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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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THE HBV AND HCV SEROPREVALENCE AMONG BLOOD DONORS IN AL-DAMAZIN STATE, SUDAN: A THREE-YEAR RETROSPECTIVE STUDY

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Abstract.

Background: The main blood-borne viruses that cause post-transfusion hepatitis are Hepatitis B virus (HBV) and Hepatitis C virus (HCV). These viruses can cause chronic infections, cirrhosis, and potentially hepatocellular cancer.

Objective: The purpose of this study was to look into the sero-prevalence and trend of HBV and HCV among blood donors in Al-Damazin Sudan.

Methods: The study utilized the records of donations in the Central Blood Bank Laboratory Al-Damazin from January 2022 to December 2024, and the relevant parameters were analyzed using the SPSS version 20-computer program.

Results: Out of 27916 blood donors, 1196 (4.3%) had positive HBV infection, and 160 (0.6%) were positive for HCV infection indicating a high prevalence of Hepatitis B virus. The prevalence of HBV and HCV showed a decreasing trend during the three years of the current investigation. There was a small decrease in the overall seroprevalence of HBV, from 6.04% in 2022 to 5.43% in 2023, and it decreased to 3.46% in 2024. The sero-detection of HBV decreased from 6.04% in 2022 to 5.43% in 2023 and decreased to 3.46% in 2024, while the sero-detection of HCV also decreased from 0.74% in 2022 to 0.62%, and then the HCV infection was further declined to 0.5% in 2024.

Conclusion: Our study found that the incidence of the hepatitis B virus was greater among the study subjects, and there was a low prevalence of HCV. We recommend carefully selecting blood donors and implementing HBV and HCV nucleic acid testing as part of the blood donor screening procedure.

Key words. HBV, HCV, seroprevalence, blood donors, Al-Damazin, Sudan.

Introduction.

Blood transfusion services are essential and therapeutic, as there is no true alternative to preserve the lives of numerous people experiencing blood loss. Donors worldwide contribute approximately eighty-one million units of blood annually. The existence of blood-borne diseases in the blood cells of asymptomatic donors is a major cause of transfusion-transmitted infections [1]. Blood transfusion is crucial for preserving patient lives and stabilizing medical conditions; nonetheless, transfusion-transmitted illnesses caused by blood-borne viruses continue to pose a medical issue. The most significant transfusion-related dangers globally encompass HIV-AIDS and viral hepatitis [2]. Hepatitis is a severe hepatic condition caused by a group of viruses. The condition is marked by hepatic inflammation accompanied by inflammatory cell infiltration, instigated by infection, potentially resulting in severe complications such as fibrosis or cirrhosis, which may be lethal. The predominant cause of hepatitis infections is a collection of five viruses: hepatitis A, B, C, D, and E. The principal health risks are predominantly associated with the hepatitis B virus (HBV) and hepatitis C virus (HCV) owing to their elevated infection rates, various transmission routes, and initial asymptomatic phases that hinder timely diagnosis, resulting in chronic disease progression [3]. Approximately one-third of the global population, exceeding two billion individuals, is infected with HBV, presenting a significant health problem; however, excluding immune-compromised patients, 95% of adult hepatitis B cases resolve with little or no clinical intervention [4], and leading to more than (820,000) deaths each year mainly due to cirrhosis and hepatocellular carcinoma [5]. Approximately 90% of HBV cases, whether resolved or chronic, acquire particular immunity to the infection [3]. Conversely, around 50 million individuals have chronic HCV globally, with 1.0 million new cases infected each year [6]. HCV resembles HBV regarding liver infectivity; however, it can also replicate in peripheral mononuclear cells of lymphoid tissue and bone marrow [7]. The prevention of these diseases predominantly depends on appropriate and timely vaccination, alongside [8,9] serological screening of blood donors utilizing hepatitis B surface antigen (HBsAg) testing for HBV and anti-HCV antibody assays for HCV. Nucleic acid amplification testing for HBV and HCV has been effectively implemented to screen donors in numerous developed nations but till now it has not been introduced in Sudan as a screening test. In Sudan, the prevalence of HBV ranges from 6.8% to 26%, while HCV prevalence is reported between 2.2% and 4.8% [10]. According to studies on blood donors across different states in Sudan, showed the prevalence of HBV ranging between 1.3% to 11.7%, while HCV ranging from 0.4% to 3.5% [11-15] indicating that there are high prevalence of HBV and low spreads of HCV infection in Sudan. Blood transfusion is considered one of the basic services for self-preservation and survival, and the need for blood transfusion and its derivatives increases, especially in times of war and conflict, which result in a large number of wounded and deaths, as is the case now in Sudan. Al-Damazin State is considered one of the states where a large number of citizens and wounded were sheltered during the war, which led to an increase in the number of blood donation. This study aims to analyze the frequency and trend of hepatitis B and C viruses among blood donors at the Central Blood Bank in Al-Damazin State during the period of 2022 to 2024 AD.

Materials and Methods.

Study Site and Population:

The study employed the donor records from the Central Blood Bank Laboratory in Al-Damazin and the General Blood Banks situated in Al-Damazin city, Al-Damazin state, Sudan. The qualified personnel evaluated the blood donors in accordance with the established protocols in Sudan. The National Center for Blood Transfusion, overseen by the Deputy Minister of National Health, regulates the blood transfusion services. The chosen donors had physical and clinical evaluations, in addition to completing a donor questionnaire that detailed their comprehensive background. The data presented in this study was obtained from surveys completed by donors. The samples and data were collected over a three-year period, from January 2022 to December 2024.

Sample processing pathway:

Each eligible donor supplied five milliliters of blood, subsequently distributed equally into two tubes. A portion was transferred to a vial containing EDTA, gently agitated, and stored at 2-4°C prior to plasma preparation within 24 hours. The plasma was acquired by centrifuging the blood sample at 3000 RPM for 5 to 10 minutes. The plasma was transferred to a different vial using a pipette, stored at -4°C, and analyzed within 24 hours. The residual blood sample was placed in a plain tube (lacking anticoagulant) and allowed to stay undisturbed for 20-30 minutes at ambient temperature. The material was subsequently centrifuged at 3000 RPM for a duration of 5 to 10 minutes. The serum was isolated, transported to a container via pipette, stored at 2-4 degrees Celsius, and assessed within 24 hours.

Sample analysis:

For the detection of HBV and HCV using immune-chromatographic test (ICT) (Fortress Diagnostics Limited, Unit 2C Antrim Technology Park, United Kingdom). All positive samples were rechecked using, Sandwich ELISA (Fortress Diagnostics) was performed using commercial kits. The absorbance was measured using an ELISA microplate reader (Awareness Technology, Model: 303 PLUS, USA) at 450 nm and a reference filter at 630 nm. The cut-off value was established to assess the outcomes.

Data analysis:

The statistical analysis was conducted using SPSS version 20 and presented in tabular and graphical formats. The Chi-square test was employed to assess the significance of the connection between variables, with a p-value of less than 0.05 denoting significance.

Ethical Approval:

The patient's anonymity and identity were protected in accordance with the hospital's study protocols. The Ministry of Health, Al Damazin State, Sudan provided ethical and institutional permission for the study.

Results.

Study population:

This study included 27,916 blood donor records from January 2022 to December 2024. All the blood donors were male only.

Table 1. *The total seroprevalence of HBV and HCV among blood donors.*

Variables		Total number	Percentage
HBV	Positive	1196	4.3%
	Negative	26720	95.7%
Total		27916	100%
HCV	Positive	160	0.6%
	Negative	27756	99.4%
Total		27916	100%

Table 2. *Sero-detection of HBV and HCV in Al-Damazin State from January 2022 to December 2024.*

Years of donation	Serological marker	Marker result	number of donors	Percentage %
2022	HBV	Negative	4418	93.96
		Positive	284	6.04
	HCV	Negative	4667	99.26
		Positive	35	0.74
2023	HBV	Negative	6686	94.57
		Positive	384	5.43
	HCV	Negative	7026	99.38
		Positive	44	0.62
2024	HBV	Negative	15616	96.54
		Positive	528	3.46
	HCV	Negative	16063	99.50
		Positive	81	0.50

Table 3. *Comparison between positive cases of HBV and HCV among blood donors.*

Years of donation	Hepatitis virus	Results		Total	P value
		Positive	Negative		
2022	HBV	284	4418	4702	0.000
2023		384	6686	7070	
2024		528	15616	16144	
2022	HCV	35	4667	4667	0.125
2023		44	7026	7070	
2024		81	16063	16144	

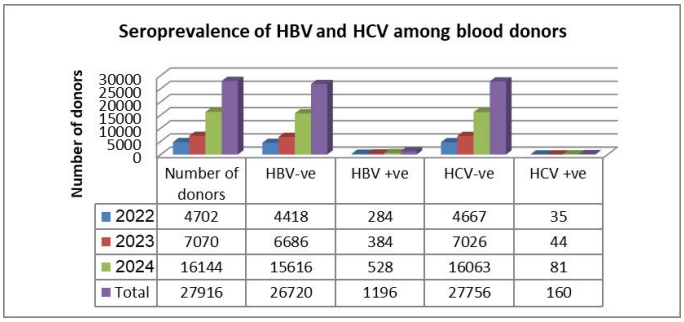

Figure 1. *Trends analysis of HBV and HCV sero-detection from January 2022 to December 2024.*

Sero-detection of HBV and HCV:

Out of 27916 blood donors, 1196 (4.3%) had positive HBV infection, and 160 (0.6%) had HCV infection (Table 1). Blood donors had the greatest rates of HBV and HCV infection.

Trends in HBV and HCV from January 2022 to December 2024:

This study examines the trends in HBV and HCV sero-detection from January 2022 to December 2024. The sero-detection of HBV decreased from 6.04% in 2022 to 5.43% in

2023 and also decreased to 3.46% in 2024, with a significant difference (p-value = 0.000), while the sero-detection of HCV also decreased from 0.74% in 2022 to 0.62%, then the HCV infection was further declined to 0.5% in 2024 with no significance difference (p-value = 0.125) (Tables 2 and 3), (Figure 1).

Discussion.

Transfusion of blood is a vital part of medical treatment that saves millions of lives annually [16] and can carry the risk of blood-borne diseases if not safely transfused. In our study all donors were male, although females can accepted as blood donors according to donation protocol in Sudan, but traditionally not accepted. Whoever any female in Sudan is eligible to donate organs, such as kidneys. Some reports indicated that an increased in vasovagal reactions, could lead to a high rejection rate among female donors [17]. The average sero-detection of HBV in the three of study was 4.3% this is less than the prevalence of HBsAg in central Sudan, which was 6.8% to 26% in southern Sudan [10].

Our study reveals that the average HCV sero-detection was 0.6%, which was lower than the studies of hepatitis C virus which showed 2.2% to 4.8% in central Sudan [10]. The overall prevalence of HBV infection in Al-Damazin was more than the prevalence of HBV infection among healthy blood donors at Dongola Hospital, Dongola State in north Sudan, during the years 2010 to 2015 showed 1.3% prevalence rate of HBV [11].

The current study of Seroprevalence of HBV was lower than prior conducted studies in a different location of Sudan, which were 11.7% in Port Sudan [12], 11% in Khartoum, 9.3% in Elobeid, north Kurdofan [14], 6.3% in Nyala, South Dar Fur [15], 5.5% in north Darfur state-Sudan [13].

Regionally our study was also higher than studies from neighboring country countries which were 3.06% in Ethiopia [18], 2.0% in Eritrea [19], 0.76%, in Egypt [20], 0.21% in Lybia [21], Except in Chad, which exhibited a higher prevalence rate of HBV at 12.4% [22]. Our result was lower than reports from other African countries, which were 14.78% in Mali [23], 9.7% in Sierra Leone [24], 8.5% in Angola [25], 7.5% in Ghana [26]. The disparities are most likely caused by variations in the geographic distribution of the infection throughout the population, as well as variations in socioeconomic status, lifestyle, social behavior, and awareness levels across the nation. Furthermore, variances may result from variations in the specificity and sensitivity of screening tests employed at various sites during the screening process. The low risk of HBV infection by transfusion may have decreased in some countries like, Egypt and Lybia [20,21] may as a result of the implementation of HBV nucleic acid testing in blood donor screening. Similar finding for sero-detection of HBV is reported in Nigeria [27].

The current investigation found an HCV prevalence of 0.6%, similar to 0.7% reported by Abdelaziz, Mohamed in Dongola, north of Sudan 0.63% reported by Abou MA et al. in Nyala, South Dar Fur State [11,15]. The current study was slightly higher than those conducted in Port Sudan and North Darfur [12,13]. However, the incidence was decreased when compared to earlier conducted research in a different part of Sudan [14], and in some countries, Egypt [20], Chad [22], Mali [23], Sierra Leone [24], Angola [25], Ghana [26] and Nigeria [27]. These differences in the prevalence of HCV infection globally may be due to factors such as risky behaviours, screening test quality, and donor selection programs. The prevalence of HBV showed a decreasing trend in our study area during the three years of the current investigation; there was a small decrease in the overall seroprevalence of HBV from 6.04% in 2022 to 5.43% in 2023 and also decreased to 3.46% in 2024. A similar study of the decreasing trend of HBV was reported in Guangzhou, China [28]. The sero-detection of HCV also decreased from 0.74% in 2022 to 0.62%, and then the HCV infection further declined to 0.5% in 2024. This finding is similar to the report in Iran, conducted among blood donors [29]. However, the fluctuation of HCV from year to year was observed [30]. The trend of decreasing rates in our study area might be conceivable if heightened awareness were among the factors contributing to the decline.

Conclusion.

Our study found high prevalence rates of HBV and low prevalence of HCV among blood donors in Al-Damazin State, and higher than in certain neighboring countries. Despite the high frequency of HBV and the low prevalence of HCV, both have decreased during the last three years. The study suggests that screening donors with both serological and NAT tests can effectively lower the number of transfusion-related hepatitis infections. More research is needed to assess awareness of infection risks among both blood donors and the general public. To properly assess the prevalence of HBV and HCV, investigations should focus on populations with a higher risk than healthy donors.

Limitations of the study.

1. Incomplete records of some data
2. The sensitivity of ICT and ELISA is less than the sensitivity of NAT, which has not been introduced until now in our study area.
3. The entire cohort of blood donors was composed solely of males (cultural context of Sudan); these findings cannot be extended to the full blood donor community, including women.

These limitations can affect the generalizability of the study.

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Conflict of Interest.

The authors disclose no conflict of interest.

Author's Contribution.

All listed authors contributed significantly to the work and approved its publication.

Data Availability.

The publication includes all datasets created and analyzed during the investigation.

Ethical approval.

This study was approved by the Ethics Committee of Planning and Development, Ministry of Health, Al-Damazin State (Reference No. K2/T/12).

REFERENCES

1. Mohammed Y, Bekele A. Seroprevalence of transfusion transmitted infection among blood donors at Jijiga blood bank, Eastern Ethiopia: retrospective 4 years study. BMC Research Notes. 2016;9.
2. Chang M.H. Hepatitis B virus infection. Seminars in Fetal & Neonatal Medicine. 2007;12:160-167.
3. https://www.who.int/news-room/fact-sheets/detail/hepatitis-b
4. Karnsakul W, Schwarz K.B. Hepatitis B and C. Pediatric Clinics of North America. 2017;64:641-658.
5. Roma K, Chandler T-M, Dossaji Z, et al. A Review of the Systemic Manifestations of Hepatitis B Virus Infection, Hepatitis D Virus, Hepatocellular Carcinoma, and Emerging Therapies. Gastro Hep Advances. 2024;3:276-291.
6. World Health Organization. Hepatitis C. 2025. https://www.who.int/news-room/fact-sheets/detail/hepatitis-c
7. Moradpour D, Penin F, Rice C.M. Replication of hepatitis C virus. Nature reviews. Microbiology. 2007;5:453-463.
8. Begum C.R.S, Banu S.N, J V. Seroprevalence of Transfusion Transmitted Infections among blood donors in a Tertiary care Hospital in Andhra Pradesh. Annals of Pathology and Laboratory Medicine. 2018;5:A82-86.
9. Busch M.P. Should HBV DNA NAT replace HBsAg and/or anti-HBc screening of blood donors? Transfusion Clinique et Biologique. 2004;11:26-32.
10. Mudawi H. Epidemiology of viral hepatitis in Sudan. Clinical and Experimental Gastroenterology. 2008;1:9.
11. Abdelaziz M. Prevalence of Transfusion Transmissible Infection among Healthy Blood Donors at Dongola Specialized Hospital, Sudan, 2010–2015. Sudan Journal of Medical Sciences. 2020;15:163-170.
12. Bashir A.B.M, Maisa AB, Mohammed OG, et al. Prevalence of transfusion-transmissible infections among blood donors in Port Sudan. The Egyptian Journal of Haematology. 2019;44:72-76.
13. Ahmed M.A.I, Abdelrahman N.K, Abdelrahman N.A.M, et al. Seropositivity to viral hepatitis in blood donors in north Darfur state-Sudan. Gastroenterology & Hepatology: Open Access. 2021;12:106-109.
14. Mh Elfaki A, Agab M.A, Humida H.M, et al. Sero-prevalence of Hepatitis B and Hepatitis C virus infection among Sudanese blood donors. International Research Journal of Basic and Clinical Studies. 2016;4:14-17.
15. Abou M.A.A, Eltahir Y.M, Ali A.S. Seroprevalence of hepatitis B virus and hepatitis C virus among blood donors in Nyala, South Dar Fur, Sudan. Virology Journal. 2009:6.
16. Chaudhary V, Agrawal V.K, Sexena S.K, et al. Seroprevalence of common transfusion transmissible infections among blood donors in western Uttar Pradesh, India. International Journal of Medical Science and Public Health. 2014;3:1381-1384.
17. Nada H.A, Atwa M. Seroprevalence of HBV, HCV, HIV and Syphilis Markers among Blood Donors at Suez Canal University Hospital Blood Bank. Journal of Blood Disorders and Transfusion. 2014;05.
18. Abebe M, Alemnew B, Biset S. Prevalence of Hepatitis B Virus and Hepatitis C Virus Among Blood Donors in Nekemte Blood Bank, Western Oromia, Ethiopia: Retrospective 5 Years Study. Journal of Blood Medicine. 2020;11:543-550.
19. Siraj N, Achila O.O, Issac J, et al. Seroprevalence of transfusion-transmissible infections among blood donors at National Blood Transfusion Service, Eritrea: a seven-year retrospective study. BMC Infectious Diseases. 2018;18.
20. Sayed Ahmed H.A, Kamel N, Mahfouz E.M. Insight into hazards and control of transfusion-transmitted infections in Egypt: A narrative review. Transfusion and apheresis science: official journal of the World Apheresis Association: Official Journal of the European Society for Haemapheresis. 2024;63.
21. Qowaider S.R.M, Ali M.S, Moftah S.A.M, et al. Prevalence of HBV and HCV Infections among Blood Donors in Northeast Libya. International Blood Research & Reviews. 2017;7:1-5.
22. Debsikréo N, Mankréo B.L, Moukénet A, et al. Prevalence of hepatitis B virus infection and its associated factors among students in N'Djamena, Chad. PloS one. 2024;19.
23. Jary A, Dienta S, Leducq V, et al. Seroprevalence and risk factors for HIV, HCV, HBV and syphilis among blood donors in Mali. BMC Infectious Diseases. 2019;19:1-8.
24. Yambasu E.E, Reid A, Owiti P, et al. Hidden dangers-prevalence of blood borne pathogens, hepatitis B, C, HIV and syphilis, among blood donors in Sierra Leone in 2016: opportunities for improvement: a retrospective, cross-sectional study. The Pan African Medical Journal. 2018;30.
25. Peliganga L.B, Mello V.M, de Sousa P.S.F, et al. Transfusion Transmissible Infections in Blood Donors in the Province of Bié, Angola, during a 15-Year Follow-Up, Imply the Need for Pathogen Reduction Technologies. Pathogens (Basel, Switzerland). 2021;10.
26. Osei E, Lokpo S.Y, Agboli E. Sero-prevalence of hepatitis B infection among blood donors in a secondary care hospital, Ghana (2014): a retrospective analysis. BMC Research Notes. 2017;10:391.
27. Okoroiwu H.U, Okafor I.M, Asemota E.A, et al. Seroprevalence of transfusion-transmissible infections (HBV, HCV, syphilis and HIV) among prospective blood donors in a tertiary health care facility in Calabar, Nigeria; an eleven years evaluation. BMC Public Health. 2018;18.
28. Zheng Z, Lin X, Huang Y, et al. Trends and age-period-cohort effect on incidence of hepatitis B from 2008 to 2022 in Guangzhou, China. Scientific Reports. 2024;14.
29. Ghorbani N.R, Djalalinia S, Modirian M, et al. Prevalence of hepatitis C infection in Iranian hemodialysis patients: An updated systematic review and meta-analysis. Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences. 2017;22:123.
30. Legese H, Berhe B, Adhanom G, et al. Trend analysis of hepatitis B and C among patients visiting health facility of Tigrai, Ethiopia, 2014-2019. BMC Gastroenterology. 2023;23.