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ORIGINAL RESEARCH

Clinical Profile of Hypothyroidism- A Cross-Sectional Study

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ABSTRACT

Background: Hypothyroidism is prevalent among obese Indian women. Patients with hypothyroidism exhibit a higher prevalence of comorbidities and complications in comparison to individuals without this condition. Therefore, timely identification and treatment of hypothyroidism can effectively mitigate numerous complications in patients, particularly in cases of subclinical hypothyroidism.

Aim and Objective: To study the presentation and clinical profile of hypothyroidism in Indian population.

Material &Methods: This cross-sectional study was conducted among 100 patients clinically diagnosed with hypothyroidism at Department of Gen. Medicine Govt. Medical College, Bundi (Rajasthan) a tertiary care center in India. A comprehensive history and clinical examination were conducted to determine the clinical characteristics.

Results: Females exhibited a greater prevalence of hypothyroidism, with a rate of 71.7%, compared to males. The predominant symptoms include fatigue, excessive weight gain, facial swelling, irritability, hair thinning, and irregular menstrual cycles. The typical observations during a general examination include weight gain, pallor, dry skin, pedal edema, and Goiter. Hypothyroidism is commonly associated with type 2 diabetes mellitus, dyslipidemia, obesity, and hypertension.

Conclusions: Hypothyroidism is most prevalent in older females. The typical clinical manifestations of hypothyroidism include increased body weight, muscle weakness, swelling of the face, swelling of the lower extremities, hair loss, pale skin, and irregular menstrual cycles.

Keywords: hypothyroidism, clinical profile, weight gain, thyroid stimulating hormone.

INTRODUCTION

The thyroid gland secretes two crucial metabolic hormones, namely thyroxine (T4) and tri-iodothyronine (T3). These hormones play a vital role in regulating metabolic rate, as well as growth and development [1]. Subclinical hypothyroidism (ScHt) is characterised by elevated levels of S.TSH, while serum Free Thyroxine (FT4) and Free Triiodothyronine (FT3) concentrations remain within the normal range. This condition is typically accompanied by minimal or no indications of hypothyroidism [2]. Hypothyroidism is the most common thyroid disorder, with a prevalence of 3-15% among adults in India. The occurrence of this condition becomes more frequent as individuals age, particularly among females [3-4]. The incidence of hypothyroidism was greater in the population belonging to lower socioeconomic groups [5]. The typical manifestations observed in individuals with hypothyroidism include fatigue, lethargy, constipation, weight gain, intolerance to cold temperatures, decreased sexual desire, dry skin, anaemia, bradycardia, and delayed ankle reflex. Hypothyroidism in young women is associated with menstrual irregularities, polycystic ovaries, and infertility. Several of these factors lack specificity and may have limited diagnostic significance in a clinical setting [6]. Hypothyroidism can lead to various negative effects, including potential cardiac dysfunction and adverse cardiac outcomes such as atherosclerotic disease and cardiovascular mortality. It can also cause an increase in total and low density lipoprotein cholesterol levels, as well as systemic or neuropsychiatric symptoms [7]. Within the Indian population, individuals with asthma, obesity, diabetes, dyslipidemia, and hypertension exhibited a higher incidence of hypothyroidism [8]. Untreated overt hypothyroidism in pregnant women is linked to gestational hypertension, abruptio placenta, anaemia, gestational diabetes, and postpartum haemorrhage.

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Overt hypothyroidism is associated with an elevated likelihood of experiencing unfavourable birth outcomes. Commonly linked birth outcomes include spontaneous miscarriage, low birth weight, premature birth, foetal distress, perinatal death, and stillbirth [9-10].

Conducting screenings for subclinical hypothyroidism in the general population and treating asymptomatic cases can alleviate clinical symptoms, enhance lipid profiles, and reduce the risk of atherosclerosis. However, there is ongoing debate regarding the sufficiency of the evidence, and it is suggested that case finding is more effective than screening [11]. Prompt and precise identification and management of hypothyroidism is essential and frequently difficult in medical practice due to its numerous manifestations; this difficulty is further heightened in cases of subclinical hypothyroidism. This study aimed to evaluate the clinical characteristics of hypothyroidism in the population of central India.

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of Gen. Medicine Govt. Medical College, Bundi (Rajasthan) India. Total of 100 patients who were confirmed case of hypothyroidism were included in the study with age more than 15 years

Inclusion criteria

- All the patients presented with signs and symptoms suggestive of hypothyroidism.
- Patients with thyroid profile suggestive of hypothyroidism.
- Age more than 15 years of age.
- Patients who given the consent for the study.

Exclusion criteria

- Patients whose thyroid profile were in the normal limits.
- Patients who were not given consent for the study.
- Age less than 15 years of age
- Pregnant women were excluded

Detailed history, socio-demographic data, history of illness, clinical sign, symptoms and complete clinical examination were done in all the patients. Laboratory test which included FT4, FT3, TSH, complete blood count, renal function test, liver function test, lipid profile, blood and sugar were done. Specific investigation like ECG, Echocardiography, and Chest X-Ray was also advised accordingly.

Data analysis was conducted using Microsoft Excel. The patient's gender and the location of the lesion were the qualitative exposure variables, while the patient's age was the quantitative exposure variable under consideration. Frequency tables were generated based on the age, gender, and location of the patient's lesion. The median and interquartile range of age were computed

RESULTS

Key attributes of the study participants. 54% of the patients were between the ages of 21 and 40, and 66% of the patients were female.

Table 1: General characteristics of Study Populations

	Frequency	Percentages
Age		
21-40	54	54%
41-60	26	26%
61>80	20	20%
Gender		
Male	34	34%
Female	66	66%

Indications Among the patients, weight gain was the prevailing symptom, affecting 36% of them. This was followed by lethargy and fatigue, experienced by 32% of the patients, menstrual problems affecting 26%, and constipation affecting 24% (Table 2).

Table 2: Clinical Symptoms of Study Participants

Symptoms	**Frequency**	Percentage
Lethargy and fatigue	32	32%
Constipation	24	24%
Weight gain	36	36%
Decreased appetite	6	6%
Cold intolerance	14	14%
Forgetfulness and impaired memory	4	4%
Decreased concentration	4	4%
Dry skin	14	14%

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menstrual problems	26	26%
Neck pain	4	4%
Dyspnea	4	4%

Cardiovascular pressure and blood-related measurements

The blood pressure distribution of the patients in the study is presented in Table 3. Mean plus or minus standard deviation The systolic blood pressure was measured at 114.16 ± 10.79, while the diastolic blood pressure was measured at 77 ± 5.7.

Table 3: Mean and SD for SBP, DBP, RBC, Hb and WBC in hypothyroidism patients			
Parameter	**Mean**	**SD**	Range
SBP(mmhg)	114.16	10.79	98-138
DBP(mmhg)	77	5.7	68-90
RBC(mil/ul)	4.49	1.022	3.27-4.9
Hb(g/dl)	11.86	1.48	9-14.1
WBC(thou/ul)	6790	1420	4300-9000

Cardiac rhythm and blood lipid levels

The table 4 below lists the parameters for heart rate and lipid profile in subclinical hypothyroidism.

Table 4:parametersinsubclinicalhypothyroidism			
Parameter	**Mean**	**SD**	RANGE
Heartrate(bpm)	67.22	11.32	50-96bpm
Totalcholesterol(mg/dl)	195.25	43.63	113-300mg/dl
HDL(mg/dl)	53.08	8.27	36-71mg/dl
LDL(mg/dl)	97.32	34.75	45-196mg/dl
T4(ug/dl)	7.13	1.21	5-10.2ug/dl
T3(ng/dl)	90.544	23.15	60-154ng/dl
TSH(mIU/ml)	11.23	2.26	7.2-20mIU/ml

Parameters for diagnosing overt hypothyroidism

Table 5 displays the average, standard deviation, and range of various parameters that were measured in individuals with overt hypothyroidism.

Table 5 displays the parameters associated with overt hypothyroidism.			
Parameter	**Mean**	**SD**	Range
Heart rate	62.24	8.105	48-76 bpm
Total cholesterol	210.56	65.87	95-320 mg/dl
Triglyceride	185.16	97.34	82-450 mg/dl
HDL	41.035	12.87	22-69 mg /dl
LDL	137.2	42.27	63-196 mg/dl
T4	2.52	0.92	1.2-4.1 ug/dl
T3	43.19	6.72	30-61.4 ng/dl
TSH	57.04	29.030	9.44->100mIU/ml

Anti-thyroid peroxidase (TPO) antibody testing was conducted on all patients. The results revealed that 32 patients (64%) tested positive for anti-TPO antibodies, while the remaining 18 patients (36%) tested negative for anti-TPO antibodies.

DISCUSSION

The study showed a higher proportion of females, with a female-to-male ratio of 1.67:1. A study conducted by Danzi et al. in 2004 found that there was a higher proportion of females overall. The female population accounted for approximately 85.84% of the total, with a female-to-male ratio of 6:1. [12]. In line with our research conducted by Prasanna et al, among the 72 patients, 44 (61.11%) were diagnosed with hypothyroidism, while hyperthyroidism was observed in 28 (38.89%) cases. The ratio of females to males was 4.5 to 1[13].

Within our study, the age range of 20 to 40 years accounted for 54% of the patients, while only 20% were aged 60 or above. In a similar manner, Hassan-Kadle et al. selected patients between the ages of 20 and 60. The average age of the patients was 47 ± 18.5, with the majority falling within the 31-50 age range (35.9%; n = 350) [14]. Unlike our study, Pande et al.,

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2014 found that out of 50 cases in their study, the average age of the patients was 50.21± 2.3[15].

The prevailing symptoms observed in both males and females in the current study were weight gain (36%), lethargy and fatigue (32%), menstrual problems (26%), constipation (24%), and cold intolerance (14%). In their study, Khemka D [16] found that weight gain was the most prevalent symptom in primary hypothyroidism, occurring in 32 cases (51.61%), followed by constipation (30.69%). Chabra et al. [17] reported that the prevailing symptoms observed in patients were weight gain (65.62%), constipation (63.28%), muscle cramps (40.62%), and cold intolerance (37.5%).

The mean ± standard deviation range of systolic blood pressure is 114.16 ± 10.79, and the diastolic blood pressure is 77 ± 5.7. The study indicates that the basic blood parameters, such as red blood cell count (RBC), haemoglobin (Hb), and white blood cell count (WBC), fall within the normal range of Mean SD. Cai et al. (2021) found that there was no statistically significant disparity in office systolic blood pressure (SBP) and diastolic blood pressure (DBP) between the S-HYPO group and the euthyroid group ($P > 0.05$). The daytime systolic blood pressure (SBP), nighttime SBP, 24-hour SBP, and diastolic blood pressure (DBP) in the S-HYPO group were significantly higher than those in the euthyroid group ($P = 0.048$, $P = 0.002$, $P = 0.003$, $P = 0.014$, $P = 0.046$, respectively) on the ambulatory blood pressure level. Additionally, the proportion of individuals with nondipper blood pressure in the S-HYPO group was higher than that in the euthyroid group [18].

In our study, we observed a reduction in high-density lipoprotein (HDL) levels among individuals with subclinical hypothyroidism. A notable disparity in HDL levels was observed, which was statistically significant ($p<0.01$). This indicates the connection between the lipid profile and subclinical hypothyroidism. Caron et al. (1990) found that the levels of total cholesterol, triglycerides, and apolipoprotein (apo A1, A2, B) in women with subclinical hypothyroidism were similar to those in the control group. The levels of HDL cholesterol were significantly lower in individuals with subclinical hypothyroidism compared to the control group ($P < 0.01$)[19].Vigna et al. found that hypothyroid patients had elevated average triglyceride levels and reduced HDL-cholesterol compared to dyslipidemic euthyroid women. However, this difference did not reach statistical significance [20].

The triglyceride levels in the current study demonstrated a statistically significant correlation with overt hypothyroidism. Gupta and Sinha found that the average serum cholesterol levels were significantly higher in both subclinical hypothyroidism (192.13 ± 47.40 mg%) ($p < 0.05$) and overt hypothyroidism (231.27 ± 68.30 mg%) ($p < 0.005$) compared to the control group (157.63 ± 37.69 mg%). In individuals with overt hypothyroidism, the average levels of serum triglyceride (235.59 ± 137.53 mg%), LDL (126.09 ± 54.99 mg%), and Apo-B (0.698 ± 0.354 g/L) were significantly higher compared to the control group (serum triglyceride 165.45 ± 49.15 mg%, LDL 88.72 ± 38.75 mg%, Apo-B 0.474 ± 0.176 g/L) [21].An association exists between subclinical and overt hypothyroidism and dyslipidemia. This could potentially serve as a risk factor for the development of coronary artery disease.

Anti-thyroid peroxidase (TPO) antibody testing was conducted on all patients. The results revealed that 32 patients (64%) tested positive for anti-TPO antibodies, while the remaining 18 patients (36%) tested negative for anti-TPO antibodies. It is necessary to assess the presence of TPO antibodies in patients who are at risk of developing hypothyroidism [22]. Siriwardhane et al. (2019) found that 73% of individuals with hypothyroidism in group A1 and 68.6% of individuals with hyperthyroidism in group A2 had anti-TPO levels 252 (±33) and 277 (±151) days before the onset of thyroid dysfunction, respectively. The prevalence of anti-thyroid peroxidase (anti-TPO) antibodies was found to be significantly higher in both subclinical/overt hypothyroidism and hyperthyroidism compared to the control group, prior to the development of thyroid dysfunction [23].

In a separate investigation conducted by Engler et al., it was discovered that a significant number of patients with thyroiditis (59%) exhibited markedly increased levels of anti-TPO (anti-thyroid peroxidase) values, specifically exceeding 500 units/ml. Conversely, none of the control subjects or patients with non-thyroidal illness displayed such elevated anti-TPO values. The average anti-TPO levels in the two control groups were 26 ± 31 units/ml and 39 ± 34 units/ml, respectively. Patients with auto-immune hypothyroidism yielded the highest rate of positive results (88%) [24].

CONCLUSION

Younger females should exercise heightened vigilance and promptly pursue medical intervention to prevent the occurrence of additional complications. Hypothyroid patients exhibit a modified lipid profile characterised by elevated triglycerides, elevated LDL, and reduced HDL, thereby heightening the susceptibility to cardiovascular disease.

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