Original Research Article

The prevalence of thyroid dysfunction in rheumatoid arthritis

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Abstract

Background: The prevalence of thyroid dysfunction in rheumatoid arthritis is 10-15% which is high in previous studies. Autoimmune thyroiditis, specifically Hashimoto's thyroiditis, is more prevalent in persons with autoimmune disorders including rheumatoid arthritis.
Aim of the study: The study aimed to evaluate the prevalence of thyroid dysfunction and the incidence of autoimmune thyroiditis in rheumatoid arthritis.
Materials and methods: The study was a cross-sectional observational study involving 50 rheumatoid arthritis patients (8 male and 32 female). The conditions which can alter the thyroid profile were excluded from the study population at the time of selection. 40 age and sex-matched healthy subjects were taken as controls. Thyroid function tests were done in all patients and controls. In patients who were found to have thyroid dysfunction, TPO antibodies were done.
Results: Prevalence of thyroid dysfunction was 14% in patients with rheumatoid arthritis. The prevalence of thyroid dysfunction in the control population was 5%. Among patients who had thyroid dysfunction, there was no statistically significant difference in gender. Abnormal thyroid function was mainly in the form of both overt and subclinical hypothyroidism. The prevalence of autoimmune hypothyroidism was 22% in our case population.
Conclusion: In summary, our study confirmed that the prevalence of thyroid dysfunction in rheumatoid arthritis was high and was associated with thyroid autoimmunity and suggest that all rheumatoid arthritis patients should undergo thyroid function testing and those with elevated TSH should go for autoimmune screening with TPO.

Key words

Thyroid dysfunction, Autoimmune disease, Rheumatoid arthritis.

Introduction

Rheumatoid arthritis (RA) is the most common inflammatory arthritis affecting about 0.5-1% of the general population. RA is a systemic autoimmune disorder characterized by symmetrical, inflammatory, deforming polyarthritis affecting small and large peripheral joints with associated systemic disturbance such as vasculitis and nodules. Being an autoimmune disease can be associated with other autoantibody-mediated diseases like autoimmune thyroiditis [1]. The prevalence of thyroid dysfunction in rheumatoid arthritis is 10-15% which is high in previous studies. Autoimmune thyroiditis, specifically Hashimoto's thyroiditis, is more prevalent in persons with autoimmune disorders including rheumatoid arthritis [2]. The term autoimmune hypothyroidism identifies situations with insufficient thyroid function caused by autoimmune thyroid diseases due to autoimmune destruction of the thyroid gland. In its initial stage, chronic autoimmune thyroiditis is characterized by the presence of hallmarks of thyroid autoimmunity and normal thyroid function. As a consequence of the autoimmune attack to the gland, hypothyroidism may develop, usually slowly and insidiously, through a subclinical phase level and an eventual phase of overt insufficiency [3]. The etiology and pathogenesis of chronic autoimmune thyroiditis and mechanisms leading to the hypothyroid phase remain elusive. However, some predisposing genetic factors and some triggering environmental factors have been identified [4]. The role of antigen-presenting cells, of T and B-cell response, and effector mechanisms in the immunopathogenesis of chronic autoimmune hypothyroidism has been extensively investigated. Circulating thyroid autoantibodies are the hallmarks of AITD and thyroid peroxidase antibodies are more sensitive than other antibodies in identifying thyroid autoimmunity [5]. Hypothyroidism is associated with fatigue, anemia, arthritis, and myalgia, and also induces destructive arthropathy, mainly of the proximal interphalangeal joints which would normally be attributed to the inflammatory state of a patient with RA. Since autoimmune thyroiditis in rheumatoid arthritis is usually asymptomatic, any patient who is not responding to conventional treatment of RA or having high levels of TSH should be evaluated for autoimmune thyroiditis [6]. There are studies evidence that RA patients having autoimmune thyroiditis improved symptomatically with thyroid supplementation [7].

Materials and methods

This single centered cross-sectional study was conducted in SPT Hospitals, Coimbatore in the year 2019. Fifty patients of Rheumatoid arthritis and forty age and sex-matched healthy controls, between the age of 17 to 60 years were selected for the study from the Rheumatology clinic and outpatient department of Internal Medicine. All the RA patients were selected based on the 1987 Revised American Rheumatism Association Criteria for the classification of rheumatoid arthritis.

Inclusion criteria:

- Diagnosed cases of rheumatoid arthritis according to the 1987 Revised American Rheumatism Association Criteria for classification of rheumatoid arthritis.

Exclusion criteria:

- Patients with rheumatoid arthritis with the following conditions were excluded from the study like Nephrotic syndrome, Diabetes mellitus, Thyroid disorders, Liver disorders, Drugs like, Diuretics, Oral contraceptives, Patients suffering from inflammatory diseases, diabetes mellitus, renal disorders, thyroid disorders, and diseases known to affect the hormonal status were excluded from the study.
- Patients on medications known to alter the hormonal levels, pregnant, postpartum, and post-menopausal patients were excluded from the study.

Any T3 /T4 value above the upper limit of normal along with a low TSH < 0.34 mIU/ml

was considered as hyperthyroidism. Any T3 /T4 value below the lower limit of normal along with an elevated TSH > 4.2 μIU/ ml was considered as hypothyroidism. TSH > 4.2 μIU/ ml along with normal range T3, T4 was considered as subclinical hypothyroidism. TSH < 0.34 μIU/ ml along with normal range T3, T4 was considered as subclinical hyperthyroidism. Thyroid autoimmunity was considered to exist if the TPOA level was > 75IU/ml and not to exist if it was lesser.

Statistical analysis

Statistical analysis was carried out for 90 participants (50 RA patients, 40 controls) after categorizing each variable. Baseline data were collected from patients. RF, T3, T4, TSH, and TPO in patients with thyroid dysfunction were analyzed. The significance of the difference in mean between the two groups was analyzed by the Student t-test. Statistical significance was taken when p-value <0.05. Statistical analysis was carried out using standard formulae. Microsoft excel 2007 and SPSS (statistical package for social sciences) version 13 software was used for data entry and analysis.

Results

On comparing the female: male 5.2:1 ratio by the chi-square test, the p-value was found 1.0 and 0.457 which was > 0.05. So, the association between gender and hypothyroidism was not significant indicating that there was no significant gender difference among hypothyroid and euthyroid rheumatoid arthritis as per this study (**Table – 1**).

On comparing the T3 by the chi-square test, the p-value was 0.001, which was < 0.05. So, there was a significant abnormality in T3 levels in rheumatoid arthritis (**Table – 2**).

Table – 1: Thyroid status about gender.

Thyroid status	**Total no. (%)**	**Gender**	
		Male	**Female**
Euthyroid	43 (86%)	7 (16.3%)	6 (83.7%)
Hypothyroid	7 (14%)	1 (14.3%)	6 (85.7%)
Hyperthyroid	0	0	0

Table – 2: Comparison of T3 values in cases and controls.

	Case	**Control**
Mean	99.70	134.8
Standard Deviation	22.29	31.37
P Value	<0.001	

Table – 3: Comparison of T4 values in cases and controls.

	Case	**Control**
Mean	6.49	9.2
Standard Deviation	4.72	3.03
P value	0.002	

Table – 4: Comparison of TSH values in cases and controls.

	Cases	**Controls**
Mean	2.75	1.96
Standard Deviation	1.96	0.96
P Value	0.04	

On comparing the T4 by the chi-square test, the p-value was 0.002, which was < 0.05. So, there was a significant abnormality in T4 levels in rheumatoid arthritis (**Table – 3**).

On comparing the TSH by the chi-square test, the p-value was 0.04, which was < 0.05. So, there was a significant abnormality in TSH levels in rheumatoid arthritis (**Table – 4**).

Discussion

The reported prevalence of thyroid dysfunction in rheumatoid arthritis populations varies widely between studies. But, thyroid dysfunction is found to be associated with organ-specific antibodies [8]. The increase of TSH levels was associated with normal FT4 in 3 cases (4.2%) and with reduced FT4 in 2 cases (2.8%). One patient (1.5%) had low TSH serum value along with normal FT4 [9]. Prevalence of hypothyroidism and autoimmune thyroiditis and was 19.1% and 16.2% respectively. A study by Pope JE, et.al.; regarding the prevalence of thyroid diseases and antithyroid antibodies in women with rheumatoid arthritis done among 100 patients with RA thyroid function and antithyroid antibodies were assessed. ATD was more prevalent (16%) in patients with RA than in the control group (9%). The difference was no statistically significant. Antithyroglobulin (anti-TG) and antithyroid peroxidase (anti-TPO) antibodies were (12% and 15%, respectively) in patients with RA and (9% and 18%, respectively) in the control group [10]. The most common thyroid dysfunction observed in both groups was subclinical hypothyroidism. A study by Scott DL et.al thyroid disorders and autoantibodies in systemic lupus erythematosus and rheumatoid arthritis did among 20 patients with SLE and 20 with RA were studied. The results were compared with 20 healthy age and sex-matched controls. This study revealed that thyroid disorders in RA, 10% had hypothyroidism (subclinical) and 5% had subclinical hyperthyroidism. TPOAb was found in 5% of RA patients and 10% of controls [11]. Thyroid dysfunction was found in 11, and thyroid autoantibodies in 15 RA patients, compared with 18 and 13 of the control group, respectively. The conclusion was there is no association between thyroid disease and RA [12]. On the whole, in agreement with many similar reports, we observed a higher prevalence of thyroid dysfunction in our study and hypothyroidism was the thyroid dysfunction found, none of the patients had hyperthyroidism. regarding the prevalence of thyroid diseases and antithyroid antibodies in women with rheumatoid arthritis done among 100 patients with RA thyroid function and antithyroid antibodies were assessed [13]. ATD was more prevalent (16%) in patients with RA than in the control group (9%). The difference was no statistically significant. Antithyroglobulin (anti-TG) and antithyroid peroxidase (anti-TPO) antibodies were present in a similar percentage of patients with RA (12% and 15%, respectively) and the control group (9% and 18%, respectively [14]. In a study by Casey BM, et al. to assess thyroid function as well as the prevalence and clinical value of anti-thyroid antibodies in patients with rheumatoid arthritis (RA) done in 70 RA patients, 9 males, and 61 females, mean age 47 years (range 15–77) were analyzed. **:** Twenty-six patients (37%) with RA were positive for TPOAb and 16 (23%) for TgAb. In (7.1%) patients TSH level was slightly elevated, this study shows an increased prevalence of anti-thyroid antibodies in RA patients with a low prevalence of hormonal alterations. On analyzing TPO antibodies in those with thyroid dysfunction prevalence was 22% which was also comparable with the previous studies [15].

Conclusion

The prevalence of hypothyroidism in RA is more than that seen among the general population. Some patients develop a subclinical form of the disease thus reducing the possibility of clinical suspicion. There is an association between thyroid autoimmunity and thyroid dysfunction in RA. In summary, our study confirms that the prevalence of thyroid dysfunction in rheumatoid arthritis is high and is associated with thyroid

autoimmunity and suggest that all rheumatoid arthritis patients should undergo thyroid function testing and those with elevated TSH should go for autoimmune screening with TPO.

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