COMPARING ABUNDANCE OF MULTIPLE SCLEROSIS IN ISFAHAN, IRAN AND NEW ZEALAND BASED ON THE MOLYBDENUM RATE IN SOIL (AREVIEW)

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Abstract- The cause of Multiple Sclerosis is unknown, however, it is believed to occur because of some combination of environmental factors such as soil pollution. In this paper relationships among Multiple Sclerosis, Molybdenum and soil properties in Isfahan, Iran and New Zealand has been investigated and from the point of view of nature of the soil and the distribution of disease was observed similarities.

Keyword- Multiple Sclerosis, New Zealand, Isfahan, Molybdenum, Soil properties.

I. INTRODUCTION

Multiple Sclerosis (MS) is a multi-factorial disease with different epidemiological patterns and clinical presentations in various populations. The cause of MS is unknown; however, it is believed to occur as a result of some combination of environmental factors such as infectious agents and genetics such as soil pollution. The problem of soil pollution by heavy metal has been receiving an increasing attention in the last few decades.

Discussions on potential harmful impacts on human and animal health related to soil chemistry are frequently focused on soil pollution. Many studies have examined relationships among elements and between elemental concentrations and other soil properties (Clay content, Cation exchange Capacity, pH, Soil texture, Carbonate content) in non-contaminated soils. In this paper relationships among Multiple Sclerosis, Molybdenum and soil properties in Isfahan, Iran and New Zealand will be reviewed.

II. DISCUSSION

2.1. Molybdenum

Molybdenum is used primarily as an additive to steel and corrosion- resistant alloys. It is also used as a chemical intermediate for molybdenum products; an industrial catalyst, a pigment, a crop nutrient, components of glass, ceramics. Molybdenum is the 54th and the most abundant element in the Earth's crust and the 25th most abundant element in the oceans (Figure.1) and also some black-shale was enriched with elements such as Molybdenum, As and rare-earth elements (Figure.2).

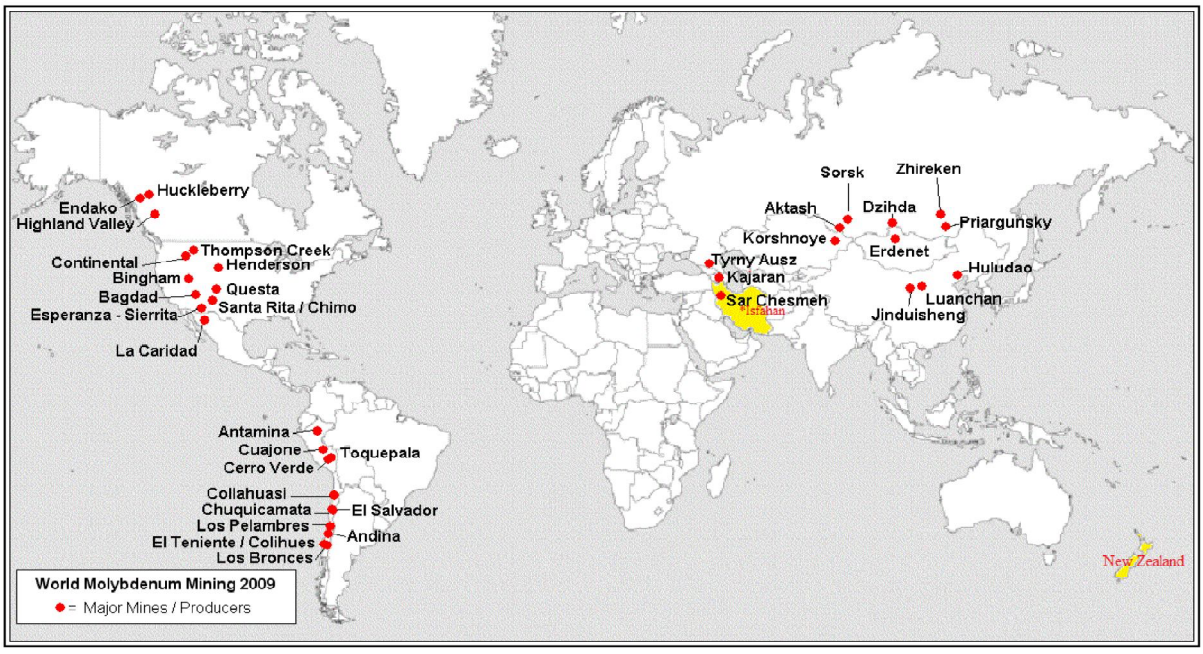


Figure 1. World Molybdenum mining

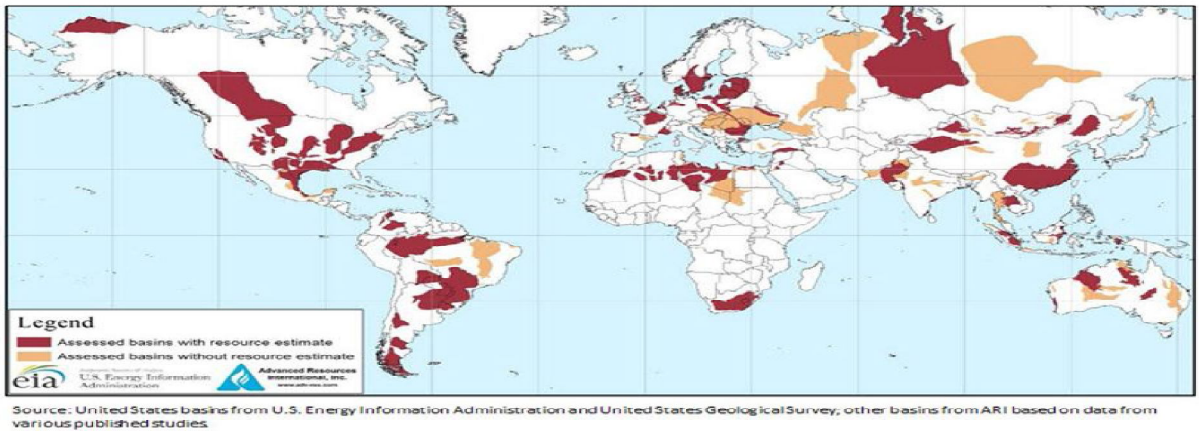


Figure 2. Map of basians with assessed black shale

Soil pH, content of Fe, p and Zn, interaction with other ions in soil solution, and environmental factors affects Molybdenum availability in soils. Most Molybdenum compounds have low solubility in water, but the Molybdate ion MoO42− is soluble and forms when molybdenum-containing minerals are in contact with oxygen and water. In general, there is a tenfold increase in MoO42− for each unit increase in soil pH. Liming will improve Mo availability because pH increased. By increasing the pH of the soil, Molybdenum becomes available to the plants. In many soils, Molybdenum deficiency might be removed by liming. Plants can have very high levels of Mo before its toxicity symptoms appear. Phosphate ions enhances Molybdenum uptake in plants. It is well known that feeding crops, high in Molybdenum, to the cattle, results in Molybdenum toxicity, often referred to as Molybdenosis[6]. Molybdenosis has been reported from western areas of the United States, Western Canada, England, and New Zealand.

2.2.Multiple Sclerosis and Molybdenum in Soil

Pathology of the Multiple Sclerosis (MS) disease is still unknown but environmental, genetic and immunological factors are mentioned as effective agents. For example, Iron toxicity may also be involved in some cases or Copper is required to form the myelin sheath on the nerves. In MS, this sheath is not maintained correctly, and this is the cause of the symptoms. Some elements such as Molybdenum can cause copper deficiency in the body[6].So it may also be involved in the Multiple Sclerosis disease. Other elements and soil properties can also affect the amount of Molybdenum in soil. Many studies have examined relationships among elements and between elemental concentrations and other soil properties in non-contaminated soils. Figure (3) shows relationships among Molybdenum and Zn, P, Fe concentrations and pH Soil on Multiple Sclerosis disease and their effects on the myliens health, Immune system, Centralnerves, Serotonin and Estrogen.

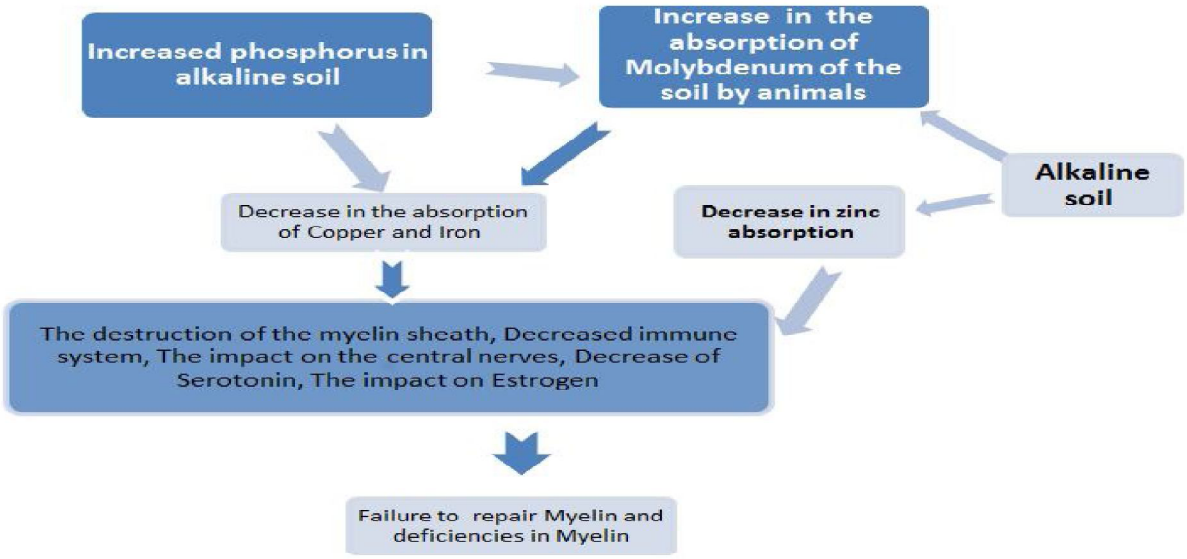


Figure3. Relationships among Molybdenum, Zn, P, Fe concentrations and pH Soil on Multiple Sclerosis disease

2.3. Multiple sclerosis and Molybdenum in Isfahan, Iran and New Zealand

Isfahan is a medium to high-risk area for Multiple Sclerosis, with the prevalence higher than what has previously been reported, possibly because of an increase in the incidence rate, Multiple Sclerosis was reported to be 43.8 per 100,000. This increase in Multiple Sclerosis puts Isfahan as the region with the highest prevalence of Multiple Sclerosis in Asia and Oceania and is mostly due to the changing environmental factors. Industrial activities are among the major factors leading to environmental disturbance. One of such activities is a big Steel factory in Isfahan. In a study, the amount of Molybdenum, p and pH was determined in the water surrounding the Steel factory that they were higher than standard level. Soil and water were alkali because of the fact that this area is surrounded by Lime Mountain. There are not any studies about Molybdenosis in the area but evidences such as diarrhea and other signs in sheeps that drink this water was observed.On the other hand, New Zealand is also a high-risk country for Multiple Sclerosis with a prevalence of 73.1 per 100,000 populations. Much of New Zealand's overseas income is still derived from agricultural production. To maintain the fertility and structure of soils, and to make the most efficient use of the nutrients, farmers add large amounts of crushed limestone (agricultural lime, $CaCO_3$) to agricultural soils; this lime was added not to supply calcium but to raise soil pH. Many New Zealand top soils are naturally acid, whereas most plants grow best in a near neutral soil. In New Zealand soils, the main benefits from the addition of lime are the increased availability of phosphorus and molybdenum. Limestone outcrops occur in most parts of New Zealand from Northland to Southland, so it is not expensive to transport it to farmers. Soil Molybdenum availability to plants increases with pH. A high proportion of lime responses in New Zealand is partly due to the correction of Molybdenum deficiency. High concentrations of molybdenum can adversely affect copper absorption. Many areas of New Zealand e.g. Northland and Gisborne (Wairoa) suffer from Molybdenum induced Cu deficiency. In most cases, liming alone will adequately increase the Molybdenum status of herbage. Inaddition, Phosphate fertilizer is applied regularly to most farmlands in New Zealand and constitutes a major input cost in most agricultural systems[5].

III. CONCLUSIONS AND RESULTS

There are common points between New Zealand and Esfahan from point of view of abundance of MS that are summarized in table 1.

Table 1. Common points between New Zealand and Esfahan from point of view of abundance of MS

Area	Abundance of MS	Abundanceof Molybdenosis	Source of MO	pH soil	Abundance of Phosphate in soil
Esfahan	✓	✓	Industrial	alkali	✓
New Zealand	✓	✓	Agricultural	Alkali (With increasing lime)	✓

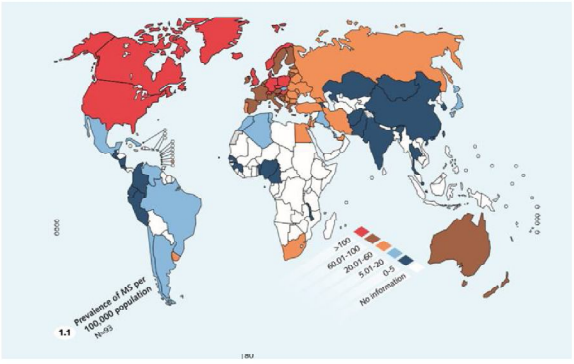


Figure 4.The prevalence of Multiple sclerosis in the world

In the Global scale, it seems that dispersion of Multiple sclerosis in the world is similar to Molybdenosis dispersion (Fig.4). This similarity can show us the effect of molybdenum on Multiple sclerosis. Therefore, it can be concluded that the dispersion of molybdenum and multiple sclerosis should be the same. Nevertheless, this adaptation is not seen in some areas because of molybdenum in alkaline soil could easily be absorbed.

These two parameters must be considered together. This is because liming increases the availability of molybdenum to plants.In addition, abundance of copper in the soil reduces the influence of molybdenumon human health. This is because the alkalinity of soil, water and nutrients such as phosphorus increases the absorption of molybdenum.With the increase in absorption of molybdenum, the absorption of copper in the body decreases. Copper contributes to the repair of the myelin.

IV. SUGGESTION

It is better that samples of nail, bone, soft tissue of patients also to be tested. In addition, the amount of molybdenum is evaluated by considering the pH of soil and water.

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