

Prevalence and Pattern of Thyroid Dysfunction among the Women of Rupandehi District of Nepal

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Abstract: Thyroid dysfunction is one of the most common endocrine disorder and its outcomes are social, psychological and medical burden to the world. This study is designed to determine the prevalence and pattern of thyroid dysfunctions and its association with different factors. In this hospital based cross-sectional study 809 women were enrolled (resident of Rupandehi District) during a period of August 2015 to September 2016. BMI was determined by measuring the height and weight to know the status of obesity and blood pressure was measured using sphygmomanometer. Other relevant information like age, sex and smoking habits were recorded by trained laboratory personnel through a comprehensive baseline questionnaire. Blood samples were collected and subjected for thyroid function test (TSH, fT3 and fT4). The studied population was categorized as euthyroid, subclinical hypothyroidism, hypothyroidism, subclinical hyperthyroidism and hyperthyroidism on the basis of the level of thyroid hormones. SPSS version 16.0 was used for statistical analysis. The prevalence of thyroid disorders is nearly one third of the total studied population. The number of participants was higher in the subclinical hypothyroidism (17.18%) followed by the hypothyroidism, hyperthyroidism and the least in subclinical hyperthyroidism (7.96%). Study revealed higher prevalence of thyroid dysfunction. The screening of thyroid function test is recommended for high risk population in Nepal which will be helpful for the prompt diagnosis of the disease and the policy makers to formulate the national policies in order to minimize the disease burden and its consequences.

Keywords: Age, hyperthyroidism, hypothyroidism, thyroid dysfunction.

INTRODUCTION

Health problems among women are numerous and thyroid dysfunction cannot be excluded [1-5]. Thyroid dysfunction refers to a clinical state having altered level of serum thyroid stimulating hormone (TSH) with normal or abnormal level of thyroid hormones namely free triiodothyronine (fT3) and free thyroxine (fT4) [6]. Globally, thyroid dysfunction has been established as a common endocrine disorder that has affected 300 million people [7]. According to World Health Organization 2001, 0.2 % of deaths in Nepal is due to endocrine disorders [8]. Multiple factors including iodine deficiency, congenital factors, genetic predisposition, autoimmunity, viral infection, surgery, radiotherapy, pregnancy, ethnicity, geographical and

environmental are known to be associated with thyroid dysfunction and screening of thyroid profile test is strongly recommended in such population [7, 9-13]. High prevalence of thyroid dysfunction with female predominance in Nepal, remains a tremendous challenge to public health [14]. However to the best of our knowledge and understanding research related to thyroid dysfunction and its poor outcomes in women's health is not well understood in Nepal.

Thus with the current fact we aimed to clarify the prevalence and pattern of thyroid dysfunction among the women in Rupandehi district of Nepal.

MATERIALS AND METHOD

This is a hospital based cross-sectional study enrolled with 809 women with the age more than 20 years who visited Devdaha Medical College and Teaching Hospital for comprehensive health checkup including the screening of thyroid profile test during a period of August 2015 to September 2016. The ethical community of Devdaha Medical College and Teaching Hospital approved the study protocol. The BMI was calculated by obtaining the weight and height of the subjects. Sphygmomanometer was employed for the measurement of diastolic and systolic blood pressure. Other relevant information like age, sex and smoking habits were recorded by trained laboratory personnel through a comprehensive baseline questionnaire. Five milliliter of venous blood sample was collected in a sterile plain tube and allowed to clot. Blood samples were centrifuged for separation of serum and stored at -20°C till get analysed. Serum TSH, fT3 and fT4 were evaluated quantitatively by chemiluminescent immunoassay (Benesphera CLIA 800 from Avantor).

Subjects under thyroid therapy, thyroidectomy, neuropsychiatric disorder, pregnancy, within hormonal therapy, oral contraceptives and with fever were excluded from the study.

Categorization of thyroid dysfunction was according to American Thyroid Association guidelines for detection of thyroid dysfunction, subjects with normal level of TSH (0.4 - 4.2 μ IU / ml), fT3 (1.4 - 4.2 pg / ml) and fT4 (0.8 - 2.0 ng / dl) are defined as euthyroid whereas the subjects with abnormal level of thyroid parameters are further categorized as hyperthyroidism for those with decreased level of TSH and elevated level of fT3 and fT4 similarly, increased TSH with decline fT3 and fT4 are categorized as hypothyroidism. Subclinical hyperthyroidism is defined as low level of TSH with normal fT3 and fT4 values and subclinical hypothyroidism is represented by elevated TSH along with normal fT3 and fT4 respectively [15].

Recorded data was tabulated in MS Excel 2007 and analysed by Software Package for Social Science (SPSS) version 16.0. Frequency distribution and descriptive statistics analysis was performed and univariate analysis of variance was performed to compare the means between different thyroid disorder along with the different variables.

RESULT

In the present study, more than half 493 (60.90%) of the total study population among 809 women were in the age group of 20-39 years with the mean value of 29.08 ± 5.15 years which was followed by the age group 40-59 years including nearly one third (30.10%) of the total population and least (9%) in the age group of ≥ 60 years as shown in table 1. The mean BMI and blood pressure values were slightly higher among the total studied population. Non smoker population was prevalent 663 (82.0%) as compared to the smokers with the minimal value (18%).

As shown in table 2, the thyroid disorder was more prevalent among the age group of 20-39 years followed by 40-59 years and 60 and above years. Among the categorized thyroid disorders, subclinical hypothyroid disorder patients were more frequent 139 (55.40%) which was followed by the hypothyroidism (22.70%), hyperthyroidism (13.94%) and subclinical hyperthyroidism (7.96).

Among 558 euthyroid participants 17.6% were smokers. The maximum numbers of smokers 20.9% were observed in subclinical hypothyroid patients whereas minimum number of smokers 17.1% was found in hyperthyroidism table 3.

In table 4 thyroid dysfunctions were compared by using univariate analysis of variance (ANOVA) with the different parameters like age, BMI, blood pressure and the thyroid profile test (TSH, fT3 and fT4). A significant difference was observed between all the parameters with the thyroid disorders.

Table 1: Personal Profile of study participants

Variables	Frequency(n)	Percentage (%)	Mean \pm SD
Age(years)			
20 – 39	493	60.90	29.08 ± 5.15
40 – 59	243	30.10	47.36 ± 5.48
≥ 60	73	9.00	64.99 ± 11.51
BMI (kg / m ²)	-	-	32.78 ± 6.01
Blood Pressure(mmHg)			
sBP	-	-	123.67 ± 10.75
dBP	-	-	80.43 ± 8.80
Smoking habit			
Yes	146	18.00	-
No	663	82.00	-

Table 2: Distribution of age group with the thyroid disorder

Thyroid dysfunctions	Age group (years)						Total	Percentage (%)
	20 - 39		40 - 59		60 and above			
	N	%	N	%	N	%		
Euthyroid	358	72.6	153	63.0	47	64.4	558	
Subclinical hypothyroidism	69	14.0	56	23	14	19.2	139	55.40
Hypothyroidism	33	6.7	18	7.4	6	8.2	57	22.70
Subclinical hyperthyroidism	11	2.2	8	3.3	1	1.4	20	7.96
Hyperthyroidism	22	4.5	8	3.3	5	6.8	35	13.94
Total	493	100	243	100	73	100	809	100

Table 3: Frequency distribution of smoking habits with thyroid disorders

Thyroid dysfunctions	Smoking habits			
	Yes	Percentage (%)	No	Percentage (%)
Euthyroid	98	17.6	460	82.4
Subclinical hypothyroidism	29	20.9	110	79.1
Hypothyroidism	9	15.8	48	89.2
Subclinical hyperthyroidism	4	20	16	80
Hyperthyroidism	6	17.1	29	82.9

Table 4: Thyroid disorders and its comparison with different variables

Variables	Euthyroid (Mean ± SD) (n=558)	Subclinical hypothyroidism (Mean ± SD) (n=139)	Hypothyroidism (Mean ± SD) (n=57)	Sub clinical hyperthyroidism (Mean ± SD) (n=20)	Hyperthyroidism (Mean ± SD) (n=35)	F value	P value
Age (years)	36.82±13.25	41.15±13.33	37.68±13.06	40.60±11.99	39.00±13.83	3.28	0.011
BMI (kg / m ²)	32.44±5.52	32.98±6.62	37.19±6.94	32.69±6.16	30.33±6.30	10.03	0.000
Blood pressure (mmHg)							
sBP	123.30±10.20	121.87±8.79	122.72±10.09	125.50±13.26	137.29±15.82	16.62	0.000
dBP	79.78±8.26	79.46±7.58	80.87±8.56	84.25±10.29	91.71±12.59	17.91	0.000
Thyroid Profile							
TSH (μIU / ml)	2.31±1.03	6.60±2.26	36.27±34.80	0.47±0.65	0.08±0.09	178.19	0.000
fT3 (pg / ml)	2.98±0.48	2.27±0.36	1.05±0.26	6.63±9.10	7.56±2.49	132.91	0.000
fT4 (ng / dl)	1.28±0.15	1.10±0.13	0.64±0.29	1.57±0.26	5.11±5.58	99.34	0.000

DISCUSSION

In the present study, the prevalence of thyroid dysfunction was higher (31.01%) compared to the other similar studies conducted in different regions of Nepal [3, 14, 16, 17]. Since, Nepal is the Himalayan country, iodine deficiency and thyroid disorder are strongly associated which is hypothesized for the soil erosion leading to the loss of iodine furthermore it is supported by the unavailability of the iodized salts, low economic

status, consumption of goitrogens are the prominent cause of thyroid dysfunctions in Nepal and other associated factors are still questioned for the upcoming researches [18].

Among the thyroid dysfunctions hyper and hypothyroidisms are two wide spread thyroid problems which is more common in women by eight times in compared to males [7].

The study participants were categorized into four different thyroid dysfunctions subgroups as subclinical hypothyroidism, hypothyroidism, subclinical hyperthyroidism and hyperthyroidism. Subclinical hypothyroid patients were more prevalent 69 (14%) in the age group of 20-39 years with 139 (55.40%) prevalence in the total population among the total thyroid disorders (251). Similar findings were reported by the studies conducted in Nepal by Gyawali *et al*, Mahato *et al* and also Ceresini *et al*, Hoogendoorn *et al*, Valeix *et al* and Lucas *et al* observed the similar results [16, 19-22]. In contrast, study conducted by Knudsen *et al*, Risal *et al* and Shantha *et al* reported higher prevalence of hypothyroidism in female population [23-25]. Since hypothyroidism is the most prevalent thyroid disorder, its personal variability is disclosed from different studies in various regions of the globe. In the present study significant differences were observed between different age groups and the thyroid dysfunctions with higher prevalence in younger ages. However, study conducted by Niafar *et al* in Iran reported the higher prevalence of hypothyroidism with increasing age prevailing among women which is inconsistent with the present study [18]. The prevalence of subclinical hyperthyroidism was 20 (2.47%) and hyperthyroidism was 35 (4.33%) which is higher than the study conducted by Aryal *et al* for subclinical hypertension whereas the hyperthyroid patients showed consistency with the study conducted by Aryal *et al* and Rijal *et al* [3, 16]. A study performed by Risal *et al* reported 8.3% hyperthyroid and 7.7% subclinical hyperthyroid which was higher than the present study whereas lower values were reported by Niafar *et al* [17, 18, 24].

Among the study population, the number of smokers was nearly one fourth 146 (18%) and participants with subclinical hypothyroidism were habitual to smoking (3.58%). Probably, the mechanism to synthesize free radicals may be related with the smoking habits and thyroid dysfunctions. The significant differences were observed with the thyroid dysfunctions and the different parameters like age, BMI, blood pressure and thyroid profile in the present study which is in agreement with the study conducted by Kota *et al* [26].

Although the study has met its aim, there were some unavoidable circumstances. This study has been conducted in a specific area of western part of Nepal. The complete thyroid panel test is the useful tool for the diagnosis of the status of thyroid dysfunction which is being lagged in the study following the routine thyroid function test. Further large scale studies are essential in different ethnic groups, areas and other diseases with different physiological scenarios including both males

and females with control population to determine the baseline data of thyroid dysfunctions in Nepal.

CONCLUSION

The routine screening of thyroid function as recommended by American Thyroid Association is essential to determine the prevalence of the thyroid dysfunctions in Nepal. It is helpful for the clinicians for the prompt diagnosis of the disease and the policy makers to formulate the national policies in order to minimize the disease burden.

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