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Retrospective study on Thyroid Dysfunction Types and its Associated Risk Factors among Libyan Women in Benghazi city

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Abstract

Background: The prevalence of thyroid disease was significantly increased in the whole world, this increase were also noted in Libya, particularly in women. However, the most thyroid dysfunctions types and its associated risk factors have been not exactly known. This study aimed to explore the most types of thyroid dysfunction and its risk factors associated with an incidence in Libyan women. Methods: The total of 150 women patient with thyroid disease, who visited the 1200 Libyan center Hospital, was included. Data were collected from patient 'medical records and unavailable data were obtained from patent. Results: hypothyroidism the was most prevalent of cases among women



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(41.8%, P<0.01) versus (14.2%) of hyperthyroid and the most of two cases were in the age 46-59 years old (46.4%, P<0.001 vs 36.8%, P<0.05) respectively. The highest percentage of hypothyroidism were only seen in overweight women (50%, P<0.001). Both of hypothyroidism and had hyperthyroidism women hypovitaminosis D, 79 (70.5%, P<0.001) vs 26 (68.4%, P<0.05). 70 of Women with hypothyroid (62.5%, P < 0.001) and 25 of them with hyperthyroid (65.8 %, p=0.05) had family history of thyroid diseases in first degree relative 48 (42.9%, P<0.001) vs 19 (50.0%, P=0.05), respectively. Conclusion: Hypothyroidism was the highest type of thyroid dysfunction among Libyan women in Benghazi city. Age,

overweight, hypovitaminosis D and family history were the most associated risk factors for thyroid disease. Regularly investigation for those risk factors could help in an attainment appropriate management to control thyroid dysfunction prevalence.

KeyWords: thyroid dysfunction, hypothyroid, hyperthyroid, family history, iron deficiency, hypovitaminosis D.

* Introduction

Thyroid disorders are medical problem that affect the thyroid gland in which the gland produce an abnormal amount of hormones. Thyroid gland productions such as T3, T4, thyroxin, have essential role in coordinating many of body activity processes including heart rate, energy level, metabolism, bone health and blood pressure (1).

Thyroid dysfunctions such as hyperthyroidism and hypothyroidism lead to over- or under-production of thyroid hormone respectively. That can be resulting from different conditions including Hashimoto's thyroiditis HT, Graves' disease GH, goiter, thyroid nodules, and thyroid cancer (2, 3). In addition, there are major factors driving the defect in thyroid gland such as iodine deficiency, inflammation, autoimmune, life style, dietary habits,

x-ray, age and sex, (1, 4, 5). The last two risk factors have been extensively studied in several Therefore, researches. increasing prevalence of TD in women comparing to men is well recognized. Particularly, women aged ≥ 30 years old is likely to display significantly higher rates of TD than younger (6, 7). However, there are further associated factors related to TD. Accordance to recent researches indicating that Hypovitaminosis D (HD) and iron deficiency (ID) have also role in medical problem issues of thyroid gland (8, 9). For instance, low levels of vitamin D increase the risk of developing HT leading to hypothyroidism (10) or developing GD resulting in hyperthyroidism (11). In addition, recent studies have showed that HD associated risk factor with thyroid nodules (12) as well as promote thyroid cancer development.

Certain of these studies found that there was some improvement in hypothyroidism patients due to vitamin D supplementation (13). Similarly, positive relationship was also seen between ID and TD (14). ID have role in impairment of thyroid metabolism in both animals and human (15). Two studies on adolescent grilles concluded that ID associated with impairment thyroid hormone status (16, 17). Additional study found that TD affected all blood parameters except platelets in female (18). Thus, HD or ID has been considered as the main health concerns issues due to their role in development of several diseases including TD as it is known both of HD (19) and ID (20) are a widespread disorder nutritional worldwide. Identifying the most risk factors of TD would do a favor for the managing of these disorders. Some researches were conducted in Libya and reported that high population was with seen in woman thyroid dysfunction (21-24) however, what the most risk factors associated with these conditions have been not yet done. Consequently, the goal of the present study was to determine the most patterns of TD among Libyan women in Benghazi city (the second capital city) and to identify the most associated risk factors such as age, BMI, family history, ID, and HD related to TD.

* Materials and Methods

* Study design and population

A retrospective study was conducted on 150 women diagnosing with patterns of thyroid dysfunction from 2019 to 2023 at the Endocrinology Department, in 1200 Libyan center Hospital. The participants with thyroid disorders were identified as hypothyroid and hyperthyroid cases dependent on their former medical history and TSH levels. The research had attained authorization from manger of Hospital and all patients including in the study were involved after obtaining their written informed consent.

* Data collection

Data on clinical features including age, BMI, family history of thyroid disease and iron and vitamin D levels for women patients were medical collected from record database. Hypovitaminosis D (HD) was defined as levels of 25-OH vitamin D below25 nmol/L (25) and iron deficiency (ID) was defined, as level of ferritin less than $<15 \mu g/L$ (26). Socio-demographics data such occupation, as marital status. education and qualification were also obtained from patient's records; unavailable information however, was taken from some patients directly after request of them.

* Statistical analysis

Data were analyzed by Package for the Social Sciences (SPSS) software, version 20. Continuous variables are presented as mean with standard deviation (SD) and categorical variables are presented frequencies, as percentages. Chi squared test was used as appropriate. $P \le 0.05$ was considered statistically different.

* Results

150 women patients with TD were included in this study. Among the study population, 112 (41.8%) were hypothyroid patient, whereas 38 (14.2%)hyperthyroid cases (P < 0.001) as showed in Table (1). The mean age of hypothyroid patient 46.04 ± 14.4 was years and $4^{\circ}.21\pm12.7$ with hyperthyroid within the age range of 18-82 years and 20-*T* respectively.

Women with hypothyroid had mean of BMI 28.89 ± 4.7 versus $28.04 \pm 4.1 \text{ kg/m2}$ hyperthyroid women. The most of women in both group were married 89 (80.5%, P<0.0 • 1) versus 28 (73.7%, P<0.01). Only 18 (16.1%) of hypothyroidism women were single versus 8 (21.1%) hyperthyroidism cases. However, the number of divorced or widow women was less than 5 in both cases. The proportions of premenopausal and postmenopausal females were 60 (53.6%) and 52 (46.42) in cases of hypothyroidism versus 18 (47.3%) and 20 (52.6%) in hyperthyroidism cases respectively. Out of 112 hypothyroidism women, 58 (51.7%, $P < 0.0 \cdot 1$) had university degree, 26 (23.2%) had secondary and 14 (12.5%)of them without of qualification.

In hyperthyroidism women, 16 (42.1%, P<0.05) of them were with university degree while 12 (31.6%) with secondary level and 8 (5.3) of them without of qualification.

Regarding Occupation, 52 (46.42%) of hypothyroid cases were employee, 44 (39.28%) of them housewives, and 16 (14.28) % of them were students whereas 12 (31.6%), 18 (47.4%) and 8 (21.05%) of hyperthyroidism cases were housewives. students, employee, respectively. Approximately 48 (42.1%)of women with hypothyroidism suffered from ID, and 64 (57.1 %) of them did not have ID, comparing to 21 (55.3%) women with hyperthyroidism had ID and the rest of them 17(44.77%) did not have it as shown in table (2). As regards of vitamin D, there were 79 (70.5%) of hypothyroidism women (P<0.001) and 26 (68.4%) of hyperthyroidism cases (P<0.05) had HD whereas the rest of them 33(29.5%) and 12 (31.6%) had not HD in both groups, respectively. Women patients were divide into underweight (BMI<18.5), normal (18.5-24.9), overweight (25-29.5), and obese (BMI \geq 30) groups according to BMI. Among all BMI groups, the highest frequency of hypothyroidism was significantly among overweight women seen group 56 (50 %, P<0.001) while 18

(47.4%, P=NS) of hyperthyroidism was observed among the same group.

Similarly, the cases were divided into 5 age groups beginning from (18-31) to (>73). Most of the patients were within the age range of 46– 59 in both hypothyroid 52 (46.4%, P<0.001) and hyperthyroid cases, 14(36.8, P<0.05) and followed by group age (32-45) in both groups 24 versus12 (21.4)(31.6)respectively. About family history, 70 (77.5%) from hypothyroidism women had a positive family history (P<0.01) where 48 (47.9 %) had a first degree relative (A parent, sibling, or offspring) with condition (P<0.01) whilst 22 (19.6 %) of them with second (aunt, uncle. grandparent, grandchild and niece/nephew). In hyperthyroidism women, 25 (75.8%) of them had a positive family history (P=0.05), 19 $(\circ, \%)$ of them had a first degree relative (P<0.05) whereas 6 (10.8%) with second degree relative.

Table 1: Socio-demographics charactersof women patients with hypothyroidismand hyperthyroidism.

parameters	Total F (%)	Hypothyroid F (%)	Hyperthyroid F (%) 38 (14.2)		
	150 (100)	112 (41.8)***			
Marital status					
Single	26 (17.4)	18 (16.1)	8 (21.1)		
Married	117 (78.5)	89 (80.5)***	28 (73.7)**		
Divorced	4 (2.7)	2 (1.8)	2 (5.3)		
Widow	3 (2.0)	3 (2.0)	0(0)		
menstruation status					
premenopausal	78 (52)	60 (53.6)	18 (47.3)		
postmenopausal	72 (48)	52 (46.42)	20 (52.6)		
Qualification					
University	74 (49.3)	58 (51.7)***	16 (42.1)*		
Secondary	38 (25.3)	26 (23.2)	12 (31.6)		
Preparatory	16 (10.7)	14 (12.5)	2 (1.3)		
No qualification	22 (14.7)	14 (12.5)	8 (5.3)		
Occupation					
Employed	64 (42.7)	52 (46.42)	12 (31.6)		
Housewife	62 (41.3)	44 (39.28)	18 (47.4)		
Student	24 (16.0)	16 (14.28)	8 (21.05)		
Body mass index (kg/m2)					
(Mean± SD)	28.89±4.5	28.89±4.7	28.04±4.1		
Rang	(20.6-40.50)	(20.6-40.50)	(22.80-38.00)		
Age (year)					
(Mean± SD)	45.33±13.87	46.04±14.4	43.21±12.7		
Rang	(18-82)	(18-82)	(20-61)		

The data are presented as Mean \pm SD (standard diffusion) for continuous variables while categorical variables are presented as frequencies and percentages. F frequency. % percentage *p < 0.05, **p < 0.01 and ***p < 0.001. BMI, Body Mass Index.

Table 2: Parameters associated riskfactors of thyroid dysfunction.

Risk factors		Hypothyroid		Hyperthyroid		
		F (%)	P values	F (%)	P values	
Age (year)						
(18-31) (32-45)		20 (17.9)	-	8 (21.05)		
		24 (21.4)		12 (31.6)	1	
(46-59)		52 (46.4)	< 0.001	14 (36.8)	< 0.05	
(60-73)		12(10.7)	1 1	4 (10.5)	1	
>73		4 (3.6)	1 [0(0)	1	
Body mass index (kg/r	n2)					
Under weight (<18.5))		0 (0)		0(0)		
Normal (18.5-24.9) overweight (25-29.9)		22 (19.6)	< 0.001	8 (21.1)	NS	
		56 (50)		18 (47.4)		
Obese (≥30)		34 (30.4)		12 (31.6)	1	
Iron deficiency	Yes	48 (42.1)	210	21(55.3)	NG	
-	No	64 (57.1)	1 NS	17(44.7)	7 ^{NS}	
Hypovitaminosis D	Yes	79 (70.5)	+ 0.001	26 (68.4)	10.05	
	No	33 (29.5)	< 0.001	12 (31.6)	< 0.05	
Family history						
NO		42 (37.5)	< 0.001	13 (34.2)	0.05	
YES		70 (62.5)	1 < 0.001	25 (65.8)	1 0.05	
irst-degree relative 48 (42.9		48 (42.9)	10.001	19 (50.0)	< 0.05	
Second-degree relative	;	22 (19.6)	7 < 0.001	6 (15.8)	7 < 0.05	

Chi squared test was used as appropriate. $P \le 0.05$ was considered statistically different. NS=not significant. % F, frequency. percentage. First-degree relative (A parent, sibling, or offspring individual). Second-degree relative (aunt, uncle, grandparent, grandchild and niece/nephew individual).

* Discussion

A high proportion of TH patients have been globally noted. The increases in prevalence of TH among patients lead to other complications health issues such as diabetes, hyperlipidemia and ultimately cardiovascular disease. This increase in percentage of patients with TH related to risk factors linked with or exasperate to these disorders. According to previous studies, the main risk factors were age, BMI, family history and sex; however, some studies have recently declared that further factors such as vitamin D and iron deficiency have been involved in development of thyroid dysfunction patients. Therefore, further investigations are required for effective management of thyroid dysfunction and its According to the complications. results of this study, the prevalence of hypothyroidism women was more than hyperthyroidism cases. This was in consisting with a number of studies (22, 27, 28, and 29). Though, this was in contrary with former studies (21,30). In those studies. hyperthyroidism was the most prevalent thyroid disease and this may be due to geographical locations or environmental factors effeteness. The greatest occurrence of both hypothyroid hyperthyroid and women was observed in age group of the 46 - 59 year old and followed by age group (32-45) which was similarly seen in some previous studies (22, 30). This incidence might probably relate to menopausal stage or reproductive conditions to in those groups. Those conditions are usually accompanying with altering of sex hormones that have role in thyroid

disorders as reported in previous studies (31, 32). Furthermore, our findings revealed that a higher of the TH prevalence was significantly observed in the subjects who were overweight, especially, in hypothyroidism cases. This was in line with most other observations (27, 33, and 34). It is known that increase in body weight is mainly symptoms of hypothyroidism as result of low metabolism rate accompanying with this condition (1) therefore, this may explain the high prevalence of hypothyroidism among overweight women comparing to hyperthyroidism cases.

About to family history, there was significant higher prevalence of patients with family history, especially first degree relatives, in both cases. Similar results have been found in a number of studies (35, 36). It was noted that individuals with a family history of thyroid disease have an increased risk of developing the condition. For instance, the risk of developing hypothyroidism increases nine-fold if a close relative has TH (35, 36). Likewise, it was observed in patients with hyperthyroid as result of having first degree relative with GD (36). Accordingly, autoimmune disorders may be considered as an association genetic influence for some of the familial TD. Regarding

to ID, 42 % of hypothyroidism women had ID vs 57% of them who did not have whereas 55% of hyperthyroidism cases had ID and remaining of them 44% did not have. It is acknowledged that, iron have role in thyroid gland and their hormones function. Thus, significant relationship was seen between level of serum Irion and thyroid hormones free thyroxin such as (٣7). Furthermore, association between ID and hypothyroidism was identified in previous study (1°). Similar finding was also established in Chinas study in pregnant women (38) and in hyperthyroid men with GD (39). However, our results were not in consisting with the above studies. While particular studies reported that ID is connected with an increased risk of thyroid disorders, others did not find significant connection (40, 41). However, conflicting results might be due to ethic causes, gender or the nature of studies.

On the contrary, there was significantly higher frequency women cases had HD among both hypothyroidism and hyperthyroidism women. Our outcomes were in agreement with previous studies (42, 12). HD has been noticeably identified as risk factor in autoimmune thyroid diseases due to its role as immune modulator factor

(43, 44). In addition, vitamin D antiinflammatory role that may help reduce inflammation in the thyroid gland, which is vital in autoimmune thyroiditis. Most related studies mentioned the to role HD in of HT development in hypothyroidism patients (45) and GD (11) in hyperthyroidism cases. Also, vitamin D has a direct effect on the expression of enzymes, type 1 deiodinase that converts T4 to T3 (46). Though, inconsistent results in studies were noticed (47, 48), and these differences may explain by effect of environmental factors such as dietary vitamin D intake, exposure to sunlight and impact of age or gender.

Taken together, demographic factors such as age, and overweight, or environmental factor such as HD could be act as predictor factors for the occurrence of TD. Also, early screening and monitoring of thyroid function in individuals with those risk factors would be important considerate for early detection and management of potential TD. Also, individual who have family history as first relatives with thyroid disease may possibly be at higher threat of TD, particularly, if they have above risk factors. Therefore, following up environmental on these and demographic factors in families with

history of the disease could prevent other members in those families from contracting or delay having a disease. However, there were limitations in our study.

The design of present study was retrospective study which Cannot establish clear causes and effects relationship, consequently, medical and blood examination for thyroid hormones and antibody are required to support our results. Also, it is valued to measure sex hormones taking in consideration suitable sample study size.

* Conclusion

Our results indicate that hypothyroidism case was the most prevalent among Libyan women in Benghazi city. The most risk factors related to thyroid dysfunction were age, overweight, HD, and family history (first degree relative). Our findings suggest that clinical and laboratory examinations are required to confirm our finding. Considered strategies are also necessary for management risk factors to lowering thyroid dysfunctions incidence rate and its complications.

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