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Original Research Article

Frequency of thyroid dysfunctions among Nigerian patients with vitiligo

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ABSTRACT

Background: Vitiligo is associated with varying degrees of thyroid dysfunctions. This study was aimed to evaluate the thyroid dysfunctions in patients with vitiligo in Port Harcourt, Nigeria, West Africa.
Methods: A retrospective, descriptive, cross-sectional analysis of thyroid function tests variables of 105 vitiligo patients who visited the Department of Chemical Pathology and Metabolic Medicine of the University of Port Harcourt Teaching Hospital between 1st January 2012 and 31st December 2016 was conducted. Records of age, sex, thyroid stimulating hormone, total thyroxine, total triiodothyronine was collected and analyzed using Shapiro-Wilk, descriptive, chi-square, Fisher's exact, and Pearson's tests. A statistical significance of $p < 0.05$ was applied.
Results: Females predominated among study cohort (61.9% female versus 38.1% male; $p = 0.015$). Most patients were less than 30 years old in both sexes. 26.7% (37 out of 105) had various degrees of thyroid dysfunctions. Among this 26.7% (37) with various thyroid dysfunctions, are 28 (75%) females and 9 (25%) males. These dysfunctions include primary hypothyroidism (6.7%), primary hyperthyroidism (1%), subclinical hypothyroidism (17.1%) and subclinical hyperthyroidism (1.9%), while the majority were euthyroid (73.3%). Subclinical hypothyroidism was the most common disorder (n = 18; 17.2%) with female preponderance (females n = 11; 61% versus males n = 7; 39%).
Conclusions: This study confirms high frequency of thyroid dysfunctions among vitiligo patients. The culture of regular assessment of thyroid function should be mandatory among patients with vitiligo.

Keywords: Age, Nigeria, Sex, Subclinical hypothyroidism, Vitiligo

INTRODUCTION

Vitiligo is a common acquired dermatologic condition due to loss of functional melanin-producing cells in the epidermis and mucous membranes resulting in the whitish/patchy appearance of the skin, hair and the mucous membranes.[1,2] It has overall prevalence of about 2% in the worldwide, and a prevalence of between 0.96% to 4.96% in Nigeria.[2-4] Despite efforts to define the basic etio-pathogenesis of vitiligo, no known factor has been implicated in the initiation and progression of the disease.[5] However, theories of autoimmunity, genetics, auto-cytotoxicity, oxidative stress, neural, melanocyte dysfunction, inflammatory and environmental factors have been proposed to play pivotal roles in the initiation and progression of the condition.[6] Among the various proposed theories, autoimmunity seems the most plausible as the vitiligo is frequently associated with other autoimmune conditions inclusive pernicious anemia, type 1 diabetes mellitus, Addison's disease, rheumatoid arthritis and autoimmune thyroid disorders.[7,8] Various authors have reported association of vitiligo with various degrees of thyroid dysfunctions with frequencies ranging between 4% to 57.1%.[9-13]

Most of these previous studies have been conducted from different parts of the world with a dearth of data in Nigeria. This present study is aimed to retrospectively evaluate the thyroid functions among patients with

vitiligo in Port Harcourt, South-South Nigeria, West Africa.

The specific objectives of this study was to determine the degree of thyroid dysfunctions among patients with vitiligo and to determine the age and sex distribution of thyroid dysfunctions among patients with vitiligo. Also, to compare the findings from this study with similar reports around the world.

METHODS

Study area and site

This study was undertaken in the Department of Chemical Pathology and Metabolic Medicine of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria. UPTH is a tertiary health facility in South-south Nigeria which serves as a referral center for all the primary and secondary health centers in South-south part of the country.

Study design

A retrospective analysis of data including serum thyroid stimulating hormone (TSH), total thyroxine (T4), total triiodothyronine (T3) of all healthy vitiligo patients who presented for routine screening for thyroid disorders in the Department of Chemical Pathology and Metabolic Medicine of the University of Port Harcourt Teaching hospital (UPTH) between 1st January 2012 to 31st December 2016. All patients have all been diagnosed by the specialist dermatologist based on history, physical examination, and investigations including wood's light assessment in UPTH. Being a retrospective study, ethical approval and informed consent are not required in UPTH.

Inclusion and exclusion criteria

Inclusion criteria were records of thyroid function test of patients with all variants of vitiligo who presented for routine screening for thyroid disorders using serum thyroid stimulating hormone (TSH), total thyroxine (T4) and total triiodothyronine (T3).

Exclusion criteria were records of thyroid function test of vitiligo patients who are either diagnosed or on treatment for thyroid disorders, including incomplete data in record books and case notes.

Specimen collection, processing, and laboratory analysis

Fasting venous whole blood specimen was collected from each patient via phlebotomy and processed accordingly. Serum analysis for TSH, T4, and T3 was carried out by enzyme immunoassay methods with same brands of laboratory reagents including three levels of commercial quality controls sourced from Monoblind Incorporated, California, United States of America.

Data collection

All records from laboratory result sheets and case notes of each vitiligo patient were collected, reviewed and entered into Statistical Package for Social Sciences (SPSS) version 20. Records collected were demographic data (Age and sex), clinical diagnosis (vitiligo), serum TSH in mIU/l (normal range: 0.4-6.8), serum T4 in nmol/l (normal range: 60-155), serum T3 in nmol/l (normal range: 0.9-2.9).

Statistical analysis

All data entered into SPSS version 20 was coded, validated, interpreted and analyzed using Shapiro-Wilk test, Chi-square test, Fisher's exact test, Pearson's correlation test and descriptive statistics. A p-value of < 0.05 was considered statistically significant. Description of thyroid dysfunctions-

- Euthyroidism: A Normal TSH levels with normal levels of T4 and T3
- Primary Hypothyroidism: A High TSH levels with low levels of T4 plus or minus low T3.
- Primary Hyperthyroidism: A Low TSH level with high levels of T4 and T3.
- Subclinical hypothyroidism: A High TSH level with normal levels of T4 and T3.
- Subclinical hyperthyroidism: A Low TSH level with normal levels of T4 and T3.

RESULTS

During the period from 1st January 2012 to December 2016, one hundred and ten (110) patients with vitiligo presented to the Department of Chemical Pathology and Metabolic Medicine for routine screening of thyroid dysfunctions using serum TSH, T4, and T3. The data of these 105 patients that certified the inclusion criteria were recruited.

There were 40 (38.1%) males and 65 (61.9%) females, $x^2 = 5.952$, $p = 0.015$. The calculated male to female ratio among the study cohort was 1:1.6.

The age was not normally distributed and ranged from 4 to 61 years with a median of 22±16.2 years. Serum TSH, T4, and T3 were all normally distributed.

The calculated mean of TSH, T4 and T3 among the cohort was 3.46mIU/l±3.38 (range 0.1-16.0), 80.45 nmol/l±18.45 (range 12-160) and 1.66 nmol/l±0.53 (range 0.2-5.4) respectively. Serum TSH was positively correlated with T4 ($p < 0.001$) and T3 ($p < 0.001$), but not with sex among the study cohort ($p = 0.391$).

Majority of the study cohorts were less than 30 years old (n = 71; 67.4%) compared to those above 30 years (n = 34; 32.6%).

Table 1: Sex distribution of patients in each age groups.

Age groups (years)	Male n (%)	Female n (%)	Total n (%)
< 30			
<10	6 (5.7)	18 (17.1)	24 (22.9)
11-20	6 (5.7)	17 (16.2)	23 (21.9)
21-30	12 (11.4)	12 (11.4)	24 (22.9)
> 30			
31-40	0 (0)	12 (11.4)	12 (11.4)
40-50	12 (11.4)	2 (1.9)	14 (13.1)
>51	4 (3.8)	4 (3.8)	8 (7.6)
Fisher's exact test p-value < 0.001			

A shown in Table 1, the majority of the study cohorts are in the age groups less than 10 years, 11-20 years, and 21-30 years with females predominating among the patients these age groups.

Table 2: Description of thyroid function status among vitiligo patients.

Thyroid function	Male n (%)	Female n (%)	Total n (%)
Normal function	31 (29.5)	46 (43.8)	77(73.3)
Dysfunctions	9 (8.65)	19 (18.15)	28(26.8)
Chi-square test with yate's continuity correction p value = 0.004			

In Table 2 above, thyroid dysfunctions were detected in 28 (26.8%) of the study cohorts, with a female preponderance (19 females versus 9 males), which was statistically significant (p = 0.004).

Figure 1 shows subclinical hypothyroidism as the most prevalent thyroid dysfunction in both the male and the female sex groups.

Table 3: Description of thyroid dysfunctions among vitiligo patients.

Laboratory diagnosis	Male N (%)	Female N (%)	Total N (%)
Euthyroidism	31 (29.5)	46(43.8)	77 (73.3)
Primary hypothyroidism	1 (1)	6 (5.7)	7 (6.7)
Primary hyperthyroidism	0 (0)	1 (1)	1 (1)
Subclinical hypothyroidism	7 (6.7)	11 (10.5)	18 (17.2)
Subclinical hyperthyroidism	1 (0.95)	1 (0.95)	2 (1.9)
Total	40 (38.1)	65 (61.9)	105 (100)
Fisher's exact test p-value = 0.691			

In table 3, the pattern of various thyroid dysfunctions among study cohorts was primary hypothyroidism (6.7%), primary hyperthyroidism (1%), subclinical hypothyroidism (17.1%) and subclinical hyperthyroidism (1.9%). The most common thyroid dysfunction in both sexes was subclinical hypothyroidism (n = 18; 17.2%) with a female preponderance (11 females versus 7 males).

Table 4: Description of thyroid dysfunctions based on age distribution among vitiligo patients.

Age groups Laboratory diagnosis	< 10 N (%)	11-20 N (%)	21-30 N (%)	31-40 N (%)	40-50 N (%)	>51 N (%)	Total N (%)
Euthyroidism	16(15.2)	17(16.2)	19(18.1)	9(8.6)	11(10.5)	5(4.8)	77(73.3)
Primary hypothyroidism	0(0)	0(0)	3(2.9)	3(2.9)	0(0)	1(1)	7(6.7)
Primary hyperthyroidism	0(0)	1(10)	0(0)	0(0)	0(0)	0(0)	(1)
Subclinical hypothyroidism	7(6.7)	4(3.8)	2(1.9)	0(0)	3(0)	2(1.9)	18(17.1)
Subclinical hyperthyroidism	1(0.95)	1(0.95)	0(0)	0(0)	0(0)	0(0)	2(1.9)
Total	24(22.9)	23(21.9)	24(22.9)	12(11.4)	14(13.3)	8(7.6)	105(100)
Fisher's exact test p-value = 0.104							

In table 4, the majority of patients with subclinical hypothyroidism are more in the age group less than 10 years (n = 7, 6.7%) followed by the patients in the age group 11-20 years (n = 4, 3.8%). Though these findings were not statistically significant (p = 0.104).

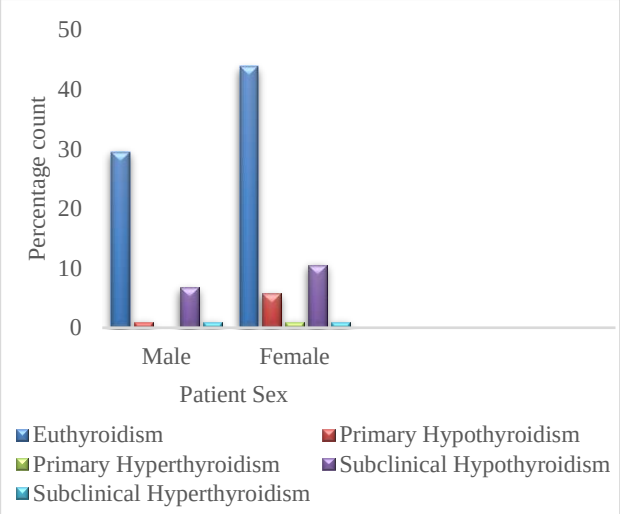

Figure 1: Sex distribution of thyroid dysfunctions among vitiligo patients.

DISCUSSION

Vitiligo is an acquired de-pigmentary disorder due to selective destruction of melanin-producing cells. The history of the condition is well documented by Wellinton and Levell.[14] In spite of extensive global research and studies regarding vitiligo across decades, its etio-pathogenesis has remained unknown.[5] It has a prevalence of about 2% globally.[1,2] However, a higher prevalence has been reported from Nigeria.[1,4]

The condition tends to occur more in the youthful age groups with higher frequencies noted among females than males, which is corroborated in this study.[15] Most of our cohorts were less than 30 years old (n = 71, 67.4%; p < 0.001). There was gender difference among the study cohort (61.9% female versus 38.1% male p = 0.015). The male to female ratio was 1:1.6 which is in contrast with the male to female ratio reported among Nigerian vitiligo patients by Onunu et al and Altraide et al.[16,4] The increased concern of women with aesthetics have been adduced for their higher frequencies observed in most studies regarding vitiligo.[15]

Several theories have been proposed to highlight the exact etio-pathogenesis of vitiligo including theories of autoimmunity, auto-cytotoxicity, oxidative stress, melanocyte dysfunction, inflammatory and environmental factors.[5-7,17] Among the aforementioned theories, the part of autoimmunity seems the most plausible.[5] This is evidenced by its familial propensities, histological proof of cytotoxic inflammatory cells in vitiligo lesions, its response to immunosuppressive agents and its frequent association with various autoantibodies and coexistence with other autoimmune disorders.[18-21] The theory of autoimmunity in etio-pathogenesis of vitiligo proposes alteration in both humoral and cellular immunity leading to the destruction of melanocytes and simultaneous involvement of various other organ-specific tissues.[18]

High frequency of thyroid dysfunctions have been reported among vitiligo patients than in the normal controls.[18-21] In this study, 26.7% of the vitiligo patients were observed to have various degrees of thyroid dysfunctions which is in accord with the finding by Jishna et al, who reported an incidence rate of 27% of thyroid dysfunctions among vitiligo patients but at variance with the findings of Altraide et al in a retrospective study reported from Nigeria in 2009.[22,4] Altraide et al had reported a 9.8% frequency of thyroid dysfunctions among vitiligo subjects in their study. However, several other studies had reported lower frequencies, and higher frequencies of thyroid dysfunctions among vitiligo patients in contrast to this study.[10,21,13,19] These observed variations between this study and that of some these cited studies could be due to differences in study methodology and genetic backgrounds.

The most prevalent thyroid dysfunction observed among our study cohort is subclinical hypothyroidism. A Similar pattern of thyroid dysfunction has been reported by other authors in various studies.[12,23] Kumar et al had reported a frequency of 28% of thyroid dysfunction among vitiligo patients in their study with strong associations noted between vitiligo and hypothyroidism than hyperthyroidism.[12] Asfar et al had also reported a 16.4% frequency of subclinical hypothyroidism among vitiligo cohorts in a retrospective study.[23] There is evidence that vitiligo precedes thyroid dysfunction by 5-35 years in about 50% of vitiligo patients and subclinical hypothyroidism precedes overt hypothyroidism at a rate of 5-20% per year.[23-27] Thus, screening of thyroid dysfunction among vitiligo subjects have been strongly advised.[23,24]

CONCLUSION

The findings of this study suggest a high frequency of thyroid dysfunction among vitiligo subjects. This corroborates the numerous global findings of increased vitiligo-associated thyroid dysfunctions in vitiligo subjects. Since vitiligo precedes thyroid dysfunctions, we suggest screening for thyroid dysfunctions among patients with vitiligo as part of their management protocol.

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