

# Sexual Function and Related Endocrinological and Psychological Aspects in Pregnancy: A Controlled Study

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## Abstract

**Introduction:** Sexuality is an important part of women's physical & psychological health. Female sexual function is affected during pregnancy. **Aim:** we aimed to assess and compare sexual function & related endocrinological & psychological aspects in pregnant and non-pregnant women. **Methods:** A total of sexually active 40 women included two groups: 20 pregnant women and 20 non-pregnant women who served as controls. Sexual function (using Female Sexual Function Index), the psychological status (using Depression, Anxiety and Stress Scale) and Serum total testosterone & estradiol levels were assessed. **Results:** The studied women's age ranged from 19 to 35 years. The mean of desire, arousal, orgasm, and total score domains in pregnant women ( $2.97 \pm 0.98$ ,  $3.00 \pm 0.82$ ,  $3.53 \pm 0.93$ ,  $21.77 \pm 3.89$  respectively) were significantly lower when compared to non-pregnant women ( $p < 0.05$ ). In pregnant women, the depression & stress axis showed significant negative correlations with desire, satisfaction, and total score domains ( $p < 0.05$ ). Both axes showed also significant negative correlations with total testosterone in both pregnant & non-pregnant women ( $p < 0.05$ ). There were negative correlations between satisfaction in pregnant women and each of female age, husbands' age, duration of marriage and parity ( $r = -0.6$   $p = .005$ ,  $r = -0.59$   $p = .006$ ,  $r = -0.72$   $p = .001$ ,  $r = -0.59$ ,  $p = .005$  respectively). **Conclusions:** Sexual function is affected in pregnant women more than non-pregnant women. Hormonal changes, depression and stress are interrelated factors along with other factors such as age, husband's age and duration of marriage affect the sexual function in pregnant women. So, when evaluating pregnant women, sexual function along with all these factors should be considered and assessed.

**Keywords:** Pregnancy; Sexual Dysfunction; FSFI; DASS-21 score

## Introduction

Sexuality is an important part of women's health, quality of life, and general well-being. There are many factors influencing the female sexual function, including psychological, physiological, and socio-cultural factors<sup>(1)</sup>. Female sexual dysfunction

(FSD) is defined as any problem that may be encountered in the sexual response cycle that deviates from a woman's normal range of functioning<sup>(2)</sup>. In sexual dysfunction, there is an interruption in normal sexual functioning at one or several points in the sexual response cycle<sup>(3)</sup>. Pregnancy is a complex period in

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which various anatomic and physiological changes in conjunction with psychological and cultural factors may have an impact on the sexuality of partners. Sexual function during pregnancy is an important aspect of quality of life and should be discussed with all pregnant women and their partners<sup>(4)</sup>. Female sexual function is affected during pregnancy, with a significant change in all female Sexual Function Index domains, especially in the first and third trimesters<sup>(5)</sup>. Hormonal changes are important biological factors which affect sexual function during pregnancy, leading to biological changes like nausea, fatigue and affect sexual desire and arousal in women<sup>(6)</sup>. Sex hormone steroids, including androgens & estradiol, increase with normal pregnancy<sup>(7)</sup>. Pregnancy also affects psychological functioning. This is noticed through variable manifestations such as frequent mood changes, anxiety, fatigue, maternal depression and stress<sup>(8)</sup>. Though several studies have been developed showing that sexual dysfunction seems to be a common health problem during pregnancy few of them compared the sexual functions between pregnant women and their non-pregnant counterparts especially in Suez Canal region and none investigated its intercorrelations with endocrinological & psychological aspect. This motivated us to carry out the present study in which we aimed to assess sexual function and related Endocrinological & psychological aspects among pregnant women and compare them with non-pregnant women in Suez Canal region and to determine the factors that may affect sexual activity during pregnancy.

## Subjects and Methods

This cross-sectional, controlled study included 40 women divided into two groups. Group (1) included 20 sexually active preg-

nant women and group (2) included 20 sexually active non-pregnant women (served as controls). The study was conducted in Andrology outpatient clinic and Obstetrics & Gynecology clinic, in Suez Canal University, Ismailia-Egypt. Patients were selected by Simple random sampling method for all patients who came to hospital after meeting the inclusion criteria. Inclusion Criteria included pregnant and non-pregnant women aged 18-35 years with Stable marital status and frequent, regular unprotected intercourse. Exclusion Criteria included females with obstetric conditions that restrict sexual activity such as antepartum hemorrhage, and placenta previa, history of any psychiatric illness, antidepressant medications, females with marital conflicts and partner's sexual problems such as erectile dysfunction or lack of desire. An approval was taken from Faculty of Medicine Suez Canal University Research Ethics Committee. Informed consent was obtained from all participants before inclusion in the study. All the participants were subjected to personal history, sexual history, medical history, surgical history, medication history, general examination, and genital examination. They were kindly asked to answer a validated questionnaire; Female Sexual Function Index (FSFI; a multi-dimensional questionnaire with sub-scales to assess the major components of sexual function in women including sexual desire, arousal, orgasm, satisfaction, and pain)<sup>(9-11)</sup>. The psychological health was evaluated using Depression, Anxiety and Stress Scale (DASS-21)<sup>(12,13)</sup>. Blood sample of 5ml was obtained from each participant in the first visit to assess total serum Testosterone and Estradiol.

## Statistical Analysis

Collected data were coded, entered, and analysed using Microsoft Office Excel

(2013) software. Data were imported into Statistical Package for the Social Sciences (SPSS) version 20.0 and MedCalc version 12.1.3.0 software. Baseline characteristics of the study population were presented as frequencies and percentages (%) for qualitative data or mean values and standard deviations (SD) for quantitative data. Analytic statistics: Chi-square Test ( $\chi^2$ ): was used to study the comparison and association between qualitative variables. Student T-Test was used for comparison between quantitative variables with normal distribution (for parametric data).  $p$  value of  $\leq 0.05$  will be considered significant. Correlation coefficient test was used to evaluate the inter-correlations between the studied variables.

## Results

In table (1) the female age ranged from 19 to 35 with a mean age of  $26.40 \pm 3.66$  in pregnant females versus  $29.35 \pm 4.12$  in non-pregnant females. The mean age of Husband was  $32.85 \pm 4.60$  in pregnant women and was  $35.55 \pm 6.08$  in non-pregnant. Marriage duration ranged from 1 to 19 years and the mean duration in pregnant and non-pregnant females were

( $5.95 \pm 3.8$  vs.  $9.35 \pm 4.89$  respectively). Parity in the studied females ranged from zero to four with a mean of  $1.55 \pm 0.82$  in pregnant women and  $2.30 \pm 0.65$  in non-pregnant women. The table showed also that the percentage of pregnant females with sexual dysfunction was 70%, compared to 60% of the non-pregnant females. The mean of desire, arousal, orgasm, and total score domains ( $2.97 \pm 0.98$ ,  $3.00 \pm 0.82$ ,  $3.53 \pm 0.93$ ,  $21.77 \pm 3.89$  respectively) were statistically significant lower in pregnant females when compared to non-pregnant females ( $p < 0.05$ ) Table (2). On the other hand, there were no statistically significant differences between pregnant and non-pregnant females concerning lubrication, satisfaction, and pain domains ( $p > 0.05$ ). Table (2) showed also that there was no statistically significant difference between pregnant and non-pregnant females as regard to any of DASS-21 axes ( $p > 0.05$ ) concerning intercourse frequency it was  $> 10$  times per month in 20% of non-pregnant females group versus 0% in pregnant females with a statistically significant decrease in intercourse frequency in pregnant females compared to non-pregnant females ( $p < 0.001$ ).

Variables	Pregnant	Non-pregnant
	Mean $\pm$ SD (Range)	Mean $\pm$ SD (Range)
Age	$26.40 \pm 3.66$ (19-35)	$29.35 \pm 4.12$ (23-35)
Husband age	$32.85 \pm 4.60$ (24-42)	$35.55 \pm 6.08$ (26-45)
Duration of Marriage	$5.95 \pm 3.80$ (1-14)	$9.35 \pm 4.89$ (3-19)
Parity	$1.55 \pm 0.82$ (0-3)	$2.30 \pm 0.65$ (1-4)
Sexual Dysfunction		
Yes (Total score $\leq 26.55$ ) n	14 (70)	12 (60)
No (Total score $> 26.55$ ) n	6 (30)	8 (40)

Regarding hormonal findings table (2) showed that the mean of Total Testosterone was  $0.62 \pm 0.25$  in pregnant women while it was  $0.28 \pm 0.07$  in non-pregnant

women. Serum Estradiol showed a mean of  $9676.2 \pm 10773.6$  in pregnant women versus  $107.5 \pm 86.6$  in non-pregnant women with a statistically significant increase in

both Testosterone & estradiol levels in pregnant women when compared to non-pregnant women ( $p < 0.001$ ). Our results in table (3) revealed that through the three trimesters desire, arousal and total score domains showed a statistically significant difference ( $p = 0.001$ ,  $p = 0.005$ ,  $p = 0.023$  respectively). The mean of total score of FSFI was significantly lower in the third trimester ( $19.83 \pm 3.54$ ) followed by first ( $21.76 \pm 3.95$ ) and finally second trimester ( $25.50 \pm 2.52$ ), meanwhile the means of lubrication, orgasm, satisfaction, and pain domains showed no statistically significant difference through the three trimesters ( $p > 0.05$ ). Table (4) concerning the correlation between FSFI domains and DASS domains revealed that in pregnant females, the depression axis showed a statistically significant negative correlation with desire ( $r = -0.533$ ,  $P = 0.01$ ), lubrication ( $r = -0.494$ ,  $p = 0.023$ ), satisfaction ( $r = -0.575$ ,  $p = 0.006$ ) and total score domains ( $r = -0.448$ ,  $p = 0.042$ ), while the stress axis showed the same type of correlations with the previous domains except for lubrication domain ( $p = 0.073$ ). Meanwhile the anxiety axis did not show any correlation with any domain ( $p > 0.05$ ). In non-pregnant females, depression axis had a statistically significant negative correlation with desire ( $r = -0.634$ ,  $p = 0.002$ ), lubrication ( $r = -0.532$ ,  $p = 0.013$ ), satisfaction ( $r = -0.556$ ,  $p = 0.009$ ), pain ( $r = -0.628$ ,  $p = 0.002$ ) and total score domains ( $r = -0.694$ ,  $p < 0.001$ ). While the stress axis showed the same type of correlations with the previous domains except for pain domain ( $p = 0.195$ ). Meanwhile the anxiety axis did not show any correlation with any domain ( $p > 0.05$ ). Table (5) concerning the correlation between FSFI domains and hormonal profile, the arousal domain showed a statistically significant negative correlation with total serum testosterone

in pregnant women ( $r = -0.49$ ,  $p = 0.026$ ) while it was a non-significant correlation in non-pregnant women ( $r = -0.196$ ,  $p = 0.4$ ). All other FSFI domains showed non-significant correlations with total testosterone in both pregnant women & non-pregnant women ( $P > 0.05$ ). As well as total testosterone, Serum estradiol showed statistically significant negative correlations in pregnant women but not only with arousal ( $r = -0.70$ ,  $p = 0.001$ ) but also with desire, orgasm & total score domains ( $r = -0.72$ ,  $p = 0.001$ ,  $r = -0.57$ ,  $p = 0.008$ ,  $r = -0.54$ ,  $p = 0.014$  respectively). Meanwhile the anxiety axis showed a statistically non-significant correlation with total testosterone in both pregnant women & non-pregnant women ( $r = 0.436$ ,  $P = 0.054$ ,  $r = 0.079$ ,  $P = 0.741$  respectively). Regarding serum Estradiol showed statistically non-significant correlations, with all DASS scales in both pregnant women & non-pregnant women ( $p > 0.05$ ). Table (7) in our study showed the correlations between FSFI domains in pregnant women and socio-demographic variables and showed that there were a statistically significant negative correlations between female age and satisfaction domain ( $r = -0.6$ ,  $p = 0.005$ ); and between husband age and orgasm ( $r = -0.52$ ,  $p = 0.02$ ), satisfaction ( $r = -0.59$ ,  $p = 0.006$ ) and total score domains ( $r = -0.44$ ,  $p = 0.05$ ). Also, there were a statistically significant negative correlations between duration of marriage and both orgasm ( $r = -0.46$ ,  $p = 0.04$ ) and satisfaction ( $r = -0.72$ ,  $p = 0.001$ ) domains and between parity and satisfaction domain ( $r = -0.59$ ,  $p = 0.005$ ).

## Discussion

Pregnancy plays an important role in female sexual function<sup>(15)</sup>. In the present study, the sexual function was evaluated in pregnant and non-pregnant women us-

<b>Table 2: Comparison between the two groups according to FSFI Domains, DASS-21 score, intercourse frequency &amp; hormonal profile</b>			
	Pregnant Mean± SD	Non-Pregnant Mean± SD	P- value
<b>FSFI</b>			
Desire	2.97±0.98	3.75±0.86	0.011*
Arousal	3.00±0.82	3.55±0.69	0.027*
Lubrication	4.09±0.51	4.04±0.88	0.35
Orgasm	3.53±0.93	4.08±0.74	0.043*
Satisfaction	4.16±0.95	4.36±1.18	0.56
Pain	4.13±1.36	4.22±1.06	0.821
Total score	21.77±3.89	24.67±4.75	0.016*
<b>DASS-21 score</b>			
Depression	4.70±3.09	6.45±4.48	0.24
Anxiety	2.80±2.01	4.30±4.73	0.83
Stress	7.55±3.15	8.80±4.00	0.22
<b>Intercourse frequency (month) n (%)</b>			
1 – 5	14 (70)	3 (15)	<0.001*
6 – 10	6 (30)	13 (65)	
>10	0	4 (20)	
Total	20 (100)	20 (100)	
<b>Total Testosterone (ng/ml)</b>	0.62±0.25	0.28±0.07	<0.001*
<b>Estradiol (pg/ml)</b>	9676.2±10773.6	107.5±86.6	<0.001*

FSFI: Female Sexual Function Index, DASS: Depression, Anxiety & Stress Scale, \*Significant p value

<b>Table 3: Relation between gestational trimesters and FSFI domains</b>				
FSFI domains	Pregnancy Trimesters			P value
	1st trimester	2nd trimester	3rd trimester	
<b>Desire</b>	3.20±0.72	3.90±0.32	2.10±0.71	0.001*
<b>Arousal</b>	3.10±0.58	3.70±0.15	2.40±0.84	0.005*
<b>Lubrication</b>	4.0±0.40	4.46±0.59	4.08±0.47	0.27
<b>Orgasm</b>	3.93±0.89	4.13±0.41	3.10±0.99	0.07
<b>Satisfaction</b>	4.26±1.12	4.46±1.05	3.85±0.76	0.49
<b>Pain</b>	3.26±1.19	5.0±1.42	4.30±1.12	0.08
<b>Total</b>	21.76±3.95	25.50±2.52	19.83±3.54	0.023*

\*Statistically significant at p ≤ 0.05

ing the FSFI and psychological status was evaluated using DASS-21. Total serum testosterone & estradiol levels were assessed for all participants along with other factors affecting sexual function such

as socio-demographic factors. The mean ages of women in the two groups were comparable as well as husbands' ages. This is important to exclude the probable bias resulting from the negative impact of

these two factors on female sexuality. In a study which assessed the prevalence of female sexual dysfunction during pregnancy among Egyptian women, Ahmed and his colleagues revealed that (68.7%) of

the pregnant women had sexual dysfunction and this agrees with our results as we found that Sexual dysfunction was demonstrated in (70%) of pregnant women, and (60%) of non-pregnant women<sup>(16)</sup>.

**Table 4:** Correlation between FSFI domains and DASS -21 score in pregnant and non- pregnant women

FSFI domains	pregnant women						Non pregnant women					
	DASS -21 score						DASS -21 score					
	Depression		Anxiety		Stress		Depression		Anxiety		Stress	
	r	P	r	P	r	P	R	P	r	P	r	P
Desire	-0.53	0.010	0.19	0.394	-0.64*	0.002*	-0.63	0.002*	-0.32	0.152	-0.60	0.004*
Arousal	-0.25	0.267	0.06	0.793	-0.17	0.455	-0.08	0.730	-0.11	0.628	-0.01	0.972
Lubrication	-0.49	0.023*	-0.28	0.217	-0.39	0.073	-0.53	0.013*	-0.41	0.062	-0.50	0.020*
Orgasm	-0.22	0.328	-0.14	0.537	-0.36	0.109	-0.34	0.125	-0.34	0.135	-0.21	0.349
Satisfaction	-0.57	0.006*	-0.40	0.070	-0.53	0.013*	-0.55	0.009*	-0.15	0.513	-0.46	0.036*
Pain	-0.20	0.363	-0.28	0.218	0.13	0.550	-0.62	0.002*	-0.15	0.507	-0.29	0.195
Total	-0.44	0.042*	-0.25	0.275	-0.71	<0.001*	-0.69	<0.001*	-0.37	0.090	-0.50	0.019*

r: Pearson coefficient \*Statistically significant at  $p \leq 0.05$

In their review Aslan and his colleagues mentioned that pregnancy is associated with reduction in sexual interest, and this interest improves postpartum. The ability to experience orgasm may decrease during pregnancy, with 60% of women experiencing orgasm through the second trimester<sup>(17)</sup>. A similar finding was in our study, as there was significant decrease of desire, arousal, orgasm, and total score domains in pregnant females when compared to non-pregnant females and the lowest score was related to sexual desire ( $2.97 \pm 0.98$  vs.  $3.75 \pm 0.86$ ,  $p=0.011$ ). This is also comes in agreement with a study of Ahmed and his colleagues in their study as they found that all sexual function domains were significantly reduced (average  $22.5 \pm 3.7$ ) when compared to the pre-pregnancy period, and that the sexual desire was significantly decreased during pregnancy ( $3.2 \pm 0.9$ ) when compared with pre-pregnancy period ( $4.7 \pm 0.7$ )<sup>(16)</sup>. On their study on 150 pregnant women Gökylidiz and Beji found that the percentage of women who have a frequency of intercourse ranging from 1-4 times per week

decreased from 84.7% in preconception period to be around 54% in conception period<sup>(18)</sup> which is consistent with our results as we found a statistically significant decrease in intercourse frequency (>10 times/ month) from 20% for non-pregnant women to zero percent in pregnant women. This reflects the association between sexual dysfunction (which was higher in pregnant women) & intercourse frequency (which was lower in pregnant women). This association was supported by the results of Maroufizadeh and his colleagues as they found an association between low frequency of intercourse & sexual dysfunction<sup>(19)</sup>. Though there was no significant difference between the two groups regarding any of DASS-21 axes ( $p>.05$ ), our results showed statistically significant negative correlations between DASS axes and female sexual function domains as we found that depression and stress have a negative effect on most of sexual function domains regardless of conception status. The most affected domains in pregnant females were desire ( $r=-0.533$   $P=.01$ ) and sexual satisfaction ( $r=-.575$ ,  $p=.0006$ ). So,

this elucidates the negative effect of both depression and stress on the female sexual functions regardless the presence or absence of conception. In a descriptive correlational study on the pregnant women sexual function Nik-Azinm and his colleagues found that depression and stress have a significant negative effect on desire ( $r=-.25$ ,  $p<.01$ ) and sexual satisfaction ( $r=-.32$   $p=.01$ ) in pregnant women and the same findings were for stress domain ( $p=.05$ ) which is consistent with our results<sup>(20)</sup>. In a cross-sectional study conducted on 300 healthy heterosexual pregnant Egyptian women and aimed to evaluate FSD through the three pregnancy trimesters, the incidence of FSD demonstrated significant alterations throughout

pregnancy, being 68% in the 1st trimester, decreasing in the 2nd trimester to 51% and increasing to 72% in the 3<sup>rd</sup> trimester ( $p<0.05$ )<sup>(5)</sup>. This goes with our findings that the FSD total score was highest in third trimester followed by first trimester and then the second trimester ( $p=0.023$ ). the 2<sup>nd</sup> trimester was the least affected which may be attributed to being the most emotionally stable period of gestation, where pregnancy seems to be clearly established, with a diminished fear of fetal loss and reduction of early symptoms of pregnancy such as fatigue, nausea, and vomiting. Throughout pregnancy there is increment in both serum testosterone estradiol<sup>(21)</sup>.

**Table 5:** Correlation between FSFI domains and hormonal profile in pregnant and non-pregnant women

			FSFI domains						Total
			Desire	Arousal	Lubrication	Orgasm	Satisfaction	Pain	
Total Testosterone	Pregnant women	r	-0.34	-0.49	-0.30	-0.29	-0.18	0.04	-0.34
		p	0.14	0.026*	0.19	0.20	0.42	0.85	0.14
	Non-pregnant women	r	-0.110	-0.196	-0.202	-0.010	0.065	-0.121	-0.103
		p	0.64	0.40	0.39	0.96	0.78	0.61	0.66
Estradiol	Pregnant women	r	-0.72	-0.70	0.07	-0.57	-0.28	0.06	-0.54
		p	0.001*	0.001*	0.61	0.008*	0.23	0.79	0.014*
	Non-pregnant women	r	0.203	-0.156	-0.121	0.218	0.365	0.323	0.210
		p	0.39	0.51	0.61	0.35	0.11	0.16	0.37

r: Pearson coefficient \*Statistically significant at  $p \leq 0.05$

This agrees with our results as we found a statistically significant increase in both serum testosterone & estradiol in pregnant women compared to non-pregnant women ( $p < 0.001$ ). Hormonal related changes such as nausea and breast tenderness, which together with fatigue, weakness and exhaustion can reduce sexual desire and arousal or in other ways determine the difficulty of sexual life<sup>(6)</sup>. We found a negative impact of hormonal changes on sexual function in pregnant women. We found a negative correlation between total testos-

terone level and arousal in pregnant women This can be explained by the finding that that enhancement of sexual desire is correlated with the increase in free testosterone<sup>(22)</sup> and as sex hormone binding globulin levels increase by five-fold to ten-fold, due to its activation by the liver in response to high estrogen levels during pregnancy<sup>(23)</sup>, this leads in turn to a decrease in free testosterone level. Erol and his colleagues found no relationship between diminished sexual function and serum androgen in pregnant women<sup>(24)</sup>.

<b>Table 6: Correlation between DASS -21 score and hormonal profile in pregnant and non-pregnant women</b>					
			<b>DASS -21 score</b>		
			<i>Depression</i>	<i>Anxiety</i>	<i>Stress</i>
<i>Total Testosterone</i>	Pregnant women	r	-0.495	0.436	-0.582
		P	0.026*	0.054	0.007*
	Non pregnant women	r	-0.0529	0.079	-0.467
		P	0.017*	0.741	0.038*
<i>Estradiol</i>	Pregnant women	r	-0.042	0.229	-0.191
		P	0.862	0.332	0.419
	Non pregnant women	r	-0.384	-0.012	-0.316
		P	0.095	0.960	0.175

<b>Table 7: Correlation between FSFI domains and socio demographic data in pregnant women</b>								
		<b>FSFI domains</b>						
		<i>Desire</i>	<i>Arousal</i>	<i>Lubricatio</i>	<i>Orgasm</i>	<i>Satisfactio</i>	<i>Pain</i>	<i>Total</i>
<i>Age</i>	r	-0.25	-0.24	-0.03	-0.39	-0.60	0.04	-0.36
	P	0.28	0.30	0.99	0.09	0.005*	0.84	0.11
<i>Husband Age</i>	r	-0.20	-0.25	-0.14	-0.52	-0.59	-0.16	-0.44
	P	0.38	0.27	0.54	0.02*	0.006*	0.47	0.05*
<i>Marriage Duration</i>	r	-0.17	-0.24	-0.14	-0.46	-0.72	0.14	-0.39
	P	0.47	0.29	0.54	0.04*	0.001*	0.95	0.08
<i>Parity</i>	r	-0.21	-0.23	0.05	-0.37	-0.59	-0.17	-0.38
	P	0.36	0.32	0.80	0.10	0.005*	0.45	0.09

r: coefficient of correlation \*: Statistically significant at  $p \leq 0.05$

Stuckey reviewed the influence of sex hormones on the sexual function during pregnancy and mentioned that if it is hormone-related, the most likely explanation of lower sexual desire towards the end of pregnancy is the high progestin level, rather than decreased androgen levels<sup>(25)</sup>. In non-pregnant women our results showed that, there was no correlation between total testosterone level and sexual function domains. The role of testosterone requires further study<sup>(25)</sup>. We found a nega

tive correlation between estradiol and some sexual function domains in pregnant women. In contrast to our results Dennerstein & his colleague found a relationship between decline in estradiol and decline in sexual functioning<sup>(22)</sup>. This contrast may be due to the increased incidence of sexual dysfunction in Egyptian females due to psychological factors & misconceptions regarding harmful effects of sexual intercourse during pregnancy such as abortion & preterm labour. So, the sexual dysfunc-



tion in our study is not actually related to estradiol itself as it seems. James & Zachary, found that estradiol positively affected the sexual desire especially during mid-cycle peak<sup>(26)</sup>. This disagrees with our results as we found non-significant correlations between estradiol & sexual function in non-pregnant women. This may be due to the random collection of non-pregnant women in our study with no data about their menstrual cycles. Symptoms such as diminished clitoral sensation, lack of desire & orgasmic disorders, that may last up to six months postpartum reveal that the changes in sexual function during pregnancy are influenced by multiple factors such as psychological, interpersonal, and cultural factors rather than the hormones<sup>(6)</sup>. Androgens are significant independent factors affecting women's mood and energy<sup>(27)</sup>. We found that both stress & depression axes showed statistically significant negative correlations with total testosterone in both pregnant and non-pregnant women, which were absent for the anxiety axis. This is consistent with Giltay & his colleagues who found that salivary testosterone levels are lower in females suffering from depression, Anxiety and social phobia, compared to controls<sup>(28)</sup>. Regarding serum Estradiol there were statistically non-significant correlations, with all DASS scales in both pregnant women & non-pregnant women ( $p > 0.05$ ). Up to our knowledge we are the first study to assess the correlations between hormones (testosterone & estradiol) and psychological status in pregnant females. This is an important point that elucidates the effect of hormonal change on psychological status which is reflected consequently on sexual functioning. The correlations between FSFI domains and socio-demographic variables were assessed and the obtained results showed that female age, husband age marriage

duration and parity were the most contributing factors affecting the sexual function. As there were statistically significant negative correlations between satisfaction domain and each of female age, husbands' age, duration of marriage and parity (( $r = -0.6$   $p = 0.005$   $r = -0.59$   $p = 0.006$ ,  $r = -0.72$   $p = 0.001$ ,  $r = -0.59$ ,  $p = 0.005$  respectively). This goes with the results of Ahmadi and his colleagues who assessed sexual satisfaction in 230 pregnant women and found a significant relationship between sexual satisfaction and women's age, partner's age, duration of marriage, ( $p < 0.0001$ - $0.006$ )<sup>(29)</sup>. Also Maita and his colleagues in their study on the risk factors associated with FSD pointed to the significant correlation between most of the FSFI domains and the studied women's age which agrees with our results<sup>(30)</sup>. An important limitation of this study is the small sample size. Additionally, male assessment was not included in this study as the affected sexual functions may occur not only in the pregnant women but also in their partners.

## Conclusion

Female sexual function is affected in pregnant women more than non-pregnant women, with a significant decrease in FSFI desire, arousal, orgasm, and total score domains. The second trimester was less affected by FSD than the first and third trimesters. Hormonal changes, depression and stress are interrelated factors that play an important role in sexual functioning during pregnancy. Also, female age, husband age and duration of marriage are significantly contributing factors that negatively affect the sexual function in pregnant women. So, when evaluating pregnant women, sexual function along with all these factors should be considered and assessed.

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