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Prevalence and quality of life among people with iodine deficiency disorders in selected villages of Udupi district, Karnataka

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Research Article

Prevalence and quality of life among people with iodine deficiency disorders in selected villages of Udupi district, Karnataka

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Abstract

Introduction: In India, the entire population is prone to iodine deficiency disorders (IDD) due to iodine deficiency in the soil of the subcontinent and consequently, the food derived from it. People with a diagnosis of hypothyroidism report a decreased quality of life (QOL). The study aimed to determine the prevalence and QOL of people who were diagnosed with IDD. **Methods:** A total of 2,360 people residing among 252 houses were surveyed using the non-probability purposive sampling technique. **Results:** Out of 2,360 people surveyed, 16 cases were identified that were diagnosed with IDD. Thus, the prevalence of diagnosed IDD in the selected villages was 0.68%. Among 16 diagnosed IDD cases, most of them (56.2%) belonged to the age group of 46 to 65 years and were females (93.8%), 56.2% had an annual income of less than 30,000 INR. Among the 16 diagnosed IDD cases, the majority (75%) were diagnosed with hypothyroidism and were on treatment. Most of them (81.2%) checked their blood TSH once in three months, 18.8% have never done blood investigations after diagnosis, and most of them were using iodized salt for cooking. Symptoms experienced by the diagnosed cases of IDD were fatigue (81.2%), lack of sleep (56.2%), appetite changes (50%), intolerance to heat/cold (31.2%), and loss of hair (43.8%). The QOL is not affected negatively among the diagnosed cases, as all of them have scored fairly well in all the domains of QOL. **Conclusions:** IDDs are a very common health problem affecting the community people, which is more prevalent among females.

Keywords: IDD, iodized salt, prevalence, quality of life, symptoms

Introduction

Iodine deficiency disorder (IDD) has been recognized as a public health problem in India. Iodine is an essential micronutrient necessary for optimum emotional and physical growth in human existence. IDDs include the spectrum of debility and disease. Iodine deficiency is recognized to be the solitary major cause of preventable brain impairment. A healthy adult body contains 15 to 20 mg of iodine, of which 70% to 80% is present in the thyroid gland. Currently, in India, iodized salt coverage is 92% at the domiciliary level after implementing the National Iodine Deficiency Disorders Control Program (NIDDCP) (Yadav & Pandav, 2018). Studies conducted in various states revealed that no state in the country is free from IDD. In 2013, in India, about 200 million people were at risk of IDDs and another 71 million were suffering from goiter and other IDDs. Sample surveys that were conducted all over the country found that 324 districts were included in the study, and 263 districts were IDD endemic, that is, where the prevalence of IDD is >10% but there was a significant decrease in visible goiter. The public awareness of IDD and its severe consequences remains low, and there is a

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lack of user demand for sufficiently iodized salt (Kaur et al., 2017).

The Government of India launched the National Goiter Control Program (NGCP) in 1962 to deliver iodized salt to recognized goiter endemic districts. In 1992, the NGCP has renamed the National Iodine Deficiency Disorders Control Program. The government is trying to eradicate IDD as an essential public health issue at the national level (Rah et al., 2013).

A study done in the United States reported that the prevalence of IDD among the old age population was nearly 25% and 17% reported that they were on medication for thyroid dysfunction. The authors recommend that additional attention is needed towards thyroid dysfunction and screening (Diab et al., 2019). Prevalence of goiter in Ethiopia was found more among pregnant women than younger women. The study indicated the need for further strengthening of the existing salt iodization program (Fereja, Gebremedhin, Gebreegziabher, Girma, & Stoecker, 2018). A clinical goiter survey (2008) was conducted among 1,663 school-aged children of both genders in the state of Uttar Pradesh. The study showed that the prevalence rate was 30.2% among girls (Chandra, Bhattacharjee, Malik, & Ghosh, 2008). Goiter prevalence among primary school children was 4.83% in the Jamnagar district (Makwana, Shah, Unadkat, Shah, & Yadav, 2012). The prevalence of goiter in the city of Srinagar was found to be 13%, out of that 12.7% were in Grade 1 goiter (Kousar et al., 2013), 33.01% of thyroid disorders were identified in Guwahati city among the older population (Baruah et al., 2019), and 13% prevalence among reproductive-age women with 11.5% in Grade 1 and 1.5% in Grade 2 was found (Reddy, Kamath, Jacob, Kamath, & Rebeiro, 2019). In the Belgaum district, the overall prevalence of goiter was 16.6% and was high among females (21.8%) aged between 20 and 29 years (Kamath R et al., 2009). A cross-sectional, multicentre, epidemiological study was conducted in eight major cities of India to study the prevalence of hypothyroidism among the adult population. A total of 5,376 participants from both genders above 18 years were enrolled. The overall prevalence of hypothyroidism was 10.95%, of which 7.48% were on thyroxine therapy. This suggests that a significant proportion of the patient population may go undetected and untreated even as it continues to impair the daily QOL, work performance, and economic productivity of an individual (Unnikrishnan et al., 2013). A total of 2,703 school children were examined for the prevalence of goiter in the Udupi district, and the result was found to be 9.3%, with 7.0% having Grade 1 goiter and 2.3% had Grade 2 goiter. Prevalence of goiter was significantly higher among females [153 (11.1%)] as compared to males [98 (7.4%)]. The district had adequate iodine nutrition; however, the other contributing factors for the persistence of endemic goiter need to be explored (Shetty, Rao, Kamath, S P, & Reddy, 2019). Further, in the Jammu region, nearly 11.98% of goiter prevalence was observed. Iodine deficiency remains a public health problem in the area, though the region seems to be in a nutritional transition from iodine deficiency to iodine sufficiency (Bhat, Pandit, & Mudassar, 2008).

The survey conducted in India (2011) reported, that out of 325 districts surveyed, 263 districts are IDD-endemic (Pandav et al., 2013), 2011, Chandrakant, 2013). Another survey was conducted by the National Nutrition Monitoring Board in 2000-2001 in Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Odisha, and West Bengal, the overall prevalence of total goiter rate (TGR) among six to twelve-year-old children was about 4%. The prevalence of goiter was highest in Maharashtra (11.9%) and West Bengal (9%) (Chandrakant S, 2013).

A study was conducted to assess the QOL associated with treated hypothyroidism among adult patients referred to Copenhagen University Hospital from 2008 to 2012 for the treatment of newly diagnosed primary hypothyroidism, whose TSH > 4.0 mIU/L and having positive antibodies to their thyroid. The QOL of patients was evaluated before the treatment with levothyroxine, at six weeks, and at six months after starting levothyroxine, using a thyroid-specific quality of life questionnaire (ThyPRO) and generic quality of life assessment (SF-36). Most of the patients who participated were healthy, middle-aged women. Approximately two-thirds of the patients

had TSH in the normal range at six months, but one-third still had mild hypothyroidism, which means that their levothyroxine dose was too low. Before starting levothyroxine, QOL was lower in patients with hypothyroidism compared to healthy Danish controls on all measured scales, with the largest difference in the degree of tiredness. The QOL scores improved in many of them by six weeks after starting the medication. Patients with untreated hypothyroidism had a worse QOL, predominantly fatigue, compared to healthy patients without hypothyroidism. QOL improved after treatment but did not remain as good as the control population (ATA, 2016).

After reviewing the above facts, figures, and the researcher's personal experience, it was decided to assess the prevalence of IDD and the QOL of those diagnosed to have IDD among the people residing in selected villages. This descriptive survey will help to enhance the quality of care and strengthen or develop new strategies which will enhance the QOL of those clients diagnosed to have IDD.

Materials and methods

A quantitative approach and descriptive survey design were used in the study since it is focused on identifying the prevalence and the QOL of people diagnosed with IDD. A survey was conducted among the 252 houses comprising 2,360 people who were screened to identify the IDD in the selected villages of Udupi District by using a non-probability purposive sampling technique. All the clients who fulfil the inclusion criteria were included in the study. The inclusion criteria were clients diagnosed to have IDD and residing in the adopted villages of Manipal College of Nursing (MCON). However, clients who were chronically ill and not willing to participate were excluded from the study. The following tools were used to collect the data: 1) Demographic proforma, 2) Assessment of prevalence and information related to the management of IDD, 3) Checklist to assess the symptoms of IDD, 4) Thyroid-specific quality of life questionnaire (ThyPRO) and generic quality of life assessment (SF-36). All tools have been pretested, and the reliability of the tool was established by administering the tools to 20 people who had IDD and tested by using the test-retest method. The tools (3 and 4) were found to be reliable with r values of 0.83 and 0.78, respectively. The reliability of the standardized QOL thyroid version was r = 0.89 by the test-retest method and r =0.93 by Cronbach's alpha internal consistency. The administrative permission was obtained from the Dean, MCON, Manipal, Panchayat President, Medical Officer of PHC. Individual written consent was obtained from the participants before collecting the data, and confidentiality was maintained throughout the study period. A pilot study was conducted among 20 people who had IDD residing in Malpe to check the feasibility. Those who were diagnosed to have IDD were administered tools 3 and 4 to assess the common symptoms and QOL respectively.

For those who were diagnosed with IDD, the demographic data, treatment modalities, follow-up, frequency of investigations, signs and symptoms experienced, and their QOL after diagnosis were collected by interview technique.

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 16.0. The data were analyzed by using both descriptive and inferential statistics.

Ethical consideration: Administrative permission and ethical clearance were obtained from Institutional Research Committee (IRC 154/2018) and Institutional Ethics Committee, Kasturba Hospital and Kasturba Medical College (IEC 279/2018) before data collection. Informed consent from participants was also obtained before conducting the study.

Results

Table 1

Sample Characteristics

N=16

Variables	Frequency (f)	Percentage (%)
Age (in years)		
15 to 30	2	12.5
31 to 45	5	31.2
46 to 65	9	56.2
Gender		

Table 1 cont...
Sample Characteristics

Variables	Frequency (f)	Percentage (%)
Male	1	6.2
Female	15	93.8
Educational status		
Illiterate	4	25
Primary	5	31.2
High school	1	6.2
PUC	3	18.8
Degree	1	6.2
Postgraduation	2	12.5
Occupation		
Skilled	4	25
Semiskilled	1	6.2
Unskilled	11	68.8
Marital status		
Single	1	6.2
Married	14	87.5
Divorced	-	-
Widow/widower	1	6.2
Type of family		
Nuclear	12	75
Joint	4	25
Place of residence		
Urban	0	-
Rural	16	100
Family income/year (INR)		
≤30,000	9	56.2
30,000 to ≤60,000	4	25
>60,000	3	18.8

Out of 2,360 people surveyed, 16 diagnosed cases of IDD were identified. Thus, the prevalence of diagnosed IDD in the selected villages was 0.68%. Among 16 diagnosed cases of IDD, 56.2% belonged to the age group of 46 to 65 years. The majority of them (93.8%) were females and 31.2% of them had their education up to the primary level. Most of them (56.2%) had an annual income of less than 30,000 INR (Table 1).

Table 2
Information Related to the Management of IDD among People with IDD

N = 16

Type of IDD	Frequency (f)	Percentage (%)
Goiter	3	18.8
Hypothyroidism	12	75
Hyperthyroidism	1	6.2
On treatment		
No	1	6.2
Past	3	18.8
Current	12	75
Type of treatment		
No	1	6.2
Oral medication	13	81.2
Both medication and surgical	2	12.5
Blood investigation	-	-
Yes	13	81.2
No	3	18.8
Frequency of blood investigation		
No	3	18.8
Once in three months	9	56.2
Once in six months	2	12.5
>6 months <1 year	1	6.2
More than one year	1	6.2
Exercise		
No	14	87.5
Yes	2	12.5
Diet		
No	14	87.5
Yes	2	12.5
Type of salt used		
Iodized	16	100
Common salt	-	-

Note: IDD = Iodine deficiency disorder

The majority (75%) were diagnosed to have hypothyroidism currently and were on treatment. Around 81.2% of them were on oral medication and

have checked their blood TSH once in three months. Only three of them never got their blood investigations done after diagnosis, and most of them were using iodized salt for cooking (Table 2).

Table 3

Assessment of Symptoms among People with IDD

N=16

Symptoms	Yes		No	
	f	%	f	%
Fatigue	13	81.2	3	18.8
Sleep changes	9	56.2	7	43.8
Changes in weight	6	37.5	10	62.5
Appetite changes	8	50	8	50
Intolerance to heat/cold	5	31.2	11	68.5
Menstrual changes/ Irregularities/infertility	1	6.2	15	93.8
Constipation	1	6.2	15	93.8
Diarrhoea	3	18.8	13	81.2
Anxiety	5	31.2	11	68.8
Dry skin	2	15.4	14	84.6
Hair changes	7	43.8	9	56.2
Voice changes	2	12.5	14	87.5
Motor skills/coordination	2	12.5	14	87.5
Swelling/fluid retention	3	18.8	13	81.2
Tremors in the hand	....	....	16	100
Palpitation	3	18.8	13	81.2

The symptoms experienced by the diagnosed cases of IDD were fatigue (81.2%), lack of sleep (56.2%), weight gain (37.5%), appetite changes (50%), intolerance to heat/cold (31.2%), anxiety (31.2%) and loss of hair (43.8%) (Table 3).

Table 4

Domain-wise QOL Score among People with IDD

N = 16

Domain	Maximum	Minimum obtained	Maximum obtained	Mean	SD
Physical wellbeing	130	47	128	92.8	24.49
Psychological wellbeing	200	88	183	142.8	32.04
Social wellbeing	140	50	140	124.3	22.76
Spiritual wellbeing	70	27	68	49.6	10.58

Note: *QOL* = Quality of life, *SD* = Standard deviation

Data presented in Table 4 showed that among the diagnosed cases of IDD, in the domain of psychological wellbeing, the mean score was 142.8 and the standard deviation was 32.04, and in the spiritual wellbeing, the mean score was 49.6, and the standard deviation was 10.58. Thus, it infers that the QOL is not much affected due to IDD as all of them have scored fairly well in all the domains.

Discussion

Iodine deficiency is caused due to low intake of the mineral iodine, which is supplied through diet. The study was conducted in the coastal area of Karnataka, where people prefer seafood for consumption. The present study showed that in the surveyed area, the prevalence of IDD was found to be 0.68% which indicates the low prevalence of IDD. A supportive study conducted in a coastal area of the Villupuram district of Tamil Nadu showed the prevalence of IDD was 8% and 2.6% had visible goiter (Vasudevan et al., 2018). The study findings are also supported by a study conducted in two villages of the Belgaum district, the prevalence of goiter was found to be 16.6% (Kamath et al., 2009). The prevalence rate of IDD is due to the action taken by the Government of India on the compulsory iodization of common salt. The present study showed that 100% of houses surveyed were using iodized salt. The current study is supported by the finding of a study conducted in Tikamgarh town of Madhya Pradesh showed that 72.4% of subjects were using iodized salt (Bali & Nayak, 2019). A study conducted in Bhubaneshwar city among the mothers showed that 47.5% of mothers knew that consumption of iodized salt is good for health and only 43.3% consumed iodized salt, despite the availability of iodized salt (Kar et al., 2020). However, the problem of hypothyroidism persists despite the adequate use of iodized salt by the population.

The current study showed that IDD is more prevalent among the age group of 46 to 65 years of which females were mostly affected. The current study is supported by the study conducted in villages under the primary health centre of Bengaluru where the prevalence of IDD is higher among the girls (26.6%) when compared to the boys (17.8%). The findings are also supported

by a study conducted in two villages of the Belgaum district, which showed that a higher prevalence of IDD was among females (21.8%) when compared to males (7.2%) (Kamath et al., 2009). Another supporting study was conducted in Karnataka, India, where the prevalence of goiter among the 6 to 12 years children was found to be 8.6%. Females had a higher prevalence compared to males in all the age groups (Biradar Mallikarjun K, 2015). Another supporting study was conducted in the Jammu region, a goiter prevalence of 11.98% was observed in the region where females had a prevalence of 16.1% and males 10.1% (Bhat, Pandit, & Mudassar, 2008).

The present study showed that hypothyroidism (75%) is more common when compared to hyperthyroid (6.2%), which is supported by the study conducted among diabetes mellitus clients in Puducherry. The findings revealed that clinical hypothyroidism (8%) is more common when compared to clinical hyperthyroidism (1%) (Hussain, 2018).

Fatigue (81.2%) was the most experienced symptom by the research participants, followed by sleep changes (56.2%), hair changes (43.8%), and appetite changes (50%). A study conducted by the thyroid registry of adult Indians with hypothyroidism also showed that the most common symptoms were fatigue (60.17%), poor appetite, weight gain (36.22%), and hair loss (30.89%) (Sethi et al., 2017).

This study was conducted in one village in the Udupi district; hence the study findings may not be generalized.

Conclusion

The slightly increased prevalence of signs and symptoms related to hypothyroidism in our study leads us to speculate whether iodine deficiency may continue to play a role in hypothyroidism in India. These data should be taken into consideration to enhance the National Iodine Deficiency Disorder Program, which needs sustained monitoring and intensified IEC activities to eliminate IDD soon.

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