

# GEORGIAN MEDICAL NEWS

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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 ВИНТИ 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 ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებშიდან.

### WEBSITE

[www.geomednews.com](http://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](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. Корректур авторам не высылаются, 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 computer-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.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](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 საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ 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 შედეგის 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 ფხიხლებში 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.

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## A CLINICO-EPIDEMIOLOGICAL STUDY OF MULTIPLE SCLEROSIS IN MOSUL CITY, IRAQ

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### Abstract.

**Introduction:** Multiple Sclerosis (MS) is a debilitating disease that affects millions of people worldwide. In this study, we aimed to shed light on the clinical and epidemiological characteristics of MS in Ninevah governorate, Iraq. Our goal was to provide valuable insights into the disease's prevalence, symptoms, and functional disability among Iraqi patients.

**Method:** the present case-series study was conducted on 418 patients diagnosed with MS based on McDonald criteria. Kurtzke Expanded Disability Status Score (EDSS) used for patients' assessment.

**Results:** The prevalence of MS in Ninevah governorate is predicted to be 10.3 per 100,000, with an annual incidence ranging from 4.6 to 11.57 per million in the last four years. The average age of symptom onset was 27.7±9.9 years, with an average symptom duration of 7.2±6.9 years. Women were twice as likely to be diagnosed with MS, with a female-male ratio of 1:0.6. Sensory symptoms were more common than visual and motor symptoms. The most common subtype of clinical presentation was relapsing-remitting MS, followed by secondary progressive MS and primary progressive MS. Finally, 68.5%, 25.4%, and 6.1% of patients had mild, moderate, and severe functional disability, respectively. **Conclusion:** The study found that the age of onset, clinical pattern, and disability from MS were consistent with studies in other Middle Eastern countries. However, the prevalence of MS in the study was relatively lower than in neighboring countries due to underestimation of the disease, limited tools for diagnosing MS, and a shortage of neurologists. The study emphasizes the importance of early diagnosis and proper management of MS to improve patients' quality of life.

**Key words.** Multiple sclerosis, rate, epidemiology, associate factors, geography, demography.

### Introduction.

A clinico-epidemiological study of multiple sclerosis (MS) is a crucial research area for understanding the incidence, prevalence, and risk factors associated with this debilitating neurological disease [1,2]. MS is a long-term autoimmune disease that affects the central nervous system and causes several neurological symptoms like muscle weakness, fatigue, and cognitive impairment [3,4]. This disease impacts millions of people worldwide, and there is currently no known cure for MS [5,6]. Therefore, studying the clinical and epidemiological aspects of MS is essential for developing better prevention strategies, early diagnosis, and effective treatments for managing the disease [7].

The main objective of a clinico-epidemiological study on MS is to identify how widespread the disease is in various populations [8,9]. This involves analyzing data from various sources, such as hospital records, patient registries, and population-based

surveys [10,11]. By examining the distribution of MS cases across different age groups, genders, and ethnicities, researchers can identify potential risk factors for the disease [12-14]. For example, studies have shown that MS is more prevalent in women than men, and the incidence of the disease increases with age [15-18]. Additionally, some studies have suggested that genetic factors, environmental factors, and lifestyle habits such as smoking, and vitamin D deficiency may increase the risk of developing MS [19]. Another important aspect of a clinico-epidemiological study of MS is to investigate the clinical features and progression of the disease. This involves analyzing data on the symptoms, disability, and quality of life of patients with MS [1,2].

By understanding how the disease progresses over time, researchers can develop better treatment options and management strategies for MS patients [3]. For instance, studies have shown that early intervention with disease-modifying therapies can slow down the progression of MS and improve patient outcomes [4-6]. In conclusion, a clinico-epidemiological study of multiple sclerosis is an essential research area for understanding the burden of this disease on individuals and society [8]. By analyzing clinical and epidemiological data, researchers can identify potential risk factors, develop better prevention strategies, and improve treatment options for MS patients [2]. Ultimately, such studies are crucial for improving the quality of life of individuals with MS and reducing the societal and economic impact of this debilitating disease [5-7].

To characterize the clinical and experimental characteristics of MS in Iraq's Ninevah town, which include the yearly MS prevalence rate calculated for this period and compared to those from recent epidemiological studies in neighbouring nations, as well as to identify clinical subtypes of our patients, common initial symptoms, and medication management levels.

### Material and Methods.

**Study site:** Nineveh is an ancient city located in the northern region of Mesopotamia (total area of 37 360.68 square kilometers), which is now known as modern-day Iraq. The city is situated on the eastern bank of the Tigris River, approximately 400 kilometers north of Baghdad. Nineveh was once the capital of the Assyrian Empire, which was one of the most powerful empires in the ancient world. The city's strategic location on the Tigris River made it an important center of trade and commerce, as it was a vital link between the Mediterranean and the Persian Gulf.

**Studied Population:** Ninevah province has a population density of over four million people. Ethnic diversity of the population is the hallmark of Ninevah province, including Arabs, Kurds, Turkmen, Assyrians, and many others.

**Study Design:** The "Multiple Sclerosis Clinic at Ibn-Sina Teaching Hospital", where nine highly skilled neurologists work

to treat patients with MS. These experts serve in the neurology department of three of the largest hospitals in the province. Anyone who shows symptoms suggestive of MS or has an MS diagnosis is admitted to one of these hospitals' neurology departments and then referred to the MS clinic for specialized care. We collected data about MS in Mosul from the MS clinics, which included patients who visited the clinic between January and June of 2022 and met the McDonald's criteria. We determined the annual MS incidence and prevalence rates for this period. These individuals are encouraged to return to the clinic monthly for follow-up and evaluated by a committee every six months. We collected demographic and clinical data that included clinical start, symptoms, disease history, length of disease, and the final "Expanded Disability Status Scale" (EDSS). Several patients underwent current studies, and all patient populations underwent magnetic resonance imaging (cranial and/or spinal cord MRIs) to confirm the medical assessment of MS.

### Results.

During the study period, we have identified 418 MS patients who have been definitively diagnosed or confirmed through laboratory testing. Unfortunately, we had to exclude five citizens from neighboring governorates from this study, three of our patients have passed away during this time, with two of them dying due to MS and the third passing away due to an accidental cause. Remarkably, a significant majority of patients, consisting of 310 individuals or 74.2% of the total, were residing in the city center of Mosul. Meanwhile, the remaining 25.8% were living outside of the city. Despite the geographical differences in their location, we remained dedicated to providing the best possible care and support to all of our patients throughout the study period.

Regarding education, the patients we've seen have varied levels of academic achievement. While the majority of patients attended secondary school (196 individuals or 46.8%), we've also treated 28 patients (6.7%) who have either a PhD or a Master's degree. Additionally, 108 patients (25.8%) graduated from college. Unfortunately, we also encountered patients who are considered low-educated or illiterate (20.5%). In terms of ethnicity, the majority of our patients were Arabs (Figure 1).

Multiple Sclerosis (MS) is a debilitating condition that affects thousands of people worldwide. According to recent studies, the estimated prevalence of MS is approximately 10.3 per 100,000 individuals. Surprisingly, in the last four years alone, the annual incidence of MS has ranged from 4.6 to 11.57 per million people. This means that the number of people diagnosed with MS has doubled every couple of years, as confirmed by Figure 2. These statistics highlight the urgent need for increased research and support for those living with MS.

According to our study, the average age when symptoms of MS first appeared was  $27.7 \pm 9.9$ , ranging from 15 to 65 years old. The patients were diagnosed at an average age of 36.7 years, after experiencing symptoms for an average duration of  $7.2 \pm 6.9$  years, with some experiencing symptoms for as little as one year and others enduring them for as long as 37 years. Interestingly, our study revealed a significant disparity in the distribution of MS between men and women. Our findings showed that women

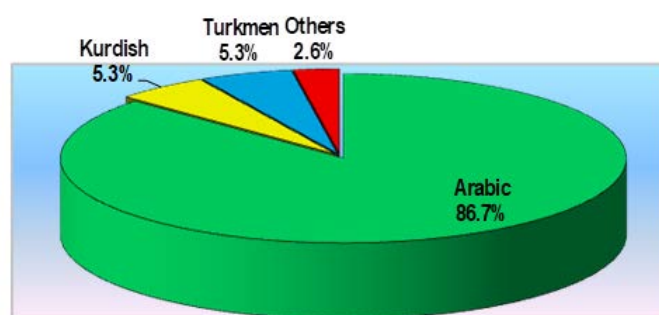


Figure 1. Prevalence of multiple sclerosis in the studied sample according to the ethnic origin.

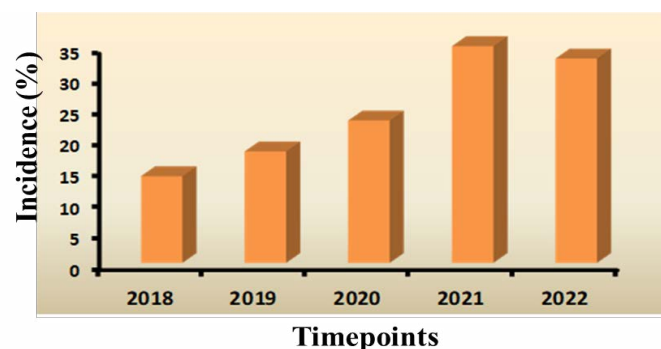


Figure 2. The increment rate of multiple sclerosis per annum over 5 year period (2018-2022).

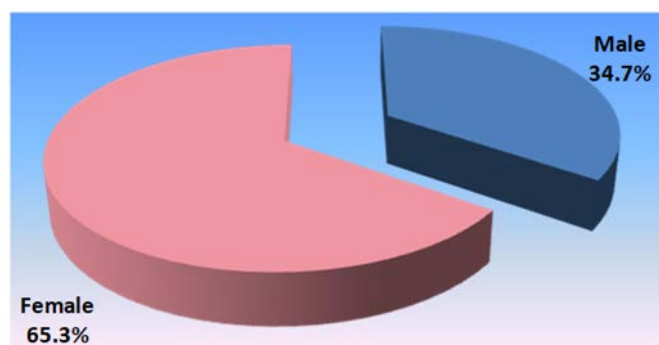


Figure 3. The rate of distribution of multiple sclerosis based on gender group.

were more susceptible to MS than men, with a female-male ratio of 1:0.53, as depicted in Figure 3.

Results confirmed that there is a specific age range during which certain conditions or diseases are more likely to occur in women. The third and fourth decade of life refers to ages 20-49, and it is interesting to note that this age range is consistently associated with a higher likelihood of onset for females. This information could be useful in understanding the risk factors for certain conditions and diseases that affect women, as well as in developing prevention and treatment strategies that are tailored to this age group. Additionally, it may be important to consider the social and cultural factors that may be contributing to this trend, such as changes in lifestyle, environmental factors, or other factors that may be specific to women in this age range. Overall, this statement provides valuable information about the age-related patterns of certain conditions and diseases in women

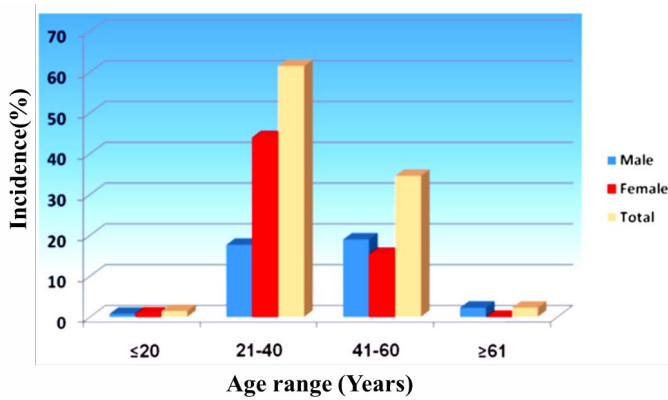


Figure 4. The rate of multiple sclerosis with relation to age range and sex.

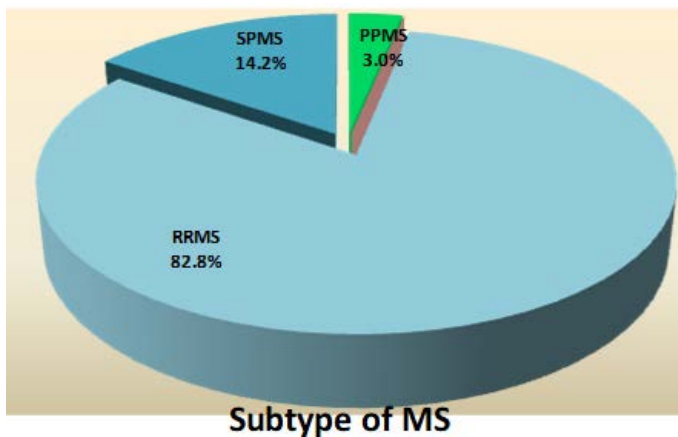


Figure 5. The rate of distribution of subtypes of multiple sclerosis among studied population sample.

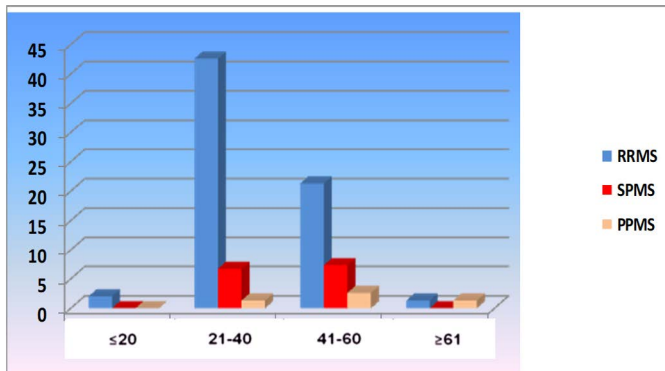


Figure 6. The age range of distribution of subtypes of multiple sclerosis among studied population sample.

and may help to guide future research and interventions aimed at improving women's health and well-being. (Figure 4).

Out of the twelve patients we studied, seven of them had first-degree relatives affected by MS and the others had second-degree relatives affected as well. Interestingly, 82.8% of these patients had the relapsing-remitting subtype, which is the most common clinical course across all age groups. However, we also found that in the older age group, the primary progressive MS subtype was more dominant (Figure 5 and Figure 6). Overall, these findings shed new light on the genetic and clinical aspects of MS that are worth exploring further.

Identifying the most common symptom of the illness, limb weakness, which was found to be the most frequently experienced symptom among patients who sought treatment. There were other symptoms that presented as well, as outlined in Table 2. Interestingly, fatigue was reported by the majority of patients at some point during their illness, with 86% of cases experiencing this symptom (Figure 7).

One of the most commonly observed clinical signs was the pyramidal sign, which also happened to be the most frequently identified one. Interestingly, the number of indicators found to be present was directly related to the duration of the disease at the time of its occurrence. Furthermore, when analyzing the functional disability distribution by EDSS, it was found that approximately two-thirds of the patients had only a mild degree of impairment (Figure 8).

In all subjects, MRI scans were conducted, up to 98% of the subjects had abnormal scans, with multiple lesions being identified in over 95% of the cases. To gain further insights, visual evoked potential tests were carried out in 47 subjects, and 83% of the subjects showing abnormal results. The somatosensory evoked potential tests were conducted on six patients, and four of them showed abnormalities, accounting for 67% of the patients tested. To add to the list of abnormalities, three patients tested positive for oligoclonal band. In essence, all patients had at least one abnormal paraclinical test result.

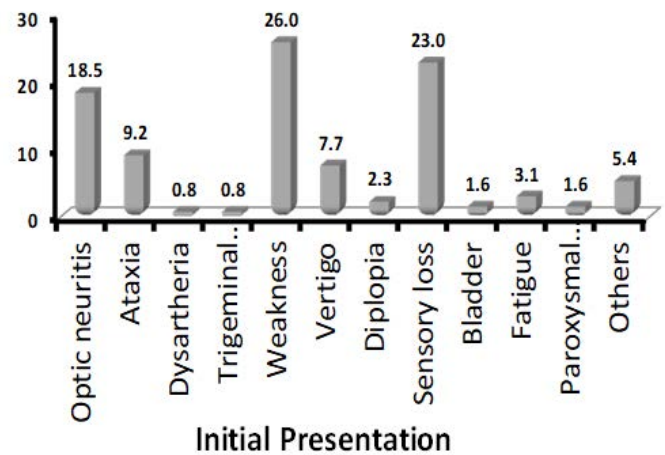


Figure 7. Common symptoms among multiple sclerosis patients in the studied sample.

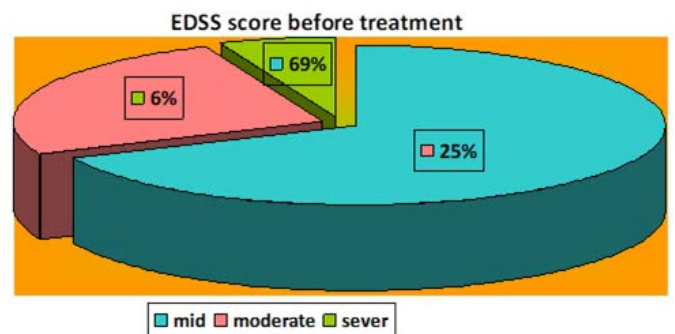


Figure 8. The diseases severity rate of studied samples based on rating scale of Kurtzke Expanded Disability Status Score.

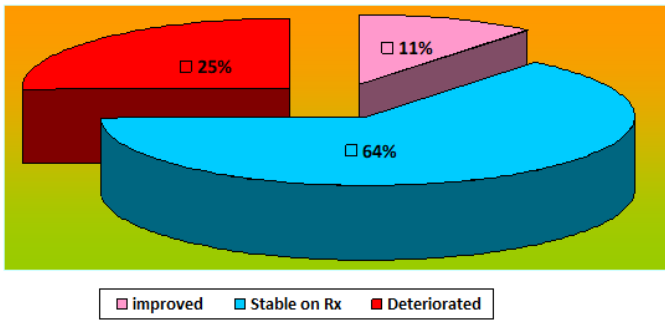


Figure 9. The fate of MS patients.

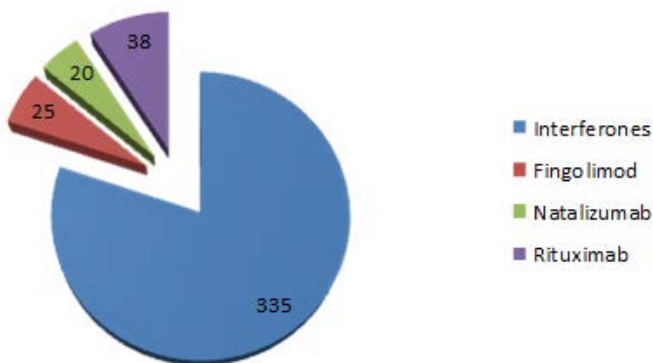


Figure 10. The rate of drug use among studied sample.

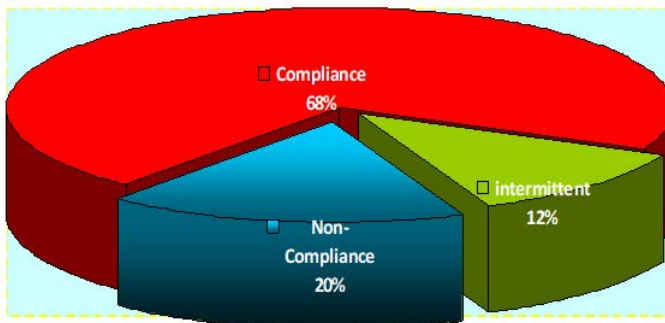


Figure 11. Compliance and adherence to the therapy.

The analysis shows that the majority of patients, 64%, have been able to maintain a stable condition while undergoing treatment. This is an encouraging sign that the treatments are working as intended for most patients. However, the analysis also indicates that 25.4% of patients have deteriorated while undergoing treatment. This is a concerning result, as it suggests that the treatments may not be effective for everyone. It is important to note that this statistical analysis is just one piece of information and should be interpreted in the context of other factors, such as the severity of the patients' conditions and the length of time they have been undergoing treatment. Nonetheless, this analysis highlights the need for ongoing monitoring and adjustment of treatment plans to ensure the best possible outcomes for patients (Figure 9).

Among the various treatment options available, 335 patients rely on interferon to manage their symptoms, 25 patients have turned to Fingolimod, while 20 others have placed Natalizumab. For the remaining 38 patients, Rituximab is the key to their recovery (Figure 10).

In the MS clinic, 284 patients (68%) were based on regular visits and received therapy properly. However, there were 50 patients who only made intermittent visits and 84 who were non-compliant. Interestingly, of those who were non-compliant, 71% came from the low or non-educated group. Oppositely, among the 24 non-adherent patients from the educated group, 20 of them had an EDSS of more than 6 - meaning their condition was quite severe. It's worth noting that nine patients were bedridden or confined to a wheelchair (Figure 11).

## Discussion.

The worldwide prevalence rates of MS have been a topic of much discussion, with published information confirming discrepancies across various populations. It's nominal to consider the many factors that contribute to the aetiology of this disease, from environmental to genetic, ethnic, and geographical. One interesting finding is that MS seems to be more prevalent in temperate areas, while subtropical and tropical regions have lower rates. However, this doesn't hold true for every population. The Middle East, for example, has reported lower prevalence rates despite being located in a temperate region. The epidemiological studies conducted in Saudi Arabia, Kuwait, and Jordan before the year 2000 showed a low rate of Multiple Sclerosis (MS) distribution per population density, with a range of 3 to 20 cases per 100,000 people [20-22]. But more recent studies conducted in the 21st century have shown a significant increase in MS rates in these countries, with numbers reaching as high as 30-38 per 100,000. It's surprising to see how these rates have evolved over time, and what factors may be contributing to this trend [23-25].

Incredible findings have been uncovered in a recent study, revealing that Multiple Sclerosis (MS) has a prevalence rate of 10.3 per 100,000 in the Ninevah area of Iraq [27]. Over the past 5 years, the annual incidence rate has been approximately 11.23 patients per 1,000,000, which is almost identical to the data provided by other studies conducted in Iraq. However, it's essential to note that these results only include validated MS patients, and therefore the actual prevalence rate may be higher than estimated. Interestingly, migration to nearby provinces was found to have a negligible effect on the incidence rate. A study conducted in Baghdad, which included a whopping 4,355 patients, reported a prevalence of 11.73 per 100,000, further supporting the notion that the actual prevalence rate might be higher. It's important to acknowledge that these figures may not be entirely accurate, as the study only accounted for medically verified MS cases using McDonald's criteria [27]. There may be additional cases of MS that have gone undiagnosed due to the diverse clinical presentation of the disease and the lack of diagnostic tests available, leading to delays in diagnosis and an inability to anticipate diagnosis. It's possible that patients with mild symptoms have not been accounted for in this study, as the number reported is significantly lower than that indicated in previous research conducted in neighboring countries [23-25].

In Ninevah, certain ethnic groups have a higher prevalence of MS. The majority of patients in the MS Clinic are Arab, which is expected as they are the dominant group in the region. However, we've also seen patients from Kurdish and Assyrian backgrounds, which could be related to security issues in the

region. It's worth noting that the high incidence rates of MS inside governorate don't necessarily mean that the whole of Ninevah is affected in the same way. The city of Mosul has a dense population and plenty of medical facilities, making it easier for patients to be diagnosed earlier. As a result, we see a higher number of cases from the central regions of the city compared to the surrounding areas.

Our research findings show that the age at which people first present with MS symptoms in our study is similar to neighbouring countries, with an average age of 27.7. The study found that the median age of diagnosis for multiple sclerosis was higher than expected, and even higher than in neighboring countries. The oldest person diagnosed with MS in the study was 36 years old [26,27]. One of the reasons for this delay in diagnosis is due to a diagnostic time lag of 7.2 decades, which is common in MS cases that typically begin at an early age. Interestingly, the male-to-female ratio in our study was consistent with the ratio observed in high prevalence regions of the world, which is typically reported in connection with the epidemiology of MS in Western countries. This finding sheds light on the global nature of MS and provides important insights into the prevalence and distribution of this disease in different regions of the world [11,12].

The study sheds light on the prevalence of the relapsing course as the most common clinical pattern in certain regions of Iraq and the Middle East and North Africa (MENA) region [27]. This finding is consistent with the general idea about disease course worldwide, where relapsing multiple sclerosis is the most common form of disease. The study's data indicate that the percentage of patients experiencing a relapsing course in another part of Iraq is estimated to be 89%, while the MENA region's percentage is as high as 96%. This information is crucial to understanding the epidemiology of multiple sclerosis in these regions and highlights the importance of early diagnosis and effective treatment to manage the disease's relapsing course. Healthcare professionals must be aware of this prevalence to provide the best possible care for patients with multiple sclerosis in these regions. Moreover, this study's findings can serve as a basis for further research to understand the underlying causes of the relapsing course in multiple sclerosis, leading to the development of more targeted therapies to improve patient outcomes. Overall, this study's results are crucial in understanding the prevalence and course of multiple sclerosis in specific regions and contribute to the global understanding of the disease [27].

The worldwide trend of demonstrating MS scenarios is a topic of much variation and discussion. After conducting extensive research, we found that motor failure is a recurring issue, and the symptoms and signs are similar to those found in other studies conducted in the MENA region [27]. It is noteworthy that spinal symptoms of motor and sensory deficit are prevalent in this demographic. The individuals in this study reported a higher frequency of motor, sensory, and sphincteric complaints, which could be attributed to a delay in identification due to the injuries' larger spread. Interestingly, we discovered that those residing in Mosul had a shorter disease duration at the time of diagnosis compared to non-Mosul residents who appeared

later and had proportionally more damaged systems. This finding suggests that early diagnosis and intervention may lead to better outcomes for those with MS. Overall, our research indicates that MS remains rare in Ninevah and Iraq. However, we did find a wider distribution of MS, which is possibly due to delayed diagnosis or late presentation. These results highlight the importance of early detection and timely treatment for individuals with MS, to prevent further damage and improve quality of life.

The city-based MS national survey conducted in Iraq revealed an array of socioeconomic, cultural, and ethnic characteristics, as well as geographical differences. However, it's essential to note that the results may not accurately represent the entire nation. Future surveys conducted in Iraq may reveal a higher prevalence of the disease than what our study discovered. The onset of symptoms generally occurred at the age of  $27.7 \pm 9.9$ , with patients being diagnosed at an average age of 36.7 years. The average duration of symptoms was  $7.2 \pm 6.9$  years, with a broad range of 1-37 years. These findings were relatively similar to those observed in neighbouring countries such as Kuwait, with an average onset age of 25 years, and Northeastern Iran, with an average onset age of 32.5 years. Interestingly, the clinical pattern of patients in Iraq was similar to those from other Middle Eastern countries like Kuwait, Iran, and Saudi Arabia. No significant differences were found in clinical patterns and disability from the disease in this region [28-30].

## Conclusion.

MS is a chronic disease that affects millions of people worldwide, and its prevalence is increasing in many parts of the world, including Ninevah and other parts of Iraq. While the prevalence in Ninevah is lower than that in neighbouring countries and worldwide, it is still essential to conduct regular studies to keep track of the disease's incidence and prevalence. This can help identify potential risk factors and assist in finding ways to prevent or manage the disease better. Raising awareness about MS and providing better access to healthcare services is also crucial in managing the disease's impact on affected individuals and their families.

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