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Gender Differences in Multiple Sclerosis in Dhi Qar: Epidemiology, Risk Factors, and Progressive Disease Stages.

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ABSTRACT

Chronic and immune-mediated, multiple sclerosis (MS) mostly affects the central nervous system. It is distinguished by a slow course and a variety of clinical symptoms. While some statistical data on this condition may be found from northern Iraq, little is known about its course in the south,

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gender distribution, and association with risk factors. With an emphasis on epidemiology, risk factors, and illness progression, this study attempts to examine gender disparities in MS prevalence in the Dhi Qar Governorate. Therefore, a sample of 30 MS patients who were evaluated during their visits to neurology clinics in the governorate's hospitals between 2019 and 2024 were the subject of a retrospective and descriptive systematic study. Specialized questionnaires were used to gather demographic, clinical, and risk factor data, which SPSS software was then used to process and statistically evaluate. According to the results, women made up 50% of the sample, compared to 33.3% for men, with 16.7% of the sample having incomplete gender information. While progressive forms of the disease, especially secondary and non-amyotrophic MS, were more common in men, relapsing-remitting MS, which is defined by recurring bouts of symptoms, was more common in women. Additionally, men were more vulnerable to factors linked to smoking and occupational exposure, whereas women were more likely to have a favorable family history and vitamin D deficiency. In terms of chronology, women received diagnoses earlier than males did. In summary, the study's findings demonstrated that there are notable gender disparities in disease patterns and risk factors in the Dhi Qar Governorate. This underscores the significance of implementing gender-specific prevention and treatment approaches to guarantee early diagnosis, lower complications, and enhance disease control in the Iraqi population.

1. Introduction

Inflammation and demyelination are hallmarks of multiple sclerosis (MS), a chronic immune-mediated illness of the brain and spinal cord that damages nerves and impairs central nervous system function [1, 2]. It primarily affects younger individuals and is a major contributor to non-traumatic neurological disability, placing a heavy strain on society and health systems [3]. According to recent epidemiological studies, MS is becoming more commonplace globally, with notable gender differences in incidence rates—the disease is more common in men and women. Over the past 20 years, there has been a noticeable rise in incidence rates throughout the Middle East, including Iraq [4]. Epidemiological data on MS from southern Iraq, especially the Dhi Qar Governorate, is conspicuously lacking, nonetheless [5]. In order to create more individualized and successful treatment and prevention plans, it is critical to comprehend the degree to which gender affects infection patterns, risk factors, and disease progression, particularly at the local level, given the variety of environmental, social, and genetic factors [6].

There are statistically significant gender disparities in the forms and severity of the disease, according to international study. While men suffer from more advanced disease types and more long-term deterioration, women are more likely to develop minor instances and relapses [7, 8]. Additionally, there are differences in how risk factors like smoking, vitamin D insufficiency, and a family history of the disease are exposed [9]. However, there is still a dearth of knowledge on these variations in the regional context of Iraq, especially in the southern regions, which hinders the creation of focused therapy interventions and public health initiatives [10]. By evaluating gender disparities in multiple sclerosis (MS) in the Dhi Qar Governorate, this study seeks to close the information gap in this area. It does this by examining epidemiological factors, the significance of

risk factors, and characteristics of disease development. In order to obtain better therapeutic and preventive results, this aims to provide scientific underpinnings for health interventions that consider demographic and genetic disparities between the sexes.

2. Method

2.1. Study Design

In the Dhi Qar Governorate in southern Iraq, a retrospective cross-sectional study was carried out to evaluate gender disparities in multiple sclerosis (MS) [11]. From January 2019 until the end of December 2024, the study was carried out. In the Dhi Qar Governorate, information was gathered from neurology and private neurology centers in public and private hospitals that frequently accept MS cases and have specialized neurology clinics. In accordance with medical confidentiality and ethical guidelines, the medical records of recently diagnosed patients were examined.

2.2. Study Sample

All patients who visited neurology centers during the study period and had an official MS diagnosis based on the 2017 MacKendon criteria were included in the study. Thirty patients in all were selected from the respective departments' medical records. Patients with additional problems that could influence the study's findings, such as other linked neurological or immunological disorders, or those whose medical records were lacking or ambiguous about their diagnosis were not included.

2.3. Data Collection

In order to ensure the accuracy of the data, structured clinical interviews were conducted where needed in addition to a review of the patient's medical reports and records. Included in the data were demographics such as age, gender, marital status, and family history. Clinical information, such as illness duration and disease kind based on approved classifications (RRMS, SPMS, PPMS). Risk factors include smoking, occupational and environmental exposures, family history, and serum vitamin D levels. Details regarding the course of the illness, its likelihood of recurrence, and any therapy response. Every piece of data was meticulously recorded to guarantee dependability while maintaining information privacy and confidentiality.

2.4. Ethical Standards

The General Hospital of Nasiriyah's Ethics Committee gave the study their previous approval after reviewing the research protocol to make sure it complied with ethical guidelines, especially those pertaining to patient data security and confidentiality. Prior to data collection, patients or their guardians were made aware of the study's purpose and given their written informed consent. Patients were free to decline or withdraw from the study at any time without facing any consequences.

2.5. Data Analysis

SPSS version 25 was used to analyze the data (IBM, New York, USA). Descriptive statistics including means, standard deviations, frequencies, and percentages were used to characterize the data. Student's t-tests were employed to compare the means of quantitative variables, whereas chi-square tests were utilized to compare qualitative categories. At a p-value of less than 0.05, the statistical significance level was established.

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3. Results and Discussion

A total of thirty MS patients were given the results of the study. 16.7% (5 patients) were of unknown gender, 33.3% (10 patients) were male, and 50% (15 patients) were female. The findings indicated that the mean age of diagnosis for females was 29.6 ± 7.4 years, whereas the mean age for men was 32.1 ± 6.8 years. Women are usually diagnosed earlier, as evidenced by this statistically significant difference ($p < 0.05$). As seen in Table 1, this might be because illness symptoms are more obvious in women, or because women respond to concomitant symptoms more rapidly and seek medical attention sooner.

According to the study's findings, relapsing-remitting MS (RRMS), which affects 60% of patients, is the most prevalent kind of MS. With 66.7% of RRMS patients being female (12 of 15 women), women were more common. 50% of males (5 of 10) and 20% of women (3 of 15) had progressive multiple sclerosis (MS), especially secondary progressive MS (SPMS) and primary progressive MS (PPMS). This distribution is in line with research showing that men typically acquire progressive MS more quickly, which is marked by higher rates of neurological deterioration over time and lower relapse rates, whereas women are more likely to develop RRMS.

Table 1. Demographic characteristics and disease subtypes by gender

Characteristic	Females (n=15)	Males (n=10)	Incomplete (n=5)
Mean age at diagnosis (years)	7.4± 29.6	6.8±32.1	-
RRMS	(66.7%) 12	(22.2%) 4	-
Progressive MS (SPMS + PPMS)	(20%) 3	(50%) 5	-

The findings showed distinct gender disparities in risk factors. Women had the highest percentage of vitamin D deficiency, at 73.3% (11 out of 15), while men had the lowest percentage, at 40% (4 out of 10). This illustrates how vitamin D insufficiency can both cause and contribute to the disease's progression, particularly in women. Additionally, women were more likely than males to have a family history of the disease (46.7% versus 20%), underscoring the significance of genetics and heredity in determining a woman's chance of contracting the illness.

Regarding additional risk variables like smoking and occupational exposure, the majority of smokers were men (6 out of 10), with a smoking prevalence of 60%. Women's smoking rates were significantly lower (6 out of 15). Men were more likely than women to have occupational variables, particularly exposure to chemicals or agricultural products, with a prevalence of 40% versus 13.3%. These results support the notion that environmental and lifestyle factors are significant contributors to the disease's development and gender-related associations. As shown in Table 2.

Table 2. Distribution of risk factors by gender

Risk Factor	Females (n=15)	Males (n=10)
Vitamin D deficiency	(73.3%) 11	(40%)4
Family history of MS	(46.7%) 7	(20%) 2
Smoking	(6.7%)1	(60%)6
Occupational exposure	(13.3%) 2	(40%) 4

The findings show a pronounced gender gap in disease patterns, risk factors, and diagnostic age. Men tend to develop progressive patterns more quickly, whereas women are more likely to be diagnosed with RRMS at a younger age and with a higher severity [12, 13]. This distribution illustrates how gender-specific genetic and environmental factors may have different effects, which should be taken into account when developing healthcare initiatives, early detection strategies, and treatment approaches. Women are more likely than men to be vitamin D deficient, which

emphasizes the need to step up prevention efforts and increase knowledge of the benefits of sun exposure and vitamin D supplements, particularly in places with low levels of sunshine or societal circumstances that limit natural exposure. In light of occupational risk factors, health authorities ought to concentrate on educating the public about the significance of safeguarding employees who are exposed to chemicals and offering routine health examinations for early prevention [14].

The study concludes by confirming that, in order to improve patient outcomes and increase the efficiency of therapies, gender differences in MS necessitate more individualized and focused treatment approaches that take into consideration the biological and environmental variations between men and women [15]. To better understand illness causes and address variations in response to various therapies, more research on genetic and environmental factors related to sex is advised. Increasing knowledge and instruction regarding individual and environmental risk factors can aid with early prevention and lifestyle changes, which can lessen the severity of the disease and enhance MS patients' quality of life.

4. Conclusion

The study's findings, which show distinct variations in age of diagnosis, disease patterns, and sex-related risk variables, underscore the significance of differentiating between genders in MS. According to the findings, women have a more noticeable relapsing-remitting pattern of disease and are frequently diagnosed at younger ages. The correlation between biological and genetic factors and illness pattern is further evidenced by the increased frequency of vitamin D insufficiency and a family history of the condition in women. Males, on the other hand, are more likely to be linked to environmental and occupational factors like smoking and chemical exposure, and they tend to exhibit progressive trends earlier. This is crucial for comprehending how diseases develop in men.

These results are significant because they offer scientific support for bolstering early diagnostic initiatives and gender-specific preventative tactics, which would enhance the standard of care given and lessen the illness burden. Additionally, the study represents a noteworthy contribution to the body of knowledge on MS in the Dhi Qar region, highlighting the need for more extensive, independent research that considers social and regional aspects while concentrating on genetic and environmental factors. As a result, this study is a significant step toward a better understanding of gender differences and effectively advances the development of more specialized therapeutic and preventive approaches that enhance patient outcomes, lessen the need for conventional treatments, and support the region's overall strategy to combat multiple sclerosis.

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