

Pattern of thyroid disorders in people from central Nepal: A Hospital based study

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Abstract- Metabolic disorders including thyroid dysfunction is increasing problem throughout the world. We aim to observe the pattern of thyroid disorder among people attending one of the hospitals in the central development region of Nepal. An observational study was conducted among 290 individuals who attended the Medical unit of Shree Puspanjali Hospital Pvt. Ltd, Bharatpur-10, Nepal between May 2016 and August 2016. Socio-demographic characteristics, clinical characteristics and laboratory data (from thyroid function test) were collected. Data were analyzed using IBM-SPSS 20.0 and descriptive and inferential analysis was performed. Of the 290 individuals, 215 (74.23%) had thyroid disorders among which hypothyroidism was the most common disorder (187, 87.0%) followed by hyperthyroidism (24, 11.2%) and subclinical hypothyroidism (4, 1.9%). Majorities (261, 90%) of the participants were female and so were those with thyroid disorders (196, 91.2%). The mean age of the participating individuals was 45.9 ± 1.3 years. Hypertension (49, 16.9%) was the commonest co-morbid condition among the participants (30, 10.3%) but diabetes ($p=0.004$) and dyslipidemia ($p=0.002$) were significantly associated with thyroid disorder. In conclusion, hypothyroidism was the most common thyroid disorders and female were at the most vulnerable group. This is a single hospital based study; therefore, it is not sufficient to generalize the thyroid disorder in whole population.

Index Terms- Nepal, Pattern, Thyroid disorders

I. INTRODUCTION

Thyroid disorders are the second most common endocrine disorders in the world.[1] Thyroid gland secretes free tri-iodo thyrosine (fT3) and free thyroxine (fT4) hormones which regulates metabolic rate, growth and development. These two hormones are under the control of thyroid stimulating hormone (TSH), which is produced by anterior pituitary gland and stimulate hormone production of thyroid gland.[2] The spectrum of thyroid disorders includes underactive hypothyroidism, subclinical hypothyroidism, overactive hyperthyroidism and subclinical hyperthyroidism. Their clinical manifestations vary considerably from area to area and determined principally by availability of iodine in the diet. In iodine-replete areas, most people with thyroid disorders have autoimmune disease, ranging through primary atrophic hypothyroidism, Hashimoto's thyroiditis, to hyperthyroidism caused by Graves' disease.[3] About 20 million people are affected by thyroid disorder in

United State of America.[4] Nepalese are considered as a high risk populations for prevalence of iodine deficiency disorder.[5] Several studies in different parts of Nepal showed wide variation in prevalence of the thyroid dysfunctions [6-9]. This study was design to observe the pattern of thyroid disorder among people attending one of the private hospitals in the central development region of Nepal.

II. METHODS

This study was conducted at the Medicine unit of Shree Puspanjali Hospital Pvt. Ltd, Bharatpur, Nepal. Ethical approval of this study was obtained from the same hospital with written informed consent from each participant. We observed the pattern of thyroid disorders among 290 individuals of all age groups and with or without previous history of thyroid disorder by performing their thyroid function test between May 2016 and August 2016. Socio-demographic characteristics [age, gender, religion, diet habit (Vegetarian or non-vegetarian), alcohol intake (Yes/No) and smoking (Yes/No)], clinical characteristics [family history of thyroid disorder (Yes/No), past history of thyroid disorder (Yes/No), duration of thyroid disorder (in years), duration of medication (in years) and currently used medications] and laboratory finding [serum level of thyroid stimulation hormone (TSH), thyroxine (fT4) and triiodothyronine (fT3)] were collected. Serum level of fT3, fT4 and TSH were estimated by Chemiluminescence Immunoassay (CLIA) method at National Reference Laboratory (Bharatpur Division). The serum level of fT3 (2.3-4.2 pg/mL), fT4 (0.78-2.19 ng/dL) and TSH (0.46-4.68 μ IU/mL) were used as a reference range for this study. Thyroid function was considered normal (Euthyroidism) when the participant had all the three hormones within the reference range. Abnormal thyroid function was further categorized as hyperthyroidism (increased FT3 and FT4 but low TSH), subclinical hyperthyroid (normal FT3 and FT4 but low TSH), hypothyroidism (decreased FT3 and FT4 but increased TSH) and subclinical hypothyroidism (normal FT3 and FT4 but elevated TSH). Data were analyzed using IBM-SPSS 20.0 (IBM Corporation, Armonk, NY, USA). The t- test and Chi- square test were used for statistical analysis. A p-value < 0.05 was considered statistically significant for all statistical tests unless otherwise stated.

III. RESULT

Out of 290 participants, female were predominate (261, 90%). The mean±S.D age of the participants was 45.9±1.3 years (Table 1).

Table 1: Socio-demographic characteristics of the participants (n=290).

Characteristic	Frequency	Percentage
Age (in years)		
<15	3	1
16-35	57	19.7
36-55	171	59
56-75	55	19
≥75	4	1.4
Mean age ± SD (years)	45.9 ± 1.3	
Gender		
Male	29	10.0
Female	261	90.0

Religion		
Hindu	284	97.9
Muslim	1	0.3
Christian	3	1.0
Buddhist	2	0.7
Diet		
Vegetarian	50	17.2
Non-vegetarian	240	82.8
Alcohol intake		
Yes	8	2.8
No	282	97.2
Smoking		
Yes	4	1.4
No	286	98.6

Overall, 215 (74.13%) participants were suffering from thyroid disorder and hypothyroidism was the most common (187, 64.48%). Twenty four participants (8.27%) were suffering from hyperthyroidism and only four (1.37%) were suffering from subclinical hypothyroidism (Figure 1).

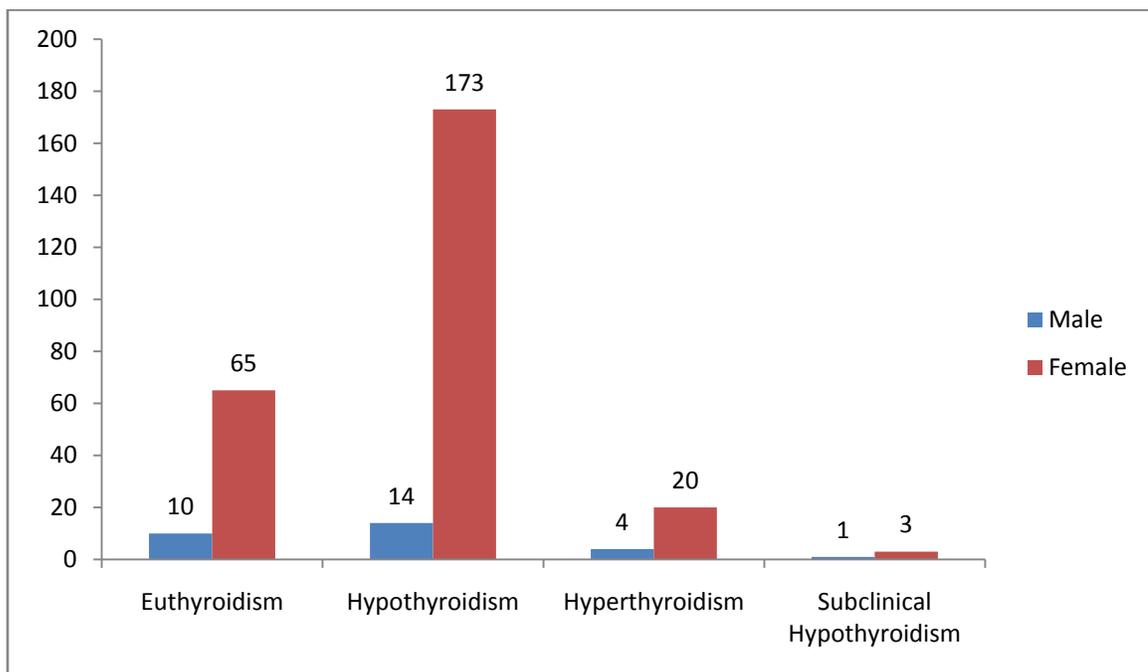


Figure 1: Final diagnosis of the thyroid disorder in the study participants.

The mean±SD serum level of fT3, fT4 and TSH were 3.91±1pg/ml, 2.42±1.08ng/dl and 7±1.2667µIU/ml respectively. Thirty two (11%) participants had family history of thyroid disorder and 176 (60.70%) had past history of thyroid disorders. Among the patients having thyroid disorders (n=174), 153 (87.90%) were on levothyroxine therapy, 17 (9.80%) were on carbimazole and four participants (2.3%) were on propylthiouracil. (Table 2). There was significant difference (p =0.001) between serum level of fT4 and gender (Table 3).

Table 2: Clinical characteristics of the participants (n=290)

Characteristic	Frequency	Percentage
Family history of thyroid disorder		
Yes	32	11.0
No	258	89.0
Past History of thyroid disorder		
Yes	176	60.7
No	114	39.3
If yes, Duration of thyroid disorder (n=176)		

<1 year	56	31.8
1-5 years	92	52.3
5-10 years	23	13.1
≥10 years	5	2.8
Duration of medication (n=174)		
<1 year	59	33.9
1-5 years	87	50.0
≥ 5 year	28	16.1
Currently used medication (n=174)		
Levothyroxine	153	87.9
Carbimazole	17	9.8
Propyl thiouracil	4	2.3

fT3(pg/ml)	3.62±3.19	2.84±.57	0.001
fT4(pg/ml)	1.49±.75	2.52±11.43	0.631
TSH(μIU/ml)	11.46±29.32	7.58±15.47	0.253

Out of 75 participants with normal thyroid hormone level, 13 (17.3%) participants were suffering from hypertension and 14(18.6%) were suffering from diabetes mellitus. Similarly, in hyperthyroid cases (n=24), two (8.3%) of them had hypertension and two (8.3%) had dyslipidemia. Most of the patients who were categorized to have hypothyroidism (n=187) had multiple co-morbidities, of which 34(18.2%) had hypertension, 14(7.5%) had diabetes mellitus and six (3.2%) had anemia (Figure 2). The abnormal thyroid function test was associated with concurrent occurrence of diabetes mellitus (p=0.004) and dyslipidemia (p=0.002) as co-morbid conditions. However, there were no significant correlations between thyroid disorders and other chronic illness namely hypertension, anemia and family history of thyroid disorder.

Table 3: Comparison of serum thyroid hormones with respect to gender (n=290).

Thyroid hormones	Male Mean±SD	Female Mean±SD	P-value
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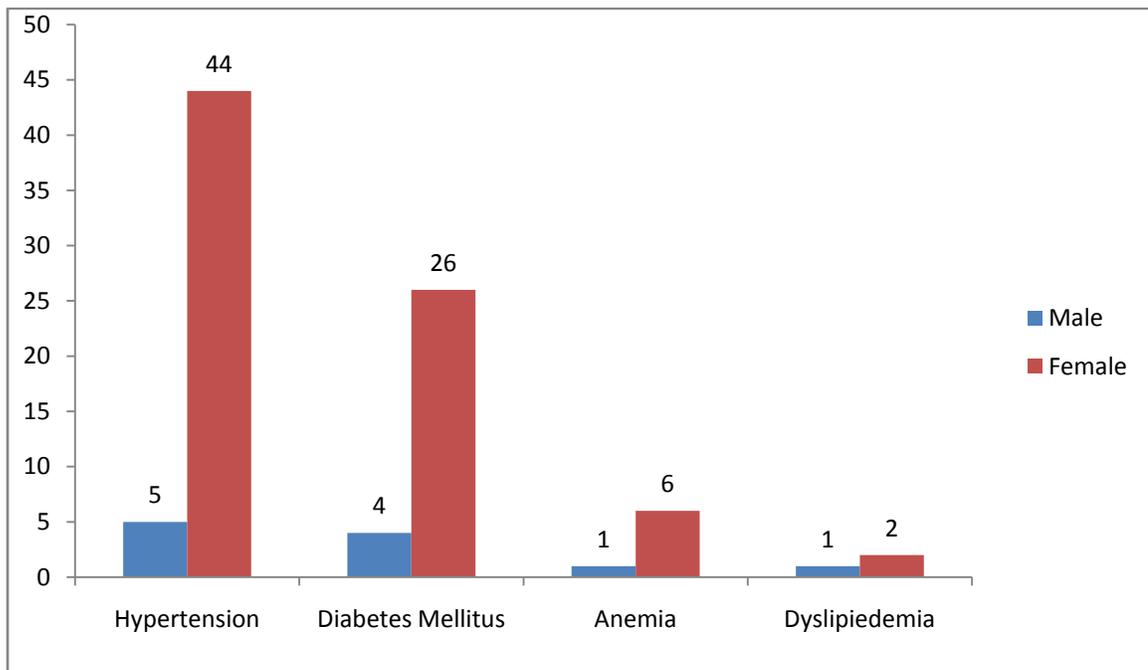


Figure 2: Associated co-morbidities in the patients with thyroid disorders.

IV. DISCUSSION

Thyroid dysfunction is the growing issue for the global health problem. Insufficient iodine in the diet is the main cause for thyroid disorder in most of the Himalayan region.[6] However, a study in south India by Usha et al among iodine sufficient adults showed that considerable proportion of individuals suffered from autoimmune thyroid disorder.[10] In our study, the proportion of females having thyroid disorder was high (196, 67.58%). Others studies also reported similar results. [7,11-13] Despite all age groups suffering from thyroid dysfunction, a significant number of cases were observed in the

age groups of 36-55 years in our study. Similar results were reported by others studies. [7,8, 12-13].

The finding of studies depends upon the methodology used for the study, age groups, ethnic group, geographical distribution and diet pattern. In our study, among all the thyroid disorders, hypothyroidism was the most common (87.0%), followed by hyperthyroidism (11.2%) and subclinical hypothyroidism (1.9%). However, a study conducted by Aryal et al in Dhulikhel Hospital reported hypothyroidism in 8% of individuals, followed by subclinical hypothyroidism in 8%, subclinical hyperthyroidism in 6% and hyperthyroidism in 3% of individuals.[9] Another study from eastern Nepal reported hypothyroidism in 17.19 % and hyperthyroidism in 13.68% of individuals.[14] Studies have

shown that hypothyroidism tends to be increased with increase in age and is more common in women [15,16] and this trend was also noted in our study. The mean fT3 level in this study was significantly different in males and females ($p=0.001$) suggesting that the mean level of fT3 hormone was higher in males in comparison to females. But, there was no statistical difference in level of fT4 and TSH.

In contrast, a study by Yadav et al reported significant difference in level of fT3 and fT4 hormones with respect to gender. [17] Our study also showed significant association ($p=0.004$) between diabetes and dyslipidemia as co-morbidities condition with hypothyroidism. A study by Risal et al also showed that there was significant correlation of raised total cholesterol in patients having hypothyroidism. [18] However, there is no statistical association with hypertension and anemia.

V. LIMITATIONS

Our study was single hospital based and the sample size was relatively small. Therefore, it is difficult to predict pattern of thyroid disorder in general population. Other parameters like total T3, T4, thyroglobulin, anti-thyropoxidase, anti-thyroglobulin, TSH receptor antibodies were not included in this study to rule out thyroid disorders

VI. CONCLUSION

Middle age groups were highly affected by thyroid dysfunctions and it was predominant in female. Hypothyroidism was the commonest thyroid disorders. Although this study was done on single private hospital and in a small population size, it revealed baseline information on pattern of thyroid disorders which can be used as reference for further studies.

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REFERENCES

- [1] Heuck CC, Kallner A, Kanagasabapathy AS, Riesen W. Diagnosis and monitoring of the disease of the thyroid. WHO. Document 2000; 8-9.
- [2] Larsen PR, Davies TF, Hay ID. The thyroid. In: Williams Wilson JD, Foster DW, Kronenberg HM, editors. Williams Text Book of Endocrinology. 9th ed. Philadelphia: Saunders; 1988; 389-416.
- [3] Mark P.J. Vanderpump. Epidemiology of thyroid disease and swelling. In: John A.H. Wass. Editors. Oxford Textbook of Endocrinology and Diabetes. 2nd edn. Oxford University Press:2011. 10.1093/med/9780199235292.003.307410

- [4] US Census Bureau, Population Estimates. <https://www.census.gov/data/2004.html>
- [5] Gelal B, Aryal M, Das BKL, et al. Assessment of iodine deficiency status among school age children of Nepal by urinary iodine assay. *South Asian J Trop Med Public Health* 2009; 40: 538-43.
- [6] Baral N, Ramprasad C, Lamsal M, Koner BC, Koirala S. Assay of iodine deficiency status in three ecological regions of Nepal by a microdigestion method. *South East Asian J Trop Med Public Health* .1999; 30: 527-31. PMID:10774663
- [7] Mahato RV, Nepal AK, Gelal B, Poudel B, Yadav BK, Lamsal M. Spectrum of thyroid dysfunction in patients visiting Kantipur hospital, thmandu, Nepal. *Mymensingh Med J* 2013;2:164-69.
- [8] Pradip Kumar S, Baijayanti B, Soma G, Thyroid stimulating hormone measurement as the confirmatory diagnosis of hypothyroidism: A study from a tertiary care teaching hospital Kolkata. *Indian J Community Med* 7;32:139-40.
- [9] Aryal M, Gywali P, Rajbhandari N, Aryal P, Pandeya DR. A prevalence of thyroid dysfunction in Kathmandu University Hospital, Nepal. *edical Research* 2010; 21: 411-15.
- [10] Usha Menon V, Sundaram KR, Unnikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine sufficient adult south Indian population. *J Indian Med Assoc* 2009; 72-77. PMID:19585813
- [11] Jimmy Antony, T. M. Celine, Michale Chacko. Spectrum of thyroid disorders: A retrospective study at a medical college hospital. *Thyroid arch and Practice*. 2014;11:55-59.
- [12] Maqsood A, Shakir MM, Shahid R, Ali A. Spectrum of thyroid gland disorders in Karachi -DDRRL experience. *Med Forum Mon* 2012; 23: 12-15.
- [13] Ikem R, Adebayo J, Soyoye D, Buroloajo, Ugwu E, Kolawole B. Spectrum of thyroid disorders in Obafemi Awolowo University teaching hospital complex. *Endocrine* 2010;21:366-69.
- [14] Baral N, Lamsal M and Koner BC. Thyroid dysfunction in eastern Nepal. *South Asian J. Trop. Med. Public Health*.2002;33: 638-41.
- [15] Wang C, Crapo LM. The epidemiology of thyroid disease and implications for screening. *Endocrinol Metab Clin North Am*. 1997;26(1):189-218. DOI: 10.1016/S0889-8529(05)70240-1
- [16] Vanderpump MP and Tunbridge WM. Epidemiology and prevention of clinical and subclinical hypothyroidism. *Thyroid*. 2002;12: 839-47. DOI:10.1089/105072502761016458
- [17] Yadav NK, Thanpari C, Shrestwa MK, Mittal RK, Koner BC. Assessment of Thyroid Disorder in FarWestern Part of Nepal: A Hospital Based Study. *Bangladesh Journal of Medical Science*.2012;11: DOI: 10.3329/bjms.v11i4.12601
- [18] Risal P, Maharjan BR, Koju R, et al . Variation of total serum cholesterol among the patient with thyroid dysfunction. *Kathmandu Univ Med J*. 2010;8: 265-68.

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