



Research Article

ZINC AND SELENIUM STATUS IN IRAQI PATIENTS WITH FIBROMYALGIA SYNDROME

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ABSTRACT

The samples were taken from the patients attending the out-patient clinic in Medical city- Baghdad Teaching Hospital- Rheumatology and Rehabilitation Consultation Unit, where the anthropometric tests were performed, from the period Nov. 2010 till June 2011. The samples were taken from 57 fibromyalgia patients and 34 apparently healthy controls. Blood samples were collected and Zn and Se were estimated in serum of patients and controls. We obtained from the present study show significant differences between serum Zn and Se concentrations ($p < 0.001$ and $p < 0.0005$ respectively) compared to healthy control.

KEY WORDS: Fibromyalgia, Zn, Se, tender points, & oxidative stress.

INTRODUCTION

Fibromyalgia syndrome (FMS) is a chronic disorder of diffuse pain in the muscle or joints, accompanied by tenderness on examination at specific, predictable anatomic sites known as tender points (1,2). It can be defined also as an idiopathic, non-articular pain defined by a widespread musculoskeletal pain and generalized tender points (3).

FMS has a prevalence of approximately 2% in the general population and is the third most common diagnosis in rheumatology clinics (4), and approximately 30% of patients who have FMS also suffering from a clinical depression (4). It is known to affect children and adolescents as well as adults; however, the average age at onset is about 45-48 years (4).

The condition is poorly understood. Although, a pathophysiologic mechanism remains unknown, no structural, inflammatory, metabolic or endocrine abnormality has been identified (2). The diagnosis was narrowed down to the most widely accepted set of classification criteria for research purposes which was elaborated in 1990 by the Multicenter Criteria Committee of the American College of Rheumatology. These criteria, which is known informally as "the ACR 1990", define fibromyalgia according to the following criteria :- (2,3,5,6)

- A history of widespread pain lasting more than three months.
- Tender points; there are 18 designated possible tender points.

Histologic and histochemical studies, suggested a possible metabolic myopathy; however, carefully controlled studies indicated that these abnormalities were simply the result of deconditioning (2). Although, disturbances in the musculoskeletal system, in the neuro-endocrine system and in the central nervous system have been implicated in the pathophysiology of FMS. Primary mechanism underlying the etiopathogenesis of FMS is unknown. A greater understanding of cellular mechanisms is needed to explain these hypotheses. Therefore, it is important to detect the alteration of trace minerals in fibromyalgia patients (7).

For many years, serum trace element levels have been studied to reveal etiopathogenesis of patients with FMS (8, 9,10). An imbalance of the trace element status in human tissues and body fluids has

been suggested as a contributing factor for the development of fibromyalgia (11).

Zinc is an essential element, it is essential nutrient for the function of many metalloenzymes, including alcohol dehydrogenase, alkaline phosphatase, carbonic anhydrase, leucine amino peptidase, superoxide dismutase, and DNA and RNA polymerase. Zn also is required for normal nucleic acid, protein and membrane metabolism as well as cell growth and division (12, 13, 14).

It is clear that this trace element has a broad impact on key immunity mediators, such as enzymes, thymic peptides and cytokines, explaining the paramount importance of zinc's status on the regulation of lymphoid cell activation, proliferation and apoptosis. In a study it was found that the level of Zn in blood is known to be related to pain in animals. This study sought evidence to implicate Zn in the mechanism of FMS pain in human. The researchers studied Zn and three measures of pain severity including the average pain threshold (amount of pain in the tender point regions) (15).

Knowledge an important and management of the trace element Se at the cell biological, biochemical, and molecular biological level has increased considerably in recent years. For many years, there has been growing interest in Se, cause its possible protective effects against cancer and other chronic diseases, and it was found that in a large-scale supplementation trial, Se had an anticarcinogenic effect (17).

Se has now become a very attractive element for human use for its antioxidant properties that protect cells from the adverse action of free radicals (18).

MATERIALS AND METHODS

The study was done during the period from November 2010 till March 2011. The subjects were selected from the people attending the out-patient clinic in Medical City – Baghdad teaching Hospital – Rheumatology and Rehabilitation Consultation Unit. The tests for Se and Zn were done in The Toxicology Center in the Specialized Surgical Hospital.

The study includes 57 patients with fibromyalgia syndrome (49 females & 8 males), their mean age 43.017 ± 10.945 years. The clinical diagnosis of these patients was confirmed by the consultant rheumatologists of the former hospital according to

the ACR 1990 criteria for the diagnosis of FMS, as shown in table-1

34 control individuals apparently healthy (28 females & 6 males) who were age and sex matching with FMS patients, were included in the study.

Table -1: Age and gender in patients and control

	Patients	Control
Age	43.017±10.945	37.833±14.217
No.	57	34
♀ : ♂	49 : 8	28 : 6

Zinc: Zn was determined by atomic absorption spectrophotometer:

A Shimadzu Atomic Absorption (AAS – 670) was used to estimate Zn. And the serum sample was diluted 1:10 with de ionized water and directly aspirated (19).

Selenium: Se was determined by using flameless atomic absorption spectrophotometer.

A Perkin Elmer 800 flameless atomic absorption spectrophotometer was used to estimate Se and sample was diluted 1:5 with de ionized water and directly aspirated (19).

Descriptive statistics for all data were expressed as mean ± S.D., compared using independent sample (t) test, (P<0.005), and considered statistically significant. The overall values for the results in the studied groups were performed according to the program of SPSS.

RESULTS AND DISCUSSION

Results

Results of the present study show that serum Zn level in patients with FMS is significantly lower than the control (P< 0.001) as shown in table -2. These results are in accordance with many studies done by Sendur et al., (15) and Eisinger et al., (10). But the results didn't agree with a study done by Rosborg et al., (11).

Table -2: Serum Zn conc. (µg/dl) in patients and control

	No .	Mean (µg/dl)	S.D.	P value
Patients	57	98.289	15.260	P < 0.001**
Control	34	115.55	25.36	

** : Highly significant difference (P<0.001) .

While, serum Se level of patients with FMS is a highly significant lower than the controls (P< 0.0005) as shown in table-3. These results are in accordance with a study done by Reinhard et al. (20)

Table-3: Se serum level in patients with FMS in comparison with control

	No.	Mean (ppb)	S.D.	P value
Patients	57	12.009	8.022	P<0.0005**
Control	34	19.306	0.666	

** : Highly significant difference (P<0.0005).

Discussion

An imbalance of the trace element status in human tissues and body fluids has been suggested as a contributing factor for the development of FMS(11). And trace elements such as selenium and zinc are essential for many antioxidant enzymes as cofactor (20, 21).

The present results of serum Zn may be in accordance with other results but the limited number of subjects and in a part the fact that plasma is often discussed , not to be reliable to monitor zinc status in humans , because zinc occurs in the body primarily intra cellularly and there is only a small portion of Zn in the plasma mainly bound to plasma proteins. Furthermore, plasma Zn is highly dynamic and is profoundly affected by several factors such as diurnal IJAET/Vol.III/ Issue II/April-June, 2012/105-107

rhythm, stress, infection, starvation and plasma protein levels (22). The importance of Zn for antioxidant stress response is well documented (23). As reported in many studies, Zn plays essential role for many antioxidant enzymes as cofactor. It was reported that total antioxidant capacity of plasma was significantly lower in patients with FMS than in healthy controls (24). In addition, studies showed that the imbalance of antioxidant enzymes plays a role in etiopathogenesis of FMS (10, 25).

In a study done by Sendur et al., it was found that the level of Zn in blood is known to be related to pain in animals. This study sought evidence to implicate Zn in the mechanism of FMS pain in human (15).

Se is an essential component of the enzyme glutathione peroxidase. Glutathione peroxidase is the general name of an enzyme family with activity of peroxidase whose main biological role is to protect the organism from oxidative damage (26) .

There is certain difficulty in establishing reference value for plasma Se , given the wide variety of results reported , depending on the geographic area in which the study was carried out (27,28). The dietary intake of Se is possibly the major determinant factor in the plasma concentration of Se. Moreover, it is known that the plasma content of Se presents important regional variations. These differences are mainly due to the content and availability of Se in foods. The Se content in food of animal origin reflects the level of Se present in the diet consumed, while that found in food of vegetable origin is directly affected by the content and physical and chemical forms of Se in the soil. Moreover, the Se content of food may also be influenced by their processing and preparation. However, the Se content of water is relatively unimportant, as drinking water is generally a poor source of Se (27,28) .

Accordingly, determinations of total Se in whole blood are a good indicator of high or low Se intake. But, many studies found that the metal (Se) pattern in FMS subjects and controls have been substantially different if the used sample is serum instead of whole blood measurements (11).

CONCLUSION

Several contributing factors are probably involved in the pathogenesis of FMS. The present investigations give support for the hypothesis that an imbalance in the trace elements status in human tissues and body fluids play a significant role for the development of FMS.

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