

Epidemiology of Multiple Sclerosis (MS) in Military Personnel: Demographic study in Iran

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ABSTRACT

We investigated the epidemiology and demographic features of multiple sclerosis in military personnel and their family members. Demographic and clinical records of 122 MS patients based on the revised Mc-Donald criteria were reviewed, which included; age, sex, marital status, presenting symptoms, type of disease, disability status and frequency of relapses. Out of 122 cases, seventy-seven were females and forty-five males. The female/male ratio was 1.7. The mean age at onset of disease was 29.9 ± 6.2 for all of the patients. The mean duration of illness was 6.17 ± 4.5 . The majority of patients (60%) had relapsing-remitting pattern. Average disability was 3.4 ± 2.45 (3.06 ± 2.34 in females and 3.59 ± 2.53 in males, $P=0.03$) on the Kurtzke disability status scale. There was no difference in epidemiologic and demographic features of multiple sclerosis between military personnel and their families and general population, therefore it seemed that military status had no important role in the prevalence of multiple sclerosis and rate of disability.

Key words: Multiple sclerosis, Demography, Iran.

INTRODUCTION

Multiple sclerosis (MS) is a chronic inflammatory and autoimmune demyelinating disorder of the central nervous system that mostly affects young adults, ages 20-40 years old and women more than men^{1,2}. Many population based studies over various geographical regions suggested the complex interactions between genetic and environmental factors in the development of MS^{3,4,5}. Although many factors like variability in surveyed population sizes, age, ethnic origins and composition, and the difficult quantification of patients have faced published

regional studies with limited validity; achieving a good knowledge of the epidemiology and demographic features of MS in different areas gives new insight into the underlying causes of the disease^{6,7}. Kurtzke believed that latitude plays a role in the frequency of MS and divided the world into 3 zones by prevalence. These zones consist of: 1) high (30 to 60 per 100,000) for the areas located farther away from the equator, medium (5 to 15 per 100,000) and low risk (less than 5 per 100,000) which are more near to equator.^{8,9} According to Kurtzke, Middle East countries had been classified as low risk regions, but nowadays, several studies show higher risk in this area¹⁰. Epidemiology of

MS in Iran has been a major topic of concern in last decade and several population based studies revealed a rapid increase in the incidence and prevalence of MS especially in females, in Iran.¹¹

In this study our objective was to determine the epidemiology and demographic features of MS in the military personnel and their family members.

MATERIAL AND METHODS

We evaluated the medical records of 122 consecutive military personnel and their family members with multiple sclerosis admitted since April 2009 to 2014 to the neurology ward of the Imam Reza Hospital, retrospectively. The diagnosis of multiple sclerosis was confirmed by one of the study neurologists based on the revised McDonald criteria by international panel for MS diagnosis¹². Patients with known inflammatory, infectious, malignancy and autoimmune disease not included in the study. In the case of missing clinical data if possible, phone contact with the patients were made; otherwise, they were excluded from the study. Medical records of patients who previously diagnosed with multiple sclerosis, were reviewed by neurology resident and all demographics as well as clinical variables such as type of disease, duration of disease, type of first attack and expanded disability status scale (EDSS) were extracted from the records.

Data analysis

Statistical analysis was performed using SPSS software (21th edition). Applied methods composed of descriptive statistics (mean, median and standard deviation) for frequency, t-test and

Anova for independent variables. Differences between the two groups were estimated using Chi-Square test and correlation between different clinical factors were evaluated using Pearson's correlation for continuous variables or Spearman's rank correlation for numerical ones. For all of the analyses, P value <0.05 were considered statistically significant.

RESULT

The total number of patients enrolled in this study was 122. Forty five were male and seventy seven were female with female/male ratio 1.71. In total, 64.8% of patients were married, 28.6% single and 6.6% widowed/divorced with mean EDSS(SD) 3.2(2.34), 2.31(2.1), 2.2(2.07) respectively, ($P_{\text{value}}=0.133$). Unfortunately, as one of limitations of our study, it was not possible to calculate prevalence of MS in military personnel, because of lacking data about the exact number of military personnel and family members. The mean age was 36.1(7.7) years and the mean age of onset was 29.9(6.2) years (29.6±6 for female and 30.4±6.5 for male with $P_{\text{value}}=0.8$). As shown in Table 1, multiple sclerosis was most frequent in the 31-35 years age group in both females and males. The youngest patient was a 14-year-old girl and the oldest was a 46-year-old woman at the onset of disease. We considered the age below 16 years as an early-onset age and above 50 years as late-onset age of MS.¹³ In total, only two patients(1.6%) were in the early-onset age and none of the patients were in the late-onset age category. The mean duration of disease was 6.17±4.5year (6.20±4.9 for female and 6.11±4 for male, $P=0.35$). The frequency of disease

Table 1: Frequencies of multiple sclerosis in different age-onset groups and gender

| Age | Male N(%) | Female N(%) | Total |
|-------|-----------|-------------|------------|
| <16 | 1(2.2%) | 1(1.2%) | 2(1.7%) |
| 16-20 | 2(4.4%) | 6(7.8%) | 8(6.6%) |
| 21-25 | 8(17.8%) | 12(15.6%) | 20 (16.4%) |
| 26-30 | 11(24.4%) | 22(28.6%) | 33(27%) |
| 31-35 | 16(36.6%) | 26(33.8%) | 42(34.4%) |
| 36-40 | 3(6.7%) | 8(10.4%) | 11(9%) |
| ≥40 | 4(7.9%) | 2(2.6%) | 6(4.9%) |
| total | 45(100%) | 77(100%) | 122(100%) |

Table 2: Comparison of the clinical pattern and disability according by sex

| | Male N(%) | Female N(%) | P _{value} |
|----------------------------------|------------|-------------|--------------------|
| Age: mean (SD) in years | 37.1(8.1) | 35.6(7.4) | 0.69 |
| Age at onset: mean (SD) in years | 30.4(6.5) | 29.6(6) | 0.8 |
| Marital status | | | 0.73 |
| Married | 30(66.7%) | 49(63.6%) | |
| Single | 13(28.9%) | 22(28.7%) | |
| Widowed/divorced | 2(4.4%) | 6(7.7%) | |
| EDSS (SD) | 3.59(2.53) | 3.06(2.34) | 0.03 |
| Duration of disease (SD) | 6.11(4) | 6.2(4.9) | 0.35 |
| Type of disease (SD) | | | 0.67 |
| RRMS | 25(55.6%) | 48(62.3%) | |
| SPMS | 17(37.8%) | 27(35.1%) | |
| PPMS | 3(6.6%) | 2(2.6%) | |
| Type of first attack | | | 0.25 |
| visual | 18(40%) | 25(32.5%) | |
| cerebellar | 7(15.5%) | 14(18.1%) | |
| sensory | 9(20%) | 29(37.7%) | |
| motor | 11(24.5%) | 9(11.7%) | |
| Relapse per year | | | 0.29 |
| ≤ 1 | 28(62.2%) | 55(71.4%) | |
| > 1 | 17(37.8%) | 22(28.6%) | |

type in 122 patients were: relapsing-remitting multiple sclerosis(RRMS) (60%), secondary progressive multiple sclerosis(SPMS) (36%) and primary progressive multiple sclerosis(PPMS) (4%); Although RRMS was more common among women with sensory symptoms as an initial attack, SPMS more frequently occurred in men with motor symptoms. Progressive relapsing multiple sclerosis(PRMS) cases were included in the PPMS group. In this study we looked that most patients with RRMS had sensory symptoms(41.1%) and most of the SPMS and PPMS had motor symptoms as their initial attack (36.4% and 80%, respectively) with $P_{value}=0.003$. The mean EDSS was 3.4 ± 2.45 (3.06 ± 2.34 for female and 3.59 ± 2.53 for male, $P=.03$). With respect to the initial feature of the disease, visual (35.1%) was the most common symptom followed by sensory(31.3%), cerebellar(17.2%) and motor symptom (16.4%); In addition, as illustrated in figure 1, on the basis of duration adjusted multivariate analysis, patients with first attack of sensory type had EDSS(SD) 1.35(1.71) subsequently, visual 2.53(2.32), cerebellar 3.19(1.43) and motor 5.34(1.77) with $P_{value}=0.003$. Patients with

cerebellar symptoms had higher rate of relapse(>1 relapse per year) (66.7%), followed by motor(65%), visual(27.9%) and sensory symptoms(18.4%) ($P_{value}=0.045$).

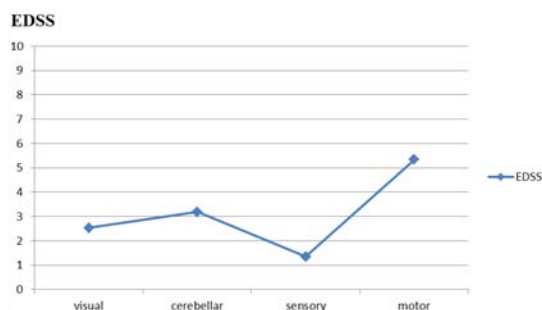


Fig. 1: EDSS of patients according to the first attack type; sensory symptoms as an initial attack had the lowest EDSS

DISCUSSION

Previously, Iran was considered as a low risk area for MS^{14,15}; however, recently several studies in different part of Iran showed significant

increase in the prevalence of multiple sclerosis and regarded as the medium risk area¹⁶⁻²¹. MS is predominant among women compared to men^{6,22,23}. According to former studies in different parts of Iran, female preponderance has been observed among Iranian MS patients with female/male ratio varied from 1.2 to 3.6^{19,24-27}. In agreement with these results, present study showed the female to male ratio of 1.7. Moreover, the results of our study revealed that the RRMS was the dominant pattern which is in consistent with previous reports^{20,21,23}. Also, we found that SPMS more common than PPMS and frequency of men suffering from progressive disease higher than women, which is similar to Rezaali et al reports²⁸. However, Montalban et al and Kalanie et al^{23,29} have shown a higher frequency of PPMS compared to SPMS, and prevailing frequency of women with progressive disease in comparison with men. In this study, the age at onset of MS in women was lower than men, approximately 1 year which is statistically insignificant (P=0.8). In addition, 86.9% of the patients were 20-40 years old with the peak incidence age at onset 31-35 and only 1.6% of the patients were early onset MS (<16 years old). According to the present study, we estimated that MS mostly occurs in adults, and early and late onset age groups account for negligible percentage of patients. This is in accordance to the results of several earlier studies^{19,20,30-33}. In agreement with the previous data from epidemiological surveys in Tehran and Qom^{20,28}, we demonstrated in this study that prevalence of MS and EDSS were higher among married, that statistically insignificant (P=0.73 and 0.133 respectively); Additionally we did not know whether the disease happened before marriage or after. There are few studies concerning the role of marriage status in MS³⁴. The average disability of our patients (EDSS) was 3.4 ± 2.45 , with higher rate of disability among men than in women (3.59 ± 2.53 for male, 3.06 ± 2.34 for female, P= .03) and the average duration of illness was 6.17 ± 4.5 year (6.20 ± 4.9 for female and 6.11 ± 4 for male, P=0.35)

which is similar to the Ebrahimi et al.³⁵, who have mentioned greater disability among men and no statistically significant differences between men and women with regards to the duration of disease. It seems that men suffered from more disability, and the rate of progression of MS in men was faster than in women. Tremlett and his colleagues suggested a 38% faster progression in males, and that younger age at disease onset predicts a slower rate of progression³⁶. This is in concordance with our findings that women tend to be afflicted earlier than men and rate of progression of disease was slower and older age at onset of disease was associated with higher EDSS (P=.004). We illustrated that visual and sensory symptoms were the most frequent initial presentation of multiple sclerosis (66.6%), followed by cerebellar (17.2%) and motor deficit (16.4%), as multiple epidemiological investigations have shown similar results^{22,27,35}. As Lublin et al and Hammond et al^{38,39}, mentioned that the advancement of disability depends on individual patient, the gap between attacks, the type of MS, symptoms and signs of the first attack, we showed that higher frequency of attacks per year and motor and cerebellar symptoms as first attack were related with greater EDSS and rapid rate of progression (P=.01 and .003 respectively). Moreover, patients with cerebellar and motor symptoms had higher rate of relapse per year (P=0.045).

In conclusion, we found that multiple sclerosis was more frequent within the ages 31-35 years and there was a linear relationship between age at onset and rate of progression. Also, type of first attack, frequency of relapses and gender had prognostic significance.

There was no difference between epidemiologic and demographic features of multiple sclerosis in military personnel and their families and general population, and it seemed that military status had no considerable effect on the frequency of multiple sclerosis and rate of disability.

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