

Knowledge, Attitude, and Practices Related to Hypothyroidism in a Tertiary Care Hospital Bangalore**Balachandra G¹, Veena RM², Sonia Y³, Keerthana AB⁴, Ashfaq Ahammed BA⁵, Neenu MR⁶**¹Professor and Head of the Department of Medicine, BGS GIMS Bangalore²Professor, Department of Pharmacology, BGS GIMS Bangalore^{3,4,5,6}Interns, Hills Pharmacy College, Bangalore

Received: 25-08-2023 / Revised: 28-09-2023 / Accepted: 30-10-2023

Corresponding author: Dr. Veena RM

Conflict of interest: Nil

Abstract:

Background and Objective: Hypothyroidism is the clinical state resulting from decreased production of thyroid hormones or very rarely from tissue resistance. Better knowledge and awareness regarding the disease in primary hypothyroidism patients can significantly improve compliance of treatment and decrease the associated morbidity. There is a paucity of data on knowledge, awareness, and practices (KAP) of patients with hypothyroidism in India. This study was designed to assess the knowledge, attitude, and practice (KAP) of hypothyroidism among patients with hypothyroidism.

Methods: A prospective observational study was performed in an outpatient attending the Department of General Medicine, BGS Global Institute of Medical Sciences, Bangalore. We used a validated questionnaire to assess hypothyroidism KAP. Using frequency counts (n) and percentages (%), discrete data were summarized.

Results: The mean age of patients was found to be 35.98±12.21 years. It was found that 52.9% of the patients were aware of the correct meaning of the term hypothyroidism. Regarding consequences of hypothyroidism, 54.7% of the study patients most properly recognized as weight gain (68.9%), followed by 58.5% of swelling in the neck and 54.7% of generalized weakness. All patients (100%) adhered to their medications.

Conclusion: Many patients with hypothyroidism had adequate basic knowledge about the disease was observed in the study. Further, we recommend that if healthcare providers could provide patients to understand with data sheets explaining the disease or have some pictorial/pamphlets about the disease's reality and myths will be more beneficial.

Keywords: Hypothyroidism, Knowledge, Attitude, Practice, Patient Education.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Thyroid diseases are, arguably, among the commonest endocrine disorders worldwide. According to a projection from various studies on thyroid disease, the prevalence of self-reported goiter or thyroid disorder in National Family Health Survey IV [NFHS IV (2015-2016)] was 2.2%, while it was 2.9% in NFHS-V (2019-2021). [1] The NFHS IV (2015-2016) has reported that amongst individuals between the age 15-49 years, the self-reported prevalence of goiter or thyroid disorder was nearly 2% in females and less than 1% in males. Also, the reported prevalence increased with age in women (15-19 years: 0.7%; 20-34 years: 1.8%; 35-49 years: 3.4%). As per NFHS V, 1969 of the cases per 100000 are reported in Karnataka. [1] The prevalence and incidence of thyroid disorders depend on geographic areas, increasing age, ethnicity, and, most importantly, the

amount of iodine intake by the population. [2] Hypothyroidism is one of the most common forms of thyroid dysfunction. [3] It is defined as the failure of the thyroid gland to produce sufficient thyroid hormone to meet the metabolic demands of the body. [3] It may be congenital or acquired, primary or secondary, chronic or transient. [4] It refers to a state that results in a deficiency of thyroid hormones, including hypothalamic or pituitary disease, generalized tissue resistant to thyroid hormone, and disorders that directly affect the thyroid gland. The signs and symptoms of hypothyroidism are nonspecific and may be confused with those of other clinical conditions, especially in postpartum women and the elderly. [3] Infants and children may present more often with lethargy and failure to thrive. Women who have hypothyroidism may present with menstrual

irregularities and infertility. In older patients, cognitive decline may be the sole manifestation. [5] Patients with severe hypothyroidism generally present with a group of signs and symptoms that may include lethargy, weight gain, hair loss, dry skin, forgetfulness, constipation, and depression. [3]

Symptoms are related to the thyroid hormone's stimulation of catabolic enzymopathic activity, catabolism, and enhancement of sensitivity to catecholamines. Older patients often present with a paucity of classic signs and symptoms, which can make the diagnosis more difficult. [6] Typical clinical features of hypothyroidism in adults are fatigue, lethargy, cold intolerance, weight gain, constipation, change in voice, and dry skin, but the clinical presentation can include a wide variety of symptoms that differ with age, sex, and time between onset and diagnosis. [6] Treatment depends on the cause and severity of the disease, the patient's age, goiter size, comorbid conditions, and treatment preferences. Treatment includes pharmacotherapy, radioactive iodine, and surgical treatment. [7] Studies have shown the importance of improving patient's knowledge through education and the associated benefits of improving compliance with healthcare appointments and medications for patients with hypertension and diabetes. [8,9] However, such data are scarce in the context of hypothyroidism. Such studies on hypothyroidism can help the physician to concentrate on specific issues during their first interaction with the patients as well as during follow-up. With this background, this study was planned to assess the KAP among patients with hypothyroidism.

Materials and Methods

A prospective observational study was conducted in the Outpatient Department of General Medicine at BGS Global Institute of Medical Sciences (BGS – GIMS), Bangalore, Karnataka. The study was

approved by the Institutional Ethics Committee. Consecutive subjects of hypothyroid with age ≥ 18 years who were educated or literate and willing to participate were included in the study. Patients who were below 18 years of age, paediatric patients, and pregnant women were excluded from the study. The study was conducted for a duration of 3 months. The patients, who gave informed written consent, were subjected to the questionnaire. A study questionnaire was validated by the experts in the BGS – GIMS hospital. The questionnaire regarding hypothyroidism consists of 19 questions in the knowledge domain, 5 in the attitude domain, and 8 in the practice domain. These questionnaires also captured the demographic details of the study subjects, which included name, age, weight, height, gender, outpatient number, phone number, education history of hypothyroidism, family history, and occupation.

All the data were collected and entered in Microsoft excel and analyzed using Open Epi software. All the qualitative data were analyzed and expressed in frequency with percentage, and quantitative data were expressed in mean with SD. The Knowledge, attitude, and practice were assessed and expressed in percentages.

Results

A total of 106 patients completed the questionnaire. The baseline demographic parameters of patients are summarized in Table 1. One hundred (94.3%) patients were female, and 6 (5/7%) were male. The mean age of the patients was 35.98 ± 12.21 years, with a min of 18 and a maximum of 70 years. The majority of patients belonged to the age group between 21 to 30 years ($n=44/41.5\%$). The mean weight of the patients was 66.59 ± 14.06 kg, with a minimum of 41 kg and a maximum of 109 kg, and the majority were in the weight range of 61 to 70 kg ($n=30/28.3\%$). The majority of patients were studied till SSLC ($n=31/29.2\%$), followed by 22 (20.8%) of the patients who were undergraduates.

Table 1: Socio-demographic profile of the study subjects

Age Group (Years)	n	%
18-20	4	3.8
21-30	44	41.5
31-40	26	24.5
41-50	18	17.0
51-60	8	7.5
61-70	6	5.7
Total	106	100.0
Min-Max	18-70	
Mean \pm SD	35.98 \pm 12.21	
Gender		
Female	100	94.3
Male	6	5.7
Weight (Kg)	n	%
41-50	15	14.2

51-60	22	20.8
61-70	30	28.3
71-80	23	21.7
81-90	10	9.4
90 & above	6	5.7
Min-Max	41-109	
Mean±SD	66.59±14.06	
Education Status	n	%
illiterate	11	10.4
Primary School	4	3.8
Middle School	8	7.5
High School	2	1.9
SSLC	31	29.2
Intermediate	18	17.0
Undergraduate	22	20.8
Post-Graduate	10	9.4

The duration of hypothyroidism was 1-50 years, observed majorly in 46 (43.4%) patients, and about 24 (22.6%) patients had a family history of hypothyroidism. (Table 2)

Table 2: Hypothyroidism profile of the study subjects

Duration of Hypothyroidism	n	%
< 1 Year	31	29.2
1-5 Years	46	43.4
6-10 Years	22	20.8
11 - 20 Years	7	6.6
Family History of Hypothyroidism	n	%
Yes	24	22.6
No	82	77.4

Regarding knowledge of hypothyroidism, out of 104, around 56 (52.9%) patients strongly agreed and were aware of the correct meaning of the term “thyroid.” Only 22 (20.8%) patients were aware of the decrease in the ability of a patient to tolerate colds in all seasons due to hypothyroidism. Twenty-six (24.5%) patients strongly agreed that hypothyroidism causes dry skin.

Most of the patients strongly agreed that hypothyroidism causes generalized weakness (n=58/54.7%), weight gain (n=73/68.9%), muscle pain (n=51/48.1%), abnormal menstruation (n=52/49.1%), change in mood (n=59 /55.7%) and abnormality or swelling in the neck (n=62/58.5%). About 21 (19.8%) patients strongly agreed that hypothyroidism causes problems in passing stools (n=21/19.8%), 36(34%) patients strongly agreed that the change in the thyroid hormone causes

hypothyroidism, 40(37.8%) patients strongly agreed that measuring the TSH level in the blood helpful in estimating hypothyroidism. The knowledge about the changes in lipid levels in hypothyroidism, changes in pregnant ladies developing hypothyroidism, thyroid disorder run in the family, iodine deficiency in the diet lead to hypothyroidism, hypothyroidism causes hair-fall and drug intake induces hypothyroidism were strongly agreed by 32 (30.2%), 47 (44.3%), 48 (45.3%), 23 (21.7%), 21 (19.8%) and 26 (24.5%) patients respectively.

The majority, 66(62.3%) patients, strongly agreed that drugs could be used to treat hypothyroidism, while only 8(7.6%) of the patients strongly agreed that alternative type of medicines like ayurveda and homeopathy is helpful in treating hypothyroidism. (Table 3)

Table 3: Knowledge of Hypothyroidism in the study subjects

Knowledge of Hypothyroidism	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Is the thyroid gland butterfly-shaped and located in the neck	56 (52.9%)	19 (17.9%)	28 (26.4%)	3 (2.8%)	0 (0%)
Can hypothyroidism decrease the ability of a patient to tolerate colds in all season	22 (20.8%)	19 (17.9%)	54 (50.9%)	11 (10.4%)	0 (0%)
Can hypothyroidism cause dry skin	26 (24.5%)	14 (13.2%)	52 (49.1%)	14 (13.2%)	0 (0%)

Does hypothyroidism cause generalized weakness	58 (54.7%)	19 (17.9%)	19 (17.9%)	10 (9.5%)	0 (0%)
Can hypothyroidism cause weight gain	73 (68.9%)	15 (14.1%)	14 (13.2%)	4 (3.8%)	0 (0%)
Does hypothyroidism cause muscle pain	51 (48.1%)	16 (15.1%)	31 (29.3%)	5 (4.7%)	3 (2.8%)
Does hypothyroidism cause problems in passing stools	21 (19.8%)	11 (10.4%)	56 (52.8%)	16 (15.1%)	2 (1.9%)
Does hypothyroidism cause abnormal menstruation	52 (49.1%)	13 (12.3%)	34 (32.1%)	6 (5.6%)	1 (0.9%)
Does hypothyroidism cause any change in mood	59 (55.7%)	13 (12.3%)	26 (24.5%)	6 (5.6%)	2 (1.9%)
Does abnormality or swelling in the neck cause hypothyroidism	62 (58.5%)	15 (14.2%)	26 (24.5%)	3 (2.8%)	0 (0%)
Do you think the change in the thyroid hormone causes hypothyroidism	36 (34%)	17 (16%)	49 (46.2%)	4 (3.8%)	0 (0%)
Does measuring the TSH level in the blood helpful in estimating hypothyroidism	40 (37.8%)	14 (13.2%)	49 (46.2%)	3 (2.8%)	0 (0%)
Will there be changes in lipid levels in hypothyroidism	32 (30.2%)	17 (16.1%)	51 (48.1%)	5 (4.7%)	1 (0.9%)
Will there be any changes in pregnant ladies developing hypothyroidism	47 (44.3%)	14 (13.2%)	40 (37.8%)	4 (3.8%)	1 (0.9%)
Does thyroid disorder run in the family	48 (45.3%)	16 (15.1%)	38 (35.8%)	4 (3.8%)	0 (0%)
Does iodine deficiency in the diet lead to hypothyroidism	23 (21.7%)	17 (16%)	62 (58.5%)	4 (3.8%)	0 (0%)
Does any drug intake induce hypothyroidism	21 (19.8%)	7 (6.6%)	70 (66.1%)	8 (7.5%)	0 (0%)
Does hypothyroidism cause hair-fall	26 (24.5%)	7 (6.6%)	46 (43.4%)	21 (19.8%)	6 (5.7%)
Do drugs can be used to treat hypothyroidism	66 (62.3%)	23 (21.7%)	10 (9.4%)	7 (6.6%)	0 (0%)
Do you think alternative type of medicines like ayurveda, and homeopathy is helpful in treating hypothyroidism	8 (7.6%)	1 (0.9%)	25 (23.6%)	53 (50%)	19 (17.9%)

The attitude of study patients towards the disease, its diagnosis, and treatment in the context of hypothyroidism are summarized in Table 4. Most of the patients strongly agreed that the test is done at regular intervals for hypothyroidism for females at higher risk of developing hypothyroidism (n=81/76.4%). A large number of the patients (n=69/65.1%) and (n=57/53.8%) strongly agreed that pregnant women should get checked for

hypothyroidism and people above the age of 35 years should be tested regularly for hypothyroidism. About 42 (39.6%) patients strongly agreed that relatives/family members of the patient should be tested and detected for hypothyroidism. The majority of the patients (n=83/78.4%) were aware and strongly agreed that the treatment for hypothyroidism should be started after consultation with a physician only. (Table 4)

Table 4: Attitude toward Hypothyroidism in the study subjects

Attitude	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Should the test be done at regular intervals for hypothyroidism for females who are at higher risk of developing hypothyroidism	81 (76.4%)	12 (11.3%)	9 (8.5%)	4 (3.8%)	0 (0%)
Should pregnant women get checked for hypothyroidism	69 (65.1%)	17 (16.1%)	18 (17%)	1 (0.9%)	1 (0.9%)
Should people above the age of 35 years be tested regularly for hypothyroidism	57 (53.8%)	18 (17%)	26 (24.5%)	5 (4.7%)	0 (0%)
Should relatives/family members of the patient be	42 (39.6%)	19 (17.9%)	41 (38.7%)	3 (2.9%)	1 (0.9%)

tested and detected for hypothyroidism					
Do you know the treatment for hypothyroidism should be started after consultation with a physician only	83 (78.4%)	20 (18.9%)	1 (0.9%)	1 (0.9%)	1 (0.9%)

Regarding treatment, 73.6% of patients agreed that they consulted the doctor for more information/counseling on how to manage/prevent hypothyroidism, while 59.4% of the patients said yes that they get the TSH level regularly tested as advised by the physician. A large number of the patients (92.5%) said that they take thyroid

medicine with other medications. Only 13.2% of the patients missed the doses of the medicine, and 66% were taking the medication for hypothyroidism regularly.

All of the patients (100%) were taking medication for hypothyroidism. (Figure 1)

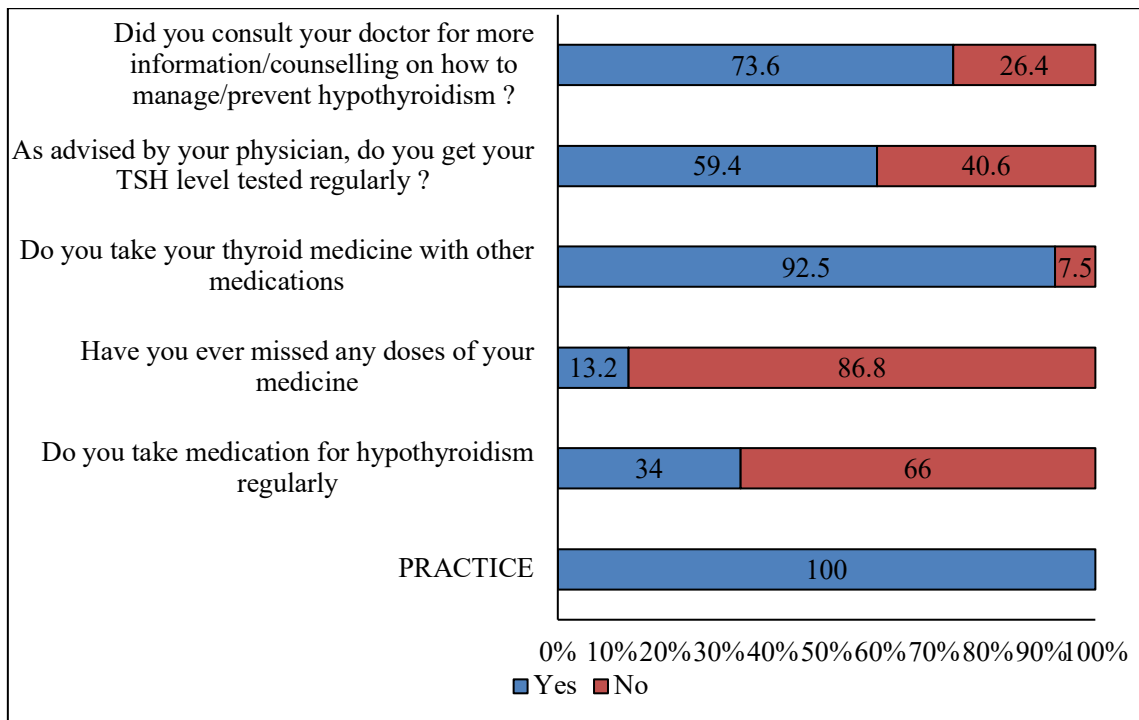


Figure 1: Practice toward Hypothyroidism in the study subjects

Discussion

This prospective observational study was conducted to assess the KAP related to hypothyroidism among patients from a tertiary care hospital in Bangalore. Knowledge and awareness about the disease among patients are very important for the better long-term outcome of any chronic illness. Our study showed that a large number of patients with hypothyroidism had sufficient basic knowledge about the disease. There is no deficit regarding the attitude towards hypothyroidism.

There are few studies reported regarding KAP among hypothyroid patients in India. Kannan et al. did a pilot study of 34 hypothyroid patients from Chennai, South India, to assess the KAP among these patients. [10] Singh et al. from Meerut did a KAP study of 200 patients with thyroid swelling

who attended the cytology clinic at their institution. [11]

Perumal et al. reported a cross-sectional study of 100 hypothyroid patients to assess their existing hypothyroidism-related knowledge, health-seeking behavior, and health literacy among these patients. [12] Rai et al. reported one community-based cross-sectional study of 250 females of age group 18–50 years from different areas of Indore city of Madhya Pradesh belonging to different socioeconomic status and occupations to assess their knowledge about thyroid disorders; in this study, only 20% females had either personal or family history of thyroid disorders. [13]

About 31% of patients completed SSLC, and 20.8% of the patients were undergraduates, similar to an analysis by Kumar et al., [14] lack of knowledge about the disease in educated

individuals is a disturbing aspect of the management of hypothyroidism.

In our study, regarding the meaning of the medical term "thyroid," the majority of participants (52.9%) knew correctly that the thyroid is a normal gland butterfly-shaped and located in the neck. Around 26.4% of patients did not have any idea about it. In this study, an incidence of about 41.5% was found in the age group of 21-30. However, many studies suggest the prevalence of hypothyroidism is higher in the elderly in the community. In Kannan et al. study, 79.41% and 55.88% of participants knew the correct meaning of the terminologies such as "thyroid" and "hypothyroidism," respectively. [10] Similarly, in a study by Singh et al., 60% of patients knew the correct meaning of the term "thyroid." Knowledge of disease-related basic terminologies is very important for patients to acquire further knowledge regarding their disease. [11]

In our study, it was observed that all patients (100%) were taking medication for hypothyroidism, and Prasanna et al. also observed that nearly 80% of the study subjects were found to be practicing with moderate levels of precaution, irrespective of their age, and educational qualification, [15] which was similar to a study done by Sethi et al. [16]

Regarding treatment, in our study, 92.5% of patients were taking thyroid medicine with other medications. About 86.8% of the patients did not miss any doses of the medicine, and 66% of patients were taking the medication regularly for hypothyroidism. Among alternative medication use, 20.4% of participants believed that alternative medicines such as Ayurveda, Yoga, Unani, Siddha, and Homeopathy could cure hypothyroidism. Our results are comparable to the previous studies; 20.58% and 35% of participants with hypothyroidism had faith in alternative medications in studies by Kannan et al. and Singh et al., respectively. [10,11]

Inappropriate knowledge regarding treatment leads to poor outcomes for chronic illness such as hypothyroidism. Considerable time must be spent explaining to the patient the lifelong nature of the illness, the need for long-term medication, and regular follow-up. Symptoms of hypothyroidism are nonspecific and likely to overlap with other conditions of the disease.

Fatigue is the most common symptom and could be the greatest misleading one too, but in our study, half of the participants identified fatigue as a symptom of hypothyroidism. In the present study, symptoms perceived related to hypothyroidism by participants were decreased ability of a patient to tolerate colds in all seasons (20.8%), dry skin issues (24.5%), generalized weakness (68.9%),

weight gain (68.9%), muscle pain (48.1%), problems in passing stools (19.8%), abnormal menstruation (49.1%), change in mood (55.7%) and swelling in the neck cause (58.5%). In a study conducted by Sethi et al., a good number of the participants identified fatigue as a clinical symptom of hypothyroidism. [16] Patients commonly tend to attribute any symptom pertaining to the neck (commonly sore throat) to their thyroid gland.

Patients should be educated about various symptoms of thyroid disorders. The various misconceptions held by patients with respect to weight gain attributable to hypothyroidism are of clinical importance. Kumar et al. observed that the participants perceived that hypothyroidism that causes weight gain (93.6%), easy fatigability (80%), irregular menstrual cycle (65.2%), constipation (51.2%), skin problems (38%), and sore throat/neck pain (35%). [14] A study by Kannan et al. and Singh et al. also showed that a significant number of subjects believed that hypothyroidism causes excessive weight gain and obesity. [10,11] However, in the previous studies, patients' perception of quantitative weight gain in hypothyroidism was not assessed. Physicians should always clarify to patients that hypothyroidism generally causes mild weight gain (<5 kg) and should lay emphasis on the importance of diet and exercise for weight loss.

Knowledge of disease symptoms is essential for patients to identify treatment effects and disease progression and to tell a doctor about their clinical experiences during follow-up visits. About 45.3% of patients strictly agreed that thyroid disorder runs in the family, which is similar to the study of Prasanna et al., about 55% of the study subjects believe hypothyroidism may run through families, [15] but this is in contrast to a study conducted by Kumar et al. where only 12% believe the genetic cause of hypothyroidism. [14] Likewise, 45.3% of patients were aware of the changes taking place in pregnant ladies developing hypothyroidism, and in Prasanna et al. study, only 21% of patients were aware of pregnancy hypothyroidism, possibly because they were not conscious that pregnancy hypothyroidism would occur. Complications linked to untreated pregnancy hypothyroidism are diverse and intense, with a higher risk of maternal morbidity, perinatal disease, and death.

Overall, this study showed although patients were more aware of the value of laboratory testing, they were less aware of the relatives/family members of the patients for testing and detection for hypothyroidism. Medication compliance and regular thyroid function testing can only be influenced if patients are aware of the effects of their conditions of diseases. Therefore, this aspect can be emphasized in programs for patient awareness. About 73.6% of patients sought

information/counseling from doctors on how to manage/prevent hypothyroidism. It is well known that thyroid disease is not a major cause of mortality. However, hypothyroidism can contribute to morbidity from osteoporosis, hypercholesterolemia, cardiovascular and neuropsychiatric diseases. Better knowledge and awareness regarding the disease in primary hypothyroid patients can significantly improve compliance with treatment and decrease the associated morbidity. In addition, this can further help even make patients spread correct facts and information regarding the disease to their relatives and friends in society. [17] There are a lot of factors contributing to the lack of knowledge among patients in our country. Lack of qualified physicians, less time spent by doctors on patient education because of high patient burden, lack of awareness, and not using available electronic media are some of them. A lot of awareness is still required at the physician level in developing countries like India for the optimum management of hypothyroid patients. [18]

Conclusion

These study findings delineated that many of the patients with hypothyroidism had adequate basic knowledge about the disease. We recommend spending time with patients explaining about their disease and its treatment may be beneficial for those who are from illiterate and come lower socioeconomical group. It will be more beneficial if healthcare providers could provide patients with data sheets explaining the disease or have some pictorial/pamphlets about the disease's reality and myths.

Acknowledgements: We wish to thank the management of BGS Global Institute of Medical Sciences and Teaching Institute for permitting us to conduct the awareness program on hypothyroidism in our BGS GIMS hospital. We also thank and acknowledge all the faculty of General medicine, Pharm D interns - Dr. Sonia Y, Dr. Keerthana AB, Dr. Ashfaq Ahammed Bin Ameer, Dr. Abhijith Sharma who participated in the study actively. We extend our special thanks to our respected Dean and Principal, Medical Superintendent, RMO, Nursing Superintendent and our statistician for their support.

Ethical approval: The study was approved by the Institutional Ethics Committee.

References

1. Status of Goitre or Thyroid Disorders in India. Ministry of Health and Family Welfare. 2022.
2. Strikić Đula I, Pleić N, Babić Leko M, Gunjača I, Torlak V, Brdar D, Punda A, Polašek O, Hayward C, Zemunik T. Epidemiology of Hypothyroidism, Hyperthyroidism and Positive Thyroid Antibodies in the Croatian Population. *Biology*. 2022; 11(3):394.
3. Chaker L, Razvi S, Bensenor IM, Azizi F, Pearce EN, Peeters RP. Hypothyroidism. *Nature Reviews Disease Primers*. 2022.
4. Bowden SA, Goldis M. Congenital Hypothyroidism. In: *StatPearls* [Internet] 2020 Jun 21. StatPearls Publishing.
5. Leng O, Razvi S. Hypothyroidism in the older population. *Thyroid research*. 2019; 12(1):1-0.
6. Kim MI. Hypothyroidism in older adults. *Endotext* [Internet]. 2020.
7. Jonklaas J, Bianco AC, Bauer AJ, Burman KD, Cappola AR, Celi FS, Cooper DS, Kim BW, Peeters RP, Rosenthal MS, Sawka AM. Guidelines for the treatment of hypothyroidism: prepared by the american thyroid association task force on thyroid hormone replacement. *thyroid*. 2014; 24(12):1670-751.
8. Heisler M, Pietee JD, Spencer M, Kieffer E, Vijan S. The relationship between knowledge of recent HbA1c values and diabetes care understanding and self-management. *Diabetes Care*. 2005; 28:816–22.
9. Williams MV, Baker DW, Parker RM, Nurss JR. Relationship of functional health literacy to patients' knowledge of their chronic disease. A study of patients with hypertension and diabetes. *Arch Intern Med*. 1998; 158:166–72.
10. Kannan S, Mukundan L, Mahadevan S, Sathya A, Kumaravel V, Bhat RV, Sriram U. Knowledge, Awareness and Practices (KAP) among patients with hypothyroidism attending endocrine clinics of community hospitals in Chennai. *Thyroid Research and Practice*. 2010; 7(1):11.
11. Singh A, Sachan B, Malik NP, Sharma VK, Verma N, Singh CP. Knowledge, awareness and practices (KAP) among patients with thyroid swelling attending Cytology Clinic in a Medical College, Meerut. *Sch J Appl Med Sci*. 2013; 1:793–5.
12. Perumal SS, Prasad S, Surapaneni KM, Joshi A. Health information-seeking behavior among hypothyroid patients at Saveetha Medical College and Hospital. *Ethiop J Health Sci*. 2015; 25:147–54.
13. Rai S, Sirohi S, Khatri AK, Dixit S, Saroshe S. Assessment of knowledge and awareness regarding thyroid disorders among women of a cosmopolitan city of central India. *Natl J Community Med*. 2016; 7:219–22.
14. Kumar P, Khandelwal D, Mittal S, Dutta D, Kalra S, Katiyar P, Aggarwal V. Knowledge, awareness, practices and adherence to treatment of patients with primary hypothyroidism in Delhi. *Indian journal of*

- endocrinology and metabolism. 2017; 21(3):429.
15. Prasanna VD, Sharumaathi SM, Sundaram SR. Assessment of knowledge, attitude and practice rearding hypothyroidism among infertile women with hypothyroidism. Asian Journal of Pharmaceutical and Clinical Research. 2020; 13(9).
 16. Sethi B, Khandwal D, Vyas U. A cross sectional survey to assess knowledge, attitude, and practices in patients with hypothyroidism in India. Thyroid Res Pract 2018; 15:15-22.
 17. Nimmy NJ, Aneesh PM, Narmadha MP, Udupi RH, Binu KM. A survey on the prevalence of thyroid disorder induced by demography and food habits in South Indian population. Indian J Pharm Pract. 2012; 5:49–52.
 18. Surana V, Aggarwal S, Khandelwal D, Singla R, Bhattacharya S, Chittawar S, Kalra S, Dutta D. A 2016 clinical practice pattern in the management of primary hypothyroidism among doctors from different clinical specialties in New Delhi. Indian journal of endocrinology and metabolism. 2017; 21(1):165.