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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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DECODING PEDIATRIC MENINGITIS UNRAVELING THE INTRICACIES OF ANTIMICROBIAL RESISTANCE IN IRAQI PEDIATRIC PATIENTS

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Abstract.

Background and objectives: Bacterial meningitis is a common serious infectious diseases in children with tough therapy due to resistance to commonly indicated antibacterial therapy. We sought to characterize the bacterial resistance spectrum of Bacterial meningitis in Iraqi pediatric patients.

Methods: Fifty-seven patients' CSF (cerebrospinal fluid) microbiological data were reviewed before enrollment of children (less than 4 years old), Gram-stain identification, white blood cells, protein, and glucose assays, and growing the bacterial pathogen from CSF or blood samples. A probable case of bacterial meningitis was determined by leukocytosis (> 100 cells/mm 3), turbidity, decreased glucose (< 40 mg/dl), and raised protein levels (> 100 mg/dl), which provided enough evidence to start antibiotic regimen.

Results: Three quarters of the patients diagnosed with meningitis 71.9 % were males, although there was no significant association neither between gender nor age group and drug resistance. There was a significant association between the level of hemoglobin (low level of Hb) and drug resistance (single 68.3%, multiple 29.3%, P value 0.004). Also, there was a significant association between vaccination (unvaccinated patient) and drug resistance (multiple drug resistance) (100%, P value 0.001).

Conclusion: This study offers valuable new insights into the characteristics and prognoses of individuals with varying degrees of therapy resistance.

Key words. Antibacterial resistance, meningitis, leukocytosis, turbidity, glucose.

Introduction.

About 25% of individuals with bacterial meningitis, a serious infectious situation that affects newborns, have increased bloodstream inflammatory markers and aberrant cerebrospinal fluid (CSF) characteristics. Of the bacterial meningitis patients who stay alive, up to 24% experience permanent neurological aftereffects include localized neurological impairments or hearing loss [1]. Additionally, the likelihood of impairment varies from 20% to 50%, and the death rate of newborn bacterial meningitis varies from 10% in high-income countries to 58% in low-income countries [2-4]. It has been noted that in contrast to newborns in the second month of their existence, feverish neonates have a higher incidence of bacterial meningitis [5]. Considering the high case fatality rate associated with the incidence of bacterial meningitis in newborn babies, Priority must be given to preventative measures and suggestions meant to improve early management of cases [6]. Adverse drug reactions (ADRs), which are linked to high rates of mortality and morbidity added to longer hospitalizations, are strongly correlated with the use of antibiotics. Up to 40.9% of ADRs are caused by antibiotic use. Twenty percent (298/1488) of the patients in a previous trial have at least one antibiotic-associated adverse drug reaction [7-9]. Regretfully, it may result in newborn patients requiring extra medication [10,11]. Conversely, antibiotics are necessary for treating infectious diseases and are generally effective at rapidly sterilising bloodstream and CSF. In addition, course of treatment for bacterial meningitis is extremely lengthy. The age and immune system state of the patient affect the dispersion of infections. The predominant pathogens of neonatal blood monocytosis have been identified to include Escherichia coli (*E. coli*), coagulase-negative staphylococci and group B Streptococcus (GBS) [12,13]. Recommended antibiotic duration varies according on the pathogenic bacteria species. For instance, medications for GBS or Listeria would be taken for 14–21 days, Klebsiella pneumoniae or gram-negative bacteria for twenty-one days, and coagulase-negative staphylococci for period of 21 days [14,15]. A few studies have shown that short antibiotic treatment regimens—five days against ten days, seven days versus ten days, ten days versus fourteen days, and so forth—are potentially beneficial in the treatment of bacterial meningitis in children and do so without raising the risk of neurological side effects, infection recurrence, or mortality [16,17]. Yet, the duration of antibiotics for bacterial meningitis in people with this condition is not well established, and the best time of antibiotic withdrawal is still up for debate since to the lack of clinical research, especially for newborns with CSF culture-negative meningitis. The general consensus characterizes an extremely short antibiotic duration in this study as ending prescription antibiotic treatment soon. More specifically, the antibiotics were discontinued even if the CSF parameters continued abnormal after over two weeks' treatment if the neonates were clinically sound or enhancing and have typical serological inflammatory parameters (platelet count [PLT], immature/total neutrophil [I/T], C-reactive protein [CRP], white blood cell count [WBCs], and procalcitonin [PCT]) [18-20].

For many years, the topic of whether a suitable antibiotic regimen given for less time during neonatal bacterial meningitis treatment is just as effective as the suggested amount of time has attracted increasing attention. The purpose of the study was to evaluate and compare the efficacy of various antibiotic treatment periods in neonatal bacterial meningitis. humans Meningitis has been linked to a number of bacterial species. The three main microorganisms that cause vaccine-preventable bacterial meningitis are *Streptococcus pneumoniae, Haemophilus influenzae type b* (Hib), and *Neisseria meningitidis*. A Gram-positive diplococcus: *S. pneumoniae*, has been identified as a primary cause of community-acquired meningitis outbreaks

in the United States and Europe [21]. Meningitis can also be brought on by the Gram-negative *Coccobacillus Hib*, especially in young children [22]. Invasive meningococcal disease (IMD) is a known severe medical condition of an encapsulated Gram-negative diplococcus which is *N. meningitidis* [23]. *N. meningitidis* ability to enter sterile tissues, such as the meninges, bloodstream, and important organs, as well as Infiltrate the nasopharyngeal mucosal surface, is what causes IMD. Clinically, meningococcal meningitis or septicemia are the most common presentations of IMD. These conditions advance quickly, resulting in mortality in ten to fifteen percent of cases or permanent disability in 20% of patients that survive [24].

Due to poor vaccination rates and inadequate resources for prompt diagnosis and treatment, bacterial meningitis and IMD outbreaks can have particularly devastating impacts on people with lower incomes groups. In the Eastern Mediterranean region, epidemiological studies on N. meningitidis infections were scarce. A single publication from Iraq in 2013 reported two cases of N. meningitidis in Baghdad [25]. An analysis Understanding the meningococcal meningitis epidemiology patterns in Iraq was necessary in light of the significant changes in the country's demographic and socioeconomic landscape in recent years. This was especially true given the rise in religious mass gatherings, which has been linked to a higher risk of IMD outbreaks [26]. The Iraqi Ministry of Health states that although the government requires proof of a quadrivalent vaccination before leaving endemic countries, certain disease serotypes are not taken into account by this requirement, nor is it applicable to Iraqis or visitors from neighboring countries, many of whom attend the country's yearly mass gatherings [27]. For these reasons, we set out to investigate meningococcal meningitis in Iraq through a prospective surveillance research. The findings of our study, conducted between June 2018 and May 2020, are presented here. They emphasize the causal agents that trigger bacterial meningitis among Iraqi patients, the most common serogroups of *N. meningitidis*, and related clinical characteristics.

Materials and Methods.

Participating Hospitals and Study design: This survey was conducted retrospectively at the Central Teaching Hospital of Pediatrics in Baghdad, Iraq, from June 2018 and May 2020, and it was based on the diagnosis of bacterial meningitis by cerebrospinal fluid (CSF) culture. The major hospitals in the area offering pediatric care, health advice, and other clinical services was this one. This facility is equipped with sufficient resources and skilled professionals to perform antibiotic susceptibility testing and bacterial culture.

Study population: Fifty-seven patients' CSF microbiological data were reviewed before enrollment of children (less than 4 years old) with bacterial meningitis was conducted. According to the World Health Organization's (WHO) case criteria, patients with clinical symptoms and +ve CSF culture were classified with proven meningitis [28]. According to attending physicians thorough evaluation, antibiotic treatments were administered to all eligible patients against the target CSF bacterial isolates [29]. Both fungal meningitis and tuberculous meningitis met the exclusion criteria. The current study did not include duplicate isolates from the same child when they were in the hospital. The recruited patients' gender, year of birth, hemoglobin level (Hb), date of collecting samples, forms of antibiotic treatment, and resistance to antimicrobial treatment were all gathered by locally trained researchers.

Specimen Collection and Confirmed Diagnosis: Upon arrival at the hospital, specimens from CSF were obtained from the study participants. Serum samples were taken in the rare instances where subjects reject to give a CSF samples. Two samples were taken from each patient in order to prevent treatment delays due to PCR testing limitation in the Central Teaching Hospital of Pediatrics at the study time. The first sample was processed on-site in accordance with standard laboratory examination procedures, which included CSF examination, Gram-stain identification, white blood cells, protein, and glucose assays, and growing the bacterial pathogen from CSF or blood samples. A probable case of bacterial meningitis was determined by leukocytosis (> 100 cells/mm 3), turbidity, decreased glucose (< 40 mg/dl), and raised protein levels (> 100 mg/dl), which provided enough evidence to start antibiotic regimen. The remaining sample was transferred to the Central Public Health Laboratory (CPHL) for subtyping the *N. meningitidis*-positive specimens and RT-PCR testing for *S. pneumoniae*, *Hib*, and *N. meningitidis*.

Ethical considerations: The Iraqi Ministry of Health granted ethical approval for this research. Written consent was not required because specimen collection is anonymous. In compliance with the ministry's standard procedures, verbal informed consent was acquired from the parents of child participants for the collection of CSF and serum; serum was collected in the event that participants or parents or guardians declined lumbar puncture. The gathered information was coded and kept safe in a database. It was explained to the volunteers that no personal information would be shared.

Results.

Fifty-seven patients with suspected meningitis were admitted to the Central Teaching Hospital of Pediatrics in Iraq / Baghdad from September 2017 to February 2018. Their ages ranged from 4 months to 7 years. Of the total suspected cases, (16 cases) 28.1 % were infants less than 1-year-old, while (36 cases) 63.2 % were children between 1 and 5 years, and (5 cases) 8.8 % were aged greater than 5 years as shown in table 1 and figure 1, (41 cases) 71.9 % were male patients, and (16 cases) 28.1 % were female as shown in table 1 and figure 2. Of the suspected cases, (14 cases) 24.6 % have normal hemoglobin (Hb) level, (42 cases) 73.7% suffered from low Hb, and (1 case) 1.8% have high Hb level. (46 cases) 80.7% were vaccinated while (11 cases) 19.3% were not vaccinated as shown in table 1 and figure 3. Sensitive cultures where (41) 71.9% while resistant cultures were (16) 28.1%. Of the suspected cases, only (4 cases) 7.1 % were with no drug resistance (DR), (37 cases) 66.1% have single DR, and (15 cases) 26.8% have Multiple DR as shown in table 1 and figure 4. (41 cases) 71.9% were improved while (16 cases) 28.1% were not.

Almost three quarters of the patients diagnosed with meningitis 71.9 % were males, although there was no significant association neither between gender nor age group and drug

Table 1. *Description of the study sample characteristics.*

		Frequency	N %
Gender	Male	41	71.9%
	Female	16	28.1%
Age Group	Infants (< 1 year)	16	28.1%
	Children (1-5 years)	36	63.2%
	Children (>5 years)	5	8.8%
Hb Level	Normal	14	24.6%
	Low	42	73.7%
	High	1	1.8%
Vaccination	Vaccinated	46	80.7%
	Not vaccinated	11	19.3%
S/R	Sensitive	41	71.9%
	Resistant	16	28.1%
Drug Resistance (DR)	No DR	4	7.1%
	Single DR	37	66.1%
	Multiple DR	15	26.8%
Pt. Outcome	Improved	41	71.9%
	Not improved	16	28.1%

Table 2. *Distribution of study sample characteristics according to Drug resistance status.*

		Drug Resistance (DR)						*P* value
		No DR		Single DR		Multiple DR		
		Freq.	N %	Freq.	N %	Freq.	N %	
Gender	Male	4	9.8%	28	68.3%	9	22%	0.233
	Female	0	0%	9	60%	6	40%	
Age Group	Infants (< 1 year)	0	0%	13	86.7%	2	13.3%	0.259
	Children (1-5 years)	3	8.3%	21	58.3%	12	33.3%	
	Children (>5 years)	1	20%	3	60%	1	20.0%	
Hb Level	Normal	2	14.3%	9	64.3%	3	21.4%	0.004*
	Low	1	2.4%	28	68.3%	12	29.3%	
	High	1	100%	0	0%	0	0%	
Vaccination	Vaccinated	4	8.7%	37	80.4%	5	10.9%	0.001*
	Not vaccinated	0	0%	0	0%	10	100%	
Pt. Outcome	Improved	4	9.8%	37	90.2%	0	0%	0.001*
	Not improved	0	0%	0	0%	15	100%	
**P* value is significant < 0.05								

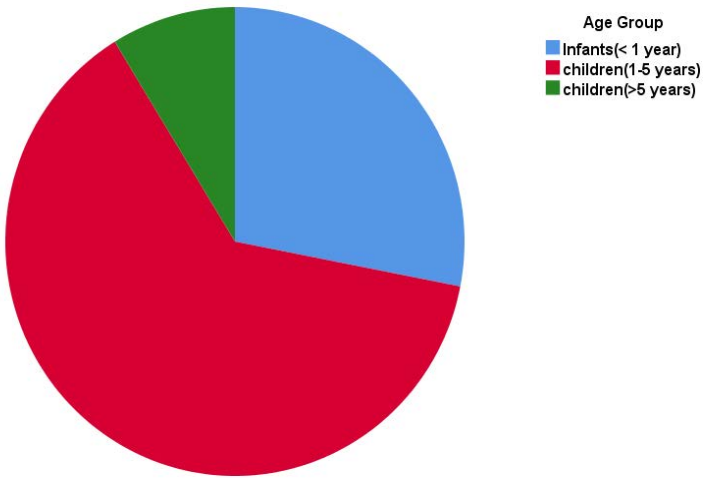

Figure 1. *Distribution of study sample according to age group.*

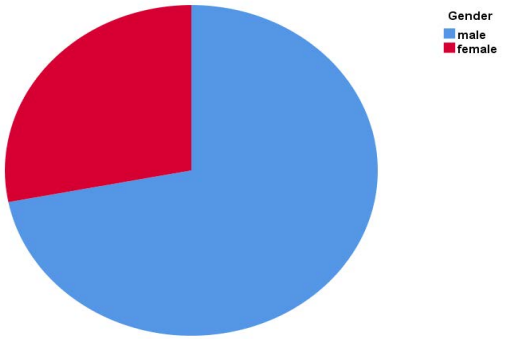

Figure 2. *Distribution of study sample according to gender.*

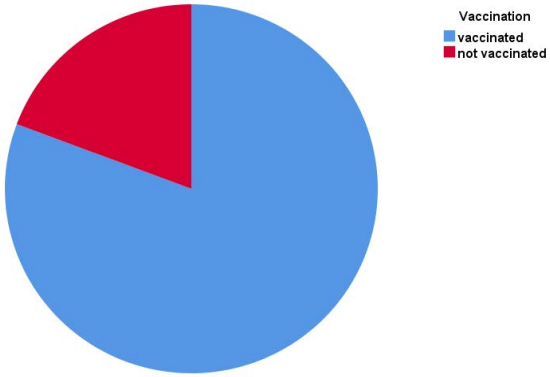

Figure 3. *Distribution of study sample according to vaccination.*

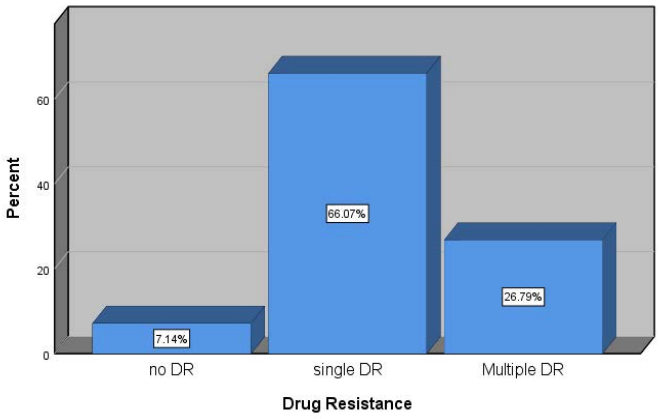

Figure 4. *Distribution of study sample according to drug resistance.*

resistance. There was a significant association between the level of hemoglobin (low level of Hb) and drug resistance (single 68.3%, multiple 29.3%, P value 0.004). Also there was a significant association between vaccination (unvaccinated patient) and drug resistance (multiple drug resistance) (100%, P value 0.001). The association between patient outcome (not improved patient) and multiple drug resistance was significant (100%, P value 0.001) as shown in table 2.

Discussion.

We studied meningitis in Iraq that could have been prevented by vaccination. It shown that bacterial meningitis is widespread throughout the nation and affects a sizable population. Our findings indicate that most of the sample were males (71.9%), but gender did not show a significant impact on drug resistance status. Additionally, it shown that age affected the etiological distribution, which was more common in children. Compared to infants and children older than five years old, children between the ages of one and five years old have higher odds of developing meningococcal meningitis. However, age did not significantly correlate with drug resistance, suggesting that drug resistance is not age-specific in this sample ($p = 0.259$). The CDC's recommendations that children receive meningococcal vaccinations reinforce the necessity for childhood meningitis immunization [30].

Our results also revealed that high proportion of patients have low Hb levels (73.7%). Importantly, low Hb was significantly associated with both single and multiple drug resistance. This suggests that patients with anemia might be more susceptible to meningitis and the result was significant (P value < 0.05). A significant majority of patients were vaccinated (80.7%). Crucially, all patients with multiple drug resistance were not vaccinated, indicating a strong protective effect of vaccination against meningitis. The PCV13 and PPSV23 pneumococcal vaccines are two vaccines that target S. pneumonia [31]; however, they don't at present included in Iraqi vaccination programs because of financial constraints and the absence of current information on incidence rates at the time this study was conducted. However, given the higher death rate of Hib between youngsters [32], nationwide vaccination campaigns by the Iraqi Ministry of Health, which began in 2012 [33], may be the reason regarding the seeming rarity of Hib infections.

Our results showed higher proportion of cultures were sensitive (71.9%), but 28.1% showed resistance, which highlights the prevalence of antibiotic resistance in the sample (P value < 0.05). Most patients exhibited single drug resistance (66.1%), but multiple drug resistance was also notable (26.8%). The distribution suggests a significant presence of drug-resistant meningitis within the population studied Because pneumococcal meningitis is becoming more resistant to numerous antibiotic categories, it presents unique public health challenges [34]. Furthermore, the majority of patients (71.9%) showed enhancement, according to our study; nevertheless, combined medication resistance was significantly associated with patients' failure to show recovery. This suggests that a significant element affecting a patient's ability to recover is resistance to drugs.

Additionally, data collection on patients' long-term mortality and morbidity may help further study attempts by providing important awareness into the prognosis of meningitis among Iraqi children. The study offered more proof that improved infectious disease detection is required in low- and middle-income countries. Finally, our results provide some new awareness into the epidemiology of meningitis among Iraqi children. It will be advantageous for public health experts to have a deeper understanding of the prevalence and etiology of meningitis in Iraq when they are setting priorities for programs designed to stop the disease's spread.

Conclusion.

This study offers valuable new insights into the characteristics and prognoses of individuals with varying degrees of therapy resistance. Low hemoglobin levels, vaccination status, and increasing treatment resistance are strongly correlated and

are associated with worse patient outcomes. The need of vaccination and hemoglobin level control in the management of meningitis is demonstrated by these findings. Future research endeavors should examine strategies to mitigate the impact of drug resistance, focusing specifically on vaccinations and anemia treatment as preventative measures.

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