



## Level and Factors Associated with Depression among Thyroid Patients at a Tertiary Care Hospital in Pakistan

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### Abstract

**Background:** Patients with thyroid disorders are at greater risk of developing depression as per globally published data but in Pakistan there is scarcity of published literature regarding this domain of health science. To evaluate the level and factors associated with depression receiving treatment at a tertiary care hospital.

**Methodology:** A cross-sectional study conducted at the outpatient department of Centre for Nuclear Medicine and Radiotherapy Quetta. A total of 341 eligible subjects were enrolled. Patients' socio-demographic and clinical data was collected via a purpose developed data collection form. Depression level was assessed through validated Urdu version of 21-items Hamilton rating scale for depression. Data was analyzed by SPSS 20. Final model of factors associated with high score of depression were analyzed through multiple linear regression. A p-value <0.05 was statistically significant.

**Results:** Mean age of subjects enrolled was  $34.03 \pm 10.06$  years. Majority being females (80.6%). All patients (100%) were depressed. Most of them very severe (46%) followed by severe (36.4%) and moderate depression (17.6%). Upon multiple linear regression, patients' age of 18 years to 30 years ( $P=0.001$ ,  $B=2.629$ ), illiteracy ( $P<0.001$ ,  $B=3.493$ ), drug abuse ( $P= <0.001$ ,  $B=3.711$ ) and thyroid disease for >10 years ( $P=0.002$ ,  $B=3.384$ ) were associated with higher depression scores.

**Conclusion:** The prevalence of depression in thyroid patients was high. These patients should be evaluated for depression regularly. High risk groups should receive enhanced clinical management.

**Keywords:** Depression; Thyroid; Pakistan; Quetta; Tertiary care

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### Introduction

As thyroid gland is a part of both neuroendocrine system as well as Hypothalamic-Pituitary-Thyroid (HPT) axis, its secretions affect many areas of the body including the Central Nervous System (CNS) [1,2]. Therefore, patients with thyroid disorders are at greater risk of developing CNS symptoms ranging from tremor to acute psychoses in hyperthyroidism on one hand, and memory deficit to depression in hypothyroidism on the other [1,3]. A positive association between thyroid function and psychiatric disorders has been established long ago and is widely reported in published clinical literature [4]. The reported prevalence of anxiety and depressive disorders ranges from 31% to 69% in hyperthyroid patients and 30% to 70% in hypothyroid patients [4,7-10]. Despite the high prevalence of depression in thyroid patients, it continues to be under-recognized and undertreated, consequently affecting patients' quality of life, treatment adherence and outcomes [7].

Unfortunately Pakistan is in the ranks thyroid disease high burden countries [11-13]. The prevalence of hypothyroidism in various areas of Pakistan ranges between 5% to 15% [11]. A study has reported that in Khyber Pukhtunkhwa province of Pakistan 70% of the rural population and >50% of the urban population is facing iodine deficiency disorders [11]. Another study conducted at Punjab Institute of Cardiology Lahore has reported the prevalence of thyroid disease in 26.3% of the 968 evaluated suspects of thyroid disorders [13]. Severe iodine deficiency is also reported in Islamabad where the prevalence of goiter in school children was 62.1%. Similarly, comparatively high prevalence of hyperthyroidism (5%) and subclinical hyperthyroidism (5.8%) has been reported from Pakistan [11]. Despite thyroid disease high burden country and established association between thyroid disorders and depression, there is dearth of published literature regarding the level and risk factors associated with depression in thyroid patients from Pakistan. Therefore the current study

**Table 1:** Patients' socio-demographic and clinical characteristics.

| Variables                          | Mean ± SD     | No. (%)    |
|------------------------------------|---------------|------------|
| <b>Age (years)</b>                 | 34.03 ± 10.06 |            |
| 18 to 30                           |               | 159 (46.6) |
| 31 to 45                           |               | 122 (35.8) |
| 45 to 65                           |               | 56 (16.4)  |
| >65                                |               | 4 (1.2)    |
| <b>Gender</b>                      |               |            |
| Female                             |               | 275 (80.6) |
| Male                               |               | 66 (19.4)  |
| <b>Religion</b>                    |               |            |
| Muslims                            |               | 295 (86.5) |
| Non-Muslims                        |               | 46 (13.5)  |
| <b>Nationality</b>                 |               |            |
| Pakistani                          |               | 305 (89.4) |
| Afghan                             |               | 28 (8.2)   |
| Iranian                            |               | 8 (2.3)    |
| <b>Residence</b>                   |               |            |
| Rural                              |               | 200 (58.7) |
| Urban                              |               | 141 (41.3) |
| <b>Marital status</b>              |               |            |
| Unmarried                          |               | 243 (71.3) |
| Married                            |               | 76 (22.3)  |
| Divorced                           |               | 12 (3.5)   |
| Widow                              |               | 10 (2.9)   |
| <b>Qualification</b>               |               |            |
| Uneducated                         |               | 162 (47.5) |
| School                             |               | 93 (27.2)  |
| College                            |               | 34 (10.0)  |
| Graduation and above               |               | 52 (15.3)  |
| <b>Employment status</b>           |               |            |
| Unemployed                         |               | 247 (72.4) |
| Employed                           |               | 94 (27.6)  |
| <b>Smoking</b>                     |               |            |
| No                                 |               | 283 (83.0) |
| Yes                                |               | 58 (17.0)  |
| <b>Drug abuse status</b>           |               |            |
| No                                 |               | 321 (94.1) |
| Yes                                |               | 20 (5.9)   |
| <b>Family type</b>                 |               |            |
| Joint                              |               | 185 (54.3) |
| Nuclear                            |               | 156 (45.7) |
| <b>Monthly family income (PKR)</b> |               |            |
| <15000                             |               | 34 (10.0)  |
| 15000 to 30000                     |               | 198 (58.0) |
| >30000                             |               | 109 (32.0) |
| <b>Type of thyroid disorder</b>    |               |            |
| Hypothyroidism                     |               | 215 (63.0) |
| Hyperthyroidism                    |               | 126 (37.0) |

| Duration of thyroid disorder |            |
|------------------------------|------------|
| <1 year                      | 62 (18.2)  |
| 1 to 10 years                | 243 (71.3) |
| >10 years                    | 36 (10.6)  |
| <b>Comorbidity</b>           |            |
| No                           | 141 (41.3) |
| Yes                          | 200 (58.7) |
| <b>Type of Comorbidity</b>   |            |
| Hypertension                 | 52         |
| GIT diseases                 | 46         |
| Diabetes mellitus            | 16         |
| Arthritis                    | 16         |
| Others                       | 70         |

was designed with the aim to evaluate the level and factors associated with depression and prescription of antidepressants among thyroid patients.

## Methodology

This was a cross-sectional study conducted at the outpatient department of Centre for Nuclear Medicine and Radiotherapy (CENAR) Quetta, Balochistan. The study site is the only public sector nuclear medicine and radiotherapy centre in the Balochistan province and has a wide catchment area of the whole province and nearby Afghanistan. All eligible established thyroid disease patients who were receiving treatment at the study site and gave written or verbal consent were included in the study. Thyroid disease patients with age <18 or >80 years, pregnant patients and those who were unable to communicate due to any physical disability or cognitive impairment were excluded from the study. Patients' socio-demographic and clinical data was collected by using a purpose developed data collection form. This included information regarding patient's age, gender, residence, marital status, education, qualification, employment status, occupation, monthly income, family type, smoking and drug abuse status, family history of depression and thyroid disorder, type of thyroid disorder, duration of thyroid disorder, thyroid hormones and thyroid stimulating hormone values, presence and type of comorbidity and medicines prescribed.

In order to assess the level of depression, enrolled patients were interviewed by using previously translated and validated Urdu version (Cronbach alpha = 0.71, Spearman correlation coefficient = 0.83, p-value <0.01) of 21-items Hamilton Rating Scale for Depression (HAM-D) [14]. This scale has been widely used for assessing the level of depression among patients suffering from thyroid disorders [8,9,15]. Although the HAM-D consists of 21 items, the scoring is based on the first 17. Eight items are scored on a 5-point scale, ranging from 0= not present to 4= severe. Nine items are scored from 0 to 2. The scores on HAM-D were interpreted as: 0 to 7= normal, 8 to 13= mild depression, 14 to 18= moderate depression, 19 to 22= severe depression, and >23= very severe depression.

## Statistical Analysis

Data was analyzed by using Statistical Software for Social Sciences (SPSS version 20). The categorical variables were presented as frequencies and percentages, whereas, continuous data was presented as mean, median and standard deviations. Simple linear regression

**Table 2:** Results of simple linear regression of factors associated with depression score.

| Variables                                  | Depression score (Mean $\pm$ SD) | B     | SE   | P-value | R <sup>2</sup> |
|--|----------------------------------|-------|------|---------|----------------|
| <b>Gender</b>                              |                                  |       |      |         |                |
| Female                                     | 24.87 $\pm$ 6.818                | 0.559 | 0.94 | 0.553   | 0              |
| Male                                       | 25.42 $\pm$ 7.034                |       |      |         |                |
| <b>Age (years)</b>                         |                                  |       |      |         |                |
| 18 to 30                                   | 24.19 $\pm$ 7.251                | -1.47 | 0.74 | 0.048   | 0.01           |
| 31 to 45                                   | 24.74 $\pm$ 5.877                | -0.37 | 0.78 | 0.636   | 0              |
| $\geq$ 46                                  | 27.53 $\pm$ 7.115                | 3.16  | 0.96 | 0.001   | 0.03           |
| <b>Residence</b>                           |                                  |       |      |         |                |
| Rural                                      | 24.34 $\pm$ 5.916                |       |      |         |                |
| Urban                                      | 25.87 $\pm$ 7.934                | 1.532 | 0.75 | 0.042   | 0.01           |
| <b>Marital status</b>                      |                                  |       |      |         |                |
| Unmarried                                  | 21.39 $\pm$ 5.264                | -4.6  | 0.86 | <0.001  | 0.08           |
| Married                                    | 26.24 $\pm$ 7.072                | 4.402 | 0.79 | <0.001  | 0.09           |
| Divorced+widow                             | 21.39 $\pm$ 5.264                | -1.71 | 1.51 | 0.255   | 0              |
| <b>Nationality</b>                         |                                  |       |      |         |                |
| Pakistani                                  | 25.02 $\pm$ 7.061                |       |      |         |                |
| Others                                     | 24.21 $\pm$ 5.336                | -0.16 | 0.93 | 0.861   | 0              |
| <b>Religion</b>                            |                                  |       |      |         |                |
| Muslims                                    | 25.10 $\pm$ 6.831                |       |      |         |                |
| Non-Muslims                                | 24.17 $\pm$ 7.022                | -0.92 | 1.09 | 0.396   | 0              |
| <b>Qualification</b>                       |                                  |       |      |         |                |
| Illiterate                                 | 27.54 $\pm$ 6.966                | 4.985 | 0.7  | <0.001  | 0.13           |
| School level                               | 24.47 $\pm$ 6.284                | -0.69 | 0.83 | 0.41    | 0              |
| Intermediate level                         | 21.35 $\pm$ 4.923                | -4.02 | 1.22 | <0.001  | 0.03           |
| Graduation Post-graduation                 | 20.23 $\pm$ 4.466                | -5.6  | 0.99 | <0.001  | 0.09           |
| <b>Employment status</b>                   |                                  |       |      |         |                |
| Unemployed                                 | 25.64 $\pm$ 7.164                |       |      |         |                |
| Employed                                   | 23.21 $\pm$ 5.626                | -2.43 | 0.82 | 0.003   | 0.03           |
| <b>Type of family</b>                      |                                  |       |      |         |                |
| Joint                                      | 25.49 $\pm$ 7.222                |       |      |         |                |
| Nuclear                                    | 24.36 $\pm$ 6.357                | -1.13 | 0.74 | 0.129   | 0.01           |
| <b>Smoking</b>                             |                                  |       |      |         |                |
| No   | 24.77 $\pm$ 7.119                |       |      |         |                |
| Yes  | 25.97 $\pm$ 5.315                | 0.494 | 0.6  | 0.411   | 0              |
| <b>Drug abuse</b>                          |                                  |       |      |         |                |
| No   | 24.55 $\pm$ 6.783                |       |      |         |                |
| Yes  | 31.70 $\pm$ 3.895                | 4.356 | 0.91 | <0.001  | 0.06           |
| <b>Type of thyroid disease</b>             |                                  |       |      |         |                |
| Hypothyroidism                             | 24.66 $\pm$ 6.309                |       |      |         |                |
| Hyperthyroidism                            | 25.51 $\pm$ 7.692                | 0.847 | 0.77 | 0.271   | 0              |
| <b>Duration of thyroid disease (years)</b> |                                  |       |      |         |                |
| < 1  | 24.68 $\pm$ 5.682                | -0.36 | 0.96 | 0.707   | 0              |
| 1 to 10                                    | 24.53 $\pm$ 6.792                | -1.56 | 0.82 | 0.058   | 0.01           |
| 11 to 20                                   | 28.50 $\pm$ 8.171                | 3.943 | 1.19 | 0.001   | 0.03           |
| <b>Any other Comorbidity</b>               |                                  |       |      |         |                |
| No   | 22.85 $\pm$ 6.292                |       |      |         |                |
| Yes  | 26.62 $\pm$ 6.831                | 3.779 | 0.72 | <0.001  | 0.08           |

was used to evaluate factors associated with high depression score on HAM-D scale. To obtain final model of factors associated with high depression scores, those factors which had statistically significant association with depression scores in simple linear regression were entered into multiple linear regression. A p-value of <0.05 was considered statistically significant.

This study was approved by the Research and Ethics Committee of Faculty of Pharmacy and Health Sciences, University of Baluchistan, Quetta.

## Results

Out of 386 eligible patients approached, a total of 341 agreed to participate in the study. Socio-demographic and clinical characteristics of the study participants are given in Table 1. Mean age of the study participants was 34.03  $\pm$  10.06. Majority of them were females (80.6%), belonged to the age group of 18 years to 30 years (46.6%), rural residents (58.7%), unmarried (71.3%) and uneducated (47.5%) and suffered from comorbidities (58.7%).

## Prevalence of Depression and Predictors of Depression Score

When evaluated by using HAM-D scale, patients' mean depression score was 24.86  $\pm$  7.0 points. All of the study participants (100%) suffered from depression. Majority of them suffered from very severe depression (46%) followed by severe (36.4%) and moderate depression (17.6%).

In simple linear regression, the factors significantly associated with higher scores on HAM-D scale were patients' age of more than 45 years (P=0.001, R<sup>2</sup>=0.030), urban residence (P=0.042, R<sup>2</sup>=0.012), married (P<0.001, R<sup>2</sup>=0.085), illiteracy (P<0.001, R<sup>2</sup>=0.128), drug abuse (P<0.001, R<sup>2</sup>=0.063), thyroid's disease duration for >10 years (P=0.001, R<sup>2</sup>=0.031) and presence of other comorbidity (P<0.001, R<sup>2</sup>=0.075). Whereas, patients' age of 18-30 years (P=0.048, R<sup>2</sup>=0.001), unmarried (P<0.001, R<sup>2</sup>=0.085), qualification of intermediate level (P<0.001, R<sup>2</sup>=0.031) and above (P= <0.001, R<sup>2</sup>=0.086) and employment (P=0.003, R<sup>2</sup>=0.025) were significantly associated with lower score on HAM-D scale than their counterparts (Table 2).

Upon multiple linear regression, patients' age of 18-30 years (P=0.001, B=2.629), illiteracy (P<0.001, B=3.493), drug abuse (P<0.001, B=3.711), thyroid disease for >10 years (P=0.002, B=3.384) and presence of comorbidity (P=0.036, B=1.436) were significantly associated with higher scores on HAM-D scale. Whereas, education level of intermediate (P=0.001, B= -3.896) and above (P=0.001, B= -3.517) were significantly associated with comparatively lower score on HAM-D scale (Table 3).

## Discussion

To the best of our knowledge this is first study in Baluchistan which evaluated the prevalence, factors associated with depression in patients suffering from thyroid disorders. In the current cohort, majority (80.6%) of patients were females. This finding is in line with the accepted global epidemiology of high prevalence of thyroid disease in women [16,17]. In a study conducted in Norway, almost five times higher prevalence of thyroid disorders has been observed in females as compared to males [18]. Similar high proportions of female patients (>70%) suffering from thyroid disorders have been reported by studies conducted in Pakistan [11], India and Nepal [10,19]. Thyroid disorder is a well-known and widely reported risk

**Table 3:** Multiple linear regressions of factors associated with high depression score.

| Variables                     | B     | SE   | P-value |
|-------------------------------|-------|------|---------|
| Age 18 to 30 years            | 2.629 | 0.79 | 0.001   |
| Illiterate                    | 3.493 | 0.88 | <0.001  |
| Intermediate                  | -3.9  | 1.8  | 0.001   |
| Graduation and above          | -3.52 | 1.07 | 0.001   |
| Drug abuser                   | 3.711 | 0.8  | <0.001  |
| Disease duration of >10 years | 3.384 | 1.07 | 0.002   |

Model summary:  $R^2=0.346$ ,  $P<0.001$

factor for depression [4]. However, in the present study all of the study participants (100%) suffered from depression. Alarmingly, upon evaluation on HAM-D scale, majority of them were categorized as very severely depressed (46%) followed by severely (36.4%) and moderately depressed (17.6%). Prevalence of depression among the study participants is relatively high than that reported by studies conducted among thyroid disease patients in Malaysia (31.9%) [7], India (60%) and Italy (63.2%) [5,7]. However, somewhat similar rate of depression (84%) among thyroid disease patients have been reported by a study conducted in Karachi Pakistan [20]. The high proportion of female patients (80.6%) could be one of the possible reasons for comparatively high prevalence and severity of depression in the current study. Biologically females are more likely than males to have dysregulated HPA response to stress, which makes them more vulnerable to develop depression [21]. It has been widely reported that due to biological responses, self-concepts and coping styles, women are two times more likely than men to develop depression even when they are confronted with the same problems [22,23]. Furthermore, in developing countries like Pakistan, women lack social power and are marginalized socially and economically. Suffering of socially and economically marginalized females from a chronic disorder like thyroid disease could have affected their mental health and have resulted in high rates of depression in current study [22]. Other possible reasons for high degree of depression in our study could be the overall high prevalence of depression in Pakistani population due to social adversities [24], high proportion of illiterate patients and poor socioeconomic conditions of the study participants.

Upon multiple linear regression, patients' age group from 18-30 years, illiteracy, and drug abuse, duration of thyroid disorders for more than 10 years and presence of other comorbidities emerged as risk factors for significantly higher depression scores on HAM-D scale. The current finding of high depression scores of younger adults (18 years to 30 years) is contrary to the common perception of increased prevalence of depression in older adults [25], but is of substantial clinical importance and needs further investigation. Similar to our finding, previous studies conducted elsewhere have also reported that symptoms of depression were more frequent and severe in young and middle-aged adults with thyroid abnormalities [26-28]. The possible reasons for this finding could be the previously reported lower TSH and higher T4 levels in young adults [29], and comparatively more worries about future life on the recent onset of a chronic disease. Moreover, the significantly high depression scores in this group of patients could be a direct consequence of relatively high prevalence of depression in young adults as compared to older adults in general population [30]. However, contrary to our finding, some studies have reported comparatively high prevalence of depression in middle aged and elderly thyroid patients than their younger counterparts [6,31]. Another factor which was significantly associated with high score of

depression was patients' illiteracy. We observed that patients' scores on HAM-D scale significantly decreased with increase in patients' qualification. Positive association between lower educational level and high prevalence of depression has been reported by various studies conducted elsewhere [32,33]. Education attainment is known to be positively associated with "health literacy," or "the degree to which individuals have the capacity to obtain, process, and understand basic health information to make appropriate health decisions" [34]. The possible reasons for this finding could be the lower socio-economic status of the illiterate patients, their less effective coping strategies and unhealthier life styles [33]. In current study, drug abusers scored significantly higher than non-abusers. Drug abuse has widely been linked with depression and is usually preceded by it [35]. As the current study was a cross-sectional one, it was not possible to evaluate that whether the drug abusers' high depression score was because of drug abuse or patients started using recreational drugs after becoming depressed. Study participants who were suffering from thyroid disease for more than ten years scored significantly high on HAM-D scale. The comparatively longer period of desperation, social stigma, fear of disease and inadequate social support could be some of the possible reasons for high depression scores in this group of patients. Similar positive association between longer duration of sickness and poor mental health of has been reported by a study conducted among tuberculosis patients [22].

## Conclusion

The high prevalence and severity of depression observed in thyroid patients at the study site makes it a worrisome issue. The identified risk factors for high depression in the current study are generally identifiable prior to the diagnosis or early in the course of treatment of thyroid patients. All the patients receiving treatment at the study site should be evaluated for the presence and level of depression. In order to improve the patients' mental health, those with a high risk of severe depression should receive special attention and enhanced clinical management, including psychological counseling and prescription of anti-depressants. In addition to psychological counseling, the provision of psychological support to the depressed patients through peer-to-peer and by support groups may enable patients to meet and socialize with other patients and give psychological support to each other.

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