The Prevalence of Multiple Sclerosis in the North Caucasus Region of Turkey: Door-to-Door Epidemiological Field Study

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ABSTRACT

Background: The prevalence rate of multiple sclerosis (MS) might differ between countries depending on whether the data is obtained from hospital-based or population-based studies. This study aimed at identifying the prevalence of MS with face-to-face interviews by door-to-door field visits in a population study conducted in the north-eastern (Caucasus) part of Turkey situated at high altitude, with long winters and with inhabitants having low socio-economic status.

Method: In this cross-sectional field study, one of every three houses within the city proper were visited searching for MS cases.

Results: 7249 subjects were included in face-to-face interviews. Five patients diagnosed as having MS were identified. The prevalence of MS was calculated as 68.97/100000, with a mean age of 35.1±10.2 years and female to male ratio of 4/1.

Conclusion: This study, similar to the previous population-based study conducted on MS in different parts of the world, being higher in regions located between the parallels 44 and 64N. Areas considered as of high prevalence are those with more than 30 cases per 100000, average prevalence areas with 5 to 30/100000, and low prevalence areas less than 5/100000. Studies carried out recently report increased MS prevalence rates (4-11).

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There is a limited number of studies conducted in our country; no data for north-eastern Turkey are available. Studies were performed in the western Turkey where there are high social-economic state and similar geographic features. Both studies were
The study was designed as follows.

**Geographical and Social-Demographical Characteristics of Kars**

Kars is a province located in north-east Turkey with geographic coordinates of 40° 00’ N latitude and 43° 50’ E longitude, at altitude of 1768 meters. There are 76,992 inhabitants in Kars (13). Geographic and climatic conditions of the region greatly differ from those of western provinces of Turkey. Extreme climate changes are observed between the seasons, where winters are extremely cold (annual temperature varies between -43°C and +30°C). Socio-economic level is very low in Kars and its environs (Figure 1).

**Target Population**

In the literature, the prevalence of MS in Mediterranean countries appears as 50/100000 (7,8,9,10,11). We calculated this figure using a 95% confidence level and a deviation range of 5 perq 10000; the number of persons needed to be interviewed was 6983.

**Screening Forms**

The questionnaire covered a total of 26 questions in 2 sections. The first section assessed the knowledge about MS, while the second dealt with MS symptoms. The questions inquired about the presence of present and past symptoms, motor and sensory dysfunction, walking ability, sphincter control, sleep, balance disturbances, ataxia, depression, increased fatigueability and memory disturbances.

**Establishment of the Neuroepidemiological Field Teams and the Study Procedure**

Two teams which consisted of five persons each (one neurologist, 4 nurse per team) were set up in order to obtain reliable and precise data with a correct provisional diagnosis.

The teams conducting the field interviews received practical training. The interviewers were informed about the steps of the procedure to be followed, that is, which doors to knock on, what to do if nobody answers the door, the methods of intervention how to address the questions and how to fill in the forms. They were trained by neurologists and public health specialists for two days on both theoretical and practical aspects. The teams conducted their visits between 08:30 a.m. and 05:00 p.m. both on weekdays and over the weekend.

In order to ensure unbiased selection of the numbers of streets and houses like 3rd street, 3rd apartment etc., a key number ‘3’ was taken from the random numbers table. The study started in front of the local administrative authority offices in each neighborhood. The team, by turning their back to the office building turned right, visited the third house, block of flats, office or public office and then continued on to the next third building.

When they could not find anyone at a given location, they moved onto the next one. When there were more than 12 people in a particular location they visited, they interviewed them consecutively starting from the youngest person. The interviews with children or elderly who could not be communicated effectively were performed with the help of their caregivers. In instances where someone refused to participate, the interviewers simply moved on to the next location.

**The Field Study**

Phase 1. For the adults and children with the ability to cooperate, the questions were asked directly and the questionnaires were filled in. For those who could not cooperate, the questions were asked to people accompanying them. If a person answered affirmatively to one or more of the questions in the section about MS symptoms, the neurology resident in the team examined this person.

Phase 2. The patients who were provisionally diagnosed with demyelinating disease, MS, optic neuritis or paraplegia during the field visits by the field teams were invited to the hospital to be examined by a neurologist blinded to the study. Those unable to come were visited and examined in their homes.

**Diagnosis**

Previous examination results and MRI images were studied. All patients were examined and the findings were recorded. If needed, further investigation (such as immunological screening, MRI, evoked potential) was conducted at our hospital. The Barkhof-Tintoré criteria (14,15) were used to classify any MRI abnormalities. The results were assessed by using the McDonald’s criteria (16), and the diagnosis was established. The Kurtzke Expanded Disability Status Score (EDSS) was used to assess disability levels (17).

**Data Analysis**

All data collected by the field teams were entered daily by using SPSS version 11.05 for statistical analysis.

**Results**

The field study lasted for three weeks. With door-to-door visits, we covered a total of 7249 (female: 3622, male: 3627) people with a mean age of 28.26±17.49 years. Fortunate for us, everybody agreed to take part in this study.

**Figure 1.** Kars is a province located northeast of Turkey.
We examined those giving at least one positive response to the questionnaire for suspected MS. Four (3 females, 1 male) people had a previous diagnosis of MS, and we confirmed their diagnosis. The remaining patients had clinically and radiologically definite MS based on the McDonald criteria (16). Of the patients who were diagnosed as having MS, four had at least two previous cranial MRs performed and four had at least one cervical MRI available.

Three people (2 females, 1 male) with a suspicion of MS were questioned and examined thoroughly; the man was found to have cerebrovascular disorder, one of the women had experienced sensory complaints once. She has been previously diagnosed with vasculitis. The other woman was considered as having possible MS. This patient complained of hypoesthesia in the facial region.

During the course of the illness, there were sensory symptoms in 5 (100%), brainstem-related signs in 4 (80%), cerebellar signs in 1 (20%), motor signs in 4 (80%), optic neuritis in 2 (40%), sphincter disturbance in 1 (20%) and cerebral signs in 1 (20%) patient. The mean final EDSS score for all patients diagnosed with MS was calculated as 1.5±0.7 (0.5-2.0).

**Discussion**

We found a prevalence rate of 68.97/100000 for MS in Kars, which is located in the north eastern region of Turkey. In a similar study that was recently performed in Maltepe, a district of Istanbul, the prevalence rate was 104.1/100000 based on a door-to-door epidemiological survey (6), carried out with the methodology same as in the current study. The prevalence rate in our study was lower compared to that study. However, according to the hospital records, Edirne (2003) (12), a neighboring city to Istanbul, had a prevalence rate of 33.9/100000. Our study had higher figures than that one. Hospital-based and population-based studies yield different results. Furthermore, Kars is a province at a high altitude and with extreme climatic conditions. It has severe winters, while summers are short with relatively low temperatures. We think that climate could have influenced the figures we have obtained.

In the countries neighboring Turkey, the prevalence rate was 38.9/100000 in Greece (2003) (18) and 39.3/100000 in Bulgaria (1997) (19). Our results were higher than those of the neighboring countries. When we compare these results with others from Mediterranean countries, our prevalence rate was much higher than in any previously reported study such as that from Spain (20), Cyprus (21) or the other Mediterranean countries (7,10,11). The prevalence rate in Northern Europe (46° N) is higher than in Southern Europe on average, with rates often over 100/100000 (5). Rates from Southern Europe (between latitudes of 36°00’N and 46°00’N) are generally lower than those from the north and range between 26 and 83 per 100000 (22). A study recently performed in Germany, another Middle European country, reported a prevalence of 111 per 100000 (23).

Studies performed in Iran (24) and Iraq (25), neighboring Turkey in the Middle East, revealed increased prevalence as well. However, they were hospital-based observational studies. Similarly, a recent hospital-based study in Jordan, covering a certain time period, found a prevalence of 39/100000 (26). Nevertheless, in countries like Turkey, some hopeless MS patients may quit the treatment and continue to live at home for years without attending the hospital. That is why hospital-based studies are far from reflecting the reality. Furthermore, in these countries and ours health inventories and filing systems are insufficient and hospital-based studies do not yield correct results.

Based on the previous reports by World Health Organization, the prevalence rate in Turkey is high as well (4). There might be different reasons for that, first of all, a more rapid diagnosis is possible thanks to the advances in health care and in imaging modalities. Moreover, prevalence rates should be interpreted in the context of the geographical, climatic and economical conditions of the region the study was performed.

Kars province is situated in a geographical location with low socio-economic characteristics. Those with economical capabilities migrate to larger regions when confronted with chronic diseases. In fact, the actual prevalence may be much higher when...
migration is taken into consideration. When we pay attention to the economical and social progress Turkey has made during recent years, we can anticipate the prevalence studies to be performed in future to yield different results.

References
