

Assessment of Nutritional Status of Women Suffering from Thyroid Dysfunction and Osteoporosis

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Abstract

Osteoporosis and thyroid disorders are common diseases in the elderly. The aim of the present study was to assess the nutritional status of women suffering from thyroid dysfunction and osteoporosis. This work was carried out on a number of 70 women (40 hyperthyroidism and 30 hypothyroidism). They were 50-60 years old. All patients were selected from the (El-Hussein, Sayed Galal and El Zaharaa) hospitals, Cairo, Egypt. Data were collected by interviewing patients. Anthropometric measurements were performed for all patients. Nutritional assessments were collected using questionnaire and 24-hr recall method for 3 days as well as food frequency questionnaire. There sults revealed that patient's weight with hypothyroidism was higher than patients with hyperthyroidism. Although, the mean values of energy, macronutrients, minerals and vitamins for hyperthyroidism and hypothyroidism were not significantly different, except vitamin A which was significantly high. Our study also revealed that the mean values of energy and macronutrients intake were greater than the recommended dietary allowance (RDA) of the tested patients. On the contrary, the minerals (copper, magnesium and calcium) in take of all women under investigation showed low values compared with the RDA. The intake of phosphorus and zinc is close to RDA. However, their intake of iron exceeded the RDA levels. Vitamins A, C, B₁ and B₂ were lower than the RDA levels. The mean values of thyroid hormones and calcium concentration in the blood are within the normal range, although there were significant differences in the blood concentration of thyroid hormones between hyperthyroidism and hypothyroidism. This study recommends nutrition education program for the women suffering from thyroid dysfunction and osteoporosis. Also, proper dietary habits should start early and continue through life.

Keywords: Nutritional Assessment, Thyroid Dysfunction, Osteoporosis, Nutrients Intake.

Introduction

Thyroid hormones (THs) are essential for normal metabolism and have important effects on skeletal development, linear growth and the maintenance of adult bone mass and strength (**Williams and Bassett, 2018**). The essential requirement for thyroid hormones during linear growth and skeletal maturation is well established and has been recognized for long time (**Bassett and Williams, 2016**). Any changes of normal thyroid function in euthyroid individuals are related to body weight variations. Thyroid stimulating hormones (TSH) directly affects the remodeling of bone through TSH receptor found on osteoblast and osteoclast precursor cells (**Bhatnagaret al., 2017**). Maintaining normal thyroid function is important for achieving appropriate bone development and peak bone mass in young age,

as well as for regulating the rate of bone turnover in adults. It is well known that bone mineralization is reduced and that the rate of bone turnover is increased in thyrotoxicosis, leading to an increased risk of hip fractures (*Lee et al., 2016*).

Osteoporosis (OP) is one of the chronic diseases affecting individuals' lives, especially women (*Sharifiet al., 2017*). It is the most common bone disease, and it is characterized by low bone mass, destruction of bone microstructure, which leads to increased bone fragility and the risk of bone fracture (*Zhao et al., 2020*). It is also an important cause for increased morbidity and mortality in postmenopausal women and elderly men (*Kapooret al., 2017*). Sometimes it is called the "silent disease", as there may be no noticeable symptoms associated with bone loss, because it can be present without any symptoms until bone breaks. The symptom associated with osteoporotic fractures usually is pain; the position of the pain depends on the location of the fracture (*Elbossaty, 2017*).

Patients and Methods

Patients:

Sample of 70 women (40 hyperthyroidism and 30 hypothyroidism), their age ranged from 50 - 60 years old. They were suffering from thyroid dysfunction and osteoporosis according to the clinical examination and laboratory investigation. Cases with other chronic diseases were excluded. All patients were selected from the Hospitals (El Hussein, SayedGalal and El Zaharaa) Cairo, Egypt.

Methods:

Personal data:

Information on personal data related to name, age, residence, occupation and phone number were collected.

Anthropometric Measurements:

Height and Weight:

The height of the patients was measured using the method described by *Jellife (1966)*. Weight was measured without shoes and in light clothing by using common health balance (*Ferro-Luzziet al., 1992*).

Body mass index:

Body mass index (BMI) is a measure for indicating nutritional status in adults. (BMI) is a simple index of weight- for-height. It has been calculated using the formula: $BMI (Wt (Kg) / Ht (m^2))$ (*WHO, 2004*).

Nutritional assessment:

24-Hr Recall:

Food intake of each subject was estimated for three days per week using 24-hour recall method. Nutritive values of the consumed foods were calculated using Egyptian food composition tables of National Nutrition Institute (2006).

Food Frequency Questionnaire (FFQ) is designed to assess habitual diet by asking about the frequency with which specific food items are consumed during the period (day or month) (*Willett and Lenart, 1998*).

Clinical assessment:

Clinical examination and laboratory investigations were conducted blood samples were collected and serum were separated and kept frozen till analysis. Biochemical analyses were conducted in Al-Husseini hospital.

Laboratory Assessment:

Thyroid hormones: free thyroxine (FT4), free triiodothyronine (FT3) and thyroid stimulating hormone levels (TSH)(*Caldwell et al., 1985*).**Calcium** concentration(*Bold, 1970*)

Statistical analysis:

Statistical analysis was done using computer software system social sciences (**SPSS**) version 21. The proportions were compared using χ^2 test. In quantitative variables, Comparison between two groups was done by t test. All data were presented as mean \pm standard deviation. P value less than 0.05 is significant level and less than 0.001 is highly significant level (*Armitage and Berry, 1987*).

Results and Discussion

Results in Table (1) show the distribution of height for the patients suffering from hyperthyroidism and hypothyroidism. It was observed that the hyperthyroidism their height was 159 cm, while the hypothyroidism was 161.3 cm. It was observed that difference was not significant. Concerning body weight, data revealed that patient's weight with hypothyroidism (90.5 kg) was higher than patients with hyperthyroidism (81.1kg) and the difference was significant ($P < 0.05$). Although, the mean values of energy, macronutrients, minerals and vitamins for hyperthyroidism and hypothyroidism were not significantly different, except vitamin A which was highly significantly different. Our results are in agreement with the findings of *Gupta et al., (2015)* reported that people with hypothyroidism were characterized by increased weight . Thereby it is concluded that Thyroid Stimulating Hormone affects the body mass index in women suffering from hypothyroidism. In addition, *Janssen et al., (2015)* demonstrated that subclinical hypothyroidism and hypothyroidism are more common in obese patients than normal-weight patients are.

Results of this study; Table (2) shows the distribution of body mass index (BMI) for the patients suffering from regarding of hyperthyroidism and hypothyroidism. Data revealed that the highest percentage of BMI was obese 83.3% for hypothyroidism and 62.5% for hyperthyroidism. These results are in agreement with the finding of *Solankiet al., (2013)* and *Al-Musa, (2017)* they concluded that a positive association between serum TSH level and BMI. In the same line a study by *Hamlouiet al., (2018)* shared total 86 patients suffering from thyroid disorders; found that patients with hypothyroidism had significantly higher level of BMI and obesity. Hyperthyroidism patients had lower level of BMI.

Results in Table (3) show mean values of energy and macronutrients intake by patients in relation to the recommended dietary allowance (RDA) of the tested women with hyperthyroidism and hypothyroidism. Data revealed that the mean value of energy intake for hyperthyroidism (1472.3 ± 407.7 kcal) was greater than the mean value for hypothyroidism (1361.2 ± 454.3 kcal). However, there were not significant differences in energy intake between hyperthyroidism and hypothyroidism.

Data also revealed that the mean value of energy intake for all patients (1424.7 ± 428.7 kcal) was greater than the value of RDA level (1066.8 kcal). This increase in the daily intake compared with

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the RDA was highly significant. **Zabriskie et al., (2019)** have stated that energy is required for all bodily functions. Humans take energy in the form of protein, carbohydrate and fat (**Hill et al., 2012**). When daily energy intake is in excess of energy expenditure (EE) a state of positive energy balance occurs. A small cumulative impact of sustained positive energy balance results in weight gain and obesity (**Markwald et al., 2013**), thus the patients in our study could be exposed to obesity.

The mean value of protein intake for both hyperthyroidism and hypothyroidism was in the same average (57.2 ± 15.8 g vs. 56.2 ± 16.4 g, respectively). It was noticed that there were not significant differences in protein intake between hyperthyroidism and hypothyroidism. Mean value of daily intake of protein for all patients was higher than the RDA level as shown in Table (3) (56.8 ± 15.9 vs. 40 g). **Oh and No, (2017)** illustrated (from the Korean National Health and Nutrition Examination Survey, using men and women aged 51-70 years for women and ≥ 71 years for men) that inadequate intake was higher in women and super-aging groups than others, which contradict our results. These conflicts in the results may be due to the differences in the average of the age of the tested subjects as well as the environment of conducting the study. Age-related endocrine and metabolic alterations induce body composition changes including progressive loss of muscles and bone mass and acquisition of fat mass. However, protein intake of the elderly has shown beneficial effects on osteoporosis prevention (**Kwon et al., 2020**). Adequate dietary protein intake is crucial for muscle protein synthesis to preserve muscle mass and limit the risk of disability associated with age. Higher dietary protein intake is associated with higher physical performance (**Mishra et al., 2018**), greater muscle mass and strength, both in postmenopausal women and in young. In older people with osteoporosis, increased levels of protein intake are associated with higher bone mineral density (BMD), a slower rate of bone loss and a reduced risk of hip fracture (**Rizzoli et al., 2014**). Therefore, it appears that the increased level of protein in our study could be beneficial to the tested subjects.

Concerning fat intake, results in the same table shows that the mean values of fat intake for both hyperthyroidism and hypothyroidism were very close (42.0 ± 15.9 g vs. 40.6 ± 19.1 g, respectively). Concerning fat intake, results in the same table shows that the mean value of daily intake of fat for all patients (41.4 ± 17.2 g) was greater than the RDA (29.6 g). This finding is in agreement with the finding by **Polito et al., (2005)** using total of 387 healthy middle-aged women (55-70y) and older men (70-87y). A high fat intake of total energy was observed in all examined subjects. Dietary fat plays a major role in human nutrition and serves many essential functions. Dietary fat can stimulate or inhibit intestinal calcium (Ca) absorption depending upon the type and amount of fat intake. High fat diets may reduce Ca absorption by forming insoluble Ca soaps (**Wang et al., 2016**).

The mean value of carbohydrate intake for hyperthyroidism (215.9 ± 65.3 g) was greater than the mean value for hypothyroidism (191.7 ± 68.3 g). It was observed that there were no significant differences in carbohydrate intake between hyperthyroidism and hypothyroidism. The mean value of daily intake of carbohydrate for all patients was 205.6 ± 67.2 g as shown in Table (3). It could be noticed that was greater than the RDA values (160g) with about 39.8%. Our results are in agreement with the findings of **Sakurai et al., (2018)** who showed from the National Health and Nutrition Survey (NHNS) using a total of 2,637 participants (1,145 men and 1,492 women) that they had a carbohydrate intake that exceeded the RDA level. In conclusion, our results revealed that although the mean values of energy and macronutrients intake for hyperthyroidism compared with hypothyroidism of the tested patients were higher than the RDA level, but the difference is not significantly.

Results in Table (4) showed the mean values of minerals intake by patients in relation to the recommended dietary allowance (RDA) of the tested women with hyperthyroidism and hypothyroidism.

The mean value of calcium intake for hyperthyroidism (499.1 ± 215.1 mg) was greater than the mean value for hypothyroidism (476.4 ± 139.7 mg). It was observed that there were no significant differences in calcium intake between hyperthyroidism and hypothyroidism. For all patients, data revealed that the mean value of daily intake of calcium (489.4 ± 185.7 mg) was less than the RDA level (1200 mg). Our result was in agreement with the findings of *Kim et al., (2014)* who found that calcium intake was less than the recommended dietary allowance (RDA) using a total of 3448 men and 3812 women older than 50 years. They concluded that low calcium intake was significantly related with low body mass density (BMD) and increased risk of osteoporosis. *Vannucciet al., (2018)* mentioned that calcium is essential element that plays numerous biological functions in the human body, of which one of the most important element in skeleton mineralization. Bone is a mineralized connective tissue in which calcium represents the major component, conferring bone strength and structure. Proper dietary calcium intake is important for bone development and metabolism.

In the same Table (4); the mean value of phosphorus intake for hyperthyroidism (734.5 ± 218.6 mg) was greater than the mean value in case hypothyroidism (691.8 ± 188.4 mg). However, it was noticed that there were no significant differences in phosphorus intake between the two groups. For all patients the mean value of daily intake of phosphorus (716.2 ± 205.9 mg) was very close to the RDA value (700 mg). *Farrow and White, (2010)* illustrated that phosphorus is important for patients due to the maintenance of appropriate phosphorus homeostasis. In addition, it is critical for the well-being of the organism and for an optimal calcium–phosphate product for the mineralization of bone without its deposition in vascular and other soft tissues. Table (4) also shows that the mean value of magnesium intake for hyperthyroidism (81.9 ± 31.0 mg) was greater than the mean value for hypothyroidism (79.8 ± 26.9 mg) un-significantly. For all patients, the mean value of daily intake of magnesium (81.0 ± 29.1 mg) was less than the RDA value (320 mg). In a study by *Orchard et al., (2014)* using 73,684 postmenopausal women enrolled in the women's health initiative observational study, they concluded that lower magnesium intake is associated with lower bone mineral density of the hip and whole body. In the same line a study by *Sharma et al., (2016)* using 68 post-menopausal women, 48-75 years of age, was having osteoporosis and osteopenia. Concluded that osteoporosis is characterized by a lower concentration of magnesium. Therefore, the dietary intake of magnesium supplement may be useful in reducing the adverse effect of osteoporosis.

Concerning iron intake, mean value of iron intake for hyperthyroidism (11.1 ± 3.4 mg) was equal to the mean value for hypothyroidism and the mean value for all patients (11.1 ± 3.4 mg) but was greater than the RDA value (8mg). It was noticed that there were not significant differences in iron intake between hyperthyroidism and hypothyroidism. In a study by *Yamasaki and Hagiwara, (2009)* they found that iron over load might give rise to osteoporosis by inhibiting osteoblast proliferation and differentiation. In the same line a study by *Messer et al., (2009)* provided evidence that iron overload alters iron metabolism and suppresses differentiation and function of cells in the osteoblast lineage associated with increased apoptosis. *Baloghet al., (2018)* mentioned that iron overload as well as iron deficiency disrupts the delicate balance between bone destruction and production, via influencing osteoclast and osteoblast differentiation as well as activity, which suggested that balanced bone homeostasis, requires optimal not too low, not too high iron levels.

As shown in Table (4), the mean value of zinc intake for hyperthyroidism (7.9 ± 2.2 mg) was the same as the mean value for hypothyroidism as well as the mean value for all patients (7.9 ± 2.2 mg). The RDA value is 8 mg per day. It was noticed that there were no significant differences in zinc intake between hyperthyroidism and hypothyroidism. There is an important relation between thyroid

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hormones and zinc. Low levels of Zinc are associated with hypothyroidism and high levels with hyperthyroidism (*Baltaciet al., 2013*).

Regarding copper intake for hyperthyroidism it was less than the mean value for hypothyroidism patients (0.5 ± 0.2 mg vs. 0.6 ± 0.2 mg, respectively). However, it was un-significantly compared with the corresponding values of the RDA (0.900 mg). In a study by *Quet al., (2018)* found that serum Cu levels are critically important for bone health. Lower serum Cu levels are significantly associated with decreased bone mineral density (BMD) in the total femur and femoral neck. *Pepa and Brandi, (2016)* mentioned that postmenopausal women with a high dietary Ca intake combined with a high serum Cu level had a greater lumbar bone density than women with low Ca intake and low serum copper.

Results in Table (5) showed the mean values of vitamins intake by patients in relation to the recommended dietary allowance (RDA) of the tested women with hyperthyroidism and hypothyroidism. The mean value of vitamin A intake for hyperthyroidism (152.1 ± 132.0 μ g) was highly significant greater than the mean value for hypothyroidism (1089.5 ± 2063.5 μ g). *Haugen, (2019)* found that the patients with hyperthyroidism were successfully treated with high dose of vitamin A which lead to decreased symptoms of hyperthyroidism as well as decreased metabolic rate. *Farhangiet al., (2012)* found that vitamin A supplementation might reduce the risk of subclinical hypothyroidism in premenopausal women.

Mean value of daily intake of vitamin A for all patients (538.0 ± 1393.5 μ g) was less than of the RDA value (3000 μ g) as shown in the same table. Our results are in agreement with the finding of *Han et al., (2005)* who have shown in dietary survey that was performed to assess the nutritional status and dietary intake of the Korean and Han nationality elderly in Yanji that the daily intake of calcium, vitamin A and vitamin B₂ in elderly were less than the recommended nutrient intake.

Results of the same Table (5) show that the mean value of vitamin C intake for hyperthyroidism (29.5 ± 34.7 mg) was less than the mean value for hypothyroidism (51.2 ± 58.6 mg). Concerning the intake of vitamin C for all patients, it was less than the level of that vitamin compared to the recommended dietary allowance (RDA) (38.9 ± 47.5 mg vs. 75 mg, respectively). Our results are in agreement with the finding of study by *Pignotti et al., (2015)* they compared and evaluated the dietary quality of young and older sedentary Mexican-American women. They illustrated that over 60% of all participants had an intake below recommendations for vitamin C. In another study, *Kim et al., (2015)* derived the data from the Fourth Korean National Health and Nutrition Examination Survey using 1,196 postmenopausal women aged 50 years and older. They concluded that dietary vitamin C intake was positively associated with bone mineral density in postmenopausal women, and inadequate vitamin C intake could increase the risk of osteoporosis.

Results in Table (5) show that the mean value of vitamin B₁ intake for hyperthyroidism, hypothyroidism and all patients (0.7 ± 0.3 mg vs. 0.7 ± 0.3 mg and 0.7 ± 0.3 mg, respectively) were equal. It is obvious that there were not significant differences in vitamin B₁ intake between hyperthyroidism and hypothyroidism. The mean value of vitamin B₂ for hyperthyroidism (0.6 ± 0.4 mg) was less than the mean value for hypothyroidism (0.8 ± 0.6 mg). However, it was not significantly differed between hyperthyroidism and hypothyroidism. Daily intake of vitamin B₁ and vitamin B₂ were lower than the RDA levels (0.7 ± 0.3 mg vs. 1.1 mg) and (0.7 ± 0.5 mg vs. 1.1 mg), respectively. *Ma et al., (2020)* found that thiamine had inhibitory effect on osteoclast differentiation, and its inhibitory role on osteoclast differentiation is in a dose-dependent way. *Yazdanpanahet al., (2007)* concluded that

increased dietary riboflavin and pyridoxine intake were associated with higher femoral neck bone mineral density. **Dai and Koh, (2015)** found that inadequate B vitamin intake has been reported among hip fracture patients. **Kim et al., (2015)** using data from a nationally representative sample of Korean menopausal women; participants consuming less protein, vitamin B₂, or vitamin C than the estimated average requirement showed higher odds of having osteoporosis.

Results in Table (6) show the correlation coefficient of calcium intake and food frequency intakes of some food items. Data revealed that there was a positive correlation between calcium and fish, shrimp, liver, eggs, milk full cream, skimmed milk, milk powder, cheeses such as gooda, & cheddar, yogurt, butter, cream, green beans, cabbage, bananas, strawberries, dried apricots, soft drinks and cocoa. However, results in the same table indicated that there was a negative correlation between calcium and cheese mozzarella, olive oil, butter, mallow, cauliflower, dried fig, tea, coffee and nescafe. It was observed that there was significant correlation coefficient between calcium and skimmed milk. The beneficial effects of milk or dairy products on bone health show a significant inverse association between dairy food intake and bone turnover markers and a positive association with bone mineral content (**Rizzoli, 2014**). Skimming method increases the concentration of mineral nutrients, which is especially remarkable in calcium contained in skimmed milk powder. In yogurt, addition of dried milk or evaporated milk appreciably increases the mineral content (**Closaet al., 2003**). **Yamada et al., (2013)** reported that increase in skimmed milk intakes brings positive calcium balances. **Chee et al., (2003)** recommend obtaining adequate calcium from low-fat milk and its products and other calcium-rich food sources to prevent osteoporosis.

In the same Table (6), it is observed that there was a significant correlation coefficient between calcium and yogurt intake. In study by **Burckhardt, (2015)** in postmenopausal women with a low dietary calcium intake of <600 mg per day, showed that three servings of yogurt lowered N-telopeptide, a marker of bone resorption, to 22% lower values than the control snack. This is mainly a calcium effect. The probiotics in yogurt enhance calcium absorption and have an additional bone effect. **Sahniet al., (2013)** concluded that milk and yogurt intakes were associated with hip but not spine bone mineral density (BMD).

Data showed that there was a significant correlation coefficient between calcium and bananas (Table 6). **Weaver (2013)** illustrates the protective effect of adequate dietary potassium on age-related bone loss accordingly, alkaline potassium salts produced from metabolizing fruits and vegetables or potassium supplements are thought to protect against bone resorption for pH homeostasis. Potassium intake has been associated with reduced urinary calcium excretion. **Kong et al., (2017)** concluded that dietary potassium reduces calcium loss from the bone, leading to beneficial effect on bone mineral density. It was associated with improved bone mineral density in older men and postmenopausal women.

Results in Table (7) show mean values of some hormones and of calcium concentration in the blood of hyper and hypothyroidism patients. Results of thyroid stimulating hormone levels (TSH), free triiodothyronine (FT3) and free thyroxine (FT4) for hyperthyroidism and hypothyroidism were within the normal range. Concerning TSH level in the blood, results recorded 0.7 ± 0.8 uIU/ml for hyperthyroidism patients and 3.8 ± 2.9 uIU/ml for the hypothyroidism. Data of FT3 concentration in the blood was higher significantly in the hyperthyroidism compared to the hypothyroidism patients (3.9 ± 1.1 Pg/ml and 2.4 ± 1.0 Pg/ml, respectively) although both were in the normal range. Concerning the FT4 concentration in the blood results, showed the same trends (1.5 ± 0.5 ng/dl for hyperthyroidism and 1.0 ± 0.2 ng/dl for hypothyroidism). Our results are in agreement with **Nygaard (2015)** who reported that hyperthyroidism

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is characterised by high levels of serum thyroxine (T4), high levels of serum triiodothyronine (T3), or both, and low levels of thyroid-stimulating hormone (TSH). On the other hand, *Calsolaroet al.,(2018)* reported that hypothyroidism is characterized by the increase in thyroid-stimulating hormone (TSH) values, accompanied by reduced circulating free triiodothyronine (FT3) and free thyroxine (FT4). In the same table results shows mean values of calcium in the blood. Results of calcium concentration in the blood were 8.8 ± 0.9 mg/dl for hyperthyroidism and 8.9 ± 0.8 mg/dl for hypothyroidism. It is clear that blood calcium level is within the normal range. However, the patient's daily intake of calcium was less than the recommended dietary allowance (Table 4). This result may be due to that most of the cases are having medicine for thyroid dysfunction and calcium supplements.

Results of Table (7) concluded that the mean values of thyroid hormones and calcium concentration in the blood are within the normal range, although there were highly significant difference in the blood concentration of thyroid hormones between hyperthyroidism and hypothyroidism.

**Table (1):
Distribution of Anthropometric Measurements (Height and Weight) for Patients Suffering from Hyperthyroidism and Hypothyroidism.**

Groups	Hyperthyroidism (n=40)	Hypothyroidism (n=30)	Pvalue
	Mean \pm SD	Mean \pm SD	
Height(cm)	159.0 \pm 5.5	161.3 \pm 6.6	0.106
Weight(kg)	81.1 \pm 10.5	90.5 \pm 14.3	0.002*

All data presented as mean \pm standard deviation.

* P<0.05 = significant.

**Table (2):
Distribution of Body Mass Index (BMI) for Patients Suffering from Hyperthyroidism and Hypothyroidism.**

Groups	Hyperthyroidism (n=40)		Hypothyroidism (n=30)		Total (n=70)		Pvalue
	No	%	No	%	No	%	
BMI							0.122
Normal	1	2.5	1	3.4	2	2.9	
Overweight	14	35.0	4	13.3	18	25.7	
Obese	25	62.5	25	83.3	50	71.4	

**Table (3):
Mean Values of Energy and Macronutrients Intake by Patients in Relation to the Recommended Dietary Allowance (RDA) of the Tested Women with Hyperthyroidism (Hyper) and Hypothyroidism (Hypo).**

Nutrients	RDA value	Hyper(40)	Hypo(30)	Total(70)	T-test	P value
		Mean \pm SD	Mean \pm SD	Mean \pm SD		
Energy (kcal)	1066.8	1472.3 \pm 407.7	1361.2 \pm 454.3	1424.7 \pm 428.7	-0.985	0.325
Protein (g)	40.0	57.2 \pm 15.8	56.2 \pm 16.4	56.8 \pm 15.9	-0.570	0.569
Fat (g)	29.6	42.0 \pm 15.9	40.6 \pm 19.1	41.4 \pm 17.2	-0.344	0.731
Carbohydrate (g)	160.0	215.9 \pm 65.3	191.7 \pm 68.3	205.6 \pm 67.2	-1.495	0.135

All data presented as mean \pm standard deviation.

Table (4):
Mean Values of Minerals Intake by Patients in Relation to Recommended Dietary Allowance (RDA) of the Tested Women with Hyperthyroidism (Hyper) and Hypothyroidism (Hypo).

Minerals	RDA value	Hyper(40)	Hypo(30)	Total(70)	T-test	P value
		Mean ± SD	Mean ± SD	Mean ± SD		
Calcium (mg)	1200	499.1 ± 215.1	476.4 ± 139.7	489.4 ± 185.7	-0.059	0.953
Phosphorus (mg)	700	734.5 ± 218.6	691.8 ± 188.4	716.2 ± 205.9	-0.854	0.393
Magnesium (mg)	320	81.9 ± 31.0	79.8 ± 26.9	81.0 ± 29.1	-0.404	0.687
Iron (mg)	8	11.1 ± 3.4	11.1 ± 3.4	11.1 ± 3.4	0.000	1.000
Zinc (mg)	8	7.9 ± 2.2	7.9 ± 2.2	7.9 ± 2.2	-0.273	0.785
Copper (mg)	0.900	0.5 ± 0.2	0.6 ± 0.2	0.5 ± 0.2	-0.018	0.986

All data presented as mean ± standard deviation.

Table (5):
Mean Values of Vitamins Intake by Patients in Relation to Recommended Dietary Allowance (RDA) of the Tested Women with Hyperthyroidism (Hyper) and Hypothyroidism (Hypo).

Vitamins	RDA value	Hyper(40)	Hypo(30)	Total(70)	T-test	P value
		Mean ± SD	Mean ± SD	Mean ± SD		
Vitamin A (µg)	3000	152.1 ± 132.0	1089 ± 2063	538.0 ± 1393	-3.626	0.0001*
Vitamin C (mg)	75	29.5 ± 34.7	51.2 ± 58.6	38.9 ± 47.5	-1.731	0.083
Vitamin B ₁ (mg)	1.1	0.7 ± 0.3	0.7 ± 0.3	0.7 ± 0.3	-0.504	0.614
Vitamin B ₂ (mg)	1.1	0.6 ± 0.4	0.8 ± 0.6	0.7 ± 0.5	-1.092	0.275

All data presented as mean ± standard deviation.

* P<0.001 = Highly significant.

**Table (6):
Correlation Coefficient between Calcium and Some Foods Frequency Intake.**

Foods	Calcium Intake	
	r	P
Fish	0.045	0.754
Shrimp	0.023	0.918
Liver	0.191	0.231
Eggs	0.141	0.266
Milk full cream	0.140	0.591
Skimmed milk	0.534	0.002*
Powder milk	0.362	0.098
Cheese gooda	0.140	0.632
Cheese cheddar	0.353	0.107
Cheese mozzarella	-0.258	0.235
Yogurt	0.416	0.002*
Olive oil	-0.106	0.666
Cream	0.122	0.736
Butter	-0.207	0.321
Mallow	-0.081	0.677
Green beans	0.244	0.075
Cauliflower	-0.20	0.147
Cabbage	0.026	0.842
Bananas	0.380	0.002*
Strawberries	0.261	0.118
Dried figs	-0.069	0.791
Dried apricots	0.088	0.721
Tea	-0.089	0.504
Coffee	-0.113	0.512
Nescafe	-0.022	0.910
Soft drinks	0.042	0.812
Cocoa	0.133	0.666

r = Correlation Coefficient.

P = Probability Value.

* P<0.05 = significant.

**Table (7):
Mean Values of Some Hormones and Calcium Concentrations in the Blood of Hyperthyroidism and Hypothyroidism Patients.**

Groups	Hyperthyroidism (n=40)	Hypothyroidism (n=30)	Normal range	p value
	Mean ± SD	Mean ± SD		
TSH(uIU/ml)	0.7 ± 0.8	3.8 ± 2.9	0.27 – 4.2	0.00001*
FT3(Pg/ml)	3.9 ± 1.1	2.4 ± 1.0	2.00 – 4.4	0.0001*
FT4(ng/dl)	1.5 ± 0.5	1.0 ± 0.2	0.90 – 1.7	0.0001*
Calcium(mg/dl)	8.8 ± 0.9	8.9 ± 0.8	8.50 – 10.5	0.686

All data presented as mean ± standard deviation.

* P<0.001 = High significant

TSH=thyroid stimulating hormone FT3= free triiodothyronine

FT4= free thyroxine

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تقييم الحالة الغذائية للسيدات اللاتي يعانين من خلل في الغدة الدرقية وهشاشة العظام

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الملخص العربي

هشاشة العظام واضطرابات الغدة الدرقية من الأمراض الشائعة لدى كبار السن. هدفت الدراسة الي تقييم الحالة الغذائية للنساء اللاتي يعانين من خلل في الغدة الدرقية وهشاشة العظام. تم اختيار عينه من 70 سيده (40 يعانين من فرط نشاط الغدة الدرقية و 30 من قصور الغدة الدرقية). تراوحت اعمارهن 50-60 سنة. تم إختيار جميع المرضى من مستشفيات (الحسين ، سيد جلال والزهران) القاهرة ، مصر. تم جمع البيانات عن طريق إجراء مقابلات شخصية.تم أخذ المقاييس الجسمية لهن،تم التقييم الغذائي باستخدام الإستبيان وطريقة إسترجاع على مدار 24 ساعة لمدة ثلاثة أيام مختلفة في الأسبوع، وكذلك إستبيان تكرار الأظعمه. أظهرت النتائج التي توصلت إليها التجربة أن مرضى قصور الغدة الدرقية يعانين من زيادة في الوزن أكثر من مرضى فرط نشاط الغدة الدرقية. على الرغم من أنه لا يوجد فروق معنوية بين مرضى فرط وقصور الغدة الدرقية في المأخوذ من الطاقة، البروتين، الدهون، الكربوهيدرات، الاملاح المعدنية والفيتامينات ماعدا فيتامين (أ) وجد فرق معنوى كبير بين المجموعتين. وتوصلت الدراسة أيضا الى أن كل المرضى يحصلن علي كميات عالية من كل من البروتين، الكربوهيدرات ،الدهون وكذلك الطاقة، مقارنةً بالتوصيات المسموح بها من ال RDA. على العكس من ذلك، أظهرت الدراسة انخفاضا ملحوظا في المتناول من الاملاح المعدنية مثل الكالسيوم، المغنيسيوم والنحاس مقارنةً ب RDA. أما المتناول من الفسفور والزنك متقارب مع RDA. علي العكس أشارت النتائج أن متوسط المتناول من الحديد أعلى معنويا مقارنة ب RDA . بالنسبة لمتوسط المتناول من الفيتامينات A و C و B₁ و B₂ أقل من مستوى RDA. بالنسبة لنتائج التحاليل الطبية لهرمونات الغدة الدرقية وتركيز الكالسيوم في الدم وجد أنها تقع ضمن المعدل الطبيعي ، بالرغم من وجود فرق معنوي في مستوي هرمونات الغدة الدرقية بين السيدات اللاتي يعانين من فرط نشاط الغدة الدرقية ونقصها. توصي هذه الدراسة بعمل برنامج تثقيف الغذائي للسيدات اللاتي يعانين من خلل في الغدة الدرقية وهشاشة العظام. كذلك يجب أن ترسخ العادات الغذائية الصحية في سن مبكر وتستمر طوال الحياة.

الكلمات المفتاحية:التقييم الغذائي، خلل الغدة الدرقية، هشاشة العظام، المتناول من المغذيات.