

Pattern of Thyroid Illness in a Tertiary Hospital in Nepal

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ABSTRACT

Introduction: Thyroid dysfunction is an important endocrine disorder worldwide among which hypothyroidism, is attributed to environmental deficiency of iodine. Congenital hypothyroidism is one of the most common preventable causes of intellectual disability worldwide. Hypothyroidism is easily treated and timely detection and treatment of the disorder could reduce the adverse fetal and maternal outcome. The aim of our study is to find the prevalence of thyroid illness in a tertiary health care center of Nepal.

Methods: This was a descriptive, cross-sectional study carried out in the Department of Biochemistry of Shree Birendra Hospital, Chhauni, Kathmandu over a period of five months from March 2021 to July 2021. We selected 1000 patients with symptoms suggestive of thyroid disorders. Detailed history was obtained and free triiodothyronine (fT3), thyroxine (fT4) and thyroid stimulating hormone (TSH) estimation was done in Siemens CP Chemiluminescence Immunoassay analyzer. Data were entered in Microsoft Excel and managed in SPSS version 20.

Results: Most of our patients with hypothyroidism presented with puffiness of the face, hoarseness of voice, whereas weight loss and restlessness were predominant features in hyperthyroid patients. In our study, the prevalence of hypothyroidism and hyperthyroidism were 16.0% and 9.5% respectively.

Conclusions: Hypothyroidism is common in the female population. We found that hypothyroidism and subclinical hypothyroidism were more prevalent in the reproductive age group.

Keywords: Hyperthyroidism; Hypothyroidism; Nepal; Sub-Himalayan region; Thyroid Stimulating Hormone (TSH)

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INTRODUCTION

According to the American Thyroid Association, the United States of America (USA) alone reported 20 million Americans with some form of thyroid disease, and at least 12% will develop a thyroid condition during their lifetime.¹ Most of the thyroid disorders are still present in the developing countries of Asia, Africa and Latin America.² Thyroid disorders are due to abnormality in thyroid functions and enlargement of the thyroid gland. Iodine, an essential micronutrient, is an integral part of thyroid hormones, so its availability to the thyroid gland affects the production of thyroid hormones.³

The environmental deficiency of iodine is one of the key factors in development of goiter in Nepal. In a study done by Karmakar et al. in Nepal showed extremely low levels of iodine in drinking water.⁴ The prevalence and pattern of thyroid disorders depend on ethnicity, gender, diet and nutrition, geographic, environmental factors and iodine intake status.^{5,6} Among the patients who visit health care facility in Nepal, most of them have complaints related to thyroid illnesses which include malaise, weight gain or loss, loss of appetite, excessive sweating, palpitation and changes in voice patterns. Thyroid dysfunction during pregnancy can bring adverse outcomes like intrauterine growth retardation, stillbirth and congenital anomalies. Untreated congenital hypothyroidism can lead to cretinism, one of the preventable cause of mental retardation.⁷

Thyroid disorders in our country is quite common. However, we don't have sufficient research regarding thyroid disorders in our institute yet. Thus, our study aims to find the prevalence of thyroid disorders in our center in Nepal.

METHODS

This was a descriptive, cross-sectional study done in the Department of Biochemistry of Shree Birendra Hospital, Chhauni, Kathmandu, Nepal. This is a tertiary care referral hospital run by Nepali Army for the army personnel and their families. The study was initiated after taking approval from Institutional Research Committee (IRC) of Nepalese Army Institute of Health Sciences. One thousand patients of both sexes were included in our study. After obtaining the informed consent, blood samples of patients who were suggestive of thyroid disorders were collected. All cases with symptoms and

clinical features of secondary thyroid dysfunction like acromegaly, Down's syndrome, post thyroidectomy and thyroid gland carcinoma were excluded. Siemens CP chemiluminescence immunoassay analyzer was used to estimate serum free triiodothyronine (fT3), free tetraiodothyronine (fT4) and thyroid stimulating hormone (TSH). Thyroid disorders were classified into subclinical and clinical hypo or hyperthyroidism based upon laboratory results of fT3, fT4 and TSH (Table 1). The sample size was calculated with 95% confidence level and 10% error of margin taking the expected prevalence thyroid illness as 4.32%.⁸ The formula used is $n = Z^2 * p(1-p) / (e)^2$, where Z is level of confidence, p is expected prevalence and e is precision (5%). The statistical level of significance (p) is < 0.05. Statistical package for social sciences (SPSS version 20) was used to carry out the statistical analysis of data. The analysis was done in the form of percentages and proportions and represented as tables, chart and bar diagrams.

Table 1. Classification of thyroid disorders based on thyroid hormones⁹

Condition	TSH Level	Thyroid Hormones	Comments
Overt hyperthyroidism	< 0.1 mIU / L	Elevated T4 or T3	
Overt hypothyroidism	> 4.5 mIU / L	Low T4	
Subclinical hyperthyroidism	< 0.1 mIU / L	Normal T4 and T3	Clearly low serum TSH
	0.1 to 0.4 mIU / L	Normal T4 and T3	Low but detectable
Subclinical hypothyroidism	4.5 to 10 mIU / L	Normal T4	Mildly elevated TSH
	≥ 10 mIU / L	Normal T4	Markedly elevated TSH

RESULTS

In this study, total of 1000 samples of patients with clinical features suggestive of thyroid illness were analyzed. The age of the patient's age ranged from one to 80 years. Most of our participants with thyroid disorders were in the age group (20 – 30 years) and (50 – 80 years) (Figures 1 and 2). Different age groups with hyperthyroidism is represented in figure 1 and different age groups with hypothyroidism is shown in figure 2. Sex wise differentiation of all thyroid disorders are shown in figure 3. There were 743 females (74.3%)

and 257 males in this study. Among the total participants, the abnormal thyroid results were seen in 395 patients (39.5%). The most prevalent abnormality was overt hypothyroidism (n = 160, 16.0%). Out of total cases of overt hypothyroidism, females comprised of total 112 (70%).

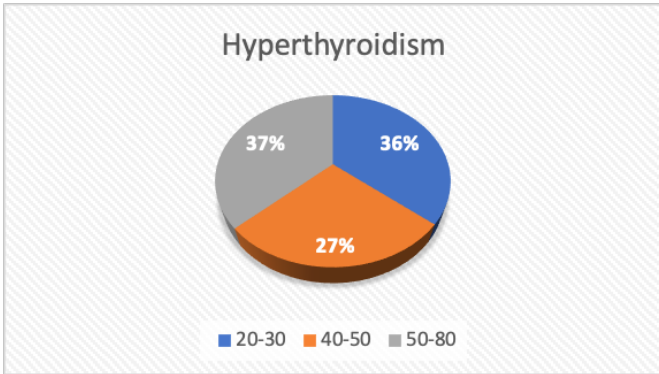


Figure 1. Age wise distribution of cases with hyperthyroidism

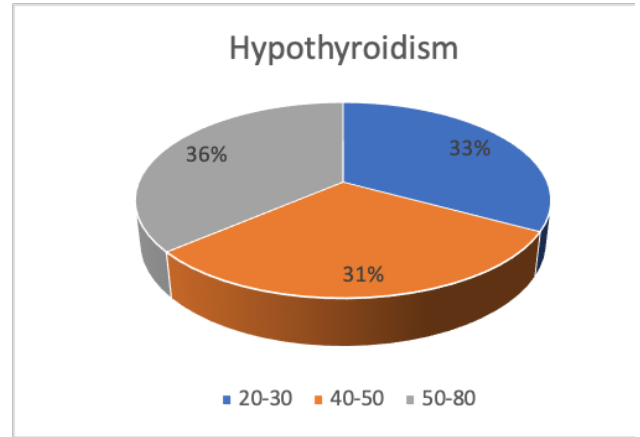


Figure 2. Age wise distribution of cases with hypothyroidism

None of our cases had visible neck swellings or goiter, however, change in weight and voice patterns were present in most of the cases. Thyroid hormone levels in the different age groups have been depicted in table 2.

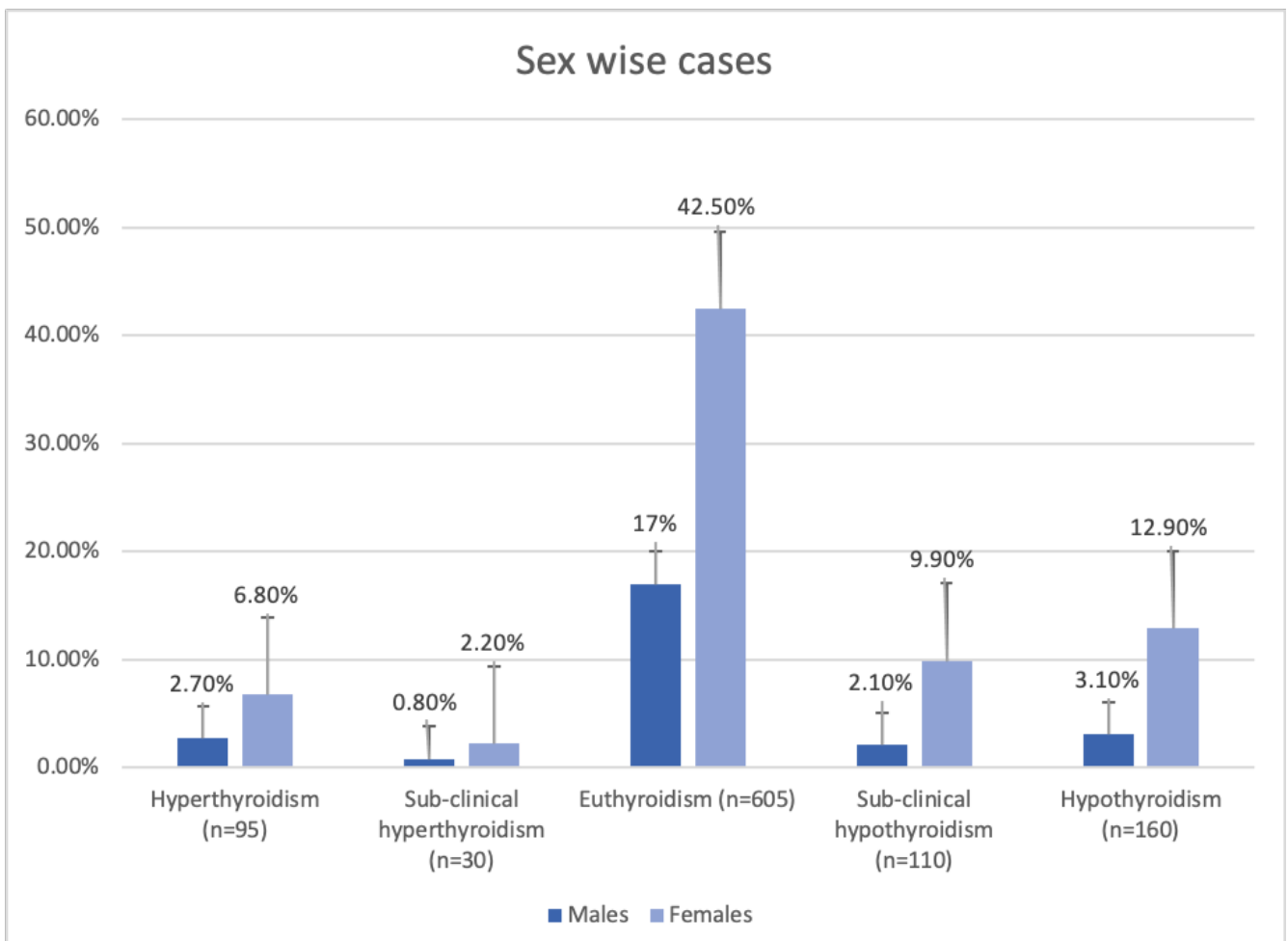


Figure 3. Sex-wise classification of cases

Table 2. Age wise distribution of thyroid hormones

Age	fT3 (pg / mL)	fT4 (ng / mL)	TSH (mIU / L)
0 - 10 (n = 6)	2.8 ± 0.0	1.8 ± 0.23	6.7 ± 0.41
10 - 20 (n = 45)	2.18 ± 0.24	2.64 ± 0.51	3.38 ± 0.61
20 - 30 (n = 424)	3.2 ± 0.24	3.6 ± 0.005	3.9 ± 0.71
30 - 50 (n = 213)	1.9 ± 0.14	2.01 ± 0.003	6.7 ± 0.31
> 50 (n = 314)	2.03 ± 0.45	2.8 ± 0.02	4.09 ± 0.36

DISCUSSION

The prevalence of thyroid disease in the developing countries is not well known because of lack of diagnostic resources and adequate research. Most of the thyroid disease in the developing world presents as goiter, an obvious neck swelling associated with symptoms due to compression of vital structures.¹⁰ However, we did not find goiter as a common presenting feature in our study. This could be because of the fact that iodine deficiency and overall prevalence of goiter has been significantly less in the modern times.

Most of our participants with thyroid disorders were in the age group (20 - 30 years) and (50 - 80 years). This finding is also supported by a similar study by Baral et al in the eastern part of Nepal where many cases with thyroid disorders were in approximately 39 years of age.¹¹ In a study done by Aryal M et al in Nepal, the prevalence of hypothyroidism alone is 8% whereas in our study it was 16%.¹² In the same study the prevalence of hyperthyroidism and subclinical hyperthyroidism was 3.27% and 5.69%, whereas in our study it was 9.5% and 3% respectively. This difference could be explained by the different geographic regions where the studies have been conducted.

In a study done by Saroj Khatiwada et al at B. P. Koirala Institute of Health Sciences, Dharan, Nepal, the prevalence of subclinical hypothyroidism was (26.5%), overt hypothyroidism (5.5%), and subclinical hyperthyroidism was (4.1%).¹³ In studies done by Mahato RV et al and Regmi A et al in central Nepal and another study done in far western region of Nepal by Yadav NK

et al have found high prevalence of overt thyroid disorders.¹⁴⁻¹⁶

One important cause of hypothyroidism is a lack of iodine in the diet, in which the thyroid glands produce too little thyroxine. Deficient production of thyroxine may lead to the development of goiter and symptoms such as heat and cold intolerance and weight changes.¹⁶ Our results showed that 228 females (22.8%) in our study with clinical and subclinical hypothyroidism were in the reproductive age group. This could have resulted due to increase in demand of thyroid hormones in this growing age group. Iodine requirements are greatly increased during pregnancy and lactation, due to the metabolic changes that take place during these periods.¹⁷ During pregnancy, maternal thyroid hormone production is increased as the transfer of thyroxine and iodine from the mother to the fetus is essential for proper brain development in the fetus. Although thyroid hormone production is normal during lactation, the demand for iodine is not met as the breastfeeding mother provides iodine to the nursing infant while the infant is exclusively breastfed.¹⁸ When the mother is deficient in thyroid hormones, it results in high chances of neonatal hypothyroidism that can be prevented by early diagnosis and treatment of mother and newborn. Congenital hypothyroidism is the only treatable causes of mental retardation and hence, it is important to pick up hypothyroidism early during pregnancy and neonatal stage.

Our study has shown that thyroid disorders can affect almost all age groups and present with various patterns of clinical features. Ours is a small study conducted in a single centre. However, it would be desirable to conduct larger, multi centric study to find out the prevalence of thyroid disorders among the Nepalese people.

CONCLUSIONS

The prevalence of abnormal thyroid function test was 39.5% in our study with hypothyroidism being the most common (16%). Females were more likely to have over all abnormal thyroid function tests as compared to the male population. Thyroid abnormalities can affect all the age groups.

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Conflict of Interest: None declared

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