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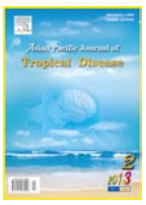

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Socio demographic wise risk assessment of thyroid function abnormalities in far western region of Nepal: A hospital based descriptive study

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PEER REVIEW

Peer reviewer

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Comments

This work in Nepal is retrieved from the population based on retrospective analysis. Overall the work done can add additive support for future epidemiological studies based on the current database.
(Details on Page 153)

ABSTRACT

Objective: To know the status of thyroid disorder in population of far western region of Nepal.
Methods: A total of 808 cases (133 men and 675 non pregnant women) were included and study was carried out using data retrieved from the register maintained in the Department of Biochemistry of the Nepalgunj Teaching Hospital between 1st January, 2011 and 28th February, 2012. The variables collected were age, sex, and thyroid function profile including free T3, free T4 and TSH. **Results:** The percentage of thyroid disorders was 33.66% in far western region of Nepal. The people were highly affected by overt hyperthyroidism (14.9%) followed by subclinical hyperthyroidism (9.9%). The subclinical hypothyroidism was 7.9% while 1% overt hypothyroidism only in a far western region of Nepal. Females were highly affected by overt hyperthyroidism (17.8%), followed by subclinical hyperthyroidism (11.9%). A total of 5.9% females were affected by subclinical hypothyroidism while only 1.2% by overt hypothyroidism. Males were affected only by subclinical hypothyroidism (18.0%) in this present study. High number of total thyroid dysfunction was observed in 21 to 40 years of age groups, followed by 41 to 60 years of age groups. Less than 40 years people were having 1.03, 0.99, 2.51 and 1.15 times risk of developing overt hyperthyroidism, subclinical hyperthyroidism, overt hypothyroidism and subclinical hyperthyroidism respectively compared to greater than 40. Female were having 0.29 times risk of developing subclinical hyperthyroidism compared to male. But overt hyperthyroidism, subclinical hyperthyroidism and overt hypothyroidism female were having more risk of developing compared to male.
Conclusions: The thyroid disorder, especially overt hyperthyroidism (14.9%) and subclinical hyperthyroidism (9.9%) was high. Further studies are required to characterize the reasons for this high prevalence.

KEYWORDS
Risk assessment, Thyroid function, Nepal

1. Introduction

The major thyroid disorders are hyperthyroidism and hypothyroidism, which have been reported in over 110 countries of the world with 1.6 billion people at risk. Hyperthyroidism and hypothyroidism are due to over and under secretion of thyroid hormones[1]. It is a common endocrine disorder affecting about 300 million people worldwide and over half are presumed to be unaware of their condition[2]. It is also the most common endocrine disorders in eastern region and central region of Nepal[3,4]. Their manifestations vary considerably

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from area to area and are determined principally by the availability of iodine in the diet. Almost one-third of the world's population live in areas of iodine deficiency[5]. Iodine deficiency is regarded as the most common cause of thyroid disorders worldwide[6-8]. Both hypothyroidism and hyperthyroidism are five or more times common in women than in men in the United States[9,10]. In the United States, hypothyroidism occurs in about 1% to 2% of the general population. It occurs in 3% to 4% of ill older patients admitted to the hospital and 5 to 6 times more common than hyperthyroidism. It is estimated that 10% of the women older than the age of 40 years have a thyroid hormone deficiency caused by autoimmune thyroid disease[11]. The people of Nepal have high risk for thyroid dysfunction with its high prevalence of iodine deficiency disorder[12]. To the best of our knowledge, no studies have been done to estimate the percentage of thyroid disorder and its risk assessment to socio demographic factors in far western part of Nepal. Therefore, the aim of the present study was to determine the status of thyroid disorder in people of far western part of Nepal.

2. Materials and methods

A total of 808 cases (133 men and 675 non pregnant women) from the far western eastern part of Nepal, who attended the thyroid clinic of Nepalgunj Teaching Hospital, Kohalpur, Banke, Nepal in order to have their Thyroid function tests done at Nepalgunj Teaching Hospital were included in the study.

This hospital based descriptive study was carried out using data retrieved from the register maintained in the Department of Biochemistry of the Nepalgunj Teaching Hospital between 1st January, 2011 and 28th February, 2012. The variables collected were age, sex, and thyroid function profile including free T3, free T4 and Thyroid stimulating hormone (TSH). Ethical approval for the study was taken from the institutional research ethical committee. The estimation of serum free T3, free T4 and TSH were made by the enzyme immunoassay method, using Randox kits (Randox Laboratories.

In sample size calculation, for 95% confidence interval and, significance level α=5%, P=35%, Q=65%, allowable error=10%, required sample size was 713. P=percentage of thyroid disorder. The pilot study done prior to the original study with 100 the data maintained in the Biochemistry department[13]. Outcome variable was thyroid disorders. Factors at individual level were age and gender.

The data collected were analyzed using Excel 2003, R2.8.0 Statistical Package for the Social Sciences (SPSS) for Windows Version 16.0 (SPSS Inc; Chicago, IL, USA) and EPI Info 3.5.1 Windows Version. The *Chi*-square test was used to observe the relationship between different variables and strength of the relationship with logistic regression. P<0.05 is considered as statistically significant. We calculated odds ratios (*OR*) and their 95% confidence intervals (95% *CI*). P<0.05 is considered as statistically significant[14,15].

3. Results

Table 1 shows the distribution of thyroid dysfunction in the studied population. The percentage of thyroid disorders was 33.66%. The people were highly affected by overt hyperthyroidism (14.9%) followed by subclinical hyperthyroidism (9.9%). The percentage of subclinical hypothyroidism was 7.9% while 1% overt hypothyroidism only in a far western region of Nepal.

Table 1
Distribution of thyroid dysfunction.

Thyroid status	Frequency	Percentage %	95% *CI*	
			Lower	Upper
Euthyroidism	536	66.3	62.9	69.6
Overt Hyperthyroidism	120	14.9	12.5	17.5
Subclinical hyperthyroidism	80	9.9	8.0	12.2
Overt hypothyroidism	8	1.0	0.5	2.0
Subclinical hypothyroidism	64	7.9	6.2	10.1
Total	808	100		

Table 2 shows the frequency, percentage distribution of thyroid dysfunction in females. Females were highly affected by overt hyperthyroidism (17.8%), followed by subclinical hyperthyroidism (11.9%). A total of 5.9% females were affected by subclinical hypothyroidism, while only 1.2% by overt hypothyroidism.

Table 3 shows the distribution of thyroid dysfunction in the studied population. Males were affected only by subclinical hypothyroidism (18.0%) in this present study. There was a relationship between gender and thyroid disorders (P=0.0001).

Table 4 shows the age distribution of thyroid dysfunction in the studied population. The majority of the study population belonged to the active age group (21-40 years). High number of total thyroid dysfunction was observed in 21-40 years of age groups followed by 41-60 years of age groups. The status of thyroid dysfunction in 21-40 years of age group was 16.7% overt hyperthyroidism, 10.3% subclinical hyperthyroidism, 7.3% subclinical hypothyroidism and 0.7% overt hypothyroidism. There was a relationship between age group and thyroid disorders (P=0.000 1).

Table 5 shows less than 40 years people were having

Table 2
Distribution of thyroid disorders in females.

Thyroid dysfunction	Frequency	Percentage	95% *CI*	
			Lower	Upper
Euthyroidism	427	63.3	59.5	66.9
Overt Hyperthyroidism	120	17.8	15.0	20.9
Subclinical hyperthyroidism	80	11.9	9.6	14.6
Overt hypothyroidism	8	1.2	0.6	2.4
Subclinical hypothyroidism	40	5.9	4.3	8.1
Total	675	100		

Table 3
Distribution of thyroid disorders in males.

Thyroid dysfunction	Frequency	Percentage	95% *CI*	
			Lower	Upper
Euthyroidism	109	82.0	74.4	88.1
Overt Hyperthyroidism	0	0.0	0.0	2.7
Subclinical hyperthyroidism	0	0.0	0.0	2.7
Overt hypothyroidism	0	0.0	0.0	2.7
Subclinical hypothyroidism	24	18.0	11.9	25.6
Total	133	100		

Table 4
Distribution of thyroid disorders according to age.

Age (years)	Euthyroidism (%)	Overt hyperthyroidism (%)	Subclinical hyperthyroidism (%)	Overt hypothyroidism (%)	Subclinical hypothyroidism (%)
0–20					
Frequency	109	16	14	4	17
Percentage	68.1	10.0	8.8	2.5	10.6
95% *CI*	(60.3, 75.3)	(5.8, 15.7)	(4.9, 14.2)	(0.7, 6.3)	(6.3, 16.5)
21–40					
Frequency	285	73	45	3	32
Percentage	65.1	16.7	10.3	0.7	7.3
95% *CI*	(60.4, 69.5)	(13.4, 20.6)	(7.7, 13.6)	(0.2, 2.2)	(5.1, 10.3)
41–60					
Frequency	132	28	21	1	12
Percentage	68.0	14.4	10.8	0.5	6.2
95% *CI*	(61.0, 74.5)	(9.8, 20.2)	(6.8, 16.1)	(0.0, 2.8)	(3.2, 10.6)
60+					
Frequency	10	3	0	0	3
Percentage	62.5	18.8	0.0	0.0	18.8
95% *CI*	(35.4, 84.4)	(4.0, 45.6)	(0.0, 20.6)	(0.0, 20.6)	(4.0, 45.6)

1.03, 0.99, 2.51 and 1.15 times risk of developing overt hyperthyroidism, subclinical hyperthyroidism, overt hypothyroidism and subclinical hyperthyroidism respectively compared to greater than 40. Female were having 0.29 times risk of developing subclinical hyperthyroidism compared to male. But overt hyperthyroidism, subclinical hyperthyroidism and overt hypothyroidism female were having more risk of developing compared to male but male cases were zero so we could not calculate odds ratio.

Table 5
The risk of thyroid disorders according to age and sex.

	Overt[a]	Subclinical[a]	Overt[b]	Subclinical[b]
0–40 years	1.03 (0.65,1.61)[×]	0.99 (0.59,1.70)[×]	2.51 (0.31,20.54)[×]	1.15 (0.62, 2.11)[×]
>41 years	1	1	1	1
Female	–	–	–	0.29 (0.17,0.49)[†]
Male	–	–	–	1

[†]$P<0.01$, odds ratio cannot be calculated (value on one of the cell 0); [×]$P>0.05$, statistically not significant; [a]: hyperthyroidism; [b]: hypothyroidism.

4. Discussion

Thyroid disorders are due to abnormality in thyroid function and enlargement of the thyroid gland. Hyperthyroidism and hypothyroidism are common conditions that have lifelong effects on health[2,16]. The present study showed thyroid disorders (33.66%) were high in far western part of Nepal. The similar study observed nearly 30% of the populations were suffering from thyroid dysfunction in eastern part[3] and 25% thyroid dysfunction in population of Kavre, Nepal[4].

In present study, the prevalence of total hyperthyroidism was 24.8% including both overt hyperthyroidism (14.9%) and subclinical hyperthyroidism (9.9%). The study conducted by Akhtar *et al.* reported that hyperthyroidism and subclinical hyperthyroidism in all age groups were 5.1% and 5.85% respectively[17]. Gomez *et al.* reported 58.2% had hyperthyroidism (53.1% of which were T4 thyrotoxicosis, 12.5% T3 thyrotoxicosis and 34.4% had subclinical hyperthyroidism) and 8.2% of patients had iodine induced hyperthyroidism[18]. In an epidemiological

study from Cochin, subclinical and overt hyperthyroidism was present in 1.6% and 1.3% of subjects participating in a community survey[19]. In a hospital-based study of women from Pondicherry, subclinical and overt hyperthyroidism was present in 0.6% and 1.2% of subjects respectively[20]. Similarly, a hospital based study from kavre, Nepal reported total hyperthyroidism was 9% including both 6% subclinical hyperthyroidism and 3% hyperthyroidism[4]. Aghini-Lombardi *et al.* reported the overall prevalence of hyperthyroidism was 2.9% in adults with no difference between females (2.96%) as well as males (2.86%)[21]. The possible reasons for such high number of hyperthyroidism cases in far western region of Nepal may be: the selection bias of a hospital-based study, the functional autonomy of thyroid in endemic goiter cases, the poorly monitored iodized salt supply program in Nepal - excessive iodized salt may also cause thyrotoxicosis[22].

In our study, the overall hypothyroidism was 8.9% including 1.0% overt hypothyroidism and 7.9% subclinical hypothyroidism is supported by Usha *et al* study, reported 3.9% hypothyroidism and 9.4% subclinical hypothyroidism[19]. Similar study by Akhtar *et al.* has reported 4.0% hypothyroidism and 5.4% subclinical hypothyroidism in thyroid patients in Pakistan[17]. The another study showed, overall prevalence of both overt and subclinical hypothyroidism was slightly, but not significantly, lower than that recalculated from the Whickham survey (0.5% and 5.3%, respectively)[23-25].

Overt and Subclinical hypothyroidism was found in 8 and 40 females (out of 565 females) respectively, as well as zero and 24 in males (out of 133) respectively in this study. Males were suffered only by subclinical hypothyroidism. This may be due to iodine deficiency and consumption of more alcohol by males in far western part of Nepal. Alcohol is a depressant, it can affect the thyroid by suppressing its functions, resulting in the thyroid gland not producing enough hormones[26]. Although all age group presented with thyroid disorder a high number of subjects was observed between age groups of 21-40 years of age in present study and results were supported by Baral et al study[3]. A similar study reported the higher prevalence of thyroid dysfunction between 15-45 years of age[4]. Some studies have reported that incidence of thyroid dysfunction increases with advancing age[23,25,27,28].

This present study identified the status of thyroid disorder in population of far western region of Nepal and can be used as a baseline data for further studies in future. The study reported the prevalence of thyroid disorder typically overt hyperthyroidism and subclinical hyperthyroidism was higher. Further studies are required to characterize the reasons for this high prevalence. This study was hospital-based and because the study population constituted of subjects who came to the hospital seeking thyroid function tests, the results may not be applicable to the general population.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

It is our proud privilege to express profound sense of gratitude and sincere thanks to the all the participants and specially Managing Director of Nepalgunj Teaching Hospital, Nepalgunj Medical College affiliated to Kathmandu University, Kohalpur, Banke, Nepal for their support to make this study successful which has been completed with logical and fruitful conclusion.

Comments

Background

One of the major problem which have been reported in the hilly region is deficiency of iodine and its associate thyroid disorders. The worst is when people harboring this disorder are presumed to be unaware and ignorant to take preventive measures against this disease causing difficulty in uprooting the disorder.

Research frontiers

The data is segmental and more précised based on geographical location of the district hospital. This retrospective data based on the investigations done on thyroid disorders can add up additive information on the future studies based on thyroid disorders in Western Eastern part of Nepal.

Related reports

The studies of Baral N, *et al.* and Aryal M, *et al.* showed most common endocrine disorders in eastern region and central region of Nepal.

Innovations & breakthroughs

This present research studied the status of thyroid disorder in population of Nepal's far western region, and can be used as a baseline data for further studies.

Applications

It results can be applied for future epidemiological studies as a support for ongoing further research based on thyroid disorders.

Peer review

This work in Nepal is retrieved from the population based on retrospective analysis. Overall the work done can add additive support for future epidemiological studies based on the current database.

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