

Examining the frequency of musculoskeletal manifestations in patients with thyroid dysfunction

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Thyroid disorders affect body organs. This study was conducted aiming to examine the frequency of skeletal muscle manifestations in patients with thyroid dysfunction. This descriptive study's statistical population comprised 200 patients with thyroid disorders referred to the endocrinology clinic of Rafsanjan University of Medical Sciences from March 21, 2018, to September 23, 2018, who were included in the study by the census method. The research checklist included information from the complete physical evaluation of each patient's organs and demographic characteristics. Chi-square and Fisher's exact tests were used to analyze the data. The mean age of the examined patients was 39.25 ± 14.43 years. Of the 200 patients, 23 (11.5%) were male and 177 (88.5%) were female. Joint pain was found in 121 people (60.5%), morning stiffness in 45 people (22.5%), limited joint mobility in 44 people (22.0%), adhesive capsulitis in 25 people (12.5%), carpal tunnel syndrome in 24 people (12.0%), trigger finger disorder in 20 people (10.0%), and two patients (1.0%) experienced tarsal tunnel. No musculoskeletal manifestations were reported in 74 individuals (37.0%) with thyroid disorders. There was a significant relationship between musculoskeletal manifestations accompanying thyroid disorders and gender ($P = 0.001$), level of education ($P < 0.001$), and occupation ($P = 0.002$). The findings of this study indicated the comorbidity of musculoskeletal disorders and thyroid dysfunction. Therefore, patients with thyroid dysfunction should be screened for musculoskeletal complaints and, if necessary, receive appropriate treatment.

Keywords: Musculoskeletal manifestations; hypothyroidism; hyperthyroidism; Rafsanjan; Iran

Introduction

The thyroid gland, a crucial structure in the human body, produces two interdependent hormones: Thyroxine (T4) and Triiodothyronine (T3). They act through nuclear receptors. These hormones play a key role in cell differentiation during

different developmental stages of the body and stabilize thermal and metabolic homeostasis. Thyroid dysfunction is mainly caused by autoimmune processes that either stimulate the thyroid to overproduce hormones (thyrotoxicosis) or lead to the destruction of the gland and

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reduction of hormone levels (hypothyroidism). In addition to benign nodules, different types of relatively common thyroid cancer interfere with the normal functioning of the thyroid [1]. In hypothyroidism, the thyroid gland does not respond to the hypophysis stimulation, or the hypophysis cannot stimulate the thyroid. Iodine deficiency is the most common cause of hypothyroidism worldwide. However, in regions with no iodine deficiency, autoimmune diseases (Hashimoto's thyroiditis) and iatrogenic causes (hyperthyroidism treatment) usually lead to hypothyroidism. Since autoimmune processes gradually decrease thyroid function, there is a compensatory phase during which the increase in TSH (Thyroid-stimulating hormone) maintains thyroid hormone levels in a normal range. Moreover, the patient's signs and symptoms become evident quickly. At this stage, called clinical hypothyroidism, the TSH level is usually over 10 mIU/L [2]. Autoimmune hypothyroidism is more common in women than in men. The average diagnosis age is 60 years old. These disorders are associated with manifestations, including cardiovascular or skin manifestations. Moreover, the patient's memory and concentration are disturbed, and symptoms of fatigue and frailty, feeling cold, harshness of voice, and paresthesia may occur in patients with hypothyroidism. In addition, autoimmune hypothyroidism might be accompanied by symptoms of other autoimmune diseases, especially vitiligo, pernicious anemia, Addison's disease, alopecia areata, and type 1 diabetes mellitus [3]. In hyperthyroidism, cardiovascular manifestations occur as sinus tachycardia. This is often associated with palpitations, atrial fibrillation, arrhythmia, diarrhea and polyuria, oliguria or amenorrhea, sexual dysfunction, and ocular manifestations [4-6]. Also, thyroid hormones directly affect bone resorption in long-term thyrotoxicosis, leading to osteopenia [7]. Since the researcher did not find any study investigating the musculoskeletal manifestations of patients with thyroid dysfunction in Rafsanjan, the present study aimed to examine the frequency of musculoskeletal manifestations in patients with thyroid dysfunction referred to the endocrinology clinic of AliIbn Abi Talib Hospital in Rafsanjan. The information obtained from this study can be used to

improve disease prevention strategies in the future.

Materials and Methods

The statistical population of this descriptive study included all patients with thyroid disorders referred to the endocrinology clinic of Rafsanjan University of Medical Sciences from March 21, 2018, to September 23, 2018. Two hundred patients were selected by the census method. After the research council of Rafsanjan University of Medical Sciences approved the project and issued the code of ethics (IR.RUMS.REC.1395.148). The study was performed following the Helsinki Declaration, and informed consent was obtained from participants. The inclusion criteria were: no history of previous accidents and injuries leading to limb defects, no congenital organ defects, no history of previous chronic musculoskeletal diseases such as multiple sclerosis, no history of injuries and concussions leading to partial or complete paralysis, no history of previous or congenital rheumatic diseases, and no history of chronic diseases such as diabetes. After patient files were created after the definite diagnosis of thyroid disorder based on the American Thyroid Association guidelines. Then, a study checklist was provided to patients, who were asked to complete it. The checklist included information about the age, sex, education level, residence, family history of thyroid patients, the duration of thyroid disorder (in years), and the type of musculoskeletal manifestation found in these patients. Based on the examination, the type of musculoskeletal disorder, if any, was checked and included in the study checklist. After collecting the data, they were entered into a computer with a special code. SPSS version 22 software and chi-square and Fisher statistical tests were used for data analysis. The significance level was considered to be $P \geq 0.05$.

Results

In this study, 200 patients with thyroid dysfunction were included in the study. The clinical manifestations were studied in these people. The mean age of the studied patients was 39.25 ± 14.43 years in the range of 3-89 years and the range. The mean duration of their illness was 51.75 ± 82.34 months in the range of 1-720

months range. Musculoskeletal manifestations were investigated in thyroid disorders. Joint pain was the most frequent symptom (121 people (60.5%); 45 people (22.5%) had morning stiffness (stiffness or difficulty moving the joints when getting out of bed and can last about 30 minutes) [8], 44 people (22%) had limited joint mobility, 25 people (12.5%) had adhesive capsulitis, 24 people (12.0%) had carpal tunnel syndrome (CTS). Twenty people (10%) had trigger finger disorder, and two subjects (1%) had tunnel syndrome. No musculo-skeletal manifestations were reported in 74 people (37%) of thyroid disorders patients. Since in some patients, more than one case of musculoskeletal manifestations was reported, the total number was more than 100%.

Discussion

This study aimed to investigate the frequency of musculoskeletal manifestations in 200 patients with thyroid disorders, including hypothyroidism and hyperthyroidism. The study's results showed that the mean age of the studied participants was 39.25 ± 14.43 years. This was in consistent with the findings of Rodríguez et al., who studied musculoskeletal disorders of the neck in patients after thyroidectomy [9]. Mean age of participants was 52.37 years [9]. Our results also was in consistent with the findings of Baghbani-Oskouei et al., who studied thyroid disorders in heart patients in Tehran with a mean age of 46.6 ± 12 years [10]. Thyroid disorders are not age-related diseases, and even congenital hypothyroidism exists. Based on our observations, the age range of people with disorders in this study was 3-89 years. Therefore, these disorders might be found in all age groups. In Heydari's study, the patients were 14 to 76 years old. [11].

In this study, 88.5% of patients were women. Most scientific sources have stated that thyroid disorders are more common in women than in men [10-15]. Chonchol et al. estimated the prevalence of hypothyroidism in women to be 10-20 times that in men [16]. Out of 200 patients under study in this research, 83% had hypothyroidism, and 17% had hyperthyroidism. According to Baghbani-Oskouei, 56.5% of the people under investigation were suffering from hypothyroidism [10]. Also, in Tayloret al.'s study, the frequency of hypothyroidism was more common [17]. This study mainly aimed to investigate the prevalence

of musculoskeletal manifestations in both hypothyroid and hyperthyroid patients. 60.5% of male and female patients had joint pain, which was the most frequent. Some patients with thyroid disorders have been referred to the clinic for frailty and muscle and bone pains that manifested as arthralgia, muscle pain, and muscle weakness. Vicenti et al. argue that the connection between thyroid disorders and musculoskeletal diseases has long been suspected. However, whether they play a role in shoulder disease pathogenesis is still debated. In vivo and in vitro studies describe thyroid hormones' role in bone, cartilage, and tendon biology [18]. In this study, muscle and skeletal pains were not considered separate from joint pains, although they were expressed as joint pains in the results. Therefore, the results of this study were consistent with the study mentioned above that distinguished joint pains from muscle pains. In this study, joint pain was seen in 52.5% of people with hypothyroidism and 8% of people with hyperthyroidism. The results of several studies also indicate that hypothyroidism causes both muscle and joint pain. Hypothyroidism is often associated with skeletal-muscular manifestations, including myalgia and arthralgia, to real myopathy and arthritis [19, 20]. In this study, after joint pain, morning stiffness was the second most frequent among people with thyroid disorders (22.5%). This complication was eight times higher in hypothyroid people than in hyperthyroid patients and 44 times higher in women than in men. Morning stiffness is one of the most important and first signs of rheumatic diseases. Skeletal muscle stiffness, especially when one gets up in the morning, had a relatively high prevalence among other skeletal muscle manifestations in various studies such as Jordan et al. [21] and Tanriverdi et al. [22].

In this study, 22% of patients suffered from limited joint mobility, and it was more common in women and hypothyroid patients. Adhesive capsulitis was observed in 12.5% of our study subjects but only in women, and its frequency was higher in hypothyroidism. In this study, adhesive capsulitis was 4% in hyperthyroidism and 8.5% in hypothyroidism. In the literature, the prevalence of adhesive capsulitis in hyperthyroidism is 2-5%, especially in women [23], which is highly consistent with this study. Schiefer et al. conducted a different study and investigated the

frequency of hypothyroidism in people with adhesive capsulitis who were referred with complaints of shoulder pain. Their study showed that hypothyroidism in these people was significantly higher than in people without shoulder problems [24]. Vicenti et al. obtained similar results [18]. Erickson et al. also stated that the prevalence of adhesive capsulitis in hypothyroid patients is 12% [25].

In their study of adhesive capsulitis, Greeshma et al. found that 28% of these patients had subclinical hypothyroidism, 14% had hypothyroidism, 52.6% had euthyroidism, 3.5% had subclinical hyperthyroidism, and 1.8% had hyperthyroidism [26]. In this study, 12% of people had CTS, all women, and hypothyroidism had a much higher prevalence than hyperthyroidism. Karne et al. stated the prevalence of CTS in hypothyroid patients to be 16.7% [27]. In a different study, van Dijk et al. examined 4908 patients suffering from CTS. The results of biochemical and hormonal tests on these people showed that hypothyroidism was significantly higher than in the control group [28]. Muscular manifestations in hypothyroidism are proximal weakness, fatigue, reflex and slow movements, stiffness, myalgia, and usually, muscle cramps and swelling. Musculoskeletal manifestations can occur in hypothyroidism and can be ameliorated with hormone therapy. Aggravating clinical manifestations of hypothyroidism may be associated with non-thyroidal illness. In addition, when hypothyroidism is caused by hypothalamic-pituitary disease, manifestations of endocrine deficiencies such as hypogonadism and adrenal insufficiency may produce manifestations of hypothyroidism. Finally, even after treating Graves' disease induced hypothyroidism, some manifestations of Graves' disease, such as eye manifestations and vitiligo, may persist throughout the patient's lifetime [29].

The main limitation of this study was the study population, which was limited to patients referred to a Endocrine Clinic in Rafsanjan. This limited domain may affect musculoskeletal manifestations in thyroid patients. Therefore, caution should be taken in generalizing the results. It is suggested to conduct a similar study in other cities of the province and on a wider population to get a more accurate picture of the problems associated with

thyroid disorders.

Conclusion

This study showed the comorbidity of musculoskeletal disorders with thyroid dysfunction. Therefore, patients with thyroid dysfunction should be screened for musculoskeletal complaints and, if necessary, receive appropriate treatment. On the other hand, paying attention to the hormonal level of patients referred with musculoskeletal complaints, especially their thyroid hormone levels, is particularly important. This may lead to the diagnosis of thyroid diseases that the patient was unaware of.

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Conflict of interest

None were declared.

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