Assessment of Nutritional Status and Food Awareness for Hyperthyroid and Hypothyroid Patients

Ahmed ameen*, Moustafa El-Tomy Yasmeen Mohamed*, Asmaa El Gamal****

Nutrition and Food Science Department, Faculty of Home Economics,

Cairo, Egypt.

Abstract

Thyroid disorder is an illness prevalent among the elderly. The objective of this study was to evaluate the nutritional status of individuals with thyroid dysfunction, both male and female. This study involved Sixty individuals, comprising Thirty with hyperthyroidism and thirty with hypothyroidism. Their ages varied from twenty to sixty years. All individuals evaluated were picked from Ahmed Maher Hospital in Cairo, Egypt. Data were obtained from patient interviews. Data on socioeconomic status and nutritional assessment was collected by a questionnaire, a 24-hour dietary recall method over three days, a food frequency questionnaire, and an evaluation of nutritional knowledge. Anthropometric assessments were conducted for all evaluated individuals, involving the assessment of thyroid-stimulating hormone (TSH), free thyroxine (FT4), and free triiodothyronine (FT3) levels. The findings indicated that the weight of patients with hypothyroidism was greater than that of patients with hyperthyroidism. The results indicated that the average consumption of energy and macronutrients exceeded the Recommended Dietary Allowance (RDA) levels for the tested patients. Conversely, the intake of minerals (magnesium and calcium) among all examined individuals exhibited levels below the RDA. The average levels of thyroid hormones fall within the normal range; nevertheless, there were notable disparities in the blood concentrations of these hormones among hyperthyroidism and hypothyroidism. This study advocated for a nutrition education program addressing thyroid dysfunction. Furthermore, appropriate eating practices should commence early and persist throughout one's lifetime.

Keywords: Nutritional Assessment, Thyroid patients, Nutrition Intake and Food awareness.

INTRODUCTION

The thyroid gland is a vital component of the human body, regulating most **Mannaa *et al* (2022).** Thyroid hormones physiological functions (triiodothyronine & thyroxine) are essential for growth, development, and the regulation of energy metabolism through their influence on protein, carbohydrate, and lipid metabolism. Furthermore, these hormones govern several essential regulatory hormones, such as catecholamines and insulin **Bianco *et al* (2013) and Kim *et al* (2008)**. Several systemic pathophysiological illnesses can be brought on by changes in thyroid hormone production, which **(Mannaa *et al* (2022)**. In accordance can be caused by any thyroid disorder with **Costilla *et al* (2019)**, Hyperthyroidism is an endocrine disorder characterized by an overabundance of thyroid hormones (T3 & T4), which increase oxygen consumption as well as basal metabolic rate in numerous tissues **Bianco *et al* (2005), Venditti and Meo (2006)**. Hyperthyroidism is most commonly caused by Graves' disease or toxic nodular goiter; toxic nodular goiter or autonomous functioning thyroid nodules are less common causes (**Subekti and Pramono, 2018)**. The hypermetabolic state caused by hyperthyroidism is associated with different degrees of oxidative stress. Damage to proteins, lipids, and DNA due to oxidative stress has been observed in hyperthyroid rats **Venditti and Meo (2006).** In order to regulate and maintain normal physiological & developmental processes, thyroid hormones are essential. **Boelaert and Franklyn (2005).** An appropriate quantity of iodine is essential for the consistent generation of thyroid hormones. **Fatourechi, (2009)**. Regulation of thyroid hormone production and secretion is facilitated by the hypothalamus-pituitary-thyroid axis. Therefore, an aberrant state manifests as hyper- or hyposecretion of hormones that affect human body health when this axis is dysfunctional. **Lin, et al (2016) and Roelfsema, et al. (2017).** Among the several thyroid disorders, hypothyroidism is a prevalent clinical condition. The presence of an elevated TSH level is indicative of hypothyroidism. **Roelfsema *et al*. (2017)**, **Wang, et al. (2019) and Ahmed *et al*. (2008).** Worldwide, hypothyroidism is most commonly caused by an iodine deficit. Autoimmune diseases (such as Hashimoto's thyroiditis) and iatrogenic causes (such as hyperthyroidism therapy) predominate in regions with sufficient iodine levels. **(Jameson and Weetman,2012).** Secondary hypothyroidism can be caused by pituitary and hypothalamic disorders. One out of every four thousand newborns are born with congenital hypothyroidism. **(Jameson & Weetman ,2012)**. Thyroid disorders can affect the function of many organs, including the heart, eye, gut, skin, nervous system, bone and muscles **(Jameson and Weetman ,2012).** It is well known that some foods can affect the function

of the thyroid gland like cruciferous vegetables as (broccoli, cawliflower, cabbage). Iodine & selenium are very important for thyroid metabolism**.** Nutritional imbalance can be a cause or a result of an underlying pathological condition.

Aim of Study:

This research aimed to evaluate the nutritional status and food awareness for hyperthyroidism& hypothyroidism patients.

subjects and Methods

Subject

This study performed on 60 patients. They divided into 2 groups:

-Group(A): 30 cases with hyperthyroidism.

-Group(B): 30 cases with hypothyroidism. this study done at Ahmed Maher teaching hospital, Cairo Egypt.

Methods

A. History and physical examination

B. Nutritional assessment

- Diet history and 24hour recall used to asses food intake and food habits.
- questionnaire designed to asses food awareness**.**

C. Anthropometric measurement

 The measurements performed by using height and weight, then the body mass index (BMI, kg/m2) calculated.

D. Biochemical study

- ❖ TSH, FT4, FT3, CHOLESTEROL (LDL- HDL- VLDL), CBC, FBS

CK and Urinalysis

E. Nutrition education for patients done at end of study

F. Inclusion Criteria: patients with hyperthyroidism& hypothyroidism.

Exclusion criteria: 1-pregnant women and Subjects with major illness such as liver cirrhosis, chronic renal failure, malignancy.

Ethical aspects

-Written informed consent was obtained from all individuals in the trail after explaining the study purpose, methods, and benefits. Data managed in complete confidentiality. Subjects telephone numbers and addresses obtained for communication and follow up. this research approved by the ethical committee of GOTHI.

Statistical analysis

Statistical analysis was performed on the data that was collected utilizing the SPSS-PC Statistical package software (SPSS, 1998). Analysis of variance (ANOVA) performed on the data in a single direction. We examined the significance of the variations among the groups using a p-value of below 0.05.

Results and Discussion

Table (1): Distribution of Age & Anthropometric Measurements (Height & Weight) for cases Suffering from Thyroid Dysfunction

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
Age (y)	**52.93 ± 2.30**	**43.80 ± 1.98**	**3.00**	**0.004 ***
Height (cm)	**162.10 ± 1.24**	**170.33 ± 1.61**	**4.03**	**0.000 ***
Weight (kg)	**83.16 ± 3.97**	**72.03 ± 2.28**	**2.42**	**0.019 ***

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant.

The results in **Table 1** illustrate the distribution of weight and height for those with thyroid dysfunction. The height for hypothyroidism was recorded as (162.10 ± 1.24 cm), but for hyperthyroidism it was (170.33 ± 1.61 cm). The variation was found to be significant. The results **in Table (1)** indicate the distribution of weight measurements for individuals with thyroid impairment. Body weight in hyperthyroidism (72.03 ± 2.28 kg) was lower than in hypothyroidism (83.16 ± 3.97 kg). The disparity was substantial. Our results corroborated with the outcomes of **Gupta et al. (2015),** which indicated that individuals with hypothyroidism had greater weight gain. Furthermore, **Janssen et al. (2015)** shown that subclinical hypothyroidism and hyperthyroidism are more prevalent in obese people in contrast to those of normal weight.

Table (2): Distribution of (fiber, protein, carb, fat and energy) for patients suffering from hypo and hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
Fiber (g)	**21.16 ± 1.12**	**26.13 ± 1.35**	**2.827**	**0.006 ***
Protein (g)	**102.85 ± 3.67**	**104.06 ± 4.40**	**0.212**	**0.833 NS**
Carb (g)	**111.41 ± 4.83**	**103.88 ± 3.29**	**1.288**	**0.204 NS**
Fat (g)	**58.48 ± 4.80**	**57.79 ± 9.42**	**.065**	**0.949 NS**
Energy (cal)	**1383.36 ± 4.32**	**1351.87 ± 4.87**	**0.533**	**0.596 NS**

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant.

Result in **Table (2)** illustrates that the distribution of fiber, protein, carb, energy and fat for the patient suffering from thyroid dysfunction. It was observed that the precent fiber for the hypothyroidism was (21.16 ± 1.12g) while the hyperthyroidism was (26.13 ± 1.35g). The distinction was found to be significant. While value of protein for the hypothyroidism was (102.85 ± 3.67g) but the hyperthyroidism was (104.06 ± 4.40g), The discrepancies in the results may stem from variations in the average age of the participants and the study's environmental conditions. Proper dietary protein consumption is essential for muscle protein synthesis to maintain muscular mass and reduce the risk of age-related impairment. A greater consumption of dietary protein correlates with enhanced physical performance in both postmenopausal women and younger individuals **(Mishra et al., 2018).** Elevated protein consumption correlates with enhanced bone mineral density (BMD), a diminished rate of bone loss, and a lower risk of hip fracture (Rizzoli et al., 2014). Consequently, the elevated protein levels seen in our study may be advantageous for the patients evaluated. The carbohydrate value for hypothyroidism was (111.41 ± 4.83g), but for hyperthyroidism it was (103.88 ± 3.29g). Our results align with the findings of **Sakurai et al. (2018).** The National Health and Nutrition Survey (NHNS) indicated that participants had a carbohydrate intake that beyond the RDA level. In summary, the mean values of energy and macronutrient consumption of the patients who were tested significantly exceed the recommended dietary allowance (RDA). The energy of hypothyroidism was (1383.36 ± 4.32cal), whereas hyperthyroidism was (1351.87 ± 4.87cal). It was highly significant that the difference between the daily intake and the daily requirement increased. **Zabriskie et al. (2019)** have asserted that energy is necessary for all bodily functions. According to **Hill et al. (2012),** humans consume energy in the form

of protein, carbohydrates, and lipids. A negative energy balance is established when the daily energy intake exceeds the energy expenditure (EE). Weight gain and obesity are the consequences of a minor cumulative impact of sustained energy balance **(Markwald et al., 2013).** Consequently, obesity may be a risk factor for the individuals involved in our research. Subsequently, the hypothyroidism fat value was (58.48 ± 4.80g), while the hyperthyroidism fat value was (57.79 ± 9.42g). It was noted that the disparity was not statistically significant. This conclusion contradicts that of **Polito et al. (2005).** All patients who were examined exhibited a high fat intake in terms of total energy. Dietary fat serves numerous essential functions and plays a significant role in human nutrition. The absorption of intestinal calcium (Ca) can be either stimulated or inhibited by dietary fat, contingent upon the type and quantity of fat consumed. The assimilation of calcium may be diminished by high-fat diets, which promote the formation of insoluble calcium soaps. **(Wang *et al*., 2016).**

Table (3): Distribution of (K, Fe, P and Na) for patients suffering from hypo and hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
k (mg)	75.50 ± 2.97	89.66 ± 3.93	-2.87	0.006 *
Fe (mg)	86.78 ± 2.94	129.29 ± 5.62	-6.691	0.000 *
P (mg)	121.75 ± 4.81	128.40 ± 5.51	-0.909	0.367 NS
Na (mg)	170.39 ± 3.35	167.72 ± 4.19	0.497	0.621 NS

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant.

Result in **Table (3)** illustrates that the distribution of K, Fe, P and Na fat for the patient suffering from thyroid dysfunction. It was observed that the precent of **k** for the hypothyroidism was (75.50 ± 2.97mg) while the (89.66 ± 3.93mg). The distinction was found to be hyperthyroidism statistically significant.

While value of **Fe** for the hypothyroidism was (86.78 ± 2.94mg) while the hyperthyroidism was (129.29 ± 5.62mg) **Liu et al. (2001)** observed that the difference was statistically significant (P ≤ 0.05). The erythrocytes of 12 hypothyroid and 20 healthy subjects were examined for the presence of specific chemical elements, such as Fe. The group with hypothyroidism and the healthy subjects did not exhibit any significant differences in Fe. In 2018, Hanif et al. published a paper that examined the correlations between thyroid hormones and

Fe. The research involved 68 healthy subjects and 68 patients with hypothyroidism. The hypothyroidism group exhibited substantially higher levels of Fe (mean ± SD) than the control group (39.80 ± 3069 μg/g vs. 14.32 ± 1970 μg/g). The hormones and metals did not exhibit any significant correlations. **Erdal et al. (2008)** performed research on a group of forty-three autoimmune thyroiditis individuals with subclinical hypothyroidism (SCH) prior to and following thyroid replacement therapy, as well as fifty-nine healthy controls. Prior to treatment with levothyroxine, the concentrations of Fe in people with SCH were 55.7 ± 38 mmol/L, while they were 73.2 ± 54.7 mmol/L following treatment. The serum levels of Fe in the control group were 75.7 ± 24 mmol/L. The concentrations of Fe among the control group and the participants were found to be significantly distinct. Individuals exhibited significantly lower basal Fe levels than controls.

There was no significant change in BMI, cholesterol, homocysteine, hsCRP, vitamin B12, or folate levels, and the researchers did not find any correlation among thyroid function and iron concentrations. Weak bones are a symptom of both iron shortage and excess, implying that the ideal iron level is somewhere in the middle, neither too high nor too low, to maintain bone homeostasis. The disparity was not significant (P ≥0.05), however the hypothyroidism P value was (121.75 ± 4.81mg) and the hyperthyroidism P value was (128.40 ± 5.51mg). It was noted that there was not a significant distinction (P ≥0.05) among the hypothyroidism and hyperthyroidism values of Na, which were (170.39 ± 3.35mg) and (167.72 ± 4.19mg) respectively. Dietary potassium has a positive impact on bone mineral density because it decreases calcium loss from the bones **(Kong et al., 2017).** Bone mineral density in postmenopausal women and older men improved with it. Researchers found that older women who consumed more potassium in their diets had better bone health and were less likely to develop osteoporosis **(Ha et al., 2020).**

Table (4): Distribution of (Mg, Ca & Zn) for patients suffering from hypo and hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
Mg (mg)	**41.16 ± 2.01**	**42.82 ± 2.55**	**-0.513**	**0.610 NS**
Ca (mg)	**58.36 ± 3.02**	**55.04 ± 3.32**	**0.738**	**0.464 NS**
Zn (mg)	**75.09 ± 2.82**	**77.51 ± 4.87**	**-0.430**	**0.66 NS**

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant

Result in **Table (4)** shows the distribution of Mg, Ca and Zn for the patient suffering from thyroid dysfunction. It was observed that the precent of **Mg** for the hypothyroidism was (41.16 ± 2.01mg) while the hyperthyroidism was (42.82 ± 2.55mg). The distinction was found to be not statistically significant. Using data from the Women's Health Initiative observational research, which included 73,684 postmenopausal women, **Orchard et al. (2014)** found that hip and overall bone mineral density were both negatively correlated with magnesium intake. In hypothyroidism, the calcium value was 58.36 ± 3.02 mg, but in hyperthyroidism, it was 55.04 ± 3.32 mg. In a study included 3448 men and 3812 women over the age of 50, **Kim et al. (2014)** discovered that calcium intake was below the RDA. However, our findings contradict this finding. Low body mass density (BMD) and an elevated risk were found to be substantially associated with insufficient calcium consumption. Bone is a mineralized connective tissue in which calcium constitutes the primary component, imparting bone strength and structure (Vannucci et al., 2018). Calcium plays a multitude of crucial biological activities in the human body. The metabolism and growth of bones depend on adequate calcium consumption. The difference was found to be not significant. For hypothyroidism, the zinc levels were 75.09 ± 2.82 mg. 77.51 ± 4.87 mg was the level of hyperthyroidism. $P > 0.05$ indicated that there were no statistically significant variations in zinc consumption among individuals and the RDA. Zinc has a significant role in thyroid hormones. According to **Baltaci et al. (2013),** hypothyroidism is linked to low zinc levels and hyperthyroidism to high zinc levels.

Numerous investigations and meta-analyses have documented the link between zinc shortage and hypothyroidism **(Betsy, et al., 2013; Rezaei, et al., 2019; Regmi, et al., 2019; Talebi, et al., 2020).** Another typical symptom of hypothyroidism is hair loss, which can be caused by acquired zinc insufficiency **(Betsy, et al., 2013).** Zinc deficiency manifests as a lack of pigment, dryness, fragility, and hair thinning. Zinc is a cofactor for many metalloenzymes. Some studies have shown that euthyroidism, which can help with alopecia, can be achieved by a zinc-rich diet **(Betsy, et al., 2013, Chang, et al., 2022, Jin, et al., 2017, and Manisha, et al., 2018).** Zinc content was positively inversely correlated with thyroid size in the research of 68 school-age children **(El-Fadeli, et al., 2016).** The primary reason, in accordance with researchers **(El-Fadeli, et al., 2016),** is a decrease in zinc levels, which in turn hinders the activity of T3 and its ability to bind to its nuclear receptor. In adults, the same findings were observed: a negative correlation between Zn content and thyroid volume **(Ertek, at al., 2010)** and nodular goiter in adults, particularly in areas with an iodine deficiency **(Turan, et al., 2021).** According to a study by **Ertek**

et al. (2010), autoimmune thyroid illness is more common in those with low zinc levels. This data raises questions about the validity of the link among Hashimoto thyroiditis (HTs) and zinc levels, since a previous study found no differences between women with HTs and healthy controls when looking at Zn levels **(Szczepanik, et al., 2021).**

Table (5): Distribution of (B1, B2, Vit C & Vit A) for patients suffering from hypo as well as hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
B1 (mg)	**55.61 ± 2.24**	**62.71 ± 3.30**	**-1.77**	**0.08 NS**
B2 (mg)	**91.60 ± 4.48**	**87.18 ± 5.10**	**0.65**	**0.51 NS**
Vit C (mg)	**106.90 ± 6.19**	**91.11 ± 8.25**	**1.53**	**0.13 NS**
Vit A (mg)	**116.70 ± 7.62**	**109.04 ± 7.28**	**0.727**	**0.47 NS**

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant

Result in **Table (5)** shows the distribution of B1, B2, Vit C and Vit A for the patient suffering from thyroid dysfunction. It was observed that the precent of **B1** for the hypothyroidism was (55.61 ± 2.24mg). while the hyperthyroidism was (62.71 ± 3.30mg). The variation was not statistically significant. While value of **B2** for the hypothyroidism was (91.60 ± 4.48mg). while the hyperthyroidism was (87.18 ± 5.10mg). The distinction was found to be not significant (P > 0.05). Increased mineral density in the femoral neck was linked to an increase in riboflavin and pyridoxine consumption, according to research by **Yazdanpanah et al. (2007).** Results from a study of Korean menopausal women were analyzed by **Kim et al. (2015).** The researchers found that those with thyroid hormone and osteoporosis were more likely to consume less protein, vitamin B2, as well as vitamin C than the EAR. Result of our study concluded that the tested patients had not significant. While value of **Vit C** for the hypothyroidism was (106.90 ± 6.19mg). while the hyperthyroidism was (91.11 ± 8.25mg). It was observed that difference was not significant (P ≥0.05). The RDA for vitamin C is 75mg per day for adult women **(Fenech *et al*., 2018).** Viam C takes part in absorption calcium and iron. Scientific data indicate that increased vitamin C intake in a diet positively affects mineral bone density, provided that an adequate calcium dosage is maintained **(Wozniak-Holecka Sobczyk, 2014).**

and While value of **Vit A** for the hypothyroidism was (116.70 ± 7.62mg). The distinction was found to be not statistically significant. We believed that the decreased content of vitamin A in individuals with HT may have a negative impact on thyroid autoimmunity and metabolic profile due to its antioxidant and anti-inflammatory characteristics. There was a correlation between higher vitamin A concentration and higher BMI, total fat mass, TG, and insulin levels in the research group. Additionally, we demonstrated that insulin level determined vitamin A concentration. We found no evidence of a link between vitamin A and measures of thyroid function. According to **Krishnamurthy et al. (2021),** the outcomes were identical. According to **Shannon et al. (2017),** the majority of it is stored in the liver as retinyl esters. Vitamin A's long-known effects on thyroid hormone synthesis and activity have been well-documented. High doses of vitamin A were shown by Simkins to be effective in treating hypothyroidism in the 1940s. Vitamin A administration may lower the likelihood of subclinical hyperthyroidism in premenopausal women, according to research by **Farhangi et al. (2012);** hypothyroid individuals treated with this vitamin also had reduced metabolic rate as well as hypothyroidism symptoms **(Haugen, 2019).**

Table (6): Distribution of (LYM, RBC, WBC, MPV, Hb and MCH) for patients suffering from hypo and hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
LYM(Ul)	4.57 ± 1.59	5.06 ± 1.37	-0.23	0.819 NS
RBC(10^6/ul)	4.81 ± 0.15	4.91 ± 0.08	-0.58	0.561 NS
WBC(10^3/ul)	6.49 ± 0.32	6.80 ± 0.31	-0.702	0.485 NS
MPV(fl)	9.28 ± 0.20	8.89 ± 0.11	1.67	0.101 NS
Hb(g/dl)	12.44 ± 0.52	13.81 ± 0.39	-2.07	0.042 *
MCH(pg)	26.59 ± 0.75	28.45 ± 0.63	-1.87	0.066 NS

All data are presented as mean ± standard deviation.

*P≤ 0.05 = significant

Result in **Table (6)** shows the distribution of LYM, RBC, WBC, MPV, Hb and MCH for the patient suffering from thyroid dysfunction. It was observed that the precent of **LYM** for the hypothyroidism was (4.57 ± 1.59). while the hyperthyroidism was (5.06 ± 1.37). The distinction was found to be not statistically significant. The present investigation found no significant effect of PTU and L-T4 therapy on leucocyte counts. In contrast, compared to their euthyroid controls, the hypothyroid group showed a rise in monocyte % in the third week, a drop in lymphocyte percentage in the sixth week, and an increase in granulocyte percentage in the hyperthyroid group. Our results are at odds with those of **(Abou-auda and Abou-shaaban,2006),** who found that rats' percentage of monocytes reduced after 30 days of PTU-induced hypothyroidism. **(Nambiar et al., 2014)** conducted additional research. It was shown that various dosing regimens resulted in a drop in WBC, lymphocyte, and monocyte counts in rats treated with PTU. Furthermore, it was found by **Osonuga et al. (2014)** that rats that were given L-T4 for 28 days had lower white blood cell counts.

While value of **RBC** for the hypothyroidism was (4.81 ± 0.15). while the hyperthyroidism was (4.91 ± 0.08). The variation was found to be not statistically significant ($P > 0.05$). Our data show that in contrast to the third week of euthyroid treatment, the red blood cell count was higher in the sixth week. These findings corroborate those of earlier research **(Giknis and Clifford,2008 and Kampfmann *et al*., 2012)** Which were explained by age-related alterations in rats. Hypothyroidism may cause various types of anemia in humans **(Chandel *et al*., 2015)** and various animals as dogs **(Dixon *et al*., 1999),** rabbits (**Jawad and Atyaf JHA-Z,2015)**, ewes **(Mostaghni *et al*., 2005)** and rats **(Umezu et al., 1998).** While value of **WBC** for the hypothyroidism was (6.49 ± 0.32). while the hyperthyroidism was (6.80 ± 0.31). The distinction was found to be not statistically significant ($P > 0.05$). **Nambiar et al. (2014)** found that various dosing regimens lowered WBC, lymphocyte & monocyte counts in rats treated with PTU. In addition, **Osonuga et al. (2014)** found that after 28 days of L-T4 treatment, WBC levels in rats reduced.

While value of **MPV** for the hypothyroidism was (9.28 ± 0.20). while the hyperthyroidism was (8.89 ± 0.11). The distinction was found to be not significant. No changes were observed in PLT, MPV, PDW, or PCT counts in the third week treatment groups in this investigation. On the other hand, the hypothyroid group in the sixth week had greater PLT numbers. Moreover, it was lower in the hyperthyroid group after 6 weeks compared to the hypothyroid and third week groups. Our findings are consistent with those of **Sullivan and McDonald (1992).** The hypothyroidism (MCH) value was (26.59 ± 0.75). In

contrast, the hyperthyroid group that received 60 days of treatment had substantially greater levels of hemoglobin concentration, hemoglobin ct value, mean corpuscular hemoglobin (MCH), and mean corpuscular volume (MCV) than the control group. However, rats treated with L-T4 for 5 weeks had lower RBC counts, Hct values, and Hb concentrations, as observed in the research by **Messarah et al. (2011).** while the hyperthyroidism was (28.45 ± 0.63). But found different from value of **Hb** for the hypothyroidism was (12.44 ± 0.52). while the hyperthyroidism was (13.81 ± 0.39). it was observed that difference was significant ($P \leq 0.05$).

Table (7): Distribution of (FT3, FT4 and TSH) for patients suffering from hypo and hyper thyroidism.

Parameters / Groups	Hypothyroidism	Hyperthyroidism	t	Sig.
FT3(ng/dl)	**1.13 ± 0.14**	**12.62 ± 0.85**	**-13.20**	**0.000 ***
FT4(µg/dl)	**1.60 ± 0.25**	**22.80 ± 3.09**	**-6.82**	**0.000 ***
TSH (uIU/L)	**17.78 ± 4.19**	**0.06 ± 0.01**	**4.22**	**0.000 ***

All data are presented as mean ± standard deviation.

*$P \leq 0.000$ = High significant

TSH = thyroid stimulating hormone, FT3 = free triiodothyronine, FT4 = free thyroxine.

Result in **Table (7)** shows the distribution of FT3, FT4 and TSH for the patient suffering from thyroid dysfunction. It was observed that the precent of **FT3** for the hypothyroidism was (1.13 ± 0.14). while the hyperthyroidism was (12.62 ± 0.85). Hyperthyroidism patients had a significantly higher FT3 concentration in their blood (12.62 ± 0.85 Pg/ml) in comparison to hypothyroidism patients (1.13 ± 0.14 Pg/ml). cases with hyperthyroidism had a considerably greater FT4 content in their blood compared to those with hypothyroidism (1.60 ± 0.25ng/dl for hypothyroidism and 22.80 ± 3. Based on the findings of **Nygaard (2015),** hyperthyroidism is defined by elevated serum levels of 09 ng/dl. Thyroxine (T4), elevated blood T3, or both, and decreased TSH levels are consistent with our findings. In contrast, hypothyroidism is defined by elevated TSH levels and decreased levels of FT3 and FT4 in the blood, according to **Calsolaro et al. (2018).** The blood concentration of TSH was found to be 0.06 ± 0.01 ulU/ml in patients with hyperthyroidism

and 17.78 ± 4.19 ulU/ml in those with hypothyroidism. A significant distinction was noticed ($P \leq 0.05$). Our results are in agreement with the findings.

Recommendations

From the results of this research, it can be recommended the followings:

1. **Education and Food Awareness Programs:** Implement educational programs to increase patients' awareness of the impact of nutrition on thyroid health.
2. Provide resources and guidance on selecting foods that support thyroid function and overall well-being.
3. **Regular Follow-ups and Support:** Schedule regular follow-up appointments to monitor patients' nutritional status and adjust interventions as necessary.
4. Offer continuous support and counseling to help patients adhere to their dietary plans and make sustainable lifestyle changes.

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تقييم الحالة التغذوية والوعي الغذائي لمرضى فرط نشاط الغدة الدرقية وقصور الغدة الدرقية

أحمد امين*، مصطفي التومي**، ياسمين محمد*، أسماء الجمل**

قسم التغذية وعلوم الأغذية- كلية الاقتصاد المنزلي- جامعة حلوان القاهرة، مصر.

*(كلية الاقتصاد المنزلي جامعه حلوان).
**(مستشفي أحمد ماهر).

الملخص العربي

اضطراب الغدة الدرقية مرض شائع بين كبار السن. وكان الهدف من الدراسة الحالية تقييم الحالة التغذوية للرجال والنساء الذين يعانون من خلل في الغدة الدرقية. وقد تم إجراء هذا العمل على عدد من ٦٠ رجلاً وامرأة (٣٠ مصابين بفرط نشاط الغدة الدرقية و٣٠ مصابين بقصور الغدة الدرقية). وكانوا تتراوح أعمارهم بين ٢٠ و٦٠ عامًا. تم اختيار جميع المرضى الذين تم اختبارهم من (مستشفى أحمد ماهر التعليمي) القاهرة، مصر. تم جمع البيانات عن طريق إجراء المقابلات مع المرضى. تم جمع الوضع الاجتماعي والاقتصادي والتقييم الغذائي باستخدام الاستبيان وطريقة التذكير لمدة ٢٤ ساعة لمدة ٣ أيام بالإضافة إلى استبيان تكرار تناول الطعام والمعرفة التغذوية. تم إجراء قياسات الجسم لجميع المرضى الذين تم اختبارهم، إلى جانب تحليل مستوى هرمون الغدة الدرقية المحفز(TSH) ، والثيروكسين الحر(FT4) ، وثلاثي يودوثيرونين (FT3)

أظهرت النتائج أن وزن المريض المصاب بقصور الغدة الدرقية كان أعلى من وزن المريض المصاب بفرط نشاط الغدة الدرقية. كما أظهرت النتائج أن متوسط قيم تناول الطاقة والمغذيات الكبرى كانت أعلى من مستوى (RDA) للمرضى الذين تم اختبارهم. وعلى العكس من ذلك، أظهر تناول المعادن (المغنيسيوم والكالسيوم) لجميع المرضى الذين تم اختبارهم قيمًا منخفضة مقارنة بـ .(RDA) القيم المتوسطة لهرمونات الغدة الدرقية ضمن النطاق الطبيعي، على الرغم من وجود فروق كبيرة في تركيز هرمونات الغدة الدرقية في الدم بين فرط نشاط الغدة الدرقية وقصور الغدة الدرقية.

أوصت هذه الدراسة ببرنامج تثقيف غذائي من خلل الغدة الدرقية. كما يجب أن تبدأ العادات الغذائية السليمة في وقت مبكر وتستمر طوال الحياة.

الكلمات المفتاحية :التقييم الغذائي،مرضي الغدة الدرقية، تناول التغذية والوعي الغذائي.