum Cardiac Troponin I (cTn-I) and Creatine Kinase (CK-MB) concentration in the diabetic cardiac injury induced (G2) group when compared with the control group (G1), and showed a significant decrease ($P<0.05$) in the serum cTn-I and CK-MB concentration in (G3) group (received G. glabra extract) and (G4) group (G.glabra loaded on silver nanoparticle) in comparison with G2.

Conclusion: This study concluded that *Glycyrriza glabra* extract and *Glycyrrhiza glabra* Silver nanoparticle have a significant Cardioprotective effect induced by alloxan and nicotinamide.

Key words. Alloxan, Nicotinamide, *Glycyrrhiza glabra*, Silver nanoparticle.

Introduction.

Diabetes mellitus (DM), a global health concern, has emerged as one of the four major non-communicable diseases, demanding immediate attention from healthcare providers worldwide. With its devastating impact on millions of lives, it ranks among the top 10 causes of death, claiming the lives of approximately 1.6 million individuals annually [1,2]. It holds the unenviable position of being the third highest risk factor for premature mortality across the globe, mainly due to the harmful effects of hyperglycemia and the resulting oxidative stress and inflammation. The intricate connection between hyperglycemia, oxidative stress, inflammation, and the development and progression of type 2 diabetes mellitus cannot be ignored [3-5]. Extensive research has established that chronic low-grade inflammation significantly increases the risk of developing type 2 diabetes. Moreover, sub-clinical inflammation plays a pivotal role in insulin resistance and is closely associated with the characteristics of metabolic syndrome, including hyperglycemia [4,5]. As a catalyst, oxidative stress triggers the production of inflammatory mediators, setting off a vicious cycle of inflammation and reactive oxygen species generation. This intricate interplay between diabetes, oxidative stress, and inflammation serves as the driving force behind the compilation of this comprehensive review [4,6,7]. Drawing insights from previous studies focused on the relationship between diabetes, oxidative stress, and inflammation to determine the underlying factors that contribute to the prevalence of diabetes mellitus, delving into the mechanisms underlying hyperglycemia-induced oxidative stress, with a special focus on type 2 diabetes and its associated complications [1,7]. By shedding light on these vital connections, this study aims to enhance our understanding of diabetes mellitus and pave the way for innovative strategies to combat this global epidemic [1]. Diabetes mellitus is an intriguing metabolic disorder that wreaks havoc on the body due to decreased insulin activity and/or insulin secretion. As this condition progresses, it brings about a series of pathological changes, including nephropathy, retinopathy, and cardiovascular complications. DM is conveniently classified into two sub-types: type I DM and type II DM [4].

Type I DM requires the use of insulin replacement therapy, while type II DM is managed with oral hypoglycemic medications [8]. The array of drug therapies available for type II DM is fascinating. It includes insulin secretagogues, biguanides, insulin sensitizers, alpha-glucosidase inhibitors, incretin mimetics, amylin antagonists, and sodium-glucose co-transporter-2 (SGLT2) inhibitors [9]. Each of these medications plays a unique role in managing this complex condition [10].

Recent studies have shed light on the alarming impact of type 2 diabetes on the life expectancy of individuals aged 40 to 49. It has been found that individuals within this age group who have been diagnosed with type 2 diabetes are likely to lose an average of ten years of their lives. This shocking revelation emphasizes the gravity of this chronic condition and the urgent need for effective management and prevention strategies [11-13].

One of the most significant risks that individuals with diabetes face is the increased likelihood of developing coronary heart disease. Research has shown that patients with diabetes mellitus have two to three times the risk of coronary heart disease compared to those without diabetes [14]. This finding underscores the importance of comprehensive cardiovascular care for individuals with diabetes, including regular screenings, lifestyle modifications, and appropriate medical interventions [15].

Additionally, it is important to note that a significant number of diabetic patients already experience complications at the time of diagnosis. Studies have revealed that 35% of diabetic patients suffer from retinopathy, a condition that affects the eyes, while 12% experience peripheral neuropathy, a disorder that affects the nerves. These statistics highlight the importance of early detection and intervention to prevent or manage these complications, which can significantly impact the quality of life for individuals with diabetes [16].

On a global scale, the prevalence of diabetes is rapidly

increasing. According to the World Health Organization (WHO), in 2008, 135 million people were living with diabetes worldwide, accounting for approximately 4% of the global population. Shockingly, within just two years, this number escalated to 221 million people in 2010, representing around 5.4% of the world population. These statistics indicate a worrying trend and emphasize the urgent need for effective public health measures to address this growing epidemic [15].

The rise in diabetes cases has become a major concern within the healthcare sector. In recent years, the country has witnessed a rapid development of diabetes, posing significant challenges to healthcare providers and policymakers. These statistics highlight the need for increased awareness, prevention programs, and accessible healthcare services to curb the escalating prevalence of diabetes [4]. We aimed to identify the role of *Glycyrrhiza glabra* silver nanoparticles in female rats' cardioprotective activity.

Materials and Methods.

Female rats were kept under standard conditions (Temperature, light/dark cycle, and food/water access) [17-20]. Rats were divided into 4 experimental groups. Experimental groups enrolled in the present study include:

Control group (G1): received distilled water.

Diabetic group (G2): this group receive alloxan monohydrate (120mg/kg of body weight) with nicotinamide 50 mg/kg single dose IP injection [16].

Diabetic rats (G3): *Glycyrrhizaglabra* extract: diabetic rats received alloxan monohydrate 120mg/kg of body weight with nicotinamide 50 mg/kg with *Glycyrrhiza glabra* extract (200 mg/ Kg B.W) (Figure 1) [21].

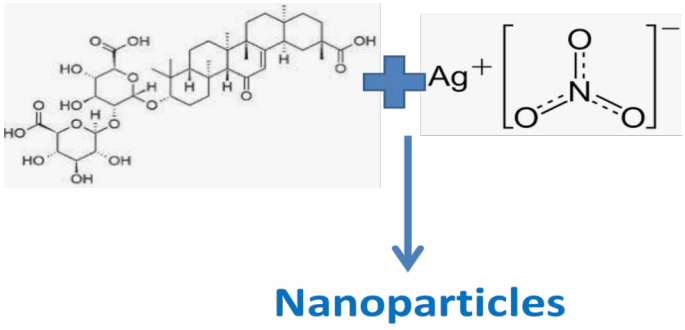

Figure 1. *Glycyrrhizin and silver nanoparticle.*

Diabetic rats (G4): *Glycyrrhizaglabra* loaded on silver nanoparticle: diabetic rats receive alloxan monohydrate 120mg/kg of body weight with nicotinamide 50 mg/kg with *Glycyrrhiza glabra* loaded on silver nanoparticle (230 µg / Kg B.W) [17].

Results.

The Cardiac Troponin I (cTn-I) concentration in serum of female rats in (G2) exhibited a significant increase (P<0.05) with mean value (4.26±0.44) when compared with other treated groups and control group, whereas (G3) and (G4) exhibited a significant decrease (P<0.05) in cTn-I concentration with mean value (2.08±0.31, 1.70±0.35) respectively in comparison with (G2) with no significant variance (P<0.05) when compared with the control group, in addition, there was no statistical differences(P<0.05) in cTn-I concentration between (G3) and (G4). Furthermore, the Creatine Kinase (CK-MB) concentration showed significant elevation (P<0.05) in (G2) with a mean value (6.18±0.61) as compared with other treated groups and control groups. whereas there were no statistical differences (P<0.05) in CK-MB concentration between (G3) and (G4 group) with mean value (4.3±0.48, 4.52±0.53) respectively. While the CK-MB concentration of (G3 and G4) showed a significant decline (P<0.05) in mean value (4.3±0.48, 4.52±0.53) as compared with (G2) with no significant difference (P<0.05) as compared with the control group as in Table (1).

Table 1. *Effect of Glycyrrhiza glabra extract and Glycyrrhiza glabra extract loaded on silver nanoparticle on Creatine kinase (CK-MB) (IU), and Cardiac troponin (cTi) (IU) in diabetic female rats.*

Groups	Creatine kinase (CK-MB) (IU)	Cardiac troponin (cTi) (IU)
G1	3.56±0.14 b	1.24±0.20 b
G2	6.18±0.61 a	4.26±0.44 a
G3	4.3±0.48 b	2.08±0.31 b
G4	4.52±0.53 b	1.70±0.35 b
LSD 0.05	1.43	1.03
*Different letters indicate significant differences between groups at level (P<0.05)		

Discussion.

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease characterized by high blood sugar levels, insulin resistance, decreased B-cell function, and impaired insulin secretion. While there is currently no cure for T2DM, it can be managed and controlled. Traditional medicine can be considered as an alternative therapy for the treatment of diabetes. Diabetic heart disease often involves cardiomyocyte atrophy caused by high blood sugar levels [22]. This study shows that high blood sugar levels can increase heart damage in diabetic animals. However, the researchers found that *glycyrrhiza glabra* and its nanoparticles have protective effects on the heart in diabetic cardiac injury. Previous studies have also shown that diabetic patients with cardiovascular disease have higher levels of circulating troponin, which suggests that it could be a marker for heart inflammation in high blood sugar conditions [23]. The *Glycyrrhiza glabra*, commonly known as liquorice, is a perennial herbaceous plant with medicinal properties. It contains a bioactive triterpenoid saponin that has anti-inflammatory and antioxidant properties. The compound inhibits inflammatory mediators and reduces enzyme activity, making it a potential treatment for conditions like arthritis, asthma, and dermatitis. It also acts as an antioxidant, protecting against oxidative stress and diseases like cancer and cardiovascular disorders. Additionally, it may have antimicrobial and antiviral activities. Further research is needed to understand its mechanisms and clinical applications, but it shows promise as a natural remedy. Exploring natural sources for therapeutic agents is important [24]. Moreover, a study revealed the cardioprotective effect in isoproterenol-induced myocardial ischemia injury in rats [25].

Our study suggested that *Glycyrrhiza glabra* may exhibit, an anti-inflammatory effect on diabetic cardiac tissue and that can prevent cardiac damage by altering oxidative Stress and inflammation.

Atherosclerosis-based diseases are a leading cause of death in developed countries. Preventing and treating atherosclerosis and cardiovascular disease is a crucial goal in modern medicine and science. The development of atherosclerosis involves multiple factors, including changes in lipoproteins, cholesterol buildup, endothelial dysfunction, oxidative stress, and inflammation at each stage of the disease [6,8]. Nanoparticles loaded with the plant extract improve its cardioprotective action, this agrees with other studies using nanoparticles as tissue protective agents [26-28].

Conclusion.

The study conducted on *Glycyrrhiza glabra* extract and *Glycyrrhiza glabra* Silver nanoparticle has yielded significant findings regarding their cardio-protective effects induced by alloxan and nicotinamide. Alloxan and nicotinamide are known to cause oxidative stress and damage to the cardiovascular system. However, the researchers discovered that the administration of *Glycyrrhiza glabra* extract and *Glycyrrhiza glabra* Silver nanoparticle effectively countered these harmful effects. The active compounds present in *Glycyrriza glabra*, such as glycyrrhizin, flavonoids, and saponins, have been shown to possess antioxidant and anti-inflammatory properties, which play a crucial role in protecting the cardiovascular system. Additionally, the incorporation of silver nanoparticles further enhanced therapeutic potential of *Glycyrrhiza glabra* by improving its bioavailability and targeted delivery. This study's conclusions provide valuable insights into the potential of *Glycyrrhiza glabra* extract and *Glycyrrhiza glabra* Silver nanoparticle as a natural and effective treatment option for cardiovascular diseases induced by alloxan and nicotinamide. Further research and clinical trials should be conducted to validate these findings and explore the full range of benefits that these compounds can offer in cardioprotection.

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