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# Anxiety and Depression among Patients with Thyroid Function Disorders

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## ABSTRACT

**Background:** Psychiatric comorbidities are common in thyroid disorder patients and complicate patients' life quality as well as disease management. We aimed to explore prevalence of anxiety and depression and identify associated characteristics among patients with thyroid function disorder.

**Methods:** A descriptive, cross-sectional study was conducted on 129 thyroid disorder patients aged  $\geq 20$  years. A semi-structured questionnaire, Beck Anxiety Inventory, and Beck Depression Inventory were used for sociodemographic characteristics, anxiety, and depression respectively. Group differences were compared (Chi square) or correlations were determined (Pearson's correlation coefficient).

**Results:** Patients' mean age was  $38.09 \pm 12.68$  years; most were females (102, 79.1%) and hypothyroid (90, 69.8%). Overall prevalence of anxiety and depression were 50.4% and 42.6% respectively. Anxiety was more prevalent in females (54.9% vs 33.3% in males,  $p=0.046$ ), low economic status (73.9% vs 35.5% in higher status,  $p=0.019$ ), and hyperthyroid (64.1% vs 44.4% in hypothyroid,  $p=0.040$ ). Depression was more prevalent in females (47.1% vs 25.9% in males,  $p=0.048$ ), Janajati ethnic group (54.8% vs 31.1% in Brahmin-Chhetri,  $p=0.002$ ), lower economic status (69.6% vs 35.5% in higher status,  $p=0.016$ ), and hyperthyroid (56.4% vs 36.7% in hypothyroid,  $p=0.037$ ). Associations with occupation, marital status, family type, religion, and duration of illness were not significant.

**Conclusions:** Anxiety and depression are highly prevalent among thyroid disorder patients, especially in females, lower economic status, and hyperfunction type thyroid disorder. Management of thyroid disorders should incorporate treatment of anxiety and depression; routine psychiatric screening of the groups with higher prevalence is advisable.

**Keywords:** Anxiety; depression; prevalence; thyroid function disorders

## INTRODUCTION

Thyroid hyperfunction (hyperthyroidism) and hypofunction (hypothyroidism) are estimated to occur in about 2% and 1% of the general population, respectively.<sup>1</sup> Additionally, a considerable number of the population have undiagnosed thyroid dysfunction.<sup>2</sup> Thyroid disorders are usually diagnosed and categorized on the basis of serum hormonal levels of the hypothalamo-pituitary-thyroid axis (namely - thyrotropin releasing hormone, TRH; thyroid stimulating hormone, TSH; tetra-iodothyronine, T<sub>4</sub>; and tri-iodothyronine, T<sub>3</sub>). Subclinical thyroid disease is defined as elevated or depressed serum TSH level with a normal serum free T<sub>4</sub> level.<sup>3</sup>

The association between thyroid function and

psychiatric disorders, particularly mood disorders, has been long recognized.<sup>4</sup> Disturbances in thyroid function may significantly affect mental health status including emotion and cognition.<sup>5</sup> This study aimed to find the prevalence of anxiety and depression among the patients of primary thyroid disorder, attending a tertiary care hospital of Kathmandu.

## METHODS

A cross-sectional descriptive study was conducted in the Endocrinology Outpatient Clinic of the Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal in the month of September, 2016. A sample size of 107 was calculated, based on a reported 63% prevalence rate of anxiety among hypothyroid patients in the Indian state of Haryana.<sup>6</sup> Patients of either sex and aged 20

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years or above, primarily diagnosed of having thyroid function disorder, were sequentially recruited for the study. Patients having comorbidity of chronic medical illnesses (such as diabetes, heart diseases, obstructive lung diseases, and renal diseases) and having depressive or anxiety disorders before diagnosis of thyroid disorder were excluded. Patients taking medicines other than to correct the thyroid hormone status (thyroxine, carbimazole) were also excluded.

Relevant demographic, socio-economic, personal, and clinical information were obtained by interviewing. Patients' anxiety and depression levels were measured by using validated Nepali translations of Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI), respectively.<sup>7,8</sup> Levels of anxiety/depression were categorized as no, mild, moderate, and severe anxiety/depression by the BAI or BDI scores of 0-9, 10-18, 19-29, and 30-63 respectively. In that way, a score of 10 or more was regarded as presence of anxiety or depression.

The prevalence of psychiatric disorders in different groups of patients was compared by Chi square test and correlations between variables were determined by Pearson's correlation coefficient (*r*). SPSS version 16.0 statistical tool was used and level of significance was set at a *p* value of 0.05 for all analyses.

Informed written consent was obtained from all participants. The study was approved by the Institutional Review Board of the Institute of Medicine, Tribhuvan University.

## RESULTS

Total 129 participants completed the study. Their mean age was 38.09±12.68 years. The majority of patients were females. Participants were categorized into different age, demographic, and socio-economic groups (Table 1).

Hypothyroidism was present in 90 patients (69.8%) and hyperthyroidism was present in 39 patients (30.2%). Overall, the mean duration of illness was just over 3 years (38.1±12.7 months). Almost all (97%) of hypothyroid and two-thirds (64%) of hyperthyroid patients were receiving pharmacologic treatment to correct the hormone levels at the time of interview.

**Table 1. General characteristics of thyroid disorder patients (n=129).**

Characteristics	Groups	Frequency	Percent
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Age (years completed)	20-39	77	59.7
	40-60	43	33.3
	>60	9	7.0
Sex	Male	27	20.9
	Female	102	79.1
Ethnicity	Brahmin/Chhetri	74	57.4
	Aadibaasi/Janajati	42	32.6
	Madhesi	8	6.2
	Dalit/others	5	3.9
Religion	Hindu	108	83.7
	Buddhist	19	14.7
	Muslim/Christian	2	1.6
Type of family	Nuclear	107	82.9
	Joint	22	17.1
	Unmarried	19	14.7
Marital status	Married	106	82.2
	Divorced/widowed	4	3.2
Education status	Illiterate (not able to read and write)	31	24.0
	Literate	98	76.0
	Agriculture	11	8.5
Occupation	Trade/business	28	21.7
	Service	26	20.2
	Housewife	47	36.4
	Others	17	13.2
	Enough for <6 months	23	17.8
Economic status (yearly income sufficiency)	Enough for <1 year	75	58.1
	Enough for >1 year	31	24.0

Anxiety (BAI score ≥10) was present in 65 patients (50.4%) and most had mild anxiety. Similarly, depression (BDI score ≥10) was present in 55 patients (42.6%) and most had moderate level of depression (Figure 1).

By percentage distribution, majority of the patients of both anxiety and depression belonged to the hyperthyroid group, about 20% more than hypothyroid group (Table 2). This difference in prevalence was statistically significant.

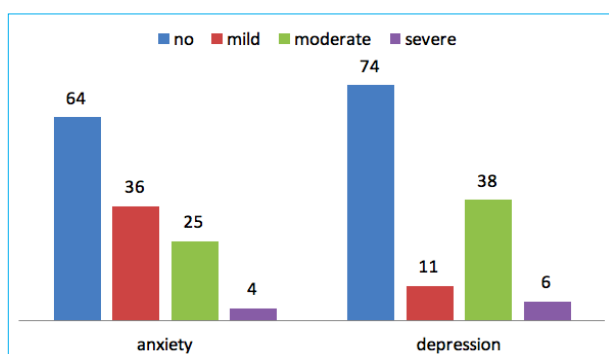


Figure 1. Levels of anxiety and depression among patients (n=129).

Table 2. Comparison of psychiatric disorders in thyroid disorder patients (N=129).

Disease type	Anxiety	Depression
Hyperthyroidism (n=39)	25 (64.1%)	22 (56.4%)
Hypothyroidism (n=90)	40 (44.4%)	33 (36.7%)
Total	65	55
Chi squared p value	0.040	0.037

The association of different socioeconomic and demographic characteristics of patients with the prevalence of anxiety and depression were explored (Table 3). In further analysis, very small patient groups were excluded such as in age (more than 60 years), ethnicity (Madhesi and Dalit/others), religion (Muslim/others), and marital status (divorced/widowed). Both the psychiatric disorders were more common in females and lower economic classes whereas age, marital status, literacy status, occupation, religion, and family types did not have significantly strong associations. The Brahmin/Chhetri people had significantly less prevalence of depression compared to Janajati people but ethnic difference observed for anxiety was not significant.

Table 3. Comparison of prevalence of anxiety and depression among different classes of thyroid disorder patients.

Characteristics	Groups	Anxiety	Depression
Age groups	20-39 years (n=77)	43 (55.84%)	38 (49.35%)
	40-59 years (n=43)	18 (41.86%)	15 (34.88%)
	Chi square (P value)	2.159 (0.183)	2.342 (0.179)
Sex	Male (n=27)	9 (33.33%)	7 (25.93%)
	Female (n=102)	56 (54.9%)	48 (47.06%)
	Chi square (P value)	3.973 (0.046)*	3.898 (0.048)*

Ethnicity	Brahmin/Chhetris (n=74)	32 (43.24%)	23 (31.08%)
	Janajati (n=42)	24 (57.14%)	23 (54.76%)
	Chi square (P value)	2.073 (0.178)	6.279 (0.018)*
Religion	Hindu (n=108)	55 (50.9%)	47 (43.5%)
	Buddhist (n=19)	10 (52.6%)	8 (42.1%)
	Chi Square (P value)	0.019 (1.00)	0.013 (1.00)
Educational levels	Illiterate (n=31)	19 (61.29%)	14 (45.16%)
	Literate (n=98)	46 (46.94%)	41 (41.84%)
	Chi square (P value)	1.940 (0.164)	0.106 (0.744)
Economic status	Enough for <6 months (n=23)	17 (73.91%)	16 (69.57%)
	Enough for <1 year (n=75)	37 (49.33%)	28 (37.33%)
	Enough for >1 year (n=31)	11 (35.48%)	11 (35.48%)
	Chi square (P value)	7.880 (0.019)*	8.330 (0.016)*
	Occupation	Agriculture (n=11)	6 (54.5%)
Trade/business (n=28)		9 (32.1%)	9 (32.1%)
Service (n=26)		13 (50%)	11 (42.3%)
Housewife (n=47)		27 (57.4%)	20 (42.6%)
Other (n=17)		10 (58.8%)	10 (58.8%)
Chi Square (p value)		5.227 (0.265)	3.119 (0.538)
Marital status	Unmarried (19)	11 (57.9%)	10 (52.6%)
	Married (106)	53 (50%)	43 (34.4%)
	Chi square (P value)	0.622 (0.351)	0.450 (0.232)
Family type	Nuclear (n=107)	50 (46.7%)	44 (41.1%)
	Joint (n=22)	15 (68.2%)	11 (50%)
	Chi Square (P value)	3.359 (0.067)	0.588 (0.443)

## DISCUSSION

A cross-sectional descriptive study was conducted to determine the prevalence of anxiety and depression in patients with thyroid function disorder attending a tertiary care hospital in Kathmandu, by using the validated Nepali translations of Beck Anxiety Inventory and Beck Depression Inventory. The study was completed in 129 patients comprising mostly of females and younger age (less than 40 years). Most of the patients had hypothyroidism and overall prevalence of anxiety (65 patients, 50.4%) was more than depression (55 patients, 42.6%), with some patients having both or none of the psychiatric afflictions.

The female preponderance for the prevalence of thyroid disorders is globally recognized.<sup>9,10</sup> Regarding age distribution, Yadav et al (2012) have reported highest prevalence of thyroid dysfunctions in 21-40 years age group, followed by 41-60 years age group in Far Western Region of Nepal.<sup>11</sup> Some studies have reported higher thyroid disorder prevalence in older population, with age more than 40 years.<sup>12,13</sup>

Both anxiety and depression were highly prevalent in the patients in this study. The prevalence rates of anxiety as well as depression in hyperthyroidism were higher by about 20% than in hypothyroidism (Table 2) and this difference in prevalence was statistically significant. The strong association between hyperthyroidism and anxiety is well known.<sup>14,15</sup> The similarity in their clinical features often result in mix ups between medical and psychiatric diagnoses, consultations, and treatment.<sup>5</sup> The finding of this study, about 64% prevalence rate of anxiety among hyperthyroidism, is in agreement with this relationship. However, most other studies have reported lower levels of anxiety prevalence in hyperthyroid patients than our observation; for example, Bove et al found it at 18% and Demet et al at 31.3%.<sup>12,16</sup> These differences could be because of use of different scales for anxiety such as Hamilton Anxiety Rating Scale (HAM-A) and Hospital Anxiety and Depression Scale (HADS) while the drawback of a smaller population size of hyperthyroidism in this study cannot be ignored.

In the hypothyroid patients, different studies have reported high prevalence of anxiety symptoms, ranging from 40 to 69.2%.<sup>6,17-19</sup> Even in subclinical hypothyroidism, a 44.6% prevalence of clinical anxiety was reported compared to 23.3% in euthyroid people ( $p=0.001$ ).<sup>20</sup> The prevalence of anxiety in hypothyroidism in our study (44.4%) is comparable to most of the other studies. As in other studies, we also found higher prevalence among female hypothyroid patients.

Significant associations were found for both the psychiatric disorders with female gender and lower socioeconomic status but not for age, occupation, education levels, marital status, or family type. Even an almost identical prevalence was observed in the Hindu and Buddhist groups for both disorders. The higher risk of depression among females than in males is well recognized, even in the general population, and is attributed to the different personality factors, societal roles and responsibilities, and differences in mechanisms of coping with life stress.<sup>21,22</sup> Similarly, in addition to higher prevalence, females are also reported to suffer more severe levels of anxiety.<sup>19</sup> The higher prevalence in lower economic class supports the similar finding by Branka et al; this could be due to the feeling of insecurity of livelihood in the class.<sup>13</sup> The higher prevalence of anxiety in the Janajati people compared to Brahmin-Chhetri could be due to differences in socio-cultural challenges and social support mechanisms. However, this would require further exploration to verify the reason. In some studies, such associations of sociodemographic characteristics with depression in thyroid disorder patients could not be observed.<sup>18,23</sup> In one study conducted on Nepalese thyroid disorder patients, there was no significant association recognized between socioeconomic variables and the mood disorders.<sup>24</sup> On the reverse, high prevalence of thyroid disorders in primary depressive patients have also been reported.<sup>5,25,26</sup> These findings highlight the close association between the two diseases and the high possibility of their co-occurrence.

Lack of randomization in recruitment of participant, small population size in some subgroups, and lack of a euthyroid control group for comparison are the limitations of this study, which are largely due to the limited available time to conduct the study. The hospital-based nature and use of validated Nepali translations of the standard tools help to increase the reliability of findings presented in this study.

## CONCLUSIONS

Our study identified a high prevalence of anxiety as well as depression in patients with thyroid function disorder attending the Endocrinology OPD of a tertiary hospital. Both anxiety and depression were significantly correlated with female sex, lower socioeconomic status, and hormonal disorder status. Larger sample studies and comparisons to the general population would be more helpful in establishing and generalizing the findings.

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