Sexual Function and Depression among Reproductive Age Women with Hyperthyroidism

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Abstract

Background: Thyroid disease and sexual dysfunction are common conditions that can have a harmful effect on Sexual function and depression among reproductive age women. Recent reports have documented an increased prevalence of sexual dysfunction among patients with thyroid disorders. **Aim of Study**: Assessing sexual function and depression among reproductive age women with hyperthyroidism. **Methods**: A total of 44 women with clinical hyperthyroidism and 44 age-matched healthy women controls were included in the study. **Design**: A comparative descriptive design was utilized. **Setting**: The study was conducted at surgical wards and outpatient clinic at Mansoura university hospital and Alazhar university hospital New Damietta. **Tools**: Three data collection tools were used: **Tool 1,** socio-demographic questionnaires, **Tool II** A Female Sexual Function Index (FSFI) questionnaire for sexual status ,**Tool III,** the Beck Depression Inventory (BDI) for psychiatric assessment. **Results:** The mean total FSFI scores were (23.54±10.76) in the hyperthyroidic group and (31.16 ± 11.65) in the control group ($P < 0.000$). Desire ($P < 0.030$), arousal ($P < 0.000$), lubrication ($P < 0.002$), orgasm ($P < 0.000$), satisfaction ($P < 0.001$), and pain ($P < 0.006$) domain scores were also significantly lower in women with hyperthyroidism. The mean scores of BDI for hyperthyroidic patients was significantly greater than the score for the control group ($P <0.000$).**Conclusion:** The hyperthyroidic women had sexual dysfunction and depressive symptoms compared to age matched women in the control group. There were a strong association between clinical hyperthyroidism and female sexual dysfunction. Increases depressive symptoms also were associated with hyperthyroidism and female sexual dysfunction. **Recommendation:** Availability of a simple and guided instruction booklet for all women with hyperthyroidism to provide all the necessary information, in particular for sexual dysfunction and depression.

Keywords: Hyperthyroidism, Female Sexual Dysfunction, Depression, Reproductive Age.

Introduction

The thyroid is a hormonally active gland that is part of the hypothalamic-pituitary-thyroid axis. The axis includes thyroid releasing hormone (TRH) which is secreted by the hypothalamus. TRH stimulates the release of thyroid stimulating hormone (TSH) from the anterior pituitary gland. TSH, in turn, stimulates the thyroid to secrete thyroxine (T4) and triiodothyronine (T3), which are present in a free, active form and a bound, inactive form **(Shoback & Gardner, 2018).**

Thus, hypothyroidism is generally associated with decreased T3 and T4 and increased TSH. In contrast, hyperthyroidism is associated with increased T3 and T4, and decreased TSH levels. Graves' disease and Hashimoto's thyroiditis (HT) result in autoimmune hyper-and hypothyroidism, respectively. Hyperfunctioning "toxic" multinodular goiter and hyperfunctioning adenoma are common non-autoimmune causes of

hyperthyroidism Non-autoimmune hypothyroidism often results secondary to surgery, radiation or radioiodine administration for the treatment of hyperthyroidism. Hyperthyroidism results in a hypermetabolic state typified by sympathetic overactivity resulting in tachycardia, tremor, anxiety, and diarrhea and weight loss. Conversely, hypothyroidism is a slowing of physical and mental activity with resultant fatigue, decreased cardiac output, constipation, and weight gain **(Abbas & Aster, 2015).**

Thyroid dysfunction is usually acquired and can occur at any time in life. The prevalence of clinical and subclinical hypothyroidism in women of reproductive age and during pregnancy is 0.3% and 4.3%, respectively. The prevalence of hyperthyroidism in women of reproductive age is 1.3%, and the disease usually occurs as a result of an increase in antibodies against the thyroid-stimulating hormone (TSH) receptor, which is known as Graves' disease. Data supporting the association of hyperthyroidism with infertility are still sparse and sometimes conflicting **(Mintziori, Kita, Duntas & Goulis, 2016).**

Individually, thyroid disease and sexual dysfunction are common conditions that can have a detrimental effect on quality of life. Recent reports have documented an increased prevalence of sexual dysfunction among patients with thyroid disorders. As such, it is important for sexual medicine physicians to be primed on the presentation of patients with overlying sexual and thyroid dysfunction to allow for proper management **(Gabrielson, Sartor& Hellstrom, 2019).**

The prevalence of women with sexual dysfunction in patients with hyperthyroidism is 44–60% (Gabrielson, Sartor& Hellstrom, 2019). The most common issues reported were the lack of desire, arousal, lubrication, orgasm, and satisfaction (Pasquali et al., 2013). There is lack of study that examine the effect of hyperthyrodism on sexual relationships between women in the reproductive age in (**Pasquali et al., 2013).**

Operational Definitions:

Hyperthyroidism: [in the context of the study], hyperthyroidism refers to primary clinical hyperthyroidism which is diagnosed by decreased TSH and increased T3 and T4 level not associated with other clinical condition.

Reproductive Age Women: [in the context of the study], reproductive age women refered to women who are cycling and had a stable heterosexual relationship and were sexually active.

Sexual Function: [in the context of the study], Sexual fuction will be measured using Female sexual function index that consists of six domains: desire, arousal, lubrication, orgasm, satisfaction, and degree of pain.

Depression: [in the context of the study], Depression will be measured using Beck Depression inventory.

Significance of the study

Hormones control all sexual functions, either directly or indirectly (desire, arousal, lubrication, orgasm). Some sexual complaints can be a psychosomatic result of hormone imbalance. Thyroid disease changes central excitability, a condition that occurs in both hypothyroidism and hyperthyroidism and is independent of the value of thyroid-stimulating hormone (TSH). Thyroid disorder, which is linked to female sexual dysfunction, manifests itself as both central (a major drop in libido, depression, weight gain, and lethargy) and peripheral symptoms (a dramatic drop in libido, depression, weight gain, and lethargy) (alteration of vaginal lubrication as a phenomenon independent of variations in estrogenemia, being a

possible psychosomatic effect). It's also linked to lower sexual satisfaction, anxiety, irritation, and difficulties achieving orgasm, as well as the possibility of dyspareunia **(Starc, Juki'c, Poljak, & Dahmane, 2018).**

The presence of thyroid malfunction may be associated to the occurrence of depressive disorder. Clinical forms of hypothyroidism and hyperthyroidism have the highest relative risk of depression (7.9 times and 6.1 times higher, respectively), followed by subclinical forms (2.9 times higher in hypothyroidism and 3.3 times higher in the case of hyperthyroidism) and decreases in asymptomatic forms of autoimmune thyroid disease (3 times higher risk) (**Siegmann etal., 2018).**Therefore, this study is very significant as it aimed at assessing sexual function and depression among reproductive age women with hyperthyroidism.

Aim of the Study:

The current study aimed at assessing sexual function and depression among reproductive age women with hyperthyroidism.

Research Question

Based on the aim of the study, the following research questions were formulated:

Q1: what is the level of sexual function among reproductive women with hyperthyroidism?

Q2: what is the level of depression among reproductive women with hyperthyroidism?

Subjects and Methods:

Research Design:
A comparative descriptive research design with two groups (study and control group) was utilized to conduct the current study.

Setting:

The study was conducted at surgical wards and outpatient clinic at Mansoura university hospital and El-Alazhar university hospital New Damietta.

Sample:
A total sample of (88) women divided into two groups: study group (44), purposively selected from sexually active, newly diagnosed, primary hyperthyroidic women and control group (44) which were conveniently selected from sexually active, age matched, healthy women from the general population. Sample size was calculated using Thompson (2012) formula; using the following parameters (N=115, p=0.50, d=0.05, z=1.96).

Inclusion criteria:
All the women recruited in this study were cycling and had a stable heterosexual relationship and were sexually active.

Exclusion criteria:
Subjects who had coexisting diseases resulting in sexual dysfunction (cardiovascular disease, neurological disease, major psychiatric disease, diabetes, previous pelvic surgery, premature ovarian failure) and patients receiving oral contraceptives or hormonal replacement therapy, or medications that interfere with sexual function, e.g., sedatives, antidepressants, and b-blockers and having no sexual activity within the past month, were not included in the study.

Data Collection Tool

Three data collection tools were used to conduct the current study:

First: socio-demographic questionnaire: includes questions about the socio-demographic characteristics of the study subjects such as (age, marital status, education, etc.).

Second: Female sexual function index (FSFI) developed by Rosen etal., (2000). It is consists of 19 items. The questionnaire assessed sexual functioning or problems during the last 4 weeks. Specific domains analyzed in the FSFI included: desire (2 items), arousal (4 items), lubrication (4

items), orgasm (3 items), satisfaction (3 items), and degree of pain (3 items). Each item was scored on five points Likert scale ranges from 0 or 1 (never/almost never) to 5 (always/almost always).

The overall FSFI score was obtained by adding the six domain scores. The overall FSFI score was 2 to 36. A total score more than 26.55 was considered normal sexual functioning, and a total score less than 26.55 was considered sexual dysfunction

Third: Beck's Depression Inventory (BDI) 21 items developed by Beck etal., (1961). Each of the 21 questions is scored between 0 and 3 (absent to severe), and the highest possible total score for the whole test is 63. The level of depression was divided into 4 categories according to the total score: No/Minimal (0-10), Mild (10-18), Moderate (19-29) and severe (30-63). The data collection tools were translated into Arabic by two translators. Each of them translated the tool separately. The two versions were combined and revised and then back translated into English by a third translator. The translation was refined after back translation until agreement was obtained among all three translators. The questionnaire was then piloted for comprehension and ease of administration on 10 Arabic-speaking.

Pilot Study

The study tools were applied on 10% of total sample size (8 reproductive married women) before starting the data collection. The purposes of pilot study were to assess validity of study tool to determine feasibility and practicability understand ability of data collection and to detect any problems prior to data collection and to estimate the time needed to complete the tool. Sample size of pilot study excluded from the total sample size.

- **Field Work:**it included two phases**; (assessment phase,and implementation phase).**
  - **Phase one; assessment phase:**

During this phase, the researchers interviewed the women to gather the socio-demographic data by using tool I, The researcher screens all reproductive married women and randomly designated to either study group or control group. The baseline data required about the hyperthyroidism cases

Phase two; implementation phase:

Based on the work completed in phase one, the researcher performed the procedure the following research questions were formulated:

Q1: what is the level of sexual function among reproductive women with hyperthyroidism?

Q2: what is the level of depression among reproductive women with hyperthyroidism?

The researcher attended the previously mentioned setting two days per week from 9:00 am to 1:00 pm until the calculated and completed sample size was obtained at surgical wards and outpatient clinic at Mansoura university hospital and El-Alazhar university hospital New Damietta.

This study was carried out in the period occurred between jaunuary and April 2021 . Confidentiality of the information was assured through coding of the data.

The researcher attended the previously mentioned setting founded at surgical wards and outpatient clinic in two days per week of sample cases.Firstly, the researcher introduced herself to all selected reproductive married women and obtained their written informed consent to participate in the study after explanation of the aim for each reproductive married woman.

The total study sample 88 reproductive married women divided into equal number for two groups as follow: The first 44 reproductive married women assigned to control group while the second 44 hyperthyrodism reproductive married women assigned to study group.

The researcher prepared reception room at surgical wards and outpatient clinic at Mansoura university hospital and El-Alazhar university hospital New Damietta for 15 minutes each reproductive married woman to fill the tools. Secondly, the researcher explained the study tools in front of reproductive married women in order to teach them how to do them .

Data Collection Procedure

Official permissions from the directors of the hospital were obtained. All subjects were invited to participate in the study. The purpose and nature of the study were explained to each participant individually and a written informed consent was obtained. The investigators informed them that participation is entirely voluntary and the possibility of withdrawing at any time without explanation of the cause. Confidentiality of the information was assured through coding of the data. Data collection occurred between jaunuary and April 2021.

Ethical considerations:

- Official approval was obtained from the director of surgical wards and outpatient clinic at Mansoura university hospital and El-Alazhar university hospital New Damietta to implement the study after explanation of the aim of this study.
- Written informed consents were taken from all the reproductive married women participating in the study after the aim of the study was explained to them.
- The participants were reassured about the confidentiality & privacy of the obtained information.
- The participants were informed about their rights to refuse participations or withdraw at any time.

Validity and Reliability

Validity of the data collection tools was tested by five nursing experts who assessed the content, clarity, applicability, and adequacy of the tools. Modifications for the tools were done based on the recommendations of the nursing experts. Then, reliability of the tools was tested using Cronbach's alpha coefficient which was (0. 763) for FSFI and (0.832) for BDI which are good score for reliability.

Limitations of the current study:

- Our sample comprised of 88 reproductive married women, where a larger sample would have been more appreciate, but wasn't feasible due to time limitation and the number of women who didn't complete the sessions due to their desire, The sample was drawn from two hospitals on two geographical areas in the Arab Republic of Egypt that not restricts generalization of findings but have more cost , hard work and overload on researcher during data collection.

Statistical Design:

The collected data were coded and entered into statistical package for social sciences (SPSS 22.0). Data were presented using descriptive statistics in the form of frequencies and percentages for categorical variables. Means and standard deviations were used for continuous variables. Chi-square tests were used for testing the differences among groups.

Results

Table (1): Demographic characteristic of the hyperthyroidic patients and control group.

Variables	Control Group (N=44)	Hyperthyroidic Group (N=44)	P-Value
Age	35.11 ± 9.02	34.30 ± 8.05	0.921
Marital status:			
1) Married	44(100)	44(100)	-
2) Unmarried	0(0.00)	0(0.00)	
Educational status:			
1) Primary	1(2.27)	0(0.00)	
2) Middle	4(9.09)	11(25)	0.171
3) High	14(31.81)	10(22.72)	
4) University	25(56.83)	23(52.28)	
Job:			
1) Not employed	24(54.54)	19(43.18)	0.286
2) Employed	20(45.46)	25(56.82)	
Smoking:			
1) No	44(100)	44(100)	-
2) Yes	0(0.00)	0(0.00)	
Physical activity			
1) Never/rare	27(61.36)	29(0.66)	
2) Once/week	11(25)	13(0.30)	0.415
3) Several times/ week	6(13.64)	2(0.04)	
No of pregnancy:			
1) None	9(20.45)	12(27.28)	
2) 1-3	20(45.45)	16(36.36)	0.636
3) 4-6	15(34.10)	16(36.36)	
Note: p value for marital status and smoking were not computed because they were constant.			

Table 1: summarized the demographic characteristics of subjects in both study and control groups. The mean age of controls was (35.11 ± 9.02) and the mean age of study group was (34.30 ± 8.05). All subjects in both groups were married. 56.83% of subjects in control and 52.28% in study groups had university degree. All subjects were non-smoker. The results of chi square and t tests indicated that there was non-significant difference between the two groups.

Table (2) Hormone levels in hyperthyroidic patients and control groups.

Variables	Control Group (N=44)	Hyperthyroidic Group (N=44)	P-Value
	Mean ± SD	**Mean ± SD**	
TSH	2.28 ± 1.32	0.13 ± 0.04	0.001
Free T3	3.12 ± 0.78	8.39 ± 6.57	0.001
Free T4	1.3 ± 0.34	2.89 ± 1.98	0.001

Table (2) illustrated the mean scores of the hormonal levels in control and study group. The TSH level in control group was higher than study group while both Free T3 and Free T4 were higher in study group compared to controls. The results of independent samples t tests indicated that the differences between groups were highly significant.

Table (3) FSFI and BDI mean scores in hyperthyroidic patients and control groups.

Variables	Maximum	Control Group (N=44)	Hyperthroidic Group (N=44)	P-Value
		Mean ± SD	Mean ± SD	
Total FSFI	36	31.16 ± 11.65	23.54±10.76	0.000
Desire	6	4.23 ± 2.14	3.79 ± 2.16	0.030
Arousal	6	4.56 ± 1.88	3.23 ± 2.13	0.000
Lubrication	6	5.32 ± 2.13	4.01 ± 1.84	0.002
Orgasm	6	5.21 ± 1.98	4.15 ± 2.34	0.000
Satisfaction	6	4.19 ± 2.17	4.18 ± 1.78	0.001
Pain	6	5.10 ± 2.67	4.65 ± 1.93	0.006
BDI	63	13.89 ± 4.52	21.19 ± 8.4	0.000

Table (3) revealed the mean scores of sexual function and depression among women in both control and study groups. The mean total FSFI scores were (23.54±10.76) in the hyperthyroidic group and (31.16 ± 11.65) in the control group (P < 0.000). The mean score of hyperthyrodic group was lower than the cutoff point (26.55) which indicates sexual dysfunction. The mean scores of the domains of FSFI in the hyperthyrodic group were also significantly lower than the control group. The mean scores of BDI for hyperthyroidic patients was significantly greater than the score for the control group (P <0.000). The mean score of the hyperthyroidic group was high which indicates the existence of depressive symptoms.

Table (4) comparison between the levels of depression in hyperthyroidic patients and control groups.

Variables	Category	Control Group (N=44)		Hyperthroidic Group (N=44)		X^2	P-Value
		N	%	N	%		
Depression	**Minimal/No**	27	61.3	6	13.6	38.25	0.000
	Mild	14	31.8	8	18.2		
	Moderate	3	6.9	13	29.5		
	Severe	0	0.00	17	38.7		

Table (4) summarized the comparison between the levels of depression in hyperthyroidic patients and control groups. The majority of subjects in the hyperthyroidic group had severe depression while in the control group the majority had only minimal depression. The difference in depression levels in both group was significant (X^2=38.25, P=0.000).

Table(5) correlation between FSFI and BDI.

	FSFI (Total)	Desire	Arousal	Lubrication	Orgasm	Satisfaction	Pain
BDI	-0.75 (0.000)	-0.67 (0.000)	-0.49 (0.000)	-0.25 (0.251)	-0.35 (0.003)	-0.39 (0.001)	-0.22 (0.073)

Table(5) showed the Pearson's correlation coefficients between FSFI and BDI. The BDI score was negatively correlated with total FSFI scores (P =0.000), desire (P =0.000), arousal (p=0.000), orgasm (P=0.003), but lubrication and pain scores were not correlated with BDI score.

Table(6) correlation between FSFI, BDI and hormonal level.

	TSH	free T3	free T4
FSFI	0.54(0.000)	-0.45 (0.005)	-0.75 (0.000)
BDI	0.32 (031)	-0.23 (0.043)	-0.35 (0.030)

Table (6) summarized Pearson's correlation coefficients between FSFI, BDI and hormonal level. The FSFI score showed a significant negative correlation with fT3 (P =0.005) and fT4 (P=0.000) and positive correlation with TSH (P =0.000). The BDI score also showed a significant negative correlation with fT3 (P =0.043) and fT4 (P=0.030) and positive correlation with TSH (P =0.031).

Discussion:

The current study showed that women with hyperthyroidism have significantly lower FSFI domain scores and higher BDI scores as compared with age matched women with hyperthyroidism. In comparison to the control groups, the hyperthyroidic group experienced sexual dysfunction and depression symptoms. The findings were similar to those of **Atis et al. (2011),** who investigated sexual function in women with hyperthyroidism and found that more than half of women with hyperthyroidism experience sexual dysfunction, compared to one-third of women without hyperthyroidism. In the same vein **Bortum etal., (2021**) studied the impact of thyroid autoimmune disease on sexual function in young women and observed that healthy patients had significantly higher FSFI scores than patients with hyperthyroidism. They also observed in the hyperthyroidic group, the risk of female sexual dysfunction increases with the severity of thyroid disease. The most affected areas as reported by **Bortum etal., (2021**) were: sexual desire, lubrication and orgasm followed by excitability and sexual satisfaction. Consistently with finding of the current study, **Krysiak1, Kowalcze and Okopień (2019)** reported that the mean total FSFI score and all domain scores were lower while the overall BDI score was higher in both groups of women with overt hyperthyroidism than in the control group, and correlated with thyrotropin and free thyroid hormone levels. The FSFI score as well as domain scores for desire, arousal and sexual satisfaction were lower, while the BDI score was higher in the hyperthyroidic group.

According to **Stechova et al., (2019),** female sexual dysfunction was present in about two-thirds of the participants (based on the FSFI score), and more than one-third of the women reported significant sexual distress (based on their FSDS score), with a strong correlation between the BDI and the FSFI.

Gabrielson, Sartor, and Hellstrom (2019) found that sexual dysfunction is common in both men and women with hypo and hyperthyroidism. Hypothyroidism and hyperthyroidism were both linked to erectile and ejaculatory dysfunction, with hypothyroidism being linked to delayed ejaculation and hyperthyroidism to premature ejaculation. Men and women have been reported to have decreased libido due to hypothyroidism and hyperthyroidism; however, evidence of hypothyroidism's impact on male libido is inconsistent. Desire, arousal/lubrication, orgasm, contentment, and satisfaction were all impaired in hypothyroid and hyperthyroid women. Mechanistically, hypothyroidism and hyperthyroidism exert effects on circulating sex hormone levels through peripheral and central pathways and can indirectly provoke psychiatric and autonomic dysregulation that can impair sexual function. Correction to euthyroid state was associated with dramatic resolution of sexual dysfunction in both male and female patients with hypothyroidism or hyperthyroidism.

Most studies show that women and men with hypo- and hyperthyroidism have elevated rates of sexual dysfunction, including erectile dysfunction in men with hypothyroidism, according to a recent literature analysis by **Bates, Kohn, and Pastuszak (2020).** The degree of the link between hormonal imbalance and sexual dysfunction, however, varies between studies. Thyroid disease treatment at least partially restores sexual dysfunction in both hyper- and hypothyroid males. In contrast, there is no consensus on the impact of hypothyroidism, hyperthyroidism, or Hashimoto's thyroiditis on female sexual function in the current literature. Correction of the thyroid derangement resulted in remission of some sexual dysfunction in studies that found

greater incidence of sexual dysfunction in women with thyroid abnormalities.Studies are also conflicted on whether there is a relationship between the degree of sexual dysfunction and the degree of hormone derangement in women. However, prior work has demonstrated a relationship between thyroid autoantibodies and sexual dysfunction in women.

Shoib et al., (2021) reported that There was a higher prevalence of psychiatric disorders among the hyperthyroidism group. In particular, there was a higher prevalence of major depressive disorder, suicidality, generalised anxiety disorder, panic attacks, and agoraphobia. In some cases, the prevalence of a psychiatric disorder diminished after endocrinological treatment.

Conclusion:

The current study concluded that the hyperthyroidic women had sexual dysfunction and depressive symptoms compared to age matched women in the control group. It also concluded that there were a strong association between clinical hyperthyroidism and female sexual dysfunction. Increases depressive symptoms also were associated with hyperthyroidism and female sexual dysfunction.

Recommendation:

- In the light of the present study, the following recommendations were suggested:
- Availability of a simple and guided instruction booklet for all women with hyperthyroidism to provide all the necessary information, in particular for decrease sexual dysfunction and depression .For further research studies:
- Replication and repeating the study using different and large sample size, to determine the generalizability of the results.

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