ORIGINAL PAPER

Evaluation of Thyroid Hormones and Anti-Thyroglobulin Antibodies among Sudanese Polycystic Ovarian Syndrome Patients

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Abstract

Background: Polycystic ovarian syndrome (PCOS) and thyroid disorders are the most common endocrine disorders in women. Evidently, the involvement of polycystic ovarian syndrome (PCOS) and thyroid autoimmunity triggering thyroid disorders has not yet occurred. **Objective:** The aim was to assess serum free tri-iodothyronine (FT3), free thyroxine (FT4) and anti-thyroglobulin antibodies among polycystic ovary syndrome Sudanese patients. **Materials and methods:** Fifty Sudanese patients diagnosed with PCOS and 50 healthy age matched females were recruited in this cross-sectional controlled study. Serum FT3 and FT4 were measured by an immunoassay analyzer and serum anti-thyroglobulin antibodies were measured using ELISA. The data was then analyzed using the SPSS. **Results:** The results showed a significant increase in serum FT3 and anti-thyroglobulin antibodies and there was no statistical difference in PCOS serum FT4 levels compared to the control group. The results revealed no correlation between levels of FT3, FT4 and anti-thyroglobulin antibodies with age; also there were no correlation between levels of FT3 and FT4 with BMI while there was a positive correlation between anti-thyroglobulin antibodies levels and BMI. **Conclusion:** Patients with PCOS had elevated FT3 and antithyroglobulin. Therefore, the assessment of thyroid autoantibody with thyroid hormones in patients with PCOS should be investigated.

Keywords: Polycystic ovary syndrome, FT3, FT4, thyroid, thyroid autoantibody, Sudanese.

INTRODUCTION

Numerous endocrine dysfunction were found in patients with polycystic ovary syndrome (PCOS)¹⁻³. The insulin resistance in PCOS patients explains features of metabolic syndrome in the affected patients. These include obesity, hypertension⁴.

The most prominent characteristics of PCOS patients include hypothyroidism, anovulatory processes, hypertension, dyslipidemia and neurological disorders⁵.

The presence of autoimmune thyroiditis and goiter with biochemical characteristics of hypothyroidism is not unusual in patients with PCOS⁶. In contrast, the results of some studies showed elevated levels of tri-iodothyronine (T3) and anti-antibody in PCOS patients⁷. Confusing the belief that hypothyroidism is part of PCOS endocrinopathy. At least two reports of Graves' disease in PCOS patients in endocrinology clinics for follow-up^{8,9}. Significant hyperthyroidism may also

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explain some features of PCOS such as hypertension, abnormal menstrual cycles, psychological disturbances and low body mass index (BMI) in some of the affected patients¹⁰. In women with PCOS the investigating thyroid function is importance for both researchers and physicians. There are small number of published data concerning thyroid functions and PCOS in Africa including Sudan.

MATERIALS AND METHODS

This cross-sectional controlled study was approved by the Committee of the Department of Clinical Chemistry of the Faculty of Medical Laboratory Sciences of the University of Alneelain and was conducted in Khartoum during the period from April to May 2019.

Fifty Sudanese patients were diagnosed with PCOS as a case and 50 healthy female volunteers as a control group were recruited in this study. Individuals diagnosed with hyperprolactinemia, congenital adrenal hyperplasia, androgen-secreting tumors, Cushing syndrome, hypertension, hepatic or renal insufficiency, diabetes mellitus and concurrent thyroid dysfunction were excluded from the study. The case and control groups were age-matched with age range between 24–38 years.

After obtaining informed consent from all participants; the demographic data was collected by using questionnaire. By standard vein puncture technique, 3 ml of blood sample was collected in a single container, then allowed to form a clot for 15–30 minutes and centrifuged at 3000 rpm for 10 minutes, after which the serum was obtained and stored at -20°C until analysed.

Serum free T3 (FT3) and T4 (FT4) and serum anti-thyroglobulin antibodies were measured using ELISA. Pathological and natural monitoring sera was used to ensure the accuracy and accuracy of the results.

The data were analyzed using version 21 of the Statistical Package for Social Sciences (SPSS). Values were expressed as percentage and mean $\pm$ SD. Independent *T*-test was used to compare groups and Pearson's correlation test was used to determine the association between study variables. *P*-values of less than 0.05 were considered statistically significant.

Table 1. Comparison of the age means in the study group (case and control)

Variables	Case (Mean $\pm$ SD)	Control (Mean $\pm$ SD)	P-value
Age	30.18 $\pm$ 3.78	28.88 $\pm$ 3.51	0.078

Table 2. Comparison of mean levels of free T3, free T4 and Anti TG in patients with PCOS and control group

Parameters	Case (Mean $\pm$ SD)	Control (Mean $\pm$ SD)	P-value
FT3	3.67 $\pm$ 0.40	3.24 $\pm$ 0.42	0.000
FT4	1.41 $\pm$ 0.30	1.32 $\pm$ 0.31	0.132
Anti TG	28.46 $\pm$ 2.96	26.59 $\pm$ 2.14	0.000

RESULTS

Hundred participants were enrolled in this study; 50 patients with PCOS and 50 apparently healthy females, age was matched in both groups (Table 1).

According to BMI, the majority of patients 29 (58%) of them were with normal weight, 10 (20%) of them were overweight and 11 (22%) of them were obese.

Figure 1. Correlation between levels of FT3 and age.

Figure 2. Correlation between levels of FT4 and age.

Figure 3. Correlation between level of anti-thyroglobulin (anti TG) and age.

Figure 5. Correlation between levels of FT4 and BMI.

Figure 4. Correlation between levels of FT3 and BMI.

Figure 6. Correlation between levels of anti-thyroglobulin (anti TG) and BMI.

The results revealed a significant increase in the levels of serum FT3 and anti-thyroglobulin antibodies (Anti TG) and no statistical difference was observed in the serum FT4 levels of PCOS patients when compared to control group (Table 2).

The results showed no correlation between levels of FT3, FT4 and age, while there was significant weak positive correlation between anti-thyroglobulin antibodies with age (Figures: 1,2 and 3 respectively), also there were no correlation between levels of FT3 and FT4 with BMI while there was a significant weak positive correlation between anti-thyroglobulin antibodies levels and BMI (Figures: 4, 5 and 6 respectively).

DISCUSSION

The most common endocrine disorders in women are polycystic ovary syndrome (PCOS) and thyroid disorders, in patients with (PCOS) critical assessment of thyroid hormones is considered significant as the majority frequent cause of infertility^{11,12}. Several studies reported that, in PCOS patients, the autoimmune thyroid diseases have an increased¹³. Indeed; several studies confirmed that PCOS is associated with autoimmune thyroiditis, subclinical and clinical hypothyroidism and suggested periodic evaluation of thyroid function in patients^{13,14}. The current study results revealed a signi-

ficant increase in serum FT3 and anti-thyroglobulin antibodies compared to healthy individuals in patients with PCOS, this result was similar to that was reported by Mohammed et al.,¹⁵ conducted among Sudanese and interestingly; the results also come on line with results of studies for non-Sudanese populations carried out by Tudose et al.,¹⁴ and Kachuei et al.¹³ Evidently; the relation of an uncommon disease such as the disease of Graves with a rather general form such as PCOS is not likely to be accidental and must prompt and encourage further research in this area.

High incidence of obesity in the present study (42% of cases) is also similar to findings of many studies¹⁵⁻¹⁸, as it is well known and reported that obesity is associated with PCOS with the prevalence of 35-70%¹³ but, obesity varies considerably with country of origin¹⁹.

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CONCLUSION

Study confirmed higher FT3 and anti-thyroglobulin antibodies among PCOS patients. Assessing thyroid autoantibodies and hormone levels in patients with PCOS at an early stage of disease diagnosis is proposed to prevent relevant complications.

Compliance with ethics requirements: The authors declare no conflict of interest regarding this article. The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from all the patients included in the study.