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Research Article

Exploring Quality of Life Among Thyroid Patients in South Indian Communities: A Comprehensive Study

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ABSTRACT

The thyroid gland plays a crucial role in regulating metabolism and influencing a wide range of physiological functions through its hormone production, and thyroid disorders affect millions globally, significantly impacting individuals' quality of life and overall health. Complications arising from thyroid diseases can vary widely, affecting both physical and emotional well-being, making a comprehensive evaluation of associated complications and quality of life essential. The primary objectives of this study were to evaluate complications related to thyroid disease and assess health-related quality of life in patients with thyroid disorders, while secondary objectives included addressing safety outcomes and providing structured guidance for newly diagnosed patients to counter misinformation and improve understanding of symptoms, causes, and treatments. Conducted at the Centre of Diabetes and Endocrine Care with ethical approval from the Pranav Diabetes Centre Ethics Committee and informed consent from all participants, the study employed a systematic search strategy to identify relevant data and evaluated patients through regular clinical and biochemical assessments. Data were analysed using Chi-square statistical tests to determine significance, and demographic factors such as marital status, residency, age, gender, weight gain, hair loss, and swallowing difficulties were examined. Quality of life evaluations revealed notable variations among thyroid patients, significantly affecting their physical and emotional well-being. The study highlighted higher occurrences of thyroid disorders among married individuals, urban residents, and non-working participants within the South Indian community, with common symptoms including weight changes, temperature sensitivity, fatigue, and variable swallowing difficulties. Factors such as healthcare access, socio-cultural influences, and treatment effectiveness were found to play crucial roles in patient well-being, underscoring the importance of tailored interventions and support systems to enhance quality of life. This research emphasizes the need for clear, structured information in research articles to guide newly diagnosed patients, helping them understand thyroid symptoms, causes, and treatments and ultimately improving their overall quality of life.

Introduction

The thyroid gland in humans is located in front of the larynx and trachea; it is situated at the level of the 5, 6, and 7th cervical and 1st thoracic vertebrae. The approximate weight of the thyroid gland is about 25 g and is enclosed by a fibrous capsule[1]. It resembles a butterfly in shape. The thyroid gland primarily produces two types of hormones, namely triiodothyronine[T3] and thyroxine[T4]; their estimated daily production is about 30 and 100 µg, respectively [2]. Both T4 and T3 are iodine-containing derivatives of thyronine, which is a condensation product of two molecules of the amino acid tyrosine; T4, thyroxine, is 3,5,3',5'–tetraiodothyronine, whereas T3 is 3,5,3'–triiodothyronine. T3 and T4 have similar biological activity, but the thyroid receptor generally shows higher sensitivity towards T3 than T4.[3] The vital micronutrients required for thyroid hormone synthesis

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include iodine, iron, selenium, zinc, and copper.[4] Iodine can be obtained from dietary sources such as cow's milk, saltwater fish, eggs, and iodised table salt.[5] The major steps involved in the biosynthesis of thyroid hormones are as follows: iodine uptake, oxidation and iodination, coupling, storage, release, and peripheral conversion of T3 and T4. The complex feedback mechanism regulating circulating thyroid hormone levels is the Hypothalamic-Pituitary-Thyroid [HPT] axis. This mechanism involves the release of Thyrotropin-Releasing Hormone [TRH] from the hypothalamus, which acts on the pituitary gland, causing the release of Thyroid-Stimulating Hormone [TSH] and thereby stimulating the secretion of thyroid hormones.[6] Both T3 and T4 enter the cells via active transport and bind to the nuclear thyroid hormone receptor, where they exert most of their activity. Only the free hormone is available for action, metabolism, and excretion. The main metabolic pathways of T3 and T4 include glucuronide and sulphate conjugation. The primary sites of metabolism include the liver, salivary glands, and kidneys. Excretion of conjugates occurs in bile, and a significant fraction is deconjugated in the intestine and reabsorbed, eventually being excreted in urine [7]. Thyroid hormones play essential roles in numerous physiological and psychological functions, including cardiac function, tissue development, normal brain maturation, the reproductive system, the excretory system, the gastrointestinal tract, metabolism of micro and macromolecules, and haemopoiesis [8].

The disorders of the thyroid gland can be classified under three main domains, i.e., abnormal secretion of thyroid hormones (T3 and T4), goitre, and tumours. Abnormal secretion of thyroid hormones results in both hyperthyroidism and hypothyroidism [9]. Excessive levels of T3 and T4 characterize hyperthyroidism (thyrotoxicosis) and include Graves' disease, toxic nodular goitre, and toxic adenoma [10]. Hypothyroidism occurs due to insufficient secretion of T3 and T4, causing cretinism in children and myxoedema in adults. Enlargement of the thyroid gland without signs of hyperthyroidism is termed goitre. Tumours include both benign and malignant types, with malignant tumours comprising papillary carcinoma, follicular carcinoma, undifferentiated carcinoma, and medullary carcinoma [11].

Hypothyroidism presents with symptoms such as tiredness, respiratory distress, hair loss, numbness, cold intolerance, dry skin, dementia, and headaches. In contrast, hyperthyroidism is characterized by insomnia, weight loss, tachycardia, anxiety, and heat intolerance. Quality of life, as defined by the World Health Organization, is a state of complete physical, mental, and social well-being, and not merely the absence of disease. Globally, the prevalence of overt hyperthyroidism ranges from 0.2 to 1.3%, while hypothyroidism ranges from 1 to 2%. In India, approximately 42 million people are affected by thyroid disease [12]. In European countries, the prevalence rate was found to be 0.75%, whereas in the United States, hyperthyroidism was estimated at 0.5%. Australia showed a lower prevalence of 0.3% for overt hyperthyroidism. In Africa, prevalences of 0.6 and 1.7% were reported for hyperthyroidism and hypothyroidism, respectively [13].

The US Food and Drug Administration (FDA) defines HRQoL as a multidomain concept reflecting the patient's perception of illness and treatment effects on physical, psychological, and social aspects of life [14]. To assess a patient's quality of life, doctors require standardized tools to view health from the patient's perspective, or they risk overlooking important issues. Therefore, this prospective case study was conducted to identify and analyse the quality of life of thyroid patients in the South Indian community [15]

Materials And Methods

Ethical Approval

The ethical committee clearance was obtained from the Institutional Ethical Committee of Pranav Diabetes Centre Ethics Committee [PDCEC], Ramurthy Nagara, Bengaluru, Karnataka, India. The study was conducted between December 2023 and January 2024 at the Centre of Diabetes and Endocrine Care, Kalyan Nagar, Bengaluru, Karnataka, India – 560054. Study characterization was performed, including the inclusion and exclusion criteria. Patients were enrolled after providing written consent for participation in the study. A study design was employed to collect all necessary information. To extend clinical pharmacy services in patient care, drug therapy and its outcomes were evaluated [16].

Search Strategy

A uniform systematic search of PubMed and ScienceDirect databases was performed using keywords such as thyroid hormone, thyroxine, levothyroxine, quality of life, and health-related quality of life. Furthermore, eligible studies were selected from the reference lists of the identified articles to find additional relevant studies. The search was restricted to studies on humans, with no limitation on language [17].

Study Design

At the outset, every participant provided written informed consent after a detailed briefing on the study's protocol, objectives, and potential benefits and risks. Participants retained the right to withdraw their data at any time. They reported their quality of life by completing the questionnaires. Data sources for the study included patient case sheets, prescriptions, blood test reports, and interactions with patients or their caregivers. The study was conducted based on the following inclusion criteria: patients aged between 20 and 60 years, including those with hyperthyroidism, hypothyroidism, Hashimoto's thyroiditis, cretinism, and related conditions. The study

also considered safety outcomes such as eye and skin problems, heart issues, hair loss, dry skin, sensitivity to heat or cold, and weight gain or loss. The exclusion criteria included patients with thyroid tumours or cancers and patients above 60 years of age [18].

Clinical And Biochemical Evaluation

During the study, all patients were examined, and their TSH, T3, and T4 levels were measured at intervals of 1.5, 3, 6, 9, 12, 18, 24, 30, 36, 42, and 48 months. To compare the distributions of categorical and continuous variables, the Chi-square test was used. The Chi-square test is a statistical method that determines whether there is a significant association between categorical variables. It compares observed frequencies with expected frequencies to evaluate whether any differences occur by chance.

Results And Discussion

Table 1 shows exploring health-related quality of life among thyroid patients

Figure A shows of all genders among 100 responses, 81% of females and 19% of males were diagnosed with thyroid diseases. Thyroid disease is more prevalent among females compared to males due to hormonal differences, particularly during reproductive years, which may contribute to this disparity. Additionally, females are more likely to seek medical attention, leading to higher diagnosis rates. Genetic factors and lifestyle choices also play a role in the increased prevalence among females.

Figure B shows among all 100 responses, thyroid disease occurred in 80% of married individuals and 19% of unmarried individuals. Thyroid disease prevalence is higher in married individuals compared to unmarried ones. Factors such as hormonal changes during pregnancy, stress from familial responsibilities, and lifestyle differences may contribute. Additionally, genetic predisposition, dietary habits, and healthcare access likely play a role in the higher occurrence among married individuals.

Figure C shows thyroid disease is more prevalent in urban areas, is 90%, compared to rural areas, which is 10%. Factors such as environmental pollution, lifestyle choices, diet, and access to healthcare in urban areas likely contribute to the higher prevalence. In contrast, rural areas may have limited healthcare awareness and fewer diagnostic facilities.

Figure D shows after analysing 100 responses, it was found that 91% of respondents were suffering from hypothyroidism, while 9% were suffering from hyperthyroidism. Hypothyroidism, where the thyroid gland is underactive, is more common due to factors like autoimmune disorders, iodine deficiency, and hormonal imbalances. Hyperthyroidism, characterized by an overactive thyroid, is less frequent and typically linked to conditions like Graves' disease or thyroid nodules.

Figure E shows in a survey of 100 responses across all age groups, thyroid disease prevalence varied by age. Among individuals aged 20-25 years, 17% reported thyroid disease. In the 26 to 40 years age group, 36% were affected, while 47% of individuals aged 41 to 60 years reported thyroid disease. This suggests that thyroid issues become more common with age, potentially due to hormonal changes, lifestyle factors, and increased risk with aging.

Figure F shows in a survey of 100 responses, thyroid disease prevalence varied across different groups. Among non-working individuals, 57% reported having thyroid issues. In working individuals, 34% were affected, while only 8% of students reported thyroid disease. These differences could be attributed to factors such as stress, lifestyle, and access to healthcare, which may vary based on work and student responsibilities.

Figure G shows in a survey of 100 responses, 47% of individuals reported weight gain, 35% experienced weight loss, and 18% noticed no changes in their weight. These variations could be linked to thyroid conditions, as hypothyroidism is often associated with weight gain, while hyperthyroidism may lead to weight loss. The absence of weight changes could indicate a more stable thyroid function or other factors unrelated to thyroid health.

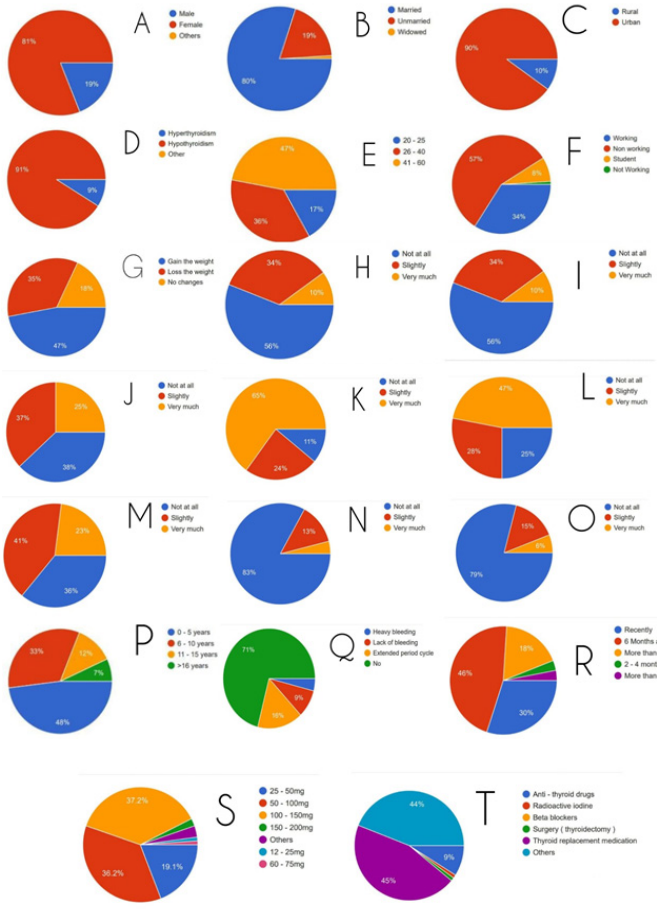

Figure 1: Exploring health-related quality of life among thyroid patients.

Table 1: Exploring health-related quality of life among thyroid patients

Figure Number	*Type of Questionnaire*	*Number of responses*				
A	Gender	Female	Male			
		81	19			
B	Marital status	Married	Unmarried			
		80	19			
C	Residence	Urban	Rural			
		90	10			
D	Which of the thyroid problems do you have	Hypothyroidism	Hyperthyroidism			
		91	9			
E	Age	20–25	26–40	41–60		
		17	36	47		
F	Employment status	Working	Non working	Student		
		34	57	8		
G	Have you noticed any changes in your weight	Gain the weight	Lose the weight	No changes		
		47	35	18		
H	Have you been sensitive to heat/ cold	Not at all	slightly	Very much		
		56	34	10		
I	Have you felt discomfort while swallowing	Not at all	slightly	Very much		
		56	34	10		
J	Have you had an increased appetite	Not at all	slightly	Very much		
		38	37	25		
K	Have you had dry skin or hair fall	Not at all	slightly	Very much		
		11	24	65		
L	Have you been tired/exhausted	Not at all	slightly	Very much		
		25	28	47		
M	Have you felt anxious/depressed	Not at all	slightly	Very much		
		36	41	23		
N	Have you felt difficulty while being together with other people in your surroundings	Not at all	slightly	Very much		
		83	13	4		
O	Have you felt that your thyroid problem harms your sex life	Not at all	slightly	Very much		
		79	15	6		
P	For how many years have you been suffering from a thyroid problem	0–5 years	6–10 years	11–15 years		>16 years
		48	33	12		7
Q	Has your menstrual cycle been affected by a thyroid problem? If yes, how?	Heavy bleeding	Lack bleeding	Extended period cycle		No
		4	9	16		71
R	When have you undergone a thyroid test	Recently	6 months ago	More than 1 year	2-4 months ago	More than 2-4 months ago
		30	46	18	3	3

S	Which of the following treatments are you currently undergoing	Thyroid replacement medication	Antithyroid drugs	Others
		45	9	44
T	What is the dose of medication that you are taking currently	25–50 mg	50–100 mg	100–150 mg
		19.1	36.2	37.2

Figure H shows after analysing 100 responses, 52% of individuals reported no sensitivity to heat and cold, while 36% were slightly sensitive, and 12% were very sensitive. Sensitivity to temperature fluctuations can be linked to thyroid function, as hypothyroidism often causes cold intolerance, and hyperthyroidism may lead to heat intolerance. These responses may indicate varying thyroid health among the participants.

Figure I shows in a survey of 100 responses, 10% of individuals reported experiencing significant discomfort while swallowing, 56% reported no discomfort at all, and 34% experienced slight discomfort. Swallowing difficulties could be linked to thyroid conditions, as an enlarged thyroid or related complications may cause discomfort, while others may not experience such symptoms, depending on the severity of their condition.

Table 1 Exploring health-related quality of life among thyroid patients.

Figure J shows of the respondents, 38% had not at all increased appetite, 37% had slightly increased appetite, and 25% had a much increased appetite. The type of thyroid disease can influence these appetite fluctuations. Hypothyroidism is often associated with a decreased appetite, while hyperthyroidism may lead to increased hunger due to the body's heightened metabolic rate and energy demands.

Figure Kshows out of 100 responses, 65% reported significant hair fall, which is commonly linked to thyroid dysfunction. Hair loss can occur in both hypothyroidism and hyperthyroidism, with hypothyroidism often leading to thinning and shedding. Hyperthyroidism can cause rapid hair loss due to an overactive metabolism. Hormonal imbalances are the primary factor affecting these symptoms.

Figure Lshows out of 100 responses, 47% reported frequent fatigue, which is a common symptom of thyroid disorders. Hypothyroidism typically causes persistent tiredness due to a slowed metabolism, while hyperthyroidism may cause fatigue due to the body's excessive energy demands. The severity of tiredness can vary depending on the disease's progression and individual response to treatment.

Figure M shows out of 100 responses, 41% experienced mild anxiety or depression. Thyroid disorders, particularly hypothyroidism and hyperthyroidism, can lead to mood disturbances due to hormonal fluctuations. A slowed metabolism in hypothyroidism can cause feelings of depression, while hyperthyroidism can result in heightened anxiety and nervousness. The impact of these mental health symptoms varies with disease type and severity.

Figure N shows out of 100 responses, 13% reported interpersonal challenges, likely due to mood swings or physical symptoms caused by thyroid disease. Thyroid imbalances can affect mental health, leading to irritability, depression, or anxiety, which may impact relationships. Conversely, the majority, 85%, did not report such difficulties, indicating a wide variation in the emotional and social impact of thyroid disease.

Figure O shows out of 100 responses, 9% reported a significant impact of thyroid issues on their sex life or fertility. Thyroid dysfunction can affect reproductive health, with hypothyroidism leading to menstrual irregularities and reduced libido, while hyperthyroidism may cause fertility issues. Many individuals may not experience these effects, reflecting variability in how thyroid disease influences sexual health.

Figure P shows out of 100 responses, 48% had been suffering from thyroid disease for 0-5 years, indicating that many individuals are recently diagnosed. Thyroid disease progression often varies with time, with long-term sufferers potentially experiencing more severe symptoms. The 33% reporting 6-10 years and the 12% with 11-15 years reflect ongoing management and varying treatment needs over time.

Figure Q shows among the responses, 71% experienced heavy bleeding during their menstrual cycle, 16% had an extended period cycle, and 9% experienced a lack of bleeding. Heavy menstrual bleeding is a common symptom linked to thyroid disorders, particularly hypothyroidism. Menstrual irregularities are a well-known consequence of thyroid dysfunction. While some individuals report longer periods or lack of bleeding, these symptoms vary significantly depending on the type of thyroid disorder and individual health conditions.

Figure R shows out of 100 responses, 48% underwent thyroid testing within the last six months, reflecting proactive health monitoring. Early diagnosis can lead to more effective management of symptoms. The 30% with recent diagnoses and 18% diagnosed within the past year show the importance of regular check-ups for detecting thyroid dysfunction, enabling timely treatment to prevent complications.

Table 1 Exploring health-related quality of life among thyroid patients.

Figure S shows out of 100 responses, 44% are using antithyroid drugs, 45% are on thyroid replacement therapy, and 9% are using alternative treatments. The choice of treatment is influenced by thyroid disease type—antithyroid drugs are typically prescribed for hyperthyroidism, while thyroid replacement medications are used for hypothyroidism. Alternative therapies may be sought by individuals who experience side effects or prefer non-conventional treatments. Treatment decisions often depend on symptom severity and individual health responses.

Figure T shows out of 100 responses, 37.2% are on a dosage of 100 to 150 mg, 36.2% are using 50 to 100 mg, and 19.1% are prescribed 25-50mg of medication. The dosage varies depending on the severity of the thyroid condition. Higher dosages are generally used for more severe hypothyroidism or hyperthyroidism cases, while lower doses are often prescribed for individuals with milder conditions or those in the early stages of treatment. Adjustments are made based on individual responses and ongoing monitoring.

Employing meticulously validated questionnaires, this study adopts a randomized design to rigorously investigate and analyse the intended outcomes in the quality of thyroid patients. Quality of Life (QoL) constitutes a holistic evaluation, encompassing physical, social, and psychological dimensions [19]. Quality of Life is about how a person feels overall, including their body, relationships, and emotions. The prior research focused narrowly on aspects of quality of life, as mentioned below. The study investigated whether adding liothyronine to levothyroxine therapy improves quality of life in female hypothyroid patients with lingering symptoms, by Bjerkreim et al [16]. Examining the enduring effects on infants born to mothers with thyroid dysfunction during pregnancy by Laura Lucaccioni et al. [20]. This study likely focused on how patients with hypothyroidism perceive their quality of life, satisfaction, and preferences during treatment. It aimed to understand how different treatment approaches impact these factors to better tailor care to patients' needs and preferences, according to Jonklaas et al [21]. The primary outcome of treating patients with levothyroxine showed a significant side effect, specifically depression, in older adults with hypothyroidism by Lea Wildisen et al. [22]. However, our study aims to take a broader approach, examining quality of life more comprehensively.

Based on the study conducted among individuals in the South Indian community, it was found that as people age, their quality of life tends to decline, and men generally report a higher quality of life compared to women [23]. Similar patterns were observed in individuals with hypothyroidism, where age and gender also influenced quality of life. Among adults aged 20 to 60 years with hyperthyroidism or hypothyroidism, regardless of gender, and with a disease duration of 2 to 8 years, quality of life reflects a complex interplay of multiple factors [24]. Age, gender, and duration of illness all contribute to the overall well-being of individuals managing thyroid disorders. Understanding these dynamics is essential for healthcare professionals to tailor interventions and support systems that meet the unique needs of each patient, ultimately improving their quality of life and overall health outcomes [25]. Considering factors beyond the standard aspects of thyroid disease treatment may reveal new strategies to enhance patient satisfaction and well-being. Exploring these dimensions could lead to more personalized and effective approaches for improving overall quality of life [26].

In a survey conducted within the South Indian community involving 100 participants, diverse personal responses were collected. Married individuals showed a higher prevalence of thyroid disease compared to unmarried participants, potentially due to increased stress, shared lifestyle habits, reproductive factors such as pregnancy, and psychosocial influences [27]. While only 10% of rural residents had thyroid disease, 90% of urban participants were affected, likely due to environmental pollution, sedentary urban lifestyles, limited rural healthcare access, socioeconomic disparities, and higher urban stress levels [28]. Among occupational groups, non-working individuals reported more thyroid issues compared to working participants, while students had the lowest incidence, reflecting differences in stress, lifestyle habits, and healthcare access [29]. Regarding thyroid-related weight changes, nearly half reported weight gain, over a third experienced weight loss, and a few noticed no significant changes, reflecting the effects of hypothyroidism slowing metabolism and hyperthyroidism accelerating it, as well as individual variations in thyroid function and treatment efficacy [30]. Most participants were not sensitive to heat or cold, though some reported slight sensitivity and a few reported high sensitivities, influenced by altered thermoregulation due to thyroid hormone imbalances [31]. Swallowing difficulties were reported by 10 participants, mild discomfort by 34, and no trouble by 56, potentially due to underlying health, age-related changes, diet, psychological factors, or anatomical variations [32]. Appetite changes were reported as no increase in 38%, slight increase in 37%, and significant increase in 25%, influenced by metabolic rate, lifestyle, genetics, and stress. Fatigue varied, with 47% feeling often exhausted, 28% slightly tired, and 25% not frequently tired, reflecting differences in sleep quality, stress, activity, diet, and underlying conditions [33]. Most participants did not report difficulties in interpersonal relationships, sex life, or fertility. Regarding treatment, many were using antithyroid drugs or thyroid replacement therapy, while some explored alternative therapies [34]. Hair fall was

significant, with 65% reporting severe loss, 25% slight loss, and 11% no hair fall. Anxiety or depression was reported as mild by 41%, severe by 22%, and absent in 36% [35].

The study, conducted at Bengaluru's Centre of Diabetes and Endocrine Care, obtained ethical clearance from the Pranav Diabetes Centre Ethics Committee, and participants aged 20 to 65 years provided written informed consent [36]. A systematic search of thyroid-related databases, including PubMed and ScienceDirect, was performed to identify the latest research on hypothyroidism treatment and patient outcomes [37]. Statistical analyses, such as Chi-square tests, were applied to evaluate the effects of drug therapy on various thyroid conditions by comparing observed and expected results [38]. The study adhered to inclusion criteria encompassing patients aged 20 to 60 years with thyroid diseases like hyperthyroidism and hypothyroidism, while considering safety outcomes such as eye and skin problems, heart issues, hair loss, temperature sensitivity, and weight fluctuations; exclusion criteria involved patients with thyroid tumours or cancers and those above 60 years [39]. Survey findings revealed that many individuals with thyroid disorders experience dissatisfaction and diminished quality of life, with factors such as age, gender, patient expectations, interactions with healthcare providers, and insufficient information from doctors playing critical roles, while the type of thyroid hormone replacement therapy had minimal impact on satisfaction or QoL [40]. Improving patient outcomes requires managing expectations, enhancing patient-provider relationships, and providing comprehensive information about thyroid disorders. Some limitations were noted, as patients were sometimes reluctant to share personal data regarding medications and medical reports due to multiple health conditions or hesitancy before the study began [41]. The primary goal of this study is to provide organized and reliable information for newly diagnosed thyroid patients, as abundant online resources often mislead regarding symptoms, causes, and treatments [42]. Ensuring clear, structured research on thyroid disorders, particularly addressing quality of life, can offer valuable insights from case studies into how thyroid conditions impact patients' QoL and guide future research and interventions [43].

Conclusion

In conclusion, our study highlights the quality of life experienced by thyroid patients within the South Indian community, identifying factors that influence their well-being, including access to healthcare, socio-cultural influences, and the effectiveness of treatment options. These findings emphasize the need for tailored interventions and support systems to enhance the QoL of individuals managing thyroid disorders in this demographic. By addressing the unique needs of South Indian thyroid patients, healthcare providers can improve overall health outcomes and foster a better quality of life. This case study offers a comprehensive and structured overview, particularly focusing on hypothyroidism, providing compelling evidence on how thyroid conditions impact patients' QoL and guiding future strategies to optimize patient care.

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