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**Original research article**

# A cross-sectional study to assess psychiatric co-morbidities with endocrinological disorders in the patients attending tertiary care hospital

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**Abstract**

**Introduction:** This study aimed to investigate the prevalence of depression, anxiety, and stress among in-patients diagnosed with various endocrine disorders. Quality of life (QoL) was also evaluated using the WHOQoL-BREF questionnaire.

**Material and Methods:** The study included 110 patients. Participants were assessed for depression using the Hamilton Depression Rating Scale (HDRS), for anxiety using the Hamilton Anxiety Scale (HAM-A), and for stress using the Perceived Stress Scale (PSS).

**Results:** The majority of patients had Type-2 Diabetes Mellitus (46.4%) or hypothyroidism (33.6%). The study showed that 22% of endocrine patients exhibited signs of depression, with the highest depression rate found among PCOD patients (58.3%). Anxiety was prevalent across all endocrine disorders, with the most severe cases found among hyperthyroid patients (66%). Regarding stress levels, most patients with Type-2 Diabetes and hypothyroidism reported moderate stress (70% and 86% respectively), while PCOD patients reported moderate (66%) and high stress (33.3%). Quality of life varied, with physical health ranging from 17.86 to 85.7 (mean 48.5), psychological health ranging from 20.83 to 70.8 (mean 50.9), social health ranging from 8.33 to 91.6 (mean 56.4), and environmental health ranging from 15.63 to 87.5 (mean 56.5).

**Conclusion:** In conclusion, endocrine disorders can have far-reaching effects on mental health, causing depression, anxiety, and stress. Understanding these connections and integrating mental health care into treatment plans is crucial to improving patient outcomes.

**Keywords:** Endocrine disorders, depression, anxiety, stress, quality of life, type-2 diabetes mellitus

## Introduction

Psychiatric problems are increasingly recognized as co-existing with various endocrine diseases, forming a reciprocal association between endocrine and mental health. The overlap in behavioral symptoms between endocrinopathies and psychiatric disorders often presents challenges in differential diagnosis. Patients with endocrine disruptions commonly experience psychiatric symptoms such as mood disorders, anxiety, cognitive decline, dementia, delirium, and psychosis. Conversely, psychiatric conditions can influence hormone levels in the thyroid and adrenal glands. The early diagnosis of endocrine dysfunction may be facilitated by the presence of preceding psychiatric symptoms.

Major depressive disorder (MDD) is a prevalent psychiatric disorder affecting millions worldwide [1]. The American Psychiatric Association reports lifetime risk estimates of 10 to 25% in women and 5 to 12% in men for developing major depressive disorder in community samples [2]. Hypothyroidism is the most common thyroid dysfunction in the general population, with a prevalence of 1-2%, increasing with age and affecting women more than men [3]. The connection between thyroid function and psychiatric diseases, especially mood disorders, dates back over 200 years. Studies have reported that 1-4% of patients with affective disorders have overt hypothyroidism, while subclinical hypothyroidism is present in 4-40% of these patients [4]. Hyperthyroidism has been associated with anxiety disorders in approximately 60% of patients and depressive disorders in 31 to 69% [5]. Thyroid function issues can significantly impact mental health status, including emotions and cognition, mediated through the hypothalamus-pituitary-thyroid (HPT) axis in response to acute and chronic stress.

Polycystic ovarian syndrome (PCOS) is a multifactorial and polygenic disorder affecting the reproductive, endocrine, and metabolic systems, leading to various indications and symptoms. PCOS commonly presents with obesity and insulin resistance [6]. PCOS affects 5%-10% of women of

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reproductive age [7]. Women with PCOS often experience higher rates of psychiatric disorders, particularly depression, anxiety and social phobia [8]. Depression rates in women with PCOS range from 14% to 64% [9].

Cushing's syndrome (CS) is characterized by an active hypercortisolaemic state and is associated with a range of mental and psychological disorders, including major depression, anxiety, mania, psychological symptoms (demoralization, irritability, somatization), and cognitive impairment [10]. Between 50% and 62% of CS patients fulfill diagnostic criteria for mood disorders, and about 25% of people with prodromal Cushing's syndrome experience depression [11]. Anxiety issues in CS patients have also been reported, with approximately 66% displaying signs of anxiety [12].

Addison's disease, or chronic adrenal insufficiency, is associated with neuropsychiatric symptoms in approximately 64-84% of cases [13]. Acromegaly, a rare disease characterized by excess growth hormone, has also been linked to neuropsychiatric comorbidities, such as anxiety and depressive symptoms [14].

While several studies have individually evaluated psychiatric comorbidities like anxiety, depression, stress and quality of life in endocrine disorders, few have comprehensively investigated the association between psychiatric comorbidities and various endocrine disorders in a single study. The aim of the study is to assess the prevalence and nature of psychiatric comorbidities in patients with endocrine disorders. The study seeks to investigate the association between endocrine diseases and mental health conditions, including mood disorders, anxiety, and stress. By examining the co-occurrence of psychiatric symptoms in patients attending a tertiary care hospital for endocrine disorders, the study aims to identify the most common psychiatric comorbidities in this patient population.

## Materials and Methods

This cross-sectional study was studied in 110 subjects attending Department of Psychiatry, Malla Reddy Narayana multi-speciality Hospital, a tertiary hospital attached to Malla Reddy Medical College for Women, Hyderabad, from January 2021-June 2022 after obtaining Institutional ethical committee clearance. Written informed consent was taken from the participants by the primary investigator before the interview stating the purpose of study, procedure, implications, inconvenience and harm if any.

### Inclusion criteria

1. Patients with pre-existing endocrinological disorder.
2. **Age:** 25-65yrs.

### Exclusion criteria

1. Patients with pre-diagnosed Psychiatric disorder
2. Pregnant females.

### Study procedure

All the study 110 subjects were In-patients diagnosed with endocrine disorder. By the primary investigator Socio-demographic data, general health status, endocrine disease and its duration, treatment taken was enquired using Intake proforma.

Depression was assessed using Hamilton depression rating scale (HDRS), Anxiety was assessed using (HAM-A) scale, stress was assessed using (P.S.S) scale. The patients were also assessed for quality of life using WHO quality of life (WHOQOL-BREF) questionnaire.

**Statistical analysis:** The data obtained were compiled and analyzed using the statistical package for social sciences (SPSS) software version 21. A probability value less than 0.05 (p value) was considered statistically significant.

## Results

**Table 1:** Demographic Distribution of Individuals by Gender and Age Group and Occupation

| Parameter | Male | Female |
|---|---|---|
| **Total Number** | 48 | 52 |
| **Age** | | **Percentage (%)** |
| 25-35 | 31 | 28.2 |
| 36-45 | 32 | 29.1 |
| 46-55 | 20 | 18.2 |
| 56-65 | 27 | 24.5 |
| Total | 110 | 100.0 |
| **Occupation** | | |
| Unemployed | 2 | 1.8 |
| Unskilled worker | 29 | 26.4 |
| Semi-skilled worker | 7 | 6.4 |
| Skilled worker | 7 | 6.4 |

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 08, 2023

| | | |
|---|---|---|
| Clerical, shop owner, farmer | 48 | 43.6 |
| Semi-profession | 4 | 3.6 |
| Profession | 6 | 5.5 |
| Student | 7 | 6.4 |
| **Socio-Economic Status** | | |
| Upper lower | 28 | 25.5 |
| Lower middle | 56 | 50.9 |
| Upper middle | 23 | 20.9 |
| Upper class | 3 | 2.7 |

The above table shows, age group ranging from 25 to 35 years comprised 28.2% of the sample, the age group ranging from 36 to 45 years represented 29.1%, the age range ranging from 46 to 55 years showed 18.2%, and the age range ranging from 56 to 65 years indicated 24.5%. Notably, the majority of the study sample belonged to the age group range of 36 to 45 years. Regarding gender distribution, females accounted for 52% of the total sample, while males made up 48%.

The study also examined the occupational status of the participants, revealing that the largest proportion of the study sample (43.65%) was involved in clerical, shop owner, or farmer work. Unskilled workers constituted 26.4%, semi-skilled and skilled workers each comprised 6.4%, and 3.6% were semi-professionals. Professionals and students accounted for 5.5% and 6.4% of the population, respectively. Interestingly, only 1.8% of the participants were unemployed.

In the current study it was observed that 28 (25.5%) of the participants belonged to the upper lower class, whereas 56(50.9%) were classified as belonging to the lower middle class. 24 (20.9%) people belonged to upper middle class, but only 3(2.7%) belonged to the upper class.

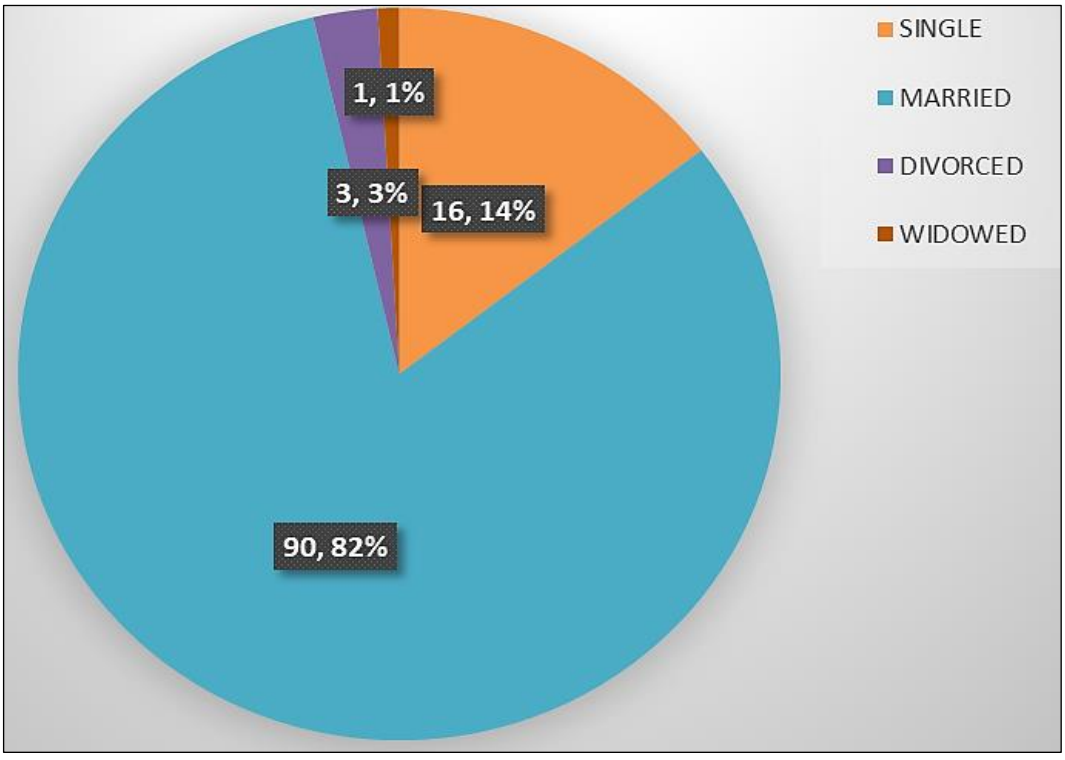


**Fig 1:** Distribution of patients according marital status

Figure 1 confirmed that the number of people who were single indicated by their marital status was 16 (14.5%). Married was 90 (81.8%) of the population. The percentage of people who were divorced was 3(2.7%). Widowed was the only one subject in the study sample. Majority of the study sample was married with 81.8%.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 08, 2023

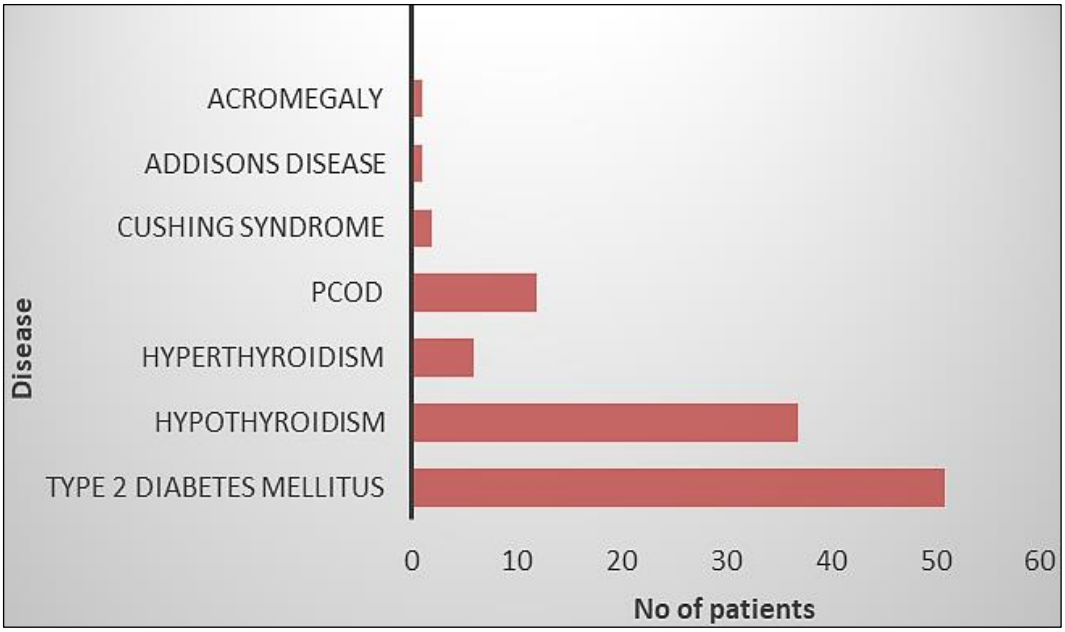


**Fig 2:** Distribution of Endocrine disorders in the study sample

Figure 2 presents the findings of the current investigation. Total study sample size is 110 endocrine patients in which the percentage type 2 Diabetes mellitus cases are 46.4%. Hypothyroid cases is found to be 33.6%, hyperthyroid cases are 5.5%. PCOD cases are 10.9%.cushing disease is found to be 1.8%. 0.9% cases are contributed by Addison's disease & Acromegaly. Majority of the study sample was type 2 DM 46.4% followed by hypothyroid cases.

**Table 2:** Association between Depression & Endocrine disorders using Hamilton depression rating scale (HDRS)

| Endocrine Disorders | Hamilton Depression Rating Scale (HDRS) | | | | Total | P value |
|---|---|---|---|---|---|---|
| | Normal (0-7) | Mild Depression (8-13) | Moderate Depression (14-18) | Severe Depression (19-22) | | |
| Type-2 Diabetes Mellitus | 46 | 5 | 0 | 0 | 51 | 0.001 |
| Hypothyroidism | 27 | 4 | 6 | 0 | 37 | |
| Hyperthyroidism | 4 | 2 | 0 | 0 | 6 | |
| PCOD | 5 | 2 | 2 | 3 | 12 | |
| Cushing Syndrome | 1 | 1 | 0 | 0 | 2 | |
| Addisons Disease | 1 | 0 | 0 | 0 | 1 | |
| Acromegaly | 1 | 0 | 0 | 0 | 1 | |
| Total | 85 | 14 | 8 | 3 | 110 | |

Table 2 shows, 22% of endocrine patients showed signs of depression. Among these, mild depression was noted in 9.8% of Type-2 DM patients and 10.8% of hypothyroid patients, with an overall depression rate of 27% in the latter group. Among hyperthyroid patients, 33% had mild depression. PCOD patients exhibited the highest depression rate at 58.3%, with various degrees of severity. Out of two Cushing's disease cases, one had mild depression. No depression was observed in Addison's disease and acromegaly cases.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 08, 2023

**Table 3:** Association between Anxiety & Endocrine disorders using Hamilton Anxiety rating scale (HDRS)

| ENDOCRINE DISORDER | HAMILTON ANXIETY RATING SCALE (HAM-A) | | | Total | |
|---|---|---|---|---|---|
| | MILD ANXIETY <17 | MODERATE SEVERITY (18-24) | SEVERE ANXIETY (25-30) | | P value |
| TYPE 2 DIABETES MELLITUS | 47 | 4 | 0 | 51 | 0.000 |
| HYPOTHYROIDISM | 25 | 10 | 2 | 37 | |
| HYPERTHYROIDISM | 2 | 0 | 4 | 6 | |
| PCOD | 5 | 2 | 5 | 12 | |
| CUSHING SYNDROME | 1 | 1 | 0 | 2 | |
| ADDISONS DISEASE | 1 | 0 | 0 | 1 | |
| ACROMEGALY | 1 | 0 | 0 | 1 | |
| Total | 82 | 17 | 11 | 110 | |

Table 3 shows, Type-2 DM (n=51) and hypothyroid patients (n=37), most had mild anxiety, at 92.1% and 67.5% respectively. Hyperthyroid patients (n=6) mainly had severe anxiety (66%). PCOD patients (n=12) exhibited all degrees of anxiety, with severe being most common (41.6%). Cushing's syndrome cases (n=2), as well as single cases of Addison's disease and Acromegaly, all showed mild anxiety.

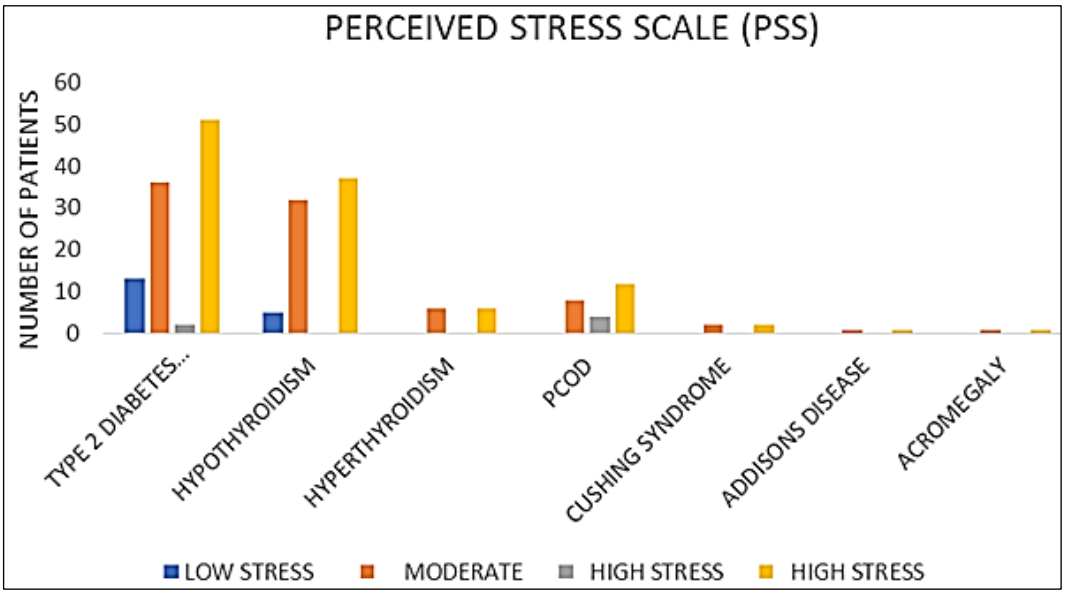


**Fig 3:** Association between Stress & Endocrine disorders using Perceived stress scale (PSS)

Figure 3 shows, out of 51 Type-2 DM patients, 25% reported low stress, 70% moderate, and 3.9% high. Among 37 hypothyroid patients, 13.5% experienced low and 86% moderate stress. All six hyperthyroid patients reported moderate stress. Of 12 PCOD patients, 66% had moderate and 33.3% high stress. Both cases of Cushing's disease and single cases of Addison's disease and Acromegaly reported moderate stress.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 08, 2023

**Table 4:** Assessment of quality of life in endocrine subjects using WHO-QOL BREFF scale

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| physical | 110 | 17.86 | 85.71 | 48.5065 | 12.04962 |
| psychological | 110 | 20.83 | 70.83 | 50.9091 | 11.43364 |
| social | 110 | 8.33 | 91.67 | 56.4394 | 17.69241 |
| environmental | 110 | 15.63 | 87.50 | 56.5625 | 15.15609 |

Table 4 shows that the minimal value for physical health was 17.86 and the maximum value was 85.7, mean of physical health was 48.5. The minimal value for psychological health was 20.83% and the maximum value was 70.8, mean of Psychological health was 50.9. The minimal value for social health was 8.33 and the maximum value was 91.6, mean of social health was 56.4. The minimal value for environmental health was 115.63 and the maximum value was 87.5, mean of environmental health was 56.5.

**Discussion**

Depression is prevalent among patients with various endocrine disorders, with multifactorial causes tied to both physiological and psychological factors. In hyperthyroidism, the excess thyroid hormones, which modulate mood regulation, contribute to mood disorders such as depression. Dealing with this chronic illness and its debilitating symptoms also plays a significant role in developing depressive symptoms [15]. Similarly, Polycystic Ovary Syndrome (PCOD) patients show a high depression rate, with 58.3% of the study cases displaying varying depression severity. This can be attributed to the hormonal disorder's physical symptoms, fertility issues, body image struggles, and hormonal changes. Though the study presented higher depression prevalence in PCOD patients compared to some other studies [16], the variation could be due to factors such as assessment tools, PCOD severity, and geographical location of study participants.

In addition, a connection was observed between Cushing's disease and depression due to high cortisol levels and the physical changes linked to the disease. However, the relationships between depression and other endocrine disorders like Addison's disease and acromegaly are less researched, highlighting the need for further investigation. This study examined depression and anxiety in patients with various endocrine disorders. It found depression in 58.3% of PCOS cases, 50% of Cushing's cases, but none in the single cases of Addison's and Acromegaly. Anxiety was identified in 100% of type 2 diabetes, 92.1% with mild symptoms, 67.5% of hypothyroidism cases, 100% of hyperthyroidism cases, 100% of PCOS cases, 50% of Cushing's cases, and 100% of Addison's and Acromegaly cases. While these results align with some prior studies, discrepancies with others indicate that factors such as assessment scales, disease severity, and geographical differences may influence results [17].

The role of stress in endocrine disorders is increasingly being studied and has shown strong associations with several conditions. For example, a study observed that majority of type 2 diabetes mellitus patients (70%) experienced moderate stress, and work stress significantly increased risk for type 2 diabetes [18]. In thyroid disorders, a similar trend was observed where the majority of hypothyroidism and hyperthyroidism patients had moderate stress levels [19]. Stress was also found to have a strong relationship with Polycystic Ovary Syndrome (PCOS), with a majority of the patients (66%) reporting moderate stress [20]. For adrenal gland disorders, particularly Cushing's disease and Addison's disease, a high stress level was found to correlate with disease onset [21]. In the case of acromegaly, the stress could be due to the changes in physical appearance, brain structure, and prolonged treatment process [22]. These studies underscore the importance of stress management in managing endocrine disorders.

Endocrine disorders, including Type-2 Diabetes Mellitus, Thyroid Disorders, Polycystic Ovary Syndrome (PCOS), Adrenal Gland Disorders, Addison's Disease, and Acromegaly, significantly influence the quality of life (QoL) in affected individuals. Patients with Type-2 Diabetes Mellitus show reduced QoL, especially those with associated depression and complications, which significantly affect their overall well-being [23]. Thyroid disorders, particularly hypothyroidism and hyperthyroidism, are associated with impaired psychological health and QoL. The impairments are severe in patients with overt hypo-and hyperthyroidism, where depressive symptoms and anxiety levels are considerably high [24]. In young women, PCOS significantly affects health-related QoL (HRQOL) and mental well-being. Certain features of PCOS, such as infertility, hirsutism, and acne, are directly linked to decreased mental well-being, impaired emotional well-being, and reduced sexual satisfaction [25].

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Adrenal gland disorders like Cushing's disease also impair psychological well-being and psychosocial functioning. Depression is a common comorbidity, which significantly impacts QoL. Residual impairment of QoL may persist even after achieving remission from hypercortisolism, highlighting the complex nature of the disease [26]. Patients with Addison's disease also show significantly lower QoL, irrespective of the cause or glucocorticoid approach. Current treatments, even those that mimic physiological hormone secretion, may not fully improve QoL [27].

Acromegaly is associated with cognitive impairment, lower self-esteem, and affective disorders, all of which impact QoL. Although various treatment methods can reduce psychological distress and improve QoL, psychiatric comorbidity remains a significant issue in these patients [28].

In conclusion, endocrine disorders can have far-reaching effects on mental health, causing depression, anxiety and stress. Understanding these connections and integrating mental health care into treatment plans is crucial to improving patient outcomes.

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