

Prevalence of Hypothyroidism and Its Epidemiological Parameters among the Adults in Selected Urban Areas of Amritsar

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Abstract

The endocrine system is vital in orchestrating cellular interactions, metabolism, growth and senescence. The prevalence of hypothyroidism in the developed world is about 4-5 percent, and subclinical hypothyroidism is 4-15 percent. Hypothyroidism is the most common thyroid disorder in India, affecting one in ten adults. Although millions of men experience thyroid dysfunction, women are ten times more likely to have a thyroid imbalance. A descriptive longitudinal study was adopted among 400 adults residing in Kitta, a community area under SGRDUHS. Data was collected from adults (baseline datasheet, clinical variables, dietary and lifestyle characteristics) through simple random sampling. Thyroid screening was done using the Zulewski clinical score of hypothyroidism. The present study findings revealed an overall prevalence of hypothyroidism of 12 percent. There was highly significant association of hypothyroidism with age, etc.

Key words: Hypothyroidism, Adults, Endocrine disorder

Hypothyroidism is one of the most prevalent endocrine disorders, presenting a spectrum of clinical symptoms. These symptoms can range from mild manifestations, such as fatigue, weight gain, cold intolerance, and depression, to more severe complications, including myxedema, which can potentially lead to fatal outcomes (Hinkle et al, 2021; Chaker et al, 2017). It can be easily diagnosed and treated, but it can be fatal in severe cases if left untreated. Hypothyroidism is a prevalent endocrinological condition with a significant global impact. In developed nations, the prevalence of hypothyroidism is estimated to be around 4-5 percent, while that of subclinical hypothyroidism ranges from 4-15 percent (Hollowell et al, 2002). It is 10 times more common in women, with incidence figures of 4.1/1000 women/year and 0.8/1000 men/year (Werhun & Hamilton, 2013). Hypothyroidism is a very serious problem in India, where 1 in every 10 men & women suffer from hypothyroidism. 42 million people in India have thyroid disorders, and hypothyroidism is the most common thyroid disorder in India, affecting one in ten adults (Down to Earth, 2018). The prevalence of hypothyroidism in India is 11 percent, compared with only 2 percent in the UK and 4-6 percent in the USA. This is possibly linked to long-standing iodine deficiency in the country

(Bagcchi, 2014). Due to the asymptomatic nature of subclinical hypothyroidism, the American Thyroid Association recommends routine thyroid-stimulating hormone (TSH) screening for both sexes at the age of 35 years and every 5 years thereafter. (Vanderpump, 2011) Serum TSH levels are the most sensitive indicator of thyroid function and can be influenced by various factors such as iodine nutrition, age, and autoimmunity (Goichot et al, 2020). There are no sufficient studies on the prevalence of hypothyroidism in different geographical territories of India. Although patients with hypothyroidism in India often remain undetected and untreated, the disease impairs the work performance and economic productivity of Indian people. The present study aimed to determine the prevalence of hypothyroidism in adults in North India.

Objectives

This study was conducted with the following objectives.

1. To estimate the prevalence of hypothyroidism among adults in urban areas of Amritsar.
2. To identify the epidemiological parameters of hypothyroidism among adults in urban areas of Amritsar.

Review of Literature

Studies on hypothyroidism

A study conducted on thyrovigilance for hypothyroidism in India shows that the prevalence

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of hypothyroidism in India is 11 percent, compared with only 2 percent – 4.6 percent in the Western population. Inland states have a higher prevalence of hypothyroidism compared to coastal states (11.7% vs 9.5%), probably due to iodine deficiency (Bajaj, 2022).

A study was conducted on the prevalence of hypothyroidism in adults by screening TSH in North India. A total of 300 asymptomatic individuals of both sexes attending the OPD of a tertiary health care centre in the age group of 15 to 50 years were included in the study. The study concluded that hypothyroidism was found to be more common in females than males (26.6% in females vs 17.3% in males) (Chandey et al, 2016).

A cross-sectional analysis of adults aged 60 years and over from the Birjand Longitudinal Ageing Study (BLAS) cohort study was conducted. A total of 363 subjects were randomly selected, and their serum thyroid-stimulating hormone (TSH) level, total thyroxine (T4), and total triiodothyronine (T3) were measured using enzyme-linked immunosorbent assay (ELISA). The crude prevalence of total hypothyroidism was 22.31 percent (subclinical 18.46%, overt 3.86%); hyperthyroidism was 1.66 percent subclinical 1.38 percent, overt 0.28 percent, resulting in a crude prevalence of total thyroid dysfunction of 23.97 percent (Mirahmad et al, 2023)

Studies on its epidemiological parameters

A study conducted on Investigation on the risk factors of thyroid diseases in the community population in Hainan showed that female gender was a risk factor for thyroid disease. Participants aged 40–69 years had a significantly higher risk of thyroid disease compared with participants aged 18–29 years (40-49 years: $p < 0.001$; 50-59 years: $p = 0.009$; 30-69 years: $p = 0.037$). The study concluded that the prevalence of thyroid diseases increases with age (Fang et al, 2022).

A descriptive, cross-sectional study was conducted on a total of 935 subjects, including patients, relatives, students, staff, and other volunteers aged 20-70 years, in a Government Medical College in Central Kerala. The results showed that out of the 935 adults screened, 157 (16.7%) had raised TSH. The study also revealed an increased prevalence of undetected hypothyroidism in midlife (41-50 years of age), with a higher prevalence in females (19.2%) (Saranraj & Santosh, 2019).

Methodology

A descriptive longitudinal study was undertaken among 400 adults residing at Kitta, a community

under Sri Guru Ram Das University of Health Sciences and Research (SGRDUHS). The study was approved by the Institutional Ethical Research Committee. Data was collected from July to December 2023. Sample size was calculated from prevalence in previous studies [$n = 4pq/L^2$]. All the samples were randomly selected through compute-generated table. Data was collected from adults.

Tool I: Prevalence and epidemiological factors of hypothyroidism had 3 parts; Part A-Baseline datasheet (Age, Sex, Marital Status, Socioeconomic status, family history of hypothyroidism, CVI: 1); Part B-Clinical variables (BMI, Menstrual status, Co-morbidities, CVI:1); Part C- Dietary and lifestyle characteristics (History of smoking and alcohol, Frequency of exercise, Dietary habits, Habit of taking junk food, Frequency of consumption of fruits, Servings of fruits, Consumption of vegetables, Usage of salt, Storage of salt and Addition of salt while cooking, CVI:0.9) through interview method.

Tool II: Thyroid screening was done using the Zulewski clinical score of hypothyroidisms. Reliability of the tool was found to be 0.76. Further, thyroid testing was advised to be performed for suspected cases of hypothyroidism. After a detailed history, screening and testing results were obtained and analysed by descriptive and inferential statistics.

Inclusion Criteria

- Adults > 18 years of age.
- Those who were permanent residents of the community.

Exclusion Criteria

- Females who were pregnant at the time of data collection.
- Adults who had been diagnosed with hyperthyroidism.
- Those who were not present at the time of data collection.

Results

Prevalence of hypothyroidism, frequency and percentage of duration, type of treatment and follow-up of hypothyroidism, epidemiological parameters of hypothyroidism, and epidemiological parameters of hypothyroidism among the adults have been shown in Tables 1-6.

Table 1: Prevalence of hypothyroidism among the adults (N=400)

	f	%
Euthyroidism	352	88
Hypothyroidism	48	12

Table 2: Frequency and percentage of duration, type of treatment and follow-up of hypothyroidism (n=37)*

Characteristics	Hypothyroid	
	f	%
<i>Duration of hypothyroidism (in years)</i>		
<5	14	37.8
5-10	15	40.5
>10	08	21.6
<i>Type of treatment</i>		
Allopathic	37	100
Homeopathic	0	0
Ayurvedic	0	0
Home remedy	0	0
None	0	0
<i>Regular follow-up</i>		
Yes	27	73.0
No	10	27.0

*(Already diagnosed cases of hypothyroidism)

Table 3: Frequency and percentage of epidemiological parameters of hypothyroidism among adults (socio-demographic variables) (N=400)

Characteristics	Euthyroid (n=352)		Hypothyroid (n=48)		Fisher test	df	p value
	f	%	f	%			
<i>Age</i>							
<30	81	23.0	0	0			
31-60	224	63.6	42	87.5	2.748	57	0.000
>60	47	13.6	06	12.5			
<i>Sex</i>							
Male	181	51.4	0	0			
Female	171	48.6	48	100	3.610	1	0.057
<i>Socio economic status (as per Kuppuswamy scale)</i>							
Upper I	34	9.7	0	0			
Upper middle II	42	11.9	16	33.3	2.215	4	0.000
Lower middle III	163	46.3	10	20.8			
Upper lower IV	102	29.0	21	43.8			
Lower V	11	3.1	1	2.1			
<i>Family history of hypothyroidism</i>							
Yes	47	13.4	16	33.3	1.877	1	0.000
No	305	86.6	32	66.7			

Significant Highly significant

Table 4: Frequency and percentage of epidemiological parameters of hypothyroidism among adults (clinical variables) (N=400)

Characteristic	Euthyroid (n=352)		Hypothyroid (n=48)		Fisher test	df	p value
	f	%	f	%			
<i>Body mass index</i>							
Normal	333	94.6	40	83.3			
Overweight	19	5.4	8	21.6	7.686	87	0.000
<i>History of co-morbid illness</i>							
No co-morbidities	283	80.4	30	62.5			
Comorbidities	69	19.6	18	37	8.754	4	0.000

Highly significant

Table 5: Frequency and percentage of epidemiological parameters of hypothyroidism among adults: Lifestyle characteristics (N=400)

Characteristic	Euthyroid (n=42)		Hypothyroid (n=8)		Fisher test	df	p value
	F	%	f	%			
<i>History of smoking</i>							
Yes	06	1.7	5	10.4			
No	346	98.3	43	89.6	3.572	1	0.000
<i>History of alcohol</i>							
Yes	42	11.9	5	10.4			
No	310	88.1	43	89.6	2.341	1	0.000
<i>Frequency of exercise</i>							
Daily	83	23.6	05	10.4			
Once a week	112	31.8	14	29.2	12.06	3	0.007
Twice a week	93	26.4	12	25.0			
None	64	18.2	17	35.4			

Highly significant

Table 6: Frequency and percentage of epidemiological parameters of hypothyroidism among adults: Dietary characteristics (N=400)

Dietary habit	Euthyroid (n=42)		Hypothyroid (n=8)		Fisher test	df	p value
	F	%	f	%			
<i>Vegetarian</i>							
Mixed	265	75.3	42	87.5			
Specify for seafood	87	24.7	06	12.5	1.14	1	0.000
	0	0	0	0			
<i>Habit of taking junk food</i>							
No	70	19.9	12	25.0			
Daily	28	8.0	0	0			
Once a week	181	51.4	21	43.8	1.406	3	0.000
Occasionally	73	20.7	15	31.2			
<i>Consumption of fruits per week</i>							
No	04	1.1	05	10.4			
Daily	20	5.7	06	12.5	6.971	3	0.000
Once a week	297	84.4	31	64.6			
Occasionally	31	8.8	06	12.5			
<i>Servings of fruits per day</i>							
One	204	58.0	25	52.1			
Two	67	19.0	07	14.6	2.590	3	0.000
Three	05	1.4	03	6.2			
None	76	21.6	13	27.1			
<i>Consumption of vegetables in diet in raw form</i>							
Cauliflower	184	52.3	21	43.8			
Soya	168	47.7	27	56.2	250	3	0.617 ^{NS}

Dietary habit	Euthyroid (n=42)		Hypothyroid (n=8)		Fisher test	df	p value
	F	%	f	%			
Usage of salt							
Iodised	301	85.5	26	54.2	1.613	1	0.000
Non-iodised	51	14.5	22	45.8			
Storage							
Air-tight container	80	22.7	04	8.3	1.346	1	0.000
Loose container	272	77.3	44	91.7			
Addition of salt while cooking food							
At the beginning	306 01	86.9 0.3	42 2	87.5 4.2	5.242	2	0.000
At the end Not fixed	45	12.8	4	8.0			

Highly significant

The results of the study showed that out of the total (400) subjects, 352 (88%) were found to be euthyroid, and 48 (12%) suffering from hypothyroidism. The maximum adults (n=42, 87.5%) were found to be vegetarian, 21 (43.8%) adults were found with a habit of taking junk food in their diet, followed by 15 (31.2%) taking it occasionally. Regarding consumption of fruits, the majority (n=31, 64.6%) were found taking fruits in their diet. Regarding vegetables, 27 adults (56.2%) found consuming soya in their diet. As for usage of salt, the majority (n=44, 91.7%) were found using iodised salt, yet a maximum number of subjects (n=42, 87.5%) had the habit of storing salt in a loose container and adding salt while cooking in the beginning. The variable consumption of vegetables was found to be non-significant at p value 0.05, which is 0.617 whereas all others were highly significant.

Discussion

Hypothyroidism is believed to be a common health issue in India, as it is worldwide. The clinical manifestations of hypothyroidism are varied, including weight gain, cold intolerance, menstrual irregularities, lethargy, fatigue, etc. Hypothyroidism is a significantly prevalent condition. In a recent study, hypothyroidism was found to be more common in females than males. The study was supported by Unnikrishnan et al (2013) on the prevalence of hypothyroidism in adults. This study showed that a significantly higher ($p < 0.05$) proportion of females vs males (15.86% vs 5.02%) were diagnosed with hypothyroidism (Saranraj et al, 2019).

The findings were also supported by National Family Health Survey IV report [NFHS IV (2015-2016)] which revealed that hypothyroidism was 2.2 percent among women and 0.5 percent among men in the age group of 15-49 years, while it was 2.7 percent for women and 0.5 percent for men in NFHS-V report (2019-2021) in 15-49 years age group in India.

Implication

- The study highlights the need for multidisciplinary teamwork (endocrinologist, dietician and nursing professionals) in screening.
- Nurses can coordinate these efforts to ensure a holistic approach to managing hypothyroidism.

Recommendation

A nationwide study to be conducted to find out the prevalence and underlying parameters. TSH screening is an important tool for the early detection of hypothyroidism. Appropriate lifestyle modifications should be undertaken to prevent hypothyroidism. Nurses should teach the community about the usage & storage of salt.

Conclusion

Hypothyroidism is a common prevailing disorder in the adult Indian population. The prevalence of hypothyroidism was high, affecting approximately one in 10 adults in the study population. Female gender and older age were found to have a significant association with hypothyroidism.

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हाइपोथायरॉयडिज्म से कैसे निबटें

हार्मोनों की शरीर के सुचालन और दैनंदिन कामकाज में बड़ी भूमिका है। इनकी अधिकता या कमी शरीर को हानि पहुंचा सकती है। हार्मोन बच्चों के विकास और विकास में विशेष भूमिका निभाते हैं। ये रासायनिक संदेशवाहक हैं जो शरीर के विभिन्न कार्य जैसे वृद्धि, विकास, चयापचय (मेटाबोलिज्म), यौन क्रिया, मनोदशा और प्रजनन को नियंत्रण में रखते हुए तालमेल बनाए रखते हैं। हार्मोन कई प्रकार के होते हैं। इनमें प्रमुख हैं वृद्धि हार्मोन, इंसुलिन, थायरॉक्सीन, टेस्टोस्टेरोन, कॉर्टिसोल, ऑक्सीटोसिन, सेरोटोनिन, एंडोर्फिन, एस्ट्रोजन और प्रोजेस्टेरोन। मानव शरीर में कुल 230 हार्मोन होते हैं। डोपामाइन और सेरोटोनिन जैसे हार्मोन मनोदशा और मूड को नियंत्रित करते हैं। प्रजनन हार्मोन पुरुषों और महिलाओं दोनों में प्रजनन क्षमता को नियंत्रित करते हैं। अन्य हार्मोन ब्लड प्रेशर, शारीरिक तापमान, सोने-जगने का क्रम, तनाव आदि को नियंत्रित करते हैं। हार्मोन की कमी को दूर करने के लिए संतुलित आहार का सेवन करें। इसमें प्रोटीन, वसा, फाइबर, एंटीऑक्सीडेंट, ओमेगा 3 फैटी एसिड का समावेश होना चाहिए। इसी के साथ प्रोसेस्ड खाद्यों से बचें।

गर्दन में स्थित छोटी, तितली के आकार की थायरॉयड ग्रंथि का मुख्य कार्य मेटाबोलिज्म को नियंत्रित करना है। यह ग्रंथि हार्मोन के दो रूप बनाती है, थायरॉक्सिन (टी 4) और ट्राईआयोडोथायोनिन (टी 3)। इनके कम उत्पादन से हाइपोथायरॉयडिज्म हो जाता है। पहला चरण में हाइपोथायरॉयडिज्म पूरे शरीर को प्रभावित करता है इसके लक्षण हर व्यक्ति में अलग-अलग होते हैं जिससे रोग की पहचान प्रायः कठिन हो जाती। तथापि इसके सामान्य लक्षण और संकेत हैं: थकान और फुर्ती न रहना, कर्कश या धीमी गति की आवाज, वजन बढ़ जाना, ठंड न सह पाना, चेहरे में सूजन, कब्ज, झुनझुनाहट, नाड़ी धीमा चलना, सूखी, खुरदरी या मोटी त्वचा, जोड़ों और मांसपेशियों में दर्द।

उपरोक्त लक्षण दिखने पर विशेषज्ञ (एंडोक्राइनोलॉजिस्ट) से परामर्श लें, वह लैब परीक्षणों के बाद उपचार देगा।

प्रकाशन एकक, टीएनएआई