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PREVALENCE AND CLINICAL FEATURES OF IODINE DEFICIENCY INDUCED HYPOTHYROIDISM IN DISTRICT MARDAN, PAKISTAN

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Abstract

Hypothyroidism is a common endocrine disorder with significant health consequences, particularly among women, yet local data from District Mardan are limited. This study was conducted to evaluate the demographic characteristics, clinical features, body mass index (BMI) status, disease duration, and treatment patterns of patients diagnosed with hypothyroidism. A cross-sectional design was used, and data were collected using a structured questionnaire. Descriptive statistical analysis was performed. A total of 100 hypothyroid patients aged 10-80 years were included in the study. Of these, 95% were female and 5% were males. The most affected age group was 30–40 years (37%), indicating that individuals in their reproductive years are at greater risk. A high prevalence of obesity was observed among the participants, with the majority belonging to Obese Class I (34%) and Obese Class II (22%), demonstrating a strong association between obesity and hypothyroidism. Clinically, most patients presented with multiple classical features of hypothyroidism. Weight gain (95%), fatigue (87%), muscle pain (90%), puffiness of the face and extremities (96%), restlessness (96%), hair loss (71%), rough skin (72%), and constipation (63%) were commonly reported. A history of infertility and menstrual irregularities was also frequent among females of reproductive age, highlighting the impact of thyroid dysfunction on reproductive health. Disease onset was most commonly reported within the past 1–5 years (58%), suggesting either increased detection or a rising burden of disease. Medical management was the primary treatment approach, with 98% of patients receiving pharmacological therapy. Levothyroxine was the most commonly prescribed medication, particularly thyroxine 50 µg, and moderate dosing (2–3 tablets) was preferred by the majority of patients. In conclusion, hypothyroidism in District Mardan predominantly affects females and obese individuals and is associated with a high clinical symptom burden. Early screening, public awareness, and strengthened primary healthcare services are essential to improve early diagnosis and management outcomes.

INTRODUCTION

The thyroid gland is a vital endocrine organ located in the inferior anterior region of the neck and plays a central role in maintaining metabolic homeostasis through the synthesis and secretion of thyroid hormones, as well as in regulating iodine balance within the human body[1, 2]. The thyroid predominantly produces thyroxine (T4), which accounts for nearly 90% of hormone output and serves as a prohormone [3], while approximately 10% is secreted as the biologically active triiodothyronine (T3) [4]. These hormones are essential for the regulation of metabolism, growth, development, and energy balance [5]. Deficiency of thyroid hormones from any cause results in hypothyroidism, a condition characterized by reduced metabolic activity and systemic physiological impairment [6].

Hypothyroidism is among the most common and treatable endocrine disorders worldwide and is defined by insufficient production of T4 and T3 [7]. It is a chronic condition associated with generalized slowing of metabolic processes, affecting multiple organ systems [8]. Globally, hypothyroidism affects approximately 10% of the population, with varying prevalence across age groups and regions [9]. In children and adolescents, untreated hypothyroidism can lead to impaired growth and neurodevelopment [10]. While in adults it often remains undiagnosed for years, resulting in compromised physical and cognitive functioning [11]. In women of .reproductive age, inadequate treatment is associated with infertility, recurrent pregnancy loss, preeclampsia, impaired fetal growth, and adverse neurocognitive outcomes in offspring, along with an increased risk of postpartum thyroiditis [12]. Clinically, hypothyroidism presents with a wide spectrum of nonspecific symptoms, including weight gain, fatigue, depression, muscle pain, constipation, menstrual irregularities, and reduced quality of life [13]. Prolonged hormonal imbalance further increases the risk of cardiovascular diseases and hypertension [14]. Diagnosis is typically confirmed by elevated thyroid-stimulating hormone (TSH) levels in conjunction with reduced free thyroxine (FT4) concentrations [15]. Once diagnosed, lifelong replacement therapy with levothyroxine (L-T4) is recommended and remains the standard treatment worldwide due to its efficacy, safety, and ability to maintain stable hormone levels with daily oral administration [16].

Iodine deficiency remains the leading preventable environmental cause of hypothyroidism and other thyroid disorders. More than 110 countries report iodine deficiency–related thyroid diseases, placing nearly 1.6 billion individuals at risk, particularly in developing regions of Asia, Africa, and Latin America [17]. In Pakistan, both clinical and subclinical hypothyroidism are prevalent, affecting 4.1% of adults and 5.4% of children, with a higher burden among women [18]. Approximately 20 million people live in iodine-deficient areas, and nearly 8 million suffer from iodine deficiency disorders. In District Mardan, the prevalence of hypothyroidism and subclinical hypothyroidism is notably high, particularly among females [19]s. In this context, the present study was conducted to assess the prevalence and clinical features of iodine deficiency–induced hypothyroidism in District Mardan, providing region-specific evidence to inform prevention and management strategies.

Materials and Methods

A cross-sectional study was conducted from January 2021 to March 2021 at Mardan Medical Complex, Dar-ul-Shifa Hospital, and within the community population of District Mardan. A total of 100 diagnosed hypothyroid patients were randomly selected. Both males and females from different age groups were included.

The study focused on patients already diagnosed with iodine-induced hypothyroidism. Data was collected using a specially designed questionnaire through face-to-face interviews. Information gathered included sociodemographic characteristics, age, height, weight, clinical manifestations, and signs and symptoms of hypothyroidism.

Anthropometric measurements were obtained using standard procedures. Height was measured using a stadiometer, and weight was measured

using a calibrated weighing scale. Body mass index (BMI) was calculated using the standard formula (kg/m²).

Results and Discussion

A total of 100 hypothyroid patients aged 10-80 years were included in the study. Of these, 95% were female and 5% were male. Marital status analysis showed that 85% were married (80% females and 5% males), while 15% were single. Family history of hypothyroidism was reported by 38% of patients, while 62% reported no family history as shown in Table 1. The highest prevalence of hypothyroidism was observed in the 30-40year age group (37%), 20-30years had 30 %, 40-50years had 14%, lowest (7%) was observed in above 60 years age group. Only 4% of patients had a history of neck radiation, whereas 96% had no such exposure as shown in Figure 1. Family history of hypothyroidism was observed in 38% of patients, which aligns with findings reported by Alruwali et al. highlighting the hereditary component of thyroid disorders [20].

Table 1: Demographic Characteristics of Hypothyroid Patients (n = 100)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	95	95
	Male	5	5
Marital Status	Married	85	85
	Female	80	80
	Male	5	5
	Single	15	15
Family History	Yes	38	38
	No	62	62

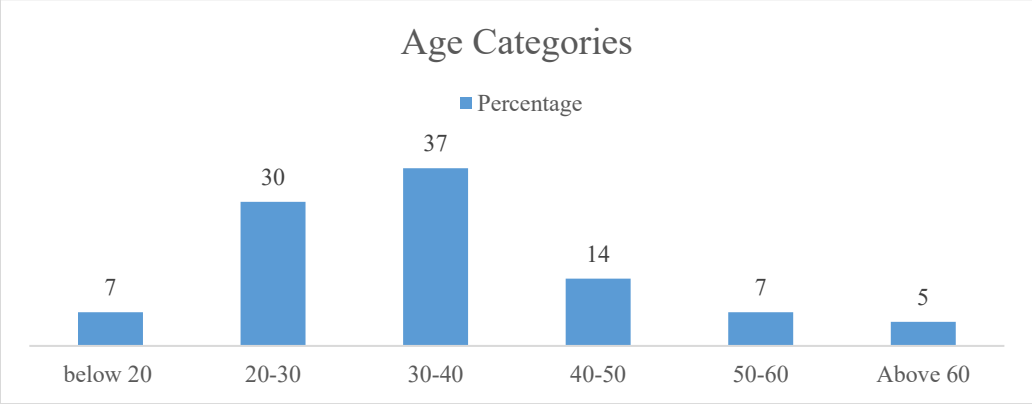

Figure 1. percentage of age categories of the respondents

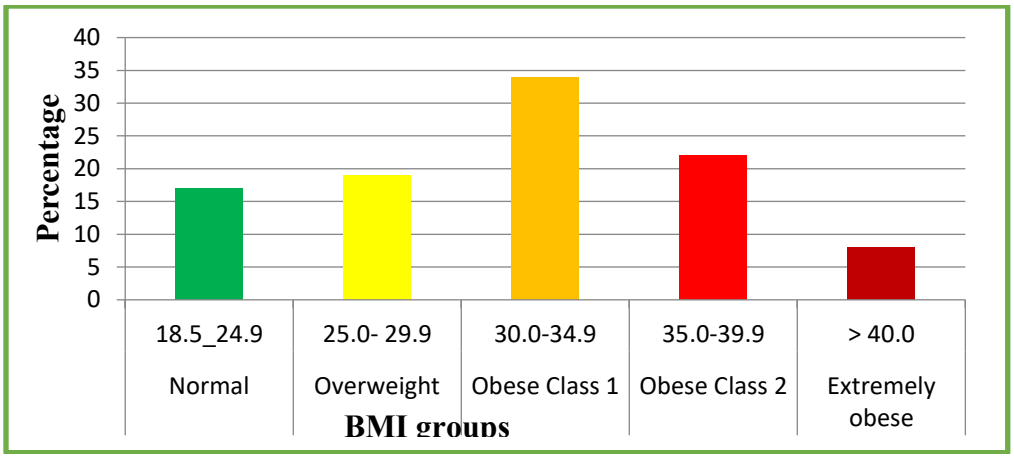

Figure 2. Percentage of BMI groups of the respondents

Table 2. Clinical Features of Hypothyroid Patients

Clinical Features	Yes (%)	No (%)
sHistory of infertility	38	62
Weight gain	95	5
Cold hands and feet	67	33
Fatigue	87	13
Hair loss	71	29
Rough skin	72	28
Brittle nails	54	46
Gravelly voice	81	19
Muscle pain	90	10
Constipation	63	37
Restlessness	96	4
Puffiness (face, eyes, hands, feet)	96	4

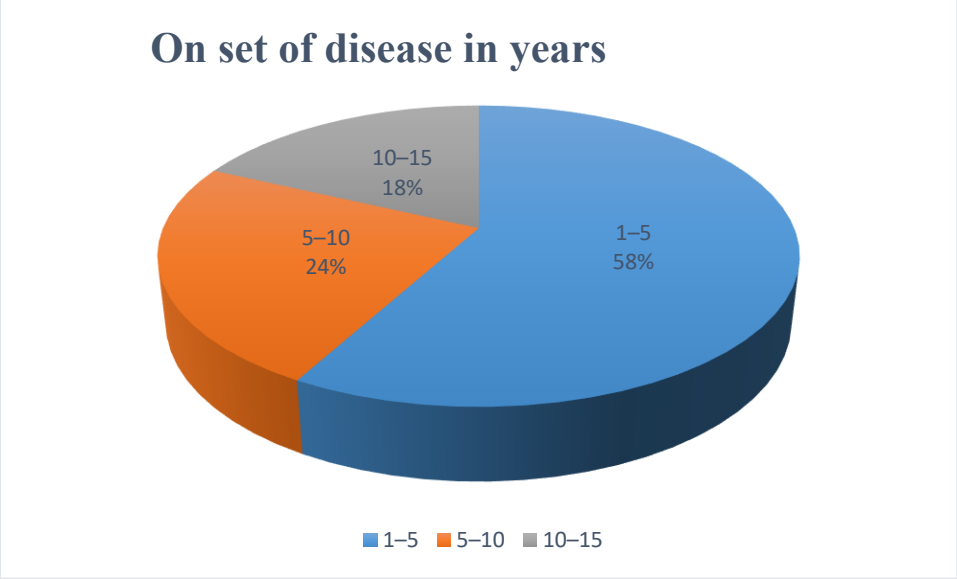

Figure 3. percentage of onset of disease in years among respondents

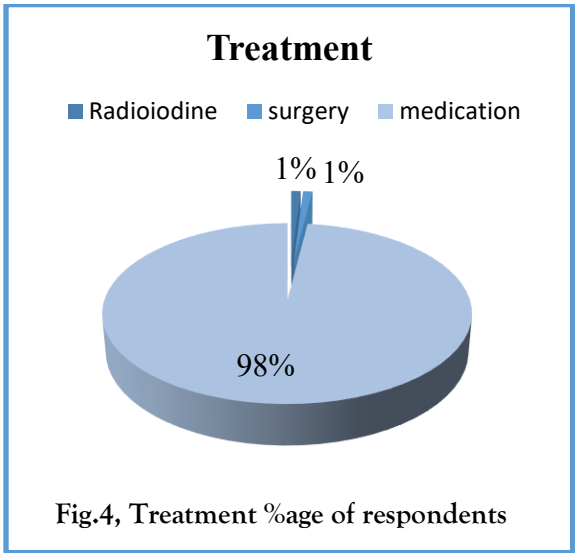

Fig.4, Treatment %age of respondents

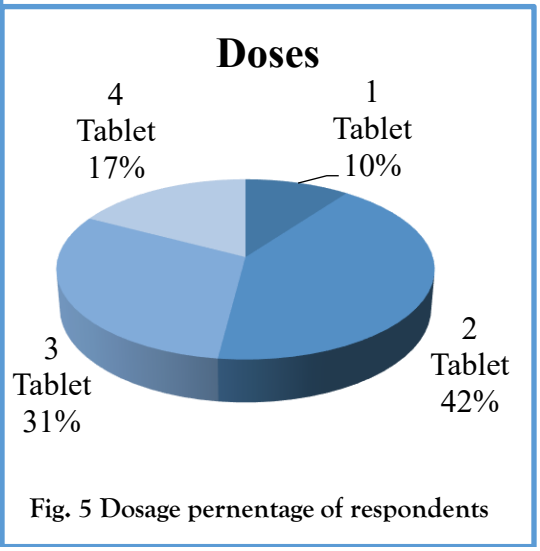

Fig. 5 Dosage pernentage of respondents

The present study revealed a markedly higher prevalence of hypothyroidism among females (95%) compared to males (5%) in District Mardan. These findings are consistent with previously reported data indicating a higher prevalence of hypothyroidism in females than males [21]. The female predominance observed in this study further supports global trends in thyroid disorders.

The most affected age group was 30–40 years (37%), which is in agreement with findings reported by Zhang et al., who documented a prevalence of 35.6% in the same age group. This indicates that individuals in their reproductive age are at greater risk [22].

Figure 2 illustrates the distribution of study participants according to BMI categories. The results show that 17% of respondents had a normal BMI (18.5–24.9), while 19% were classified as overweight (25.0–29.9). The highest proportion of participants fell into Obese Class I (BMI 30.0–34.9), accounting for 34% of the study population. Obese Class II (BMI 35.0–39.9) was observed in 22% of respondents,

whereas only 8% were categorized as extremely obese (BMI >40.0). Overall, the findings indicate a high prevalence of obesity among the participants, with the majority falling into Obese Class I and II categories. The majority of patients in this study belonged to obese class I (BMI 30.0–34.9 kg/m²). Similar findings were reported by Ali, 2024, who observed a higher prevalence of hypothyroidism among individuals with BMI greater than 30 kg/m². These results suggest a strong association between obesity and hypothyroidism [23].

The clinical features observed among the study participants showed a high prevalence of classic hypothyroid-related symptoms. A history of infertility was reported by 38% of respondents, while 62% denied such history. Weight gain was one of the most common features, present in 95% of patients. Cold hands and feet were reported by 67% of respondents, whereas 33% did not experience this symptom.

Fatigue was highly prevalent and reported by 87% of participants. Lethargy and facial oedema was the commonest symptom in population of Faisalabad as reported by Khurram et al., [24]. Hair loss and rough skin were also common, affecting 71% and 72% of patients, respectively, In a study by Jamwal et al., dry skin, pruritus and hair loss were seen more frequently with older age groups of hypothyroidism[25]. Brittle nails were present in slightly more than half of the respondents (54%), while 46% did not report this condition. Niaz et al., reported slow nail growth and brittle nails, in <20% cases from Islamabad, Pakistan.

A gravelly or hoarse voice was noted in 81% of the study population. Muscle pain was reported by 90% of patients, indicating a high burden of musculoskeletal complaints. Constipation was present in 63% of respondents, while 37% reported normal bowel habits. Interestingly, restlessness was reported by 96% of participants. Puffiness of the face, eyes, hands, and feet was also very common, affecting 96% of the respondents, with only 4% reporting no puffiness.

Overall, the results indicate that the majority of patients exhibited multiple clinical features consistent with hypothyroidism, highlighting the substantial symptom burden in the study population as shown in table 2.

Clinical manifestations observed in this study, including puffiness, restlessness, weight gain, muscle pain, and fatigue, were consistent with findings reported by Shah et al. (2020) [26]. Menstrual irregularities were particularly common among females of reproductive age, supporting previous evidence that thyroid dysfunction significantly affects reproductive health Kumar et al., 2020 [27]

The distribution of disease onset by duration revealed that the majority of cases developed the disease within the first 1-5 years, accounting for 58% of the total participants. A smaller proportion of patients (24%) reported disease onset between 5-10 years, while the lowest frequency (18%) was observed among those with disease onset between 10-15 years. Overall, the findings indicate that disease onset predominantly occurs within the early years, with a gradual decline in prevalence as the duration increases (figure 3). Only 1% of patients had undergone radiation therapy, indicating that radiation exposure was not a major contributing factor in this population (figure 4) Surgical therapies were rarely used in this population (1%), while majority of the respondents (98%) were using medication for treatment of hypothyroidism. The analysis of dosage patterns among respondents showed that the most commonly used dose was 2 tablets, reported by 42% of participants. This was followed by 3 tablets, used by 31% of respondents. A smaller proportion of participants reported taking 4 tablets (17%), while the least common dosage was 1 tablet, reported by only 10% of respondents. Overall, the results indicate that moderate dosing (2–3 tablets) was preferred by the majority of respondents as shown in Figure 5. Most patients were receiving thyroxine therapy, with thyroxine 50 µg being the most commonly prescribed medication. Levothyroxine remains an essential medicine recommended by the World Health Organization for the management of hypothyroidism [28].

Conclusion

The present study highlights a substantial burden of hypothyroidism in District Mardan, with a marked female predominance, particularly among women of reproductive age. The most affected age group was 30–40 years, indicating that hypothyroidism commonly manifests during economically productive and reproductive years, thereby posing significant health and social implications. A strong association between hypothyroidism and obesity was evident, as the majority of patients belonged to Obese Class I and II categories. This finding supports existing evidence that excess body weight is closely linked with thyroid dysfunction. Clinically, most patients presented with multiple classical symptoms of hypothyroidism, including weight gain, fatigue, muscle pain, puffiness, restlessness, and dermatological manifestations, reflecting a high symptom burden and likely delayed diagnosis. The majority of cases had disease onset within the past 1–5 years, suggesting increasing detection in recent years or a rising incidence. Medical management was the primary treatment modality, with levothyroxine being the most commonly prescribed drug, consistent with international guidelines. Overall, the findings underscore the need for early diagnosis, effective management, and increased awareness of hypothyroidism, particularly among high-risk groups.

Recommendations

Routine thyroid function screening should be encouraged, especially for women of reproductive age, obese individuals, and those presenting with nonspecific symptoms such as fatigue, weight gain, or menstrual irregularities. Community-based awareness campaigns should be implemented to educate the population about the signs, symptoms, risk factors, and long-term consequences of hypothyroidism, facilitating early healthcare-seeking behavior. Given the strong association between obesity and hypothyroidism, integrated lifestyle modification programs focusing on weight management, balanced nutrition, and physical activity should be incorporated into patient care. Regular monitoring of thyroid hormone levels and dose adjustment of levothyroxine should be ensured to improve symptom control and quality of life. Large-scale, longitudinal studies are recommended to explore causal relationships, environmental and nutritional factors, and long-term outcomes of hypothyroidism in this region.

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