# THYROID DYSFUNCTION IN EASTERN NEPAL

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**Abstract.** Nepal lies in an area of endemic iodine deficiency. Thyroid dysfunction, along with a higher than average prevalence of goiter, is a major public health problem among the local population. The present study was undertaken to investigate the prevalence of thyroid dysfunction among the hill and *terai* (low land) castes of eastern Nepal that attended the thyroid clinic at the BP Koirala Institute of Health Sciences (BPKIHS), Dharan. A total of 599 cases were studied during a single year. The distribution of hyperthyroid and hypothyroidism was 13.68% and 17.19% respectively. The majority of the thyroid dysfunction was seen in the 21-40 year age group. The prevalence of hypothyroidism was slightly higher among *terai* castes (17.66%) when compared with hill castes (15.17%). There was a similar distribution of thyroid dysfunction among the male and female populations of the goitrous subjects (n=157), most were euthyroid (58.59%); hyperthyroidism affected (27.38%). Since, it was a hospital-based study, the prevalence of thyroid dysfunction may not be applicable to the general population. Extensive field-based countrywide epidemiological studies are necessary to provide data about thyroid dysfunction in the community.

## INTRODUCTION

Iodine deficiency disorders (IDD) are recognized as a global public health problem (Clugston and Hetzel, 1994). Nepal, a Himalayan kingdom, lies in the severe ambient iodine deficiency zone and has a very high prevalence of IDD (Pandav, 1994). Iodine supplements, *ie* iodized salt and injectable iodized oil, were given a high priority by the National Iodine Supplementation Program in the 1970s (the Goiter Control Project and the Goiter and Cretinism Eradication Project). A recent survey on urinary iodine content (1998) revealed that Nepal had mild IDD (prevalence 5-20%) rather than severe IDD (prevalence 30% or more). This survey showed a 13.6% prevalence of iodine deficiency in Nepal (Baral *et al*, 1999). Goiter and hypothyroidism are the commonest form of IDD. There are a few old reports, but no recent data on the age, sex, and racial distribution of hypo- and hyperthyroidism from Nepal (Ibberston, 1974; White, 1977; Archard, 1987; Ratcliffe *et al*, 1991; Pandav, 1994; Baral *et al*, 2001).

Subclinical hypothyroidism features a normal level of thyroid hormones accompanied by elevated TSH (McKinnon, 1968; Larsen and Ingbar, 1992). In the elderly age group, 20-40% of the subjects with subclinical hypothyroidism develop overt hypothyroidism (Larsen and Ingbar, 1992). There is controversy about whether these subjects should be treated by hormone replacement (McKinnon, 1968; Ashworth, 1996). The magnitude of this disorder is not known in Nepal.

The present study was designed to: (a) find out the age, sex, and racial distribution of thyroid dysfunction; and (b) determine the prevalence of subclinical hypothyroidism.

## MATERIALS AND METHODS

A total of 599 cases (98 men and 501 non-pregnant women) from the eastern region of Nepal who attended the thyroid clinic of BPKIHS in order to have their TFTs done in BPKIHS were included in the study. The study

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was conducted between 1st August, 1999 and 31st July, 2000. The T3, T4, and TSH estimations from fasting serum were made by the enzyme immunoassay method, using Randox kits (Randox Laboratories Ltd, Ardmore, UK). The internal quality control was included in each batch of tests performed and the assay method was found to be acceptably precise (Intra assay CV < 9.7%; Inter assay CV < 10.5%). A detailed clinical profile was recorded in a proforma in order to evaluate the thyroid function of each patient and to exclude the effect of systemic illness and drugs on the TFTs. A TSH level above 6.3IU/ml without any features of hyperthyroidism (to exclude the secondary type) was considered to be the criterion for the diagnosis of hypothyroidism, irrespective of T4 and T3 level. The subjects with normal T4 and T3 both high TSH (>6.3IU/ml) were diagnosed with subclinical hypothyroidism. A TSH level below 0.3IU/ml was suspected to indicate hyperthyroidism and a high T4 and/or T3 confirmed the diagnosis (Mardel and Gamlen, 1985; Hefand and Redfern, 1998). Patients were categorized into hill caste (including hill natives) and *terai* caste subjects on the basis of their ethnicity (Balkumar, 1995).

## RESULTS

Table 1 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). Hypothyroidism affected 17.19% of the study population, while 13.68% were affected by hyperthyroidism.

Table 2 shows the racial and sex distribution among the subjects who had thyroid dysfunction. The male:female and hill castes:*terai* castes ratios were 1:5 and 1:4.35 respectively. No statistical difference was observed among the people who had hypo- and hyperthyroidism when data was differentiated by age and sex.

Table 3A and 3B depict the distribution of thyroid dysfunction status in the population

Table 1
Age distribution of thyroid dysfunction in the study population.

| Age group (years) | Hypothyroidism | Hyperthyroidism | Euthyroid |
|---|---|---|---|
| 0-10 (N = 23) | 6 | 2 | 15 |
| 11-20 (N = 46) | 10 | 6 | 30 |
| 21-30 (N = 149) | 24 | 21 | 104 |
| 31-40 (N = 185) | 29 | 22 | 134 |
| 41-50 (N = 110) | 17 | 17 | 76 |
| 51- 60 (N = 43) | 8 | 6 | 29 |
| > 60 (N = 43) | 9 | 8 | 26 |
| Total (N = 599) | 103 | 82 | 414 |
| Distribution (%) | 17.19 | 13.68 | 69.11 |

Table 2
Sex and racial distribution of thyroid dysfunction in the study population.

| | Hypothyroidism | Hyperthyroidism | Euthyroid |
|---|---|---|---|
| Male (N = 98) | 18 (18.36%) | 13 (13.26%) | 67 (68.36%) |
| Female (N = 501) | 85 (16.97%) | 69 (13.77%) | 347 (69.26%) |
| Hill castes (N = 112) | 17 (15.17%) | 16 (14.28%) | 79 (70.52%) |
| *Terai* castes (N = 487) | 86 (17.66%) | 66 (13.55%) | 335 (68.79%) |

Table 3A
Racial distribution of thyroid dysfunction in subjects with goiter.

| | Hypothyroidism | Hyperthyroidism | Euthyroid |
|---|---|---|---|
| Hill castes (N = 38) | 6 (15.78%) | 11 (28.94%) | 21 (55.26%) |
| *Terai* castes (N = 119) | 16 (13.44%) | 32 (26.89%) | 71 (59.66%) |
| Total (N = 157) | 22 (14.01%) | 43 (27.38%) | 92 (58.59%) |

Table 3B
Sex distribution of thyroid dysfunction in subjects with goiter.

| | Hypothyroidism | Hyperthyroidism | Euthyroid |
|---|---|---|---|
| Male (N = 8) | 2 (25%) | 2 (25 %) | 4 (50 %) |
| Female (N = 149) | 20 (13.42%) | 41 (27.51%) | 88 (59.06%) |
| Total (N = 157) | 22 (14.01%) | 43 (27.38%) | 92 (58.59%) |

that had visible goiter. Race- and sex-wise percentage distribution of thyroid dysfunction in goitrous subject was not statistically different. However, 29.74% females sent for TFT had goiter, whereas only 8.16% of males were goitrous. Some 10.7% of the hypothyroid subjects were found to have subclinical disease. All the hypothyroid cases, except three (including one case of Sheehan's Syndrome) were found to be of the primary type.

## DISCUSSION

Nepal lies in an iodine deficiency belt where goiter is endemic. Nationwide urinary iodine survey that was conducted recently showed that in the eastern part of Nepal 12.9% of the population were deficient in iodine, compared with a countrywide prevalence of 18% (Baral *et al*, 1999). This indicates that iodine deficiency is less in the eastern than the western and central parts of the country. This difference might be due to a variety of social, economical and geographical reasons. The literacy rate in eastern region is higher than the mid and far western region. The eastern region has better means of transportation and communication and is comparatively nearer to the salt iodination factories/ industries. Moreover, in the mid and far western region people are habituated to consumption of phoda salt with very low iodine content. (Nepal South Asia Center, Ministry of Health, 1998, Nepal Micronutrient Status Survey, 1998). The improvement of iodine status in comparison with the previous survey (Pandav, 1994) is a reflection of the efficacy of the iodine supplementation program in Nepal.

In the present study, it was found that a number of female subjects sent for TFTs was nearly five times that of the males and that goiter was more prevalent in females. This indicates that thyroid disorders are more common in females in Nepal. The distribution of hyper-, hypo-, and euthyroidism among males and females was not significantly different. The most common presentation of IDD is hypo- or euthyroid goiter. Approximately 17% of the subjects screened were hypothyroid and 10.7% of them, *ie*, 1.8% of the subjects tested were found to have sub-clinical disease. This high prevalence of hypothyroidism is a reflection of the persistence of iodine deficiency in the population. Owing to the fact that the management of sub-clinical cases is controversial, and because of financial constraints, these cases need to be followed-up regularly and advised to take iodized salt.

The study showed that a substantial number of cases (13.68%) sent for TFTs had hyperthyroidism. The distribution of hyperthyroidism in subjects with goiter was yet higher (27%), and there was no difference in the distribution of hypo- and hyperthyroidism relative to racial status in goitrous subjects. Normally, the prevalence of hypothyroidism (2-15%) is usually much higher in comparison with hyperthyroidism in the general population (Whitley, 1998). The possible reasons for such high number of hyperthyroid cases may be: (a) the selection bias of a hospital-based study; (b) the functional autonomy of thyroid in endemic goiter cases; (c) the poorly monitored iodized salt supply program in Nepal - excessive iodized salt may also cause thyrotoxicosis (Clugston and Hetzel, 1994; Baral *et al*, 1999); (d) the patients being more uncomfortable with an alarm by the symptoms of hyperthyroidism and therefore being more likely to present to a doctor.

The percentage distribution pattern of the various thyroid dysfunctions between hill and *terai* castes was not significantly different, which indicates that some common environmental factors (*eg* ambient iodine deficiency) rather than genetic factors predominantly determine the nature of thyroid dysfunction in the population of this area. However, because this study was hospital-based and because the study population constituted of subjects who came to the institute seeking TFTs, the results may not be applicable to the general population.

## ACKNOWLEDGEMENTS

The authors thank, Dr IP Niraula and Mr Amrendra Jha for their technical help, Ms Ekta Surana for her secretarial assistance, and Professor KK Sharma for his thoughtful contributions during the preparation of the manuscript.

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