Introduction

Multiple sclerosis (MS) is a chronic disease of the central nervous system with a strong tendency to white matter in the brain, spinal cord, and optic nerve, with loss of sensory and motor function as a result of immune inflammation, demyelination, and then axon damage (1,2). During an MS attack, inflammation occurs in areas of the white matter of the central nervous system in areas called plaques. This process continues with the destruction of myelin in the brain and spinal cord, eventually leading to a decrease or lack of function (3,4). The onset of MS occurs in youth aged of 20-40 years, and its prevalence is two to three times higher in women than in men (5,6).

The reaction of lipid peroxidation in biomolecules is one of the cell and tissue damages, and its concentration changes can play an important role in the diagnosis of many degenerative diseases. Determining these values will effectively help to identify the mechanisms involved in various diseases (7,8).

The body naturally produces free radicals during metabolism. Although free radicals are necessary in certain amounts for body functions, in larger amounts, they cause irreparable damage to the key components of the cell, including membrane lipids, nucleic acids, carbohydrates, and proteins. Hence, in this way, they affect many physiological functions and make a person naturally vulnerable to the aging process, cancer, and other diseases such as degenerative disorders. However, the body itself has a natural antioxidant and anticancer mechanism that protects most cells from oxidative damage (9,10). Therefore, according to the necessity of maintaining the balance of free radicals in the body by antioxidant agents, by maintaining this balance, the body’s defense power can be improved to prevent diseases such as degenerative disorders, cancers, and other chronic diseases in humans (11). Considering the fact that various studies on MS, as a disease whose causes have not been clearly identified, are increasing, this research aimed to measure the lipid peroxidation reaction in patients with MS.
that lipid peroxidation is considered a risk factor for degenerative diseases and carcinogenesis, is the level of lipid peroxidation different in MS sufferers compared to that in normal individuals?

Materials and Methods

Two groups of patients and controls (case and control) with 70 patients and 70 healthy people were studied. The test group consisted of individuals with MS who were referred to the MS Support Association and Sina hospital in Hamadan, and their presence of this disease was confirmed by the diagnosis of a neurologist. The control group included healthy people who were matched with the patient group in terms of age and sex. The health criteria of the subjects were having normal blood pressure, no history of diabetes and high blood fat, no heart disease or any other specific disease, and no use of heart drugs and blood sugar- and blood fat-lowering drugs.

As seen, 78% of patients with MS were women, their illness onset was 22-60 years old.

The general information of the participants in the study is summarized in Table 1.

The information in Table 2 represents the comparison of plasma MDA values between two groups of sick and healthy people. According to the data in the table, the average values of plasma MDA in these two groups are 1.49 ± 0.46 and 0.58 ± 0.15 μmol/L, respectively. The observed difference in the amount of plasma MDA at a level above 1% is significant based on the t-test; that is, the observed difference in the amount of MDA is significant at a level above 5%.

Discussion

MS is known as a multi-factorial disease that is caused by various factors. Although this disease is related to the immune system, various mechanisms have been reported for its pathogenesis such as oxidative stress, demyelination, and neuronal cell death (12,13).

The current study compared the serum level of MDA concentration in people with MS and normal people. In this study, a significant increase was observed in the serum level of patients with MS compared to healthy people. In line with this study, Tsikas investigated the serum level of MDA and oxidative stress factors in the serum of patients with relapsing-remitting MS and reported an increase in the serum level of MDA in these people compared to healthy people (13). According to the studies by Liu et al, brain tissue is extremely sensitive to reactive oxygen species, and it leads to lipid peroxidation due to increased oxygen consumption and high concentration of unsaturated fatty acids; as a result, MDA is caused by oxidative stress processes (12). In addition, Wang et al and Padureanu et al reported that lipid peroxidation plays an effective role in the development of neurological diseases such as Alzheimer’s and Parkinson’s (14,15). Additionally,

Table 1. Characteristics of the Two Studied Groups

<table>
<thead>
<tr>
<th>Male/Female</th>
<th>Age</th>
<th>Course of Illness</th>
<th>Age of Disease Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal group</td>
<td>26/74 %</td>
<td>35 ± 2</td>
<td>-</td>
</tr>
<tr>
<td>Patient group</td>
<td>22/78 %</td>
<td>36 ± 3</td>
<td>4.5 ± 3</td>
</tr>
</tbody>
</table>

Table 2. Statistical Analysis Information of Plasma MDA Values

<table>
<thead>
<tr>
<th>Statistics (MDA)</th>
<th>MS</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Mean</td>
<td>1.49</td>
<td>0.58</td>
</tr>
<tr>
<td>SD</td>
<td>0.46</td>
<td>0.16</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.11</td>
<td>0.13</td>
</tr>
<tr>
<td>Median</td>
<td>1.5</td>
<td>0.55</td>
</tr>
<tr>
<td>Mode</td>
<td>1.1</td>
<td>0.49</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.8</td>
<td>0.38</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.3</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Note: MDA: Malondialdehyde; MS: Multiple sclerosis; SD: Standard deviation.
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Competing Interests
None.

Ethical Approval
A research project entitled “Determination of plasma malondialdehyde levels as a laboratory index of lipid peroxidation reaction in multiple sclerosis patients and its comparison with normal individuals” with project ID number 9410015448 was approved by the Research Ethics Committee of Hamadan University of Medical Sciences and has the code ethical with the special ID IR.UMSHA.REC.1394.373.

References


