Dietary Assessment of Women with Thyroid Dysfunction

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ARTICLE DETAILS	ABSTRACT
Research Paper	The study titled "Dietary assessment of women with thyroid dysfunction" was a prospective investigation conducted to assess the nutritional status and dietary habits of women aged 25-45 residing in Thiruvananthapuram district who were experiencing thyroid issues. A structured questionnaire was employed to gather data on personal characteristics, socioeconomic background, lifestyle patterns, health status, and nutritional awareness. Anthropometric assessment, biochemical analysis, clinical examination, and dietary evaluation were utilized to assess the nutritional status and dietary profile of the participants. The majority of the subjects were from middle-income, nuclear families in rural areas and were literate. Anthropometric assessment included measurements of height, weight, and BMI. Health status analysis indicated a higher prevalence of hypothyroidism compared to hyperthyroidism among the participants, along with the presence of comorbidities associated with thyroid disorders. Biochemical assessment involved analyzing the levels of T3, T4, and TSH. Clinical examination focused on identifying general symptoms. Most respondents followed a non-vegetarian dietary pattern and consumed three meals with irregular timing. Commonly used food items included cereals, milk, fish, coconut, and sugar, while
Keywords : *Triiodothyronine, Thyroxine, Thyroid Stimulating Hormone, Goitrogens, Dietary profile*	

goitrogenic foods such as cabbage, tapioca, cauliflower, and soy were less frequently consumed. The assessment of nutritional awareness revealed that most participants had good knowledge regarding goitrogenic foods and the use of iodized salt, although some were unaware of nutrient interactions. The study suggests that dietary modifications and providing patients with diet-related knowledge could help in reducing thyroid problems.

1. INTRODUCTION

Thyroid disorders are prevalent worldwide, particularly in India and the United States. According to Kochupillai (2000), thyroid diseases are the most common among all endocrine disorders in India, affecting approximately 42 million individuals. In India, the prevalence of thyroid disorders is estimated to be around 11% of the adult population (Jayakumar et al., 2016). Similarly, in the United States, about 20 million Americans are diagnosed or undergoing treatment for thyroid disease (ATA, 2015). Research by Deepthi et al. (2013) emphasizes that thyroid disease varies based on geographic location, environmental factors, and dietary habits, among other factors. Aghini et al. (2000) highlighted the role of iodine intake in thyroid diseases, stating that both insufficient and excessive iodine intake can lead to thyroid disorders.

Iodine deficiency disorders encompass various consequences, especially during pregnancy, such as fetal hypothyroidism and mental impairment. Harris (2012) reported that salt iodization programs significantly reduced iodine deficiency disorders in the United States by the 1920s. Hypothyroidism is the most prevalent thyroid dysfunction, especially among women, with rates rising with age (Escribano et al., 2016). Thyroxine (T4) and triiodothyronine (T3) are the main thyroid hormones, regulated by Thyroid Stimulating Hormone (TSH) produced in the pituitary gland in response to Thyrotropin Releasing Hormone (TRH). Goiter, characterized by thyroid gland enlargement, can result from various factors including iodine intake, hypothyroidism, hyperthyroidism, and thyroid cancer (Aschebrook et al., 2011).

Serum TSH measurement is crucial for screening thyroid disorders due to its relationship with thyroid hormone levels (Cooper, 2001). Finally, studies such as the "Dietary Profile of Women with

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Thyroid Problems" aim to assess the lifestyle and dietary habits of individuals with thyroid disorders in specific regions like Thiruvananthapuram district.

II. MATERIALS AND METHODS

Selection of Respondents and Area

A sample, as described by McGraw Hill (2004), is a subset of the population chosen to accurately represent the larger group. In this study, 100 patients with thyroid disorders were deliberately selected using purposive sampling, a method outlined by Maxwell (1996). Purposive sampling involves intentionally selecting specific settings, individuals, or events to gather essential information that may not be accessible through other means. The research took place in Thiruvananthapuram district, encompassing both urban and rural areas.

Inclusion Criteria

- Patients with thyroid disorders, mainly having hypothyroidism or hypothyroidism.
- Only female respondents of age between 25-45 years.
- Willing to cooperate with the study.

Exclusion Criteria

- Pregnant women

Selection of Tools and Technique

For this study, a questionnaire was chosen as the primary tool for data collection. Pinsonneault and Kraemer (1993) characterized a survey as a means to gather information about the characteristics, actions, or opinions of a large group of individuals. The questionnaire used in the survey underwent pre-testing through a pilot study to ensure its effectiveness. Krishna Kumar (1992) defined a questionnaire as a written document containing a series of questions relevant to the research topic, designed to elicit responses from participants.

A pilot study, as described by Arain et al. (2010), serves as a small-scale feasibility study aimed at testing various aspects of the methods planned for a larger investigation. For the present study, 10 subjects were selected for the pilot study and after that necessary changes were made to make the questionnaire more effective and understandable. Questionnaire were used to gather the

general information, socio economic status, lifestyle, dietary habits, health status of the respondents.   Anthropometric measurements, biochemical assessment and the nutritional awareness of the subjects are scheduled.   Also the details of co morbidities and clinical symptoms present in respondents are collected.

Dietary Pattern and health status of the Respondents

Some of the major dietary details like food habits, frequency of food intake, timing, consumption of coffee or tea, skipping of meals, eat out habits, and most liked food were collected with the help of a standardized questionnaire. A food use frequency table was included in the questionnaire as a dietary assessment tool to estimate the food consumption frequency of respondents. It consists of a finite lists of foods with response categories to indicate usual frequency of consumption over the time period queried. A set of 10 statements regarding thyroid diseases were screened out and included in the questionnaire. It helped to assess the level of knowledge of the respondents. The percentage of correct answers given by the subjects were calculated as an indicator of their knowledge.

Statistical Analysis

Based on the methodology discussed above, the data of subjects was collected and statistical analysis were done. Statistical analysis is the collection and interpretation of data in order to uncover pattern and trends. Thus the data was summarized, tabulated and analyzed. Graphs were also included to show the results with frequency or percentage.

III RESULTS AND DISCUSSION

Health Status of the Respondents

Based on the distribution of respondents according to the type of thyroidism, it was observed that the majority (79 percent) had hypothyroidism, while 21 percent had hyperthyroidism. Abraham et al. (2009) discovered a prevalence of 72.5% for hypothyroidism among all thyroid disorder cases in Puducherry, emphasizing hypothyroidism as the primary thyroid ailment in the region. Tunbridge et al. (1977) highlighted insights from the Whickham Survey conducted in Britain in 1975, which revealed notable patterns in thyroid diseases. While thyroid stimulating hormone (TSH) levels remained relatively constant with age among males, they notably increased among females after the age of 45 years. However, this age-related rise in TSH levels among females was significantly reduced when individuals with thyroid antibodies were excluded from the analysis.
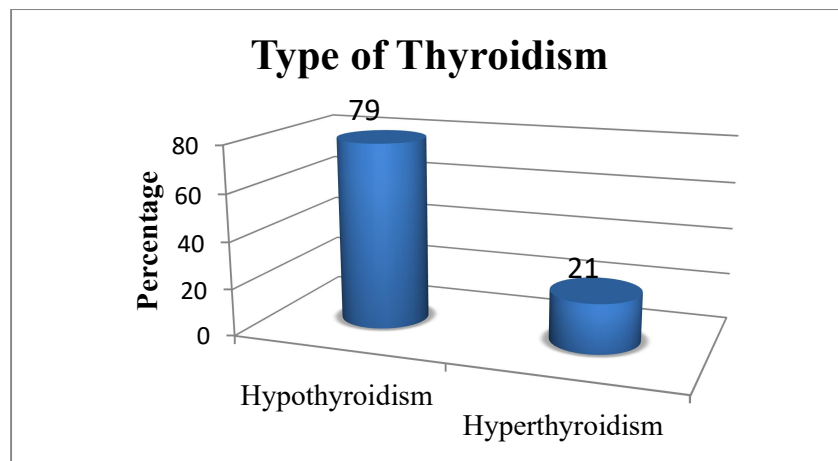
Type of Thyroidism

Figure showing a 3D bar chart titled "Type of Thyroidism" with y-axis "Percentage" (0 to 80). Hypothyroidism = 79, Hyperthyroidism = 21.

Figure 1. Type of Thyroidism present in the Respondents

Distribution of respondents based on the duration of disease

Distribution of respondents based on the duration of disease is shown in table 2. From this table it was evident that, 31 percent of the respondents were diagnosed of thyroid disorder within a period of 1-3 years and 35 percent within 4-6 years. 21 percent of the subjects were known thyroid disorder within7-9 years and 13 percent of them had disease for 10 years and above. Distribution of respondents based on frequency of thyroid function test. It was revealed from the table that, about 4 percent of the respondents were done test once in 6 weeks, 29 percent in 3 months and most of them (67 percent) had done in 6 months.

Distribution of respondents based on the co-morbidities associated with thyroid diseases are mentioned in the above table 23. From this table it was revealed that about 15 percent of the respondents had type 2 diabetes, 30 percent had hypertension, 8 percent each had fatty liver, dyslipidemia and PCOD (Polycystic Ovarian Disease). About 7 percent of subjects were had osteoarthritis, 40 percent had back pain and 22 percent had knee pain. None of them had founded coronary artery disease. Abraham et al. (2009) highlighted research indicating that hypothyroidism may contribute to morbidity associated with osteoporosis, hyperlipidemia, hypercholesterolemia, cardiovascular diseases, and neuropsychiatric disorders within the population.

Dietary Pattern of the Respondents

Food habit refers to the way in which different people select, cook, serve and eat food that are available to them. Factors influencing food choice are not only based upon individual preferences, but are constrained by circumstances that are social, cultural and economic. Table 26 shows the distribution of respondents based on food habits. From this table it was revealed that, majority (79 percent) of the respondents were non-vegetarians, 9 percent were vegetarians, 5 percent were ovo-vegetarians and 7 percent were pesco-vegetarians.
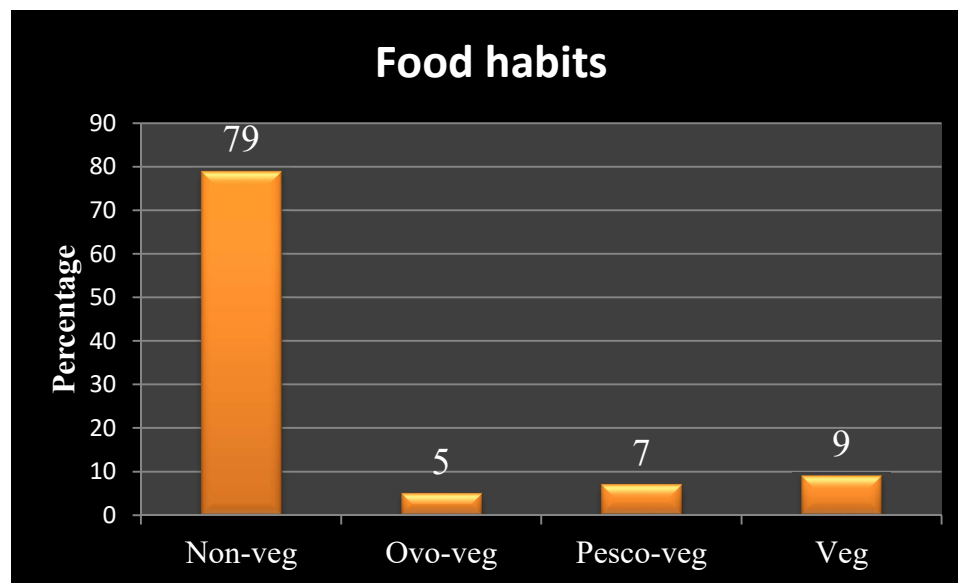

Figure 2. Food Habits of the Respondents

Distribution of respondents based on the food frequency

The cereals included in the table 32 were rice, wheat, ragi, semolina and maida. According to the food use frequency table, 100 percent of the respondents were consumed rice daily. Wheat consumption were majority (54 percent) in alternate days. Majority of the respondents, about 92 percent did not consumed ragi and only 8 percent consumed it occasionally. 33 percent of the respondents consumed semolina on monthly basis and 46 percent of them consumed maida occasionally. The pulses included in the table were Bengal gram, black gram, green gram, soya bean and sprouted pulses. Among this 43 percent of the subjects consumed black gram daily. Majority of them, about 71 percent consumed Bengal gram and 67 percent consumed green gram weekly. Most of them (39 percent) never consumed soya bean and 42 percent never consumed sprouted pulses.

Leafy vegetables included spinach, drumstick leaves, amaranth leaves and cabbage. About 49 percent of the respondents consumed spinach and 37 percent consumed drumstick leaves monthly.

Among the subjects, about half of them (53 percent) consumed amaranth leaves monthly and 42 percent never consumed cabbage. Cucumber, ladies finger, brinjal, tomato, beans and gourds were included in this category. Among the respondents, 33 percent consumed cucumber on alternate days, 34 percent consumed ladies finger weekly and 60 percent consumed on alternate days. About half of the respondents consumed brinjal (52 percent), beans (58 percent) and gourds (53 percent) weekly. Here, carrot, potato, onion, beetroot, tapioca and yam are included in the table. Among this, majority (81 percent) of the respondents consumed onion daily. 31 percent of them consumed carrot monthly, 36 percent consumed tapioca occasionally and 47 percent consumed beetroot weekly. About half of the respondents consumed potato (52 percent) weekly and yam (53 percent) occasionally. Apple, banana, mango, pineapple, guava, papaya, orange, grapes, pomegranate, lemon and jackfruit are included in this category. Among this majority (42 percent) of them consumed banana on daily basis. 27 percent consumed apple weekly, 37 percent consumed mango occasionally, 33 percent consumed papaya occasionally, 34 percent consumed orange monthly, 41 percent consumed grapes monthly, 47 percent consumed pomegranate occasionally and 25 percent consumed lemon occasionally. Pineapple and guava were not consumed by the subjects, 41 percent and 48 percent respectively. About half (51 percent) of the subjects consumed jackfruit occasionally.

Milk was consumed daily by the respondents (84 percent) and only 7 percent never consumed it. 35 percent of the subjects consumed curd weekly. Butter (42 percent) and paneer (47 percent) were never consumed by the respondents. Coconut is consumed greater by the respondents daily, about 87 percent. Chaturvedi et al. (2006) noted that the regular consumption of coconut and its products in meals is linked to hyperthyroidism. This is because coconut has stimulating effects on the thyroid, potentially leading to the development of hyperthyroidism. Egg, fish, red meat and chicken were included in animal foods. Among this, 32 percent of the subjects consumed egg weekly, 47 percent consumed fish daily, 40 percent consumed red meat occasionally and 43 percent consumed chicken monthly.

Table 1. Distribution of respondents based on the consumption of goitrogenic foods

Goitrogenic Foods	Daily %	Alternate days%	Weekly %	Monthly %	Occasionally %	Never %	Total (n=100)
Cabbage	-	-	9	16	33	42	100
Cauliflower	-	-	7	13	48	32	100

Sweet potato	-	-	-	14	37	49	100
Radish	-	-	-	-	13	87	100
Tapioca	-	-	15	21	36	28	100
Turnips	-	-	-	-	4	96	100
Broccoli	-	-	-	2	7	91	100

Bender (2009) explained that a "goitrogen" refers to any substance capable of inducing goiter, the enlargement of the thyroid gland. Typically, this is achieved by effects that reduce thyroidal iodine, although goitrogenic substances can also inhibit other components of normal thyroid hormone production. Common dietary examples of goitrogens include cruciferous vegetables and soy products.

The distribution of respondents based on consumption of goitrogenic foods. In the present study, it was revealed that among the respondents about 42 percent of them never consumed cabbage, 33 percent consumed occasionally, 16 percent on monthly basis and 9 percent weekly. Cauliflower consumption of the respondents was 48 percent occasionally, 32 percent never consumed, 13 percent monthly and 7 percent weekly. In the case of sweet potato consumption, 49 percent of the respondents were never consumed, 37 percent occasionally and 14 percent monthly. Majority (87 percent) of the subjects never consumed radish and the rest of them consumed it occasionally. Among the respondents, 36 percent of them had consumed tapioca occasionally, 28 percent never consumed, 21 percent on monthly basis and only 15 percent on weekly. Majority (96 percent) of the subjects never consumed turnips and only 4 percent of them consumed it occasionally. About 91 percent of the subjects never consumed broccoli, 7 percent consumed it occasionally and only 2 percent consumed in monthly basis. None of the respondents consumed the goitrogenic foods mentioned above in daily and alternative days.

Table 2. Distribution of respondents based on their knowledge level

Nutritional Awareness	Yes		No		Total
	No. of Respondents (n=100)	Percentage (%)	No. of Respondents (n=100)	Percentage (%)	
Thyroid patients cannot eat cabbage	90	90	10	10	100

Seafoods are rich in Iodine	62	62	38	38	100
Untreated thyroid diseases can lead to other health issues	97	97	3	3	100
Hypothyroidism may cause weight gain	90	90	10	10	100
Iodized salt can be used to treat hypothyroidism	85	85	15	15	100
Diet should be rich in dietary calcium	59	59	41	41	100
Cauliflower, tapioca and soya should be avoided in hypothyroidism	69	69	31	31	100
Thyroid dysfunction affects brain development	78	78	22	22	100
Hypothyroid patients may face a higher risk of elevated cholesterol levels.	92	92	8	8	100
Some medications can elevate the risk of developing hypothyroidism.	91	91	9	9	100

Studies on thyroidism indicate that non-vegetarian foods and certain vegetables such as cabbage, cauliflower, and soy products can act as goitrogens, potentially affecting thyroid hormone levels. Additionally, Hitman (1999) highlighted in his research that a high-fiber diet can also lead to fluctuations in thyroid hormone levels. To assess the nutritional awareness of the sample ten statements were administered. The result indicated that most of the respondents were aware of the statements and some were not. Statements showing the importance of dietary modifications were included such as goitrogenic foods (cabbage, cauliflower, tapioca, soya, etc.), iodized salt (to treat hypothyroidism), seafoods (rich in iodine) and diet rich in dietary calcium. To aware about the risks or health problems related to thyroid disorders, statements such as 'Hypothyroidism may cause weight gain', 'Thyroid dysfunction affects brain development', 'Hypothyroid patients might have more risk of increased cholesterol levels' and 'Certain medications may increase the risk for developing hypothyroidism' were administered to the respondents.

Thus from the table it was revealed that majority of the respondents had good knowledge regarding the goitrogenic food like cabbage, tapioca, cauliflower, soya, etc. About 85 percent of them had the knowledge about the use of iodized salt and 41 percent were unaware of the nutrient interactions. Thyroid disorders represent a significant medical issue, often overlooked and underestimated. The lack of general patient awareness regarding these conditions is a matter of considerable concern. Increased awareness could greatly benefit individuals with thyroid diseases who may be unaware of their condition.

SUMMARY AND CONCLUSION

According to WHO (2000), diseases of the thyroid gland are among the most abundant endocrine disorders worldwide, second only to diabetes. Hyperfunction- hyperthyroidism as well as hypofunction-hypothyroidism occur in about 2 % and 1 %, respectively. The prevalence in men is about one tenth of that in women. The present study entitled "Dietary assessment of women with thyroid dysfunction" was aimed to assess the dietary profile of patients suffering from thyroid disorders. The study was conducted among 100 women aged 25-45 years and were selected through purposive random sampling residing in Thiruvananthapuram.

Efficient diagnostic strategies can be based on the initial measurement of serum TSH concentrations, provided that measurement procedure with sufficiently low detection limit is available. The thyroid hormones (thyroxine, T4 and triiodothyronine, T3) participate in the energy regulation.

Biochemical test and function test e.g. basal metabolic rate were developed to diagnose thyroid disease. These investigations have lost their role in modern medicine and are substituted by direct measurement of the hormones (WHO 2000).

About half of the respondents (56 percent) were belonged to the age group of 25-35 years. 74 percent followed Hinduism and 84 percent were married. 67 percent of them lived in rural areas and in nuclear family system (61 percent). Majority of the respondents showed non vegetarian food pattern (79 percent) and 90 percent followed three main meal pattern. Consumption of regular meal is important in maintaining the good health, although half of the respondents (58 percent) followed irregular meal timing and a few of them (10 percent) were found to skip their breakfast. Frequency of food consumption among the respondents shows that 100 percent were consumed rice daily. Pulses, leafy vegetables, other vegetables, roots and tubers, fruits, nuts, sugars, etc were included in their diet. Majority of the respondents consumed milk (84 percent), coconut (87 percent), fish (47 percent), sugar (82 percent) and onion (81 percent) daily. None of the respondents were consuming goitrogenic foods on daily basis. Mostly they consumed food items occasionally or never. The nutritional awareness of the respondents were analyzed through 10 statements administered. Majority of them were familiar with the goitrogenic foods and their consumption were comparatively lower. About 85 percent of the subjects had the knowledge regarding use of iodized salt. About 41 percent were unaware about the nutrient interactions.

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