



The Relationship between Vitamin D and Quality of Life in Patients with Fibromyalgia Syndrome

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Abstract

Fibromyalgia, is a widespread chronic pain syndrome accompanied by tiredness, depression and sleep disorders. The etiology and pathogenesis have not yet been fully clarified. As the pain is accompanied by tiredness, sleep disorders and psychiatric symptoms, daily activities and quality of life can be affected. Muscle weakness due to reduced vitamin D synthesis causes an increase in pain in the musculoskeletal system, in impaired balance and in the number of falls. Quality of life is negatively affected by these problems. Previous studies have shown that a reduction in vitamin D levels is common in fibromyalgia syndrome. The aim of this review was to provide an overall view of the relationship between vitamin D and quality of life in patients with fibromyalgia syndrome.

Key Words: Fibromyalgia, vitamin D, functional disability

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Introduction

Fibromyalgia syndrome (FMS) is a rheumatismal disease of unknown etiology characterised by pain throughout the body and sensitive points in specific areas [1,2]. Other important symptoms accompanying FMS are tiredness, sleep disorders, psychological discomfort and cognitive impairments [3]. According to the American College of Rheumatology (ACR) diagnostic criteria for fibromyalgia, the symptoms should have been ongoing for at least 3 months and 11 of 18 specific points should be positive [4].

FMS is seen in 1-2% of the general population and 9 times more in females than males [6,7]. Previous studies have reported that neuro-endocrine, autonomic and immunological mechanisms play a role and in genetically susceptible individuals, there are various stress factors involved in the development of the disease such as environmental, physiological and psychological factors. Recent studies in particular have supported the activity of the central mechanisms, which has led to new approaches to treatment [1,2,8]. As FMS is often accompanied by emotional and sleep disorders, it has been considered for many years as a psychological disease.

In previous studies, the prevalence of lifelong depression and anxiety in FMS cases has been determined as higher than in the normal population [9,10]. Despite the presence of widespread pain in the musculoskeletal system, the results of physical examination, laboratory and radiological tests are normal [11]. The perception and evaluation of the quality of life of individuals is formed from life events in the context of cultural structure and value systems [12]. Several previous studies have shown the quality of life of FMS patients to be negatively affected [13,14].

Vitamin D plays a role in bone structure by increasing the absorption of calcium and phosphate from the intestine and stimulating osteoid maturation and mineralisation [15]. When there are insufficient levels of vitamin D, calcium absorption is decreased, and the parathormone level increases, thereby causing bone resorption [16]. In addition to disruption of the bone formation, there is an increased tendency to fall and risk of fracture due to weakness in proximal muscles and impaired neuromuscular co-ordination, which affect quality of life negatively as pain and functional restriction. In several previous studies, a

relationship has been shown between vitamin D and physical performance and disability [17,18].

Low levels of vitamin D have been shown to be common in individuals with fibromyalgia and non-specific musculoskeletal system pain [7,19]. In studies comparing vitamin D levels in premenopausal women with FMS and healthy women, the vitamin D level of the FMS group was determined to be significantly lower than that of the control group [7,20].

This paper was prepared with the aim of shedding light on the relationship between quality of life and vitamin D in FMS by reviewing studies which have researched vitamin D levels in FMS, quality of life in FMS and the effects of vitamin D on quality of life.

Vitamin D

Vitamin D is a fat-soluble vitamin and hormone of steroid structure [21]. The precursors of vitamin D are synthesised as 7-dehydrocholesterol in the keratinocytes of the skin. These precursors are transformed to provitamin D under the effect of the light rays transmitted from ultraviolet light at 275-305 nm wave dimension. With the heat energy of sunlight, the provitamin D which has formed is transformed to vitamin D [22]. In this state vitamin D cannot show sufficient activity. To be able to be effective it has to pass through a further two stages of hydroxylation. Firstly, in the liver, it is changed to 25(OH)D then in the kidneys to 1.25(OH)₂D. Thus it takes on a structure which will be able to show sufficient activity. Vitamin D obtained from foodstuffs does not have to be exposed to the light reactions in the skin, but can be utilised by the body after the hydroxylation stages. Vitamin D is found in abundance in liver, fish, eggs, milk and dairy products.

Vitamin D is necessary for the regulation of many gene functions and for growth and development of the body [19]. Normal levels of vitamin D are required not only for the most appropriate bone development but also for protection against several chronic diseases [23]. Vitamin D is an important regulator of the immune system [24]. For autoimmune diseases such as inflammatory intestinal diseases, insulin-related diabetes, rheumatoid arthritis and multiple sclerosis, vitamin D has been defined as an important factor [25]. Vitamin D is also vital for the healthy mineralisation of the skeletal system [26].

There is no consensus on the level of vitamin D necessary in the serum [27,28]. Plasma 25-OH-D₃ is the best clinical indicator of Vitamin D status as cutaneous synthesis and vitamin D obtained from the diet are expressed as a total [29]. Most researchers have defined vitamin D values below 20 ng/ml as a deficiency [27,28]. Some studies, which have taken a lower limit of 15 ng/ml of the normal range of 25-OH-D₃, have shown that this is insufficient to provide appropriate skeletal integrity [30,31]. In another study, it was reported that a serum level of 20 ng/ml 25-OH-D₃ is necessary to reach ideal PTH levels in adults aged over 49 years [31]. However, other studies have reported that when 25-OH-D₃ levels are over 28 ng/ml, the PTH levels will be in the lowest range [32].

The main reason for vitamin D deficiency is lack of exposure to sunlight as the main source of vitamin D [33-35]. However, there are various factors such as duration of exposure and strength of the sunlight which have an impact on the effect of sunlight. These may include the geographical area [26], seasonal weather variations, whether exposure is direct or through glass [36], the density of melanin in the skin, the use of protective creams and the clothes that are worn. The greater the natural exposure to sunlight, then the greater the synthesis of vitamin D in the skin. It has also been reported that sunlight is of sufficient benefit just with the hands and face exposed, but accompanying malabsorption with insufficient intake of vitamin D from the diet or medications causes' vitamin D deficiency in these individuals [37]. Moreover, very little natural vitamin D is contained in foodstuffs. Therefore, foods fortified with vitamin D are not sufficient to meet the vitamin needs of children or adults.

Vitamin D deficiency is related to rickets, birth defects, osteomalacia, osteoporosis, osteoarthritis, treatment-resistant musculoskeletal system pain and neuromuscular dysfunctions [34,35]. Some recent studies have shown vitamin D deficiency to be a factor facilitating heart disease, hypertension, neurological diseases, autoimmune diseases, depression and cancer [33]. In addition, vitamin D deficiency has been shown to be closely related to treatment-resistant musculoskeletal system pain and neuromuscular dysfunctions [38].

As vitamin D is a widespread problem, it is accepted as a pandemic disease [34]. In Asian countries, it is seen more especially in children, females and the elderly. A diet lacking vitamin D and regional cultural characteristics and differences are significant causes of vitamin deficiency [19]. It has been estimated in studies that a billion people worldwide are

deficient in vitamin D [39]. Studies in Saudi Arabia, the United Arab Emirates, Australia, Turkey, India and Lebanon have shown vitamin D levels of below 20 ng/ml in 30-50% of children and adults [40,41].

Fibromyalgia and Vitamin D

As there are no specific laboratory or radiological findings of FMS, some symptoms seen in FMS have been interpreted as other diseases such as depression and not as a different clinical entity of the disease. It has been suggested that the occurrence of symptoms similar to those of vitamin D deficiency has caused incorrect diagnosis in these patients [42].

Many studies which have evaluated the relationship between fibromyalgia and vitamin D level have presented conflicting results. In a study by Al-Allaff et al comparing the Vitamin D levels of premenopausal women with FMS with those of a control group, the vitamin D levels of the FMS group were determined to be at a significantly low level compared to those of the control group. It was suggested that this result of low vitamin D in FMS could have been associated with a sedentary lifestyle and low exposure to sunlight in these patients [7]. Although Plotnikoff and Quigley found deficient levels of serum 25-OH-D₃ in 93% of individuals with chronic non-specific pain, it was suggested that the reason for the widespread pain could have been a low level of vitamin D.

It was emphasised in that study that it was necessary to examine serum 25-OH-D₃ levels when evaluating patients with non-specific musculoskeletal pain [19]. In another study in which vitamin D levels were compared between groups of patients with SLE and FMS, the vitamin D level was found to be ≤ 20 ng/ml in 48% of the FMS patient group [43]. A different study which researched the relationship between non-specific musculoskeletal pain, including FMS, and 25-OH-D, determined a significant correlation between vitamin D levels and widespread pain [44]. Vitamin D levels were evaluated in FMS patients in a study by Bhatta and a significantly high rate of vitamin D deficiency was determined [33].

In a study by Tanderer et al which included premenopausal FMS patients and age-matched premenopausal healthy females, the vitamin D level was determined as < 20 ng/ml in 44.1% of the FMS patients and in 51.2% of the healthy controls, which indicated no relationship

between low vitamin D levels and FMS [45]. Okumuş et al compared vitamin D levels in a group of 40 premenopausal females with FMS and an age-matched control group and no statistically significant difference was determined [46]. Similarly, in a study by Ulusoy, the vitamin D levels of FMS patients showed no difference when compared with a healthy control group [47]. In a study of 124 patients who presented at a rheumatology clinic with complaints of musculoskeletal system pain and were diagnosed with FMS, knee osteoarthritis or non-specific back pain, a difference was determined in the vitamin D levels of these patients compared to a control group [48].

Fibromyalgia and Quality of Life

Quality of life is a concept which shows the level of personal fulfillment which can be obtained within the living conditions which is affected by diseases and the personal responses to physical, emotional and societal effects of daily life [49]. Although quality of life is a perspective covering life as a whole such as health, environmental factors, economic status and individual differences, health-related quality of life or health status is a sub-group of quality of life and includes all physical, emotional and social states of well-being [50].

Rheumatismal diseases are characterised by leading to chronic progression and disability. By affecting the physical and emotional status of the patient, these properties cause changes in quality of life at different levels [51]. FMS, which is a chronic rheumatismal disease does not cause injury or deformations to the joints, but by leading to significant difficulties in functional capacity and the undertaking of daily activities, family relationships and social performance are negatively affected [52]. The main symptom of FMS is widespread and chronic pain [53]. This pain in FMS has a negative effect on the patient's quality of life and functional capacity. The Fibromyalgia Impact Questionnaire (FIQ) has been developed to evaluate quality of life in FMS patients and is a questionnaire used to evaluate functional capacity, work, psychological impairment and physical symptoms [54].

Several studies have reported that the FIQ scores of quality of life in FMS patients have been found to be significantly low compared to the control group [52-54]. In a study by Sivas et al, 80 FMS patients were evaluated with FIQ and compared with a control group and the quality

of life was found to be lower in the FMS group [55]. SF-36, developed by Ware, is one of the most widely-used generic scales evaluating quality of life [56]. There is nothing specific to any age, disease or treatment group. It contains general health concepts and evaluates both physical and mental health [57]. Using the FIQ and SF-36 forms, Türkyilmaz et al evaluated quality of life in FMS patients and determined a significant difference compared to a control group [58]. Various studies have shown that quality of life was negatively affected in FMS patients [13,14]. Different studies have shown that the quality of life was extremely low compared to control groups in FMS patients with diseases such as rheumatoid arthritis, osteoarthritis, chronic obstructive pulmonary disease and insulin-related diabetes [51].

Vitamin D and Quality of Life

Vitamin D deficiency is a known risk factor for osteoporosis, falls and fractures [59]. There is no negative effect on fracture risk of vitamin D values over 30 ng/ml but values below 20 ng/ml have been found to be related to an increased risk of fractures associated with balance and low physical activity. Vitamin D receptors are found in the skeletal muscles [60] and vitamin D deficiency has been shown to be related to proximal muscle weakness, increased loss of body balance and increased risk of falls [61,62]. 1,25 hydroxy vitamin D, which is an active vitamin D metabolite connects to an extremely specific nuclear receptor in the muscle tissue and by affecting the growth of muscle cells, leads to recovery of muscle functions, thereby decreasing the risk of falls [63].

In a study of 1 alpha hydroxy vitamin D therapy in elderly females, it was reported that a relative increase in the number and size of type II muscle fibres was achieved [64]. Previous studies have shown a relationship between vitamin D and physical performance and disability [17,18]. In a study by Başaran et al, which examined the effect of vitamin D level on quality of life by questioning physical and social functions in sub groups, the vitamin D levels were found to be much worse compared to normal individuals [65]. In another study researching the relationship between quality of life and vitamin D, two separate analyses were made according to the threshold values of vitamin D deficiency and insufficiency. Quality of life was found to be low in both cases and a correlation was determined between vitamin D level and SF-36 scores [66].

In a study by Verrault et al, no relationship was found between vitamin D deficiency and mobility and upper extremity functions [67]. Irrespective of the vitamin D levels, Güler et al questioned quality of life in patients using Vitamin D and active vitamin D and no significant difference was observed in quality of life compared to a group not using vitamin D [68]. Similarly, there are studies which show a positive effect of the use of vitamin D on muscle strength, physical function and the risk of falls [69-70]. In another study of elderly females, no relationship was shown between the use of vitamin D and neuromuscular function and falls [71].

The Relationship of Vitamin D and Quality of Life in Fibromyalgia

Although there are many studies which have separately evaluated the level of vitamin D in FMS and quality of life in FMS and examined the effect of vitamin D on quality of life, there has been limited research on the effect of vitamin D level on quality of life in FMS.

In a study by Wepner, in which 30 fibromyalgia patients determined with low levels of vitamin D, were administered with vitamin D supplements and using the SF-36 and FIQ questionnaires, vitamin D was determined to have a positive effect on quality of life [72]. In another study by Armstrong et al, FMS patients were separated into 2 groups of low level vitamin D (<25 nmol/ml) and high level vitamin D (\geq 25 nmol/ml). To evaluate the disease activity between the two groups, the FIQ was used and no difference was determined between the low and high vitamin D level cases in terms of FIQ [73]. In a study by Okumuş et al, 40 premenopausal FMS patients were compared with an age-matched healthy control group in respect of FIQ and physical functional capacity and a negative correlation was determined between low vitamin D levels and quality of life [46].

Limitations and Conclusion

Although superficially an organic disorder, the excess and severity of symptoms seen in FMS patients cause lasting dissatisfaction in patients and those close to them and therefore, research into permanent treatments is ongoing. It is known that widespread pain, tiredness,

sleep disorders and psychiatric symptoms have a disruptive effect on quality of life. Determining the other factors which affect quality of life in fibromyalgia syndrome seems to be important at the stage of directing treatment of the disease.

Consideration of all these studies suggests that there may be a relationship between low quality of life in FMS and vitamin D level. However, there are few studies which have researched the relationship between quality of life and vitamin D level in FMS and clear results have not been obtained. Therefore, there is a need for further studies on this subject.

In the light of all these findings, vitamin D level should be kept in mind as one of the factors negatively affecting quality of life in FMS. More extensive studies should be conducted to clarify this subject.

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