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# Prevalence of Subclinical Hypothyroidism in High-Risk Individuals Attending Medicine Outpatient Department (OPD) in Tertiary Care Hospital

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## ABSTRACT

**Introduction:** Nowadays Hypothyroidism is quite common. It results in many problems which ultimately hampers the quality of life. It is a common endocrine disorder in general practice. A textbook describes the classical hypothyroid state thus, the patients face looks grotesquely swollen and eyelids may be so infiltrated that the skin beneath hangs in sacs.

The present study aims to study the magnitude and association of subclinical hypothyroidism in individuals having risk factors. (Females with age more than 50 years old and family history of hypothyroidism).

**Method:** This is a Cross-sectional, observational hospital-based study design. The study was conducted on patients attending the medicine outpatient department in Krishna Hospital and Medical Research Centre, Karad. The study duration was from October 2018 to March 2020 (18 months). Result: A significant association between smoking and subclinical hypothyroidism was found ($p < .05$). It was observed that a comparatively larger proportion of subjects who consumed tobacco (smokeless form) developed subclinical hypothyroidism, but the statistical significance could not be established ($p > .05$). Subclinical hypothyroidism was observed significantly more among the subjects with a body mass index of more than 25 kg/m2 ($p < .05$).

**Conclusion:** Present study provides valuable information regarding the presence of subclinical hypothyroidism in a significant proportion of subjects in context with the Indian population.

**Key Words:** Subclinical Hypothyroidism, High-Risk Individuals, Outpatient Department, History of cigarette smoking, Diabetes mellitus and obesity

## INTRODUCTION

Hypothyroidism is a common problem; it causes symptoms that reduce the functional status and quality of life. It is a common endocrine disorder in general practice. A textbook describes the classical hypothyroid state thus, the patients face looks grotesquely swollen and eyelids may be so infiltrated that the skin beneath hangs in sacs. Movements and speech are grossly retarded. The tongue may fill the mouth. The voice is hoarse, almost a croak. Skin is thickened, cold, rough and dry. Hair tends to dry and become brittle and sparse. A slow pulse rate may be found. Non-pitting oedema can be recorded in third to half of the patients. The Achilles reflex is prolonged. The disease may progress slowly without the patient being aware that he/she is ill.[1, 2] The history about the thyroid is summarized by Rolleston1 according to which Galen in his De Voce briefly described the gland. Vesalius added to the anatomy of the gland. He suggested that the gland was there to round out and beautify the neck. Hypothyroidism is a clinical syndrome that was described for the first time in London in 1870. In 1873 Sir William Gull was the first to understand that the cause of myxoedema is atrophy of the thyroid gland.[3]

Ord coined the term Myxedema in 1878 and published the definitive account of myxedema. Later it was accepted widespread that cretinism, myxedema and post-thyroidectomy changes all were a result of the loss of function of the thyroid body. In 1896 Baumann suggested that iodine deficiency caused the malfunctioning of the thyroid. Kendall isolated thyroxin (thyroxyindole) for the first time in 1914. Harrington synthesized it for the first time in 1926. However,

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synthesis of thyroxine was done on a large scale in 1949; later it became a universally accepted therapy for hypothyroidism.[4] In 1951 T3 was found to be metabolically active in the treatment of hypothyroidism.[5]

Subclinical hypothyroidism was a new clinical entity described in the early 1970s after TSH estimation became routine. It represents a form of mild thyroid failure. Large epidemiological studies indicate that subclinical hypothyroidism is the most prevalent thyroid disease in the community.[6]

## AIM

To study the magnitude and association of subclinical hypothyroidism in individuals having risk factors. (females with age more than 50 years old and family history of hypothyroidism). At the same time, we will study the magnitude and association of subclinical hypothyroidism in subjects having the following risk factors

a) Females more than 50 years old
b) Family history of hypothyroidism
c) History of cigarette smoking
d) Diabetes mellitus and obesity

## METHOD

This is a Cross-sectional, observational hospital-based study design. The study was conducted in patients attending the medicine outpatient department in Krishna Hospital and Medical Research Centre, Karad. The study duration was from October 2018 to March 2020 (18 months). Ethical committee clearance: This study was approved by Institutional Ethics and Protocol Committee (Protocol number 0252/2018-2019). The Sample size was calculated by using the following formula

$$N=4\times p\times q/d2$$

Concerning previous studies, we found that the prevalence of subclinical hypothyroidism was 9.4% that constituted p in the above equation. Hence 'q' which is 100 - p became 90.6% (100-9.4). The 'd' is absolute allowable error taken as 5% (considering a confidence interval of 95%). Hence from the above equation, the estimated sample size for this study was 136.

### Inclusion criteria

Subjects with high-risk factors for the development of hypothyroidism were included. We took the following high-risk factors for screening of subclinical hypothyroidism

1. Females more than 50 years old
2. Family history of hypothyroidism
3. History of cigarette smoking
4. Diabetes mellitus and obesity

### Exclusion criteria

1. Subjects already diagnosed to have hypothyroidism
2. Cases of frank hypothyroidism
3. Critically ill patients

## METHOD

Demographic information such as age, gender, past medical history, personal history and general examination findings such as weight, height, body mass index were recorded with the help of standard, pre-validated, semi-structured case record proforma.

## RESULT

Subclinical hypothyroidism is defined as an elevated serum thyroid-stimulating hormone (TSH) level associated with normal total tetra-iodothyronine (T4) and tri-iodothyronine (T3) levels. This is a much more common disorder than overt hypothyroidism. After institutional ethical clearance, with informed consent and with inclusion and exclusion criteria 136 cases with known high-risk factors in the medicine outpatient department were included in the study and were evaluated based on thyroid hormone profile. The data was entered in the master sheet and analysed statistically. The salient features of studied criteria in the study population are summarized below: In the present study majority of the study, subjects were females (69.11%) whereas 30.88% of the subjects were males. The majority of the study subjects were in the age group of 46 to 55 years (41.91%)

A family history of hypothyroidism was present among 26.47% of study subjects, and 22% of the subject's history of diabetes mellitus was seen. It was found that 19.85% of subjects were smokers, whereas 12.5% of the subject of tobacco consumption (smokeless) and 16.91% subjects were having the habit of alcohol consumption37.50% of study subjects had body mass index between 17.5 - 25 i.e normal, followed by 33.82% with BMI 25 – 30 and 28.68% subjects were obese with BMI between 30 -40The presence of subclinical hypothyroidism in this study was 24.26%, whereas overt hypothyroidism was observed among 11.76% of the subjects. Hyperthyroidism was noted among 3.68% of the subjects and 60.29 % of the subjects were having normal thyroid function status. Subclinical hypothyroidism was significantly observed more among subjects with type 2 diabetes mellitus ($p < .05$)

A significant association between smoking and subclinical hypothyroidism was found($p < .05$). It was observed that a comparatively larger proportion of subjects who consumed tobacco (smokeless form) developed subclinical hypothyroidism, but the statistical significance could not be established ($p > .05$). Subclinical hypothyroidism was observed

significantly more among the subjects with a body mass index of more than 25 kg/m2 ($p < .05$). Subclinical hypothyroidism in the present study was seen in 35.13% of females with more than 50 years of age ($p < .05$)In the present study risk factors associated with subclinical hypothyroidism were female subjects with age more than 50 years, family history of hypothyroidism, obesity (BMI >30kg/m2), smoking, history of type 2 diabetes mellitus.

## DISCUSSION

### Age and gender-wise distribution

In the present study, the majority of the study subjects were females (69.11%) whereas 30.88% of the subjects were males. The M: F ratio observed in the present study was 1:2.23. In the present study, the age distribution of the study subjects was assessed. It was observed that the majority of the study subjects belonged to the age group of 46 to 55 years (41.91%), followed by 56 to 65 years (22.06%) then 36 to 45 years (20.59%) and more than 66 years (7.35%). The mean age of the study subjects was 50.68 ± 9.76 years. Similar to the present study, studies were conducted by Thakur V et al. [n=678, M: F ratio=1.06:1, age 49.4 ± 12.5], Eidan et al.[ n=394, M:F ratio= 1:1.11, age 41 ± 12] and Wang J et al.[n=4256, M:F ratio=1.06:1, age [50.51 ± 14.2].[7,8,9] The observation of these studies were comparable to the present study.

### Family history of hypothyroidism

In the present study, the family history of hypothyroidism of the study subjects was assessed. It was observed that the family history of hypothyroidism was present among 25.73% of study subjects and subclinical hypothyroidism was observed more among cases with a family history of hypothyroidism. [chi-square statistic is 11.6246. 'p'-value is 0.0006. Odds ratio= 4.2. Relative risk = 2.63] Eidan et al. in their study observed the odds of developing subclinical hypothyroidism among the cases with a family history of hypothyroidism as 2.8. These findings are not comparable with our study which is due to the ethnicity of the study population.[7]

### History of type 2 diabetes mellitus

In the present study, the history of type 2 diabetes mellitus among the study subjects was evaluated. It was found that in 22% of the subjects history of type 2 diabetes mellitus was present and subclinical hypothyroidism was significantly observed more among cases with type 2 diabetes mellitus. [chi-square statistic is 31.5842. The 'p'-value is < 0.00001. Relative Risk = 3.85. Odds Ratio = 8.76] Thakur V et al in their study compared the presence of type 2 diabetes mellitus among subclinical hypothyroidism and euthyroid subjects. They observed 19.80% euthyroid subjects and 14.70% subclinical hypothyroidism subjects. The findings were not statistically significant. These findings were not consistent with our results due to the difference in the duration of diabetes at the time of screening.[9]

## CONCLUSION

Subclinical hypothyroidism is a common clinical problem and is associated with various high-risk factors. Thyroid disorders in such patients having these associated high-risk factors have significant morbidity if they are not treated and subsequently, these patients may develop clinical hypothyroidism. In the present study, the clinical presentation of the patients with subclinical hypothyroidism was mostly nonspecific, which were mostly undiagnosed compared to euthyroid; so, screening of these patients is required to find out subclinical hypothyroidism and early intervention can be done. The risk factors associated with increased risk of development of subclinical hypothyroidism in the present study population were female subjects with age more than 50 years, family history of hypothyroidism, obesity, smoking, history of diabetes mellitus. The present study provides valuable information regarding the presence of subclinical hypothyroidism in a significant proportion of subjects in context with the Indian population.

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