Sapporo Medical Journal
Volume 55, Issue 09, September 2021

The burden of female sexual dysfunction in Basrah-Iraq: The first preliminary report

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Abstract— Background: Help-seeking behavior for female sexual dysfunction (FSD) in conservative communities is affected by cultural and religious factors. Our objective was to evaluate psychosexual, social, physical, and biochemical factors which impact FSD in premenopausal women from Basrah. **Methods:** From (Sep 2018-Jan 2021), we conducted a cross-sectional study in a tertiary endocrine center on 673 married premenopausal women with sexually-related complaints for >6 months. Initial visit involvedrelevant history and examination using non-judgmental patient-centered integrative approaches. FSD diagnosis was fulfilled in 219 women, for whom a couple-interview session was scheduled, involved intimacy assessment, use of Female Sexual Function Index (FSFI) Scoring and Decreased Sexual Desire Screener (DSDS) for hypoactive sexual desire disorder (HSDD) diagnosis. Relevant hormonal and biochemical tests were tested. The ultimately enrolledwomen were 166 women. We used Pearson's correlational analysis to confirm significant correlations between FSD and different parameters. We used Mann-Whitney U test in a subgroup analysis of HSDD subtypes. **Results:** FSD prevalence was 24.67% with a mean duration (8±2 months). Intercourse frequency prior to complaint onset (3±1 times weekly), compared to (2±1 times monthly) in the latest month before presentation. All FSFI domains scores were reduced. DSDS diagnosed generalized and secondary acquired-HSDD in 31 and 57 women, respectively. The hormonal investigation did not aid FSD diagnosis. Pearson's correlational analysis showed no significant correlation between the test variables and FSD. **Conclusion**: No significant correlation between FSD and any psychosexual, physical, and biochemical parameters could be seen. Longitudinal multicenter larger-scale studies are needed.

Keywords: DSDS; FSD; FSFI; HSDD; Sexual Dysfunction

Introduction

Sexual function in woman is far more complex and its variability is wider than that of man. There are multifactorial and multidimensional relationships between its domains, which include desire, arousal, lubrication, orgasm, satisfaction, and pain.[1,2] The dysfunction of any of the domains lead to consecutive female sexual dysfunction (FSD). The most important of these is the hypoactive sexual desire disorder (HSDD), which has considerable emotional, psychological, interpersonal difficulty states of the affected women.[2,3]

The help-seeking behaviour in women with FSD in Middle-Eastern Muslim communities is heavily affected by many cultural and religious factors. The majority of women from these cultures are not supposed to advocate for their own sexual pleasure, because it is traditionally unacceptable.[4,5]Muslim women are unlikely to disclose private sexual matters to their health care provider, which makes diagnosis and treatment of sexual problems challenging for the health care professional.[5] This is compounded because clinicians frequently do not inquire about the sexual health of their patients.[6]

We aimed to evaluate the social, physical, and biochemical factors which may affect the sexual function in a cohort of premenopausal women in Basrah.

Materials and Methods

This is a cross-sectional observational (real-world) study done on 673 reproductive aged premenopausal married women who attended the tertiary endocrine center (Faiha Specialized Diabetes Endocrine and Metabolism Center) (FDEMC) from September 2018 to January 2021 for different complains regarding their reproductive health.

During the initial visit, the endocrine team performed a general screening with a thorough history, and the relevant clinical examination. The general characteristics for every woman were assessed, and these included age, age at marriage, parity, age at menarche, body mass index (BMI), level of education, menstrual pattern, her current job, and the age and her partner's job. The term (FSD) was used interchangeably to refer to female sexual (dysfunction) and (disorder).

For screening of any sexually related complaint, we used a non-judgmental patient-centered integrative approach, with ubiquity statement followed by a closed-ended question, and then an open-ended follow-up like: “Many women in your age with your such complain might have problem with their sexual relationships. What about you? do you have any problems or concerns related to sex? If you had any, tell me about it, please”. If the woman confirmed any distressing sexually related complaint, we proceeded with an open-ended follow-up such as: “Tell me more about your complaint and how it affects your quality of life”. It is likely that patients will respond with a brief but informative narrative about their sexual-related problems. We used specific focused and open-ended questions if the couple's responses did not clarify the true and very nature of the sexual distress.

Any woman who had any sort of FSD for more than six months would be enrolled in the study, and was asked to attend a prescheduled second session accompanied by her husband, and was given a full details about the purpose and content of the next session, which would include many exact details of her sexual life, which many would found uncomfortable and distressing.

The exclusion criteria included any woman in menopause, any woman on hormonal or anti-hormonal medications, women in postpartum period, women who underwent (any) operative intervention within the last six months, women with any documented psychiatric diseases, whether on therapy or not, women with any type or stage of any malignancy, women with any bodily malformation, and women with primary infertility. During the initial enrollment, we enrolled 240 women out of the 673 women.

We excluded 21 women with the primary diagnosis of FSD who did not consent for further analysis in presence of their partners, to get 219 women with who were eligible to the study criteria.

During the second visit, we interviewed the couple, and discussed all the presumed session details, to answer any of their queries directly. We ask the couple to discuss the response of each individual question together and then answer it. Some questions were planned for the male partner only in private due to some social restrictions.

During this session, we asked the following general questions about the sexual life of the couple in the last 6 months or more:

- When did your complaint start? Or what was the duration of your sexual complaint?
- What was the frequency of intercourse before the complaints? Per week.
- What was the frequency of intercourse during the last six months? Per month.
- When was your last pregnancy? What was the age of youngest child? Were you lactating?

- Whether their sexual relation was in the form of monogamous, bigamous, or polygamous marriage.
- Whether the woman married after divorce?
- In the most instances, did you had day sex, night sex, or mixed day and night?
- Did you have a satisfactory time for initial foreplay?
- Did your partner fall asleep after sex? Or do you have time to talk after sex?

Then we used the Female Sexual Function Index (FSFI) Scoring [1] and Decreased Sexual Desire Screener (DSDS).[7]FSFI has 19 multiple-choice questions, and is a standard tool for assessing the main dimensions of female sexual function over the past four weeks. These dimensions include sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. Each question scored from (0-5) points. The values of each domain were added and then multiplied by a correction factor to obtain the total score, which ranges from (2-36 points). A total score below 26.55 points suggested FSD. Cut-off points for each domain (desire=4.28, arousal=5.08, lubrication=5.45, orgasm=5.05, satisfaction=5.04, and pain=5.51), and scores less than or equal to these values indicated sexual problems in that domain.[1]

The DSDS is an applicable user-friendly brief five-item validated questionnaire designed for clinical practice, relies on (yes-or-no) answers, with no population-specific cut-off scores. It is an easy-to-use, brief assessment instrument used to diagnose HSDD in women presenting with complaints of decreased sexual desire regardless the age.The DSDS is intended for use by practicing clinicians with little or no experience in diagnosing HSDD, and requires no special training to administer/interpret.[7,8] The diagnosis of HSDD requires low sexual desire which was preceded by normal sexual desire.[9]

If the woman answers “Yes” to all (1 through 4) questions, and "No" to all question 5 items, the GA-HSDD diagnosis will be set. Answering with "Yes" to any item in question 5, does not met the criteria of the GA-HSDD diagnosis. Different co-morbid conditions like arousal or orgasmic disorders may co-exist with HSDD.[3,7]

These two scoring systems were used to ask the couples verbally in a common Arabic language after full description for each item. The answer responses of the couples were recorded by the interviewing endocrinologist and marked the answer on the printed questionnaires directly.

The second session lasted between 25-30 minutes, after which we gave the couple a break of 60 minutes, during which we evaluated each recorded response on each question, and interpret the scores to reach a preliminary diagnosis of cases who fulfil the criteria of GA-HSDD, SA-HSDD, and any disorder which was related to the six domains of FSFI, and cases who did not fulfil any diagnosis.

Laboratory investigations

The 219 women were tested by a cascade of hormonal investigations in the (morning and fasting status). For women who had regular menstrual cycle (MC), we performed the tests in the follicular phase, and the luteal phase for serum progesterone, while women who had irregular MC, we performed the tests in any day of the MC. The specific timing for hormonal investigations was essential to mirror the physiological changes during MC.

The hormonal cascade included: total testosterone (TT) with sex-hormone binding globulins (SHBG), dehydroepiandrosterone sulfate (DHEA-S), thyrotropin stimulating hormone (TSH), free thyroxine (FT4) (when TSH was abnormal only), estradiol (E2), prolactin, follicular stimulating hormone (FSH), luteinizing hormone (LH), day 21 progesterone, cortisol, adrenocorticotropic hormone

(ACTH). Insulin resistance was assessed by (Homeostatic Model Assessment for Insulin Resistance) (HOMA-IR).

The normal reference values of these hormonal test were: TT (15-46 ng/dL), SHBG (18–86 nmol/L), TSH (0.27-4.2 µIU/mL), FT4 (0.93-1.7 ng/dL), E2 (27–136 pg/mL), prolactin (4-30 ng/mL), FSH (2-12 mIU/mL), LH (1-18 mIU/mL), day 21 progesterone (2.0-20.0 ng/mL),cortisol (5-25 µg/dL), ACTH (10-60 pg/mL) and insulin (2.6-24.9 µU/mL). The DHEA-S normal reference values are age specific (Appendix-Table 1).

These hormonal test were assessed using electrochemiluminescence by Roche Cobas e411 Analyzer (Germany).

We used the online method for estimation of calculated free testosterone (cFT) at (http://www.issam.ch/freetesto.htm). We adopted the normal reference values of FDEMC lab which were (1.2-6.4 pg/mL).

Additional biochemical investigations included total cholesterol (TC), triglycerides (TG), low density lipoprotein-cholesterol (LDL-C), high density lipoprotein-cholesterol (HDL-C), very low density lipoprotein-cholesterol (VLDL-C), fasting plasma glucose (FPG), and glycated hemoglobin (HbA1c). These test were assessed using (COBAS INTEGRA® 400 Plus, Roche Diagnostics, Basel, Switzerland). The HbA1c was assessed for women who have FPG above the upper normal range, using Bio-Rad Variant II Turbo HbA1c Kit – 2.0 Quick Guide 270-2455EX.

The normal reference values for lipid profile in (mg/dL): TC (<200), TG (<150), LDL-C (60-130), HDL-C (40-60), and VLDL-C (<30). The reference range of FPG in (mg/dL) for normal is < 100, prediabetes (100-125), and for diabetes range ≥ 126. The reference normal value for HbA1c was < 5.7%, and diabetes was > 6.5%.

Additional assessment

Assessment for clinical hyperandrogenism signs, like (Hirsutism) by the modified Ferriman–Gallwey (mFG) score, and (Female Pattern Hair Loss) (FPHL) by the Sinclair's hair loss severity scale..

A third interview session was scheduled to discuss the tests results, possible diagnoses, and the plan of therapy in the center or referral to other specialty.

We excluded further 42 women who had overt and subclinical thyroid dysfunction, and additional 11 women with newly diagnosed diabetes mellitus did not include them in the final analysis. The final number of the women in the study was 166 women.

Ethical Approval

All the study phases that involved interviewing women individually and with her husband, were in accordance with FDEMC ethical committee standards, from which the study ethical approval was obtained. The approval followed the 1964 Declaration of Helsinki and its amendments. All enrolled women signed informed consent in Arabic before participating in the study.

Statistical Analysis

We used IBM SPSS for Windows, Version 26.0. (Armonk, NY: IBM Corp.)for analysis of different variables. We used (mean ± standard deviation), (median ± standard error), and frequency (%) for data expression. Flow-chart, bars, histograms, and boxes and whiskers were used for graphical presentation of the data. We used Pearson's correlational analysis to study different correlation between the social, clinical, and biochemical parameters with confirmed diagnoses of HSDD. The minimal value of Pearson's coefficient to confirm the correlation is 0.3. To study the relationship

between different domain scores of FSFI in women with the diagnosis of GA- and SA-HSDD, we used Mann-Whitney U test. A two-sided significance level of ≤0.05 was considered significant.

Results

During the 25 months of the study, we encountered 673 women with different sexual relation-related complains, of whom only 166 women were enrolled in the final analysis after a thorough evaluation in compliant-directed, patient centered approach. The FSD prevalence in this study was 24.67% (Figure 1).

Table 1 demonstrated the general characteristics of the enrolled 166 women, and included many social and biological determinants and parameters, which were supposed to affect the sexual function of these women.

The minimal duration of sexual dysfunction must be more than six months in any women to be enrolled in the study. Figure 2 is a positively-skewed graphic representation of different durations of the sexually-related complaints, with a mean duration of (8 ± 2 months). The sexual relationship frequency prior to the complaint was 3 ± 1 times per week, with a range of (1–6 times/daily) (Figure 3), which was different from the mean of sexual intercourse frequency in the last month prior to presentation to FDEMC, which was 2±1 times per month. We have 12 women with no sexual activity at all (Figure 4).

Only ten women exceed the domain score of 3, otherwise the maximum score was 3, which denoted profound decrease in the sexual function domain score in FSFI (Table 2 and Figure 5). The score of (0) denoted no sexual activity at the corresponding period. it was evident that all the scores of sexual domains of FSFI were low or very low for all women in the study. The use of FSFI did not exclude any women from additional screening by the DSDS (Figure 6). Interpretation of the findings of DSDS revealed 31 women with GA-HSDD, 57 women with SA-HSDD, and 78 women with different sexual dysfunction which did not fulfil the diagnosis of HSD.

Table 3 illustrated the different laboratory findings and clinical; assessment of the women in the study, regardless the final diagnosis. The mean values of all the investigations were in the normal reference ranges.

During initial assessment, we used the measurement of TT as an indicator for the androgenic status of the women. Figure 7 illustrated that 12 women had hypoandrogenism (7.22%), and 125 woman had normal androgens (75.3%). The use of cFT as an indicator revealed that the women in our cohort had either normal androgen (18.1%) or relatively low androgen levels (81.9%). Although this finding is striking, it was approved later in table 4 of no significant correlation to HSDD diagnosis at any level.

In order to find the possible psychosexual, social, clinical, physical, and biochemical variables which might impact the FSD, we used Pearson's correlational analysis (Table 4). Any of the listed variables did not have any significant correlation to the proposed diagnosis of HSDD. There was simple note that the marriage duration had a $p<0.05$, but the Pearson's coefficient was below the acceptable minimal value of 0.3, which negate its effect on the HSDD diagnosis. The negative sign of the coefficient denotes the direction of the effect of the proposed variable.

For the 88 women with HSDD whether generalized or secondary acquired form, we compared the different sexual domains score of FSFI. All the scores denoted marked reduction of the FSFI scoring to less than half the proposed cut-off values. Women with GA-HSDD had significantly lower orgasm and satisfaction scores than women with SA-HSDD, using Mann-Whitney U test. This finding was of low value because both scores of the two subgroup were around quarter of the lower cut-off value for the orgasm and satisfaction domains, (5.05 and 5.04, respectively).

Discussion

Reports about the treatment-seeking behavior of women experiencing personal distress due to sexual problems in our community are scarce.

Sexual health is an embarrassing issue to be discussed, with a potential to create discomfort within the clinician-patient relationship. The difference in the acquired or expected attitudes, and beliefs might affect the effective communication about sexual problems.[9]

The psychosexual assessment in FSD is history-based, with the aid of prescheduled questionnaires; however, no standardized assessment methodology exists.[2]

The patient-centered approach to healthcare and cultural competence facilitate more effective healthcare delivery and a greater understanding of the FSD management, and appear to be better suited to capture the multidimensional information,[10]using simple, universally applicable (yes/no) questions, including questions that enable the clinician to rule out common confounding diagnoses.[8]

Although clinical examination and laboratory testing had low diagnostic yield and are not required to make the FSD diagnosis in most cases, it may be appropriate, based on the focused clinical history, to rule out other contributory factors in reproductive, and sexual history; status of current relationships and sexual activity, family and personal beliefs about sexuality; and history of sexual trauma or abuse.[3,11]

In this study, the FSD prevalence was 24.7% (n=166/673). We lacked any comparable study in the Iraqi population. There was a wide diversity in the FSD prevalence in different cultures worldwide (25.6% – 85.2%) might mirror the cultural role on couples' relationship.[12]

Considering the cultural difficulties, the presence of the couples together improved the doctor-patient communication, and strengthened the accuracy of the recalled information about the critical points in their sexual life, through an effective interactive intimate relationship interventions.[12]

Dissatisfaction with a sexual partner role may be contributory. Women who only experience low desire towards their partner in the presence of active sexual fantasies or interests, do not met the criteria of generalized HSDD; they have a desire-specific problem.[9]

The neurochemical and hormonal contribution to HSDD is hard to prove. The etiology of HSDD is complex, as it involves the interplay between genetic, medical and psychiatric, motivational, social, cultural, and biological (excitatory and inhibitory) factors, which interfere with the optimal genital responses giving rise to possible HSDD.[7,9,11,13]

All women in the study described different levels of sexual domain effect as a manifestation of FSD. All the sexual domains in FSFI were markedly affected, although some domain were more affected. All the enrolled 166 women had domains' scores which were markedly below the cut-off value for each domain (Table 2 and Figure 5).

More than one problems in any sexual domain can be found concurrently, with special consideration to their individual onset. Reduction in desire may follow any distressing events in arousal and orgasm, leading to FSD.[9,11] Studies from Middle East were contradicting about the most important sexual problem that urge for help-seeking behaviour, whether it was desire or dyspareunia, although both were important.[4,14]

Cordova et al. described a complex psychological background in which women may experience arousal, orgasm, and satisfying sexual experiences without initially, or ever, having sexual desire. They need to have intimacy or bonding, wanting to feel attractive or desired, or to express affection

for a partner.[15] Those women would not meet criteria for HSDD.[9] This was very difficult to ascertain and evaluate during the course of the study.

DSDS provide a useful screening utility for HSDD, even though, there is no clear 'gold standard' for HSDD diagnosis.[7]

Across the study, we evaluated different variables which were proposed to affect the female sexual function. And we will come across them individually.

Age: The proof of the relation between the current age of women and their sexual dysfunction was difficult, we did not found any significant correlation between them.

Sexual responsiveness is thought to decrease with age.[16]Graziottin A study showed that the relation between current age and low desire probability was positively correlated, while the relation to the resulting distress was negatively correlated.[2] Contradicting this assumption, other scholars considered age as unreliable predictor of a woman's relationship stage, which will not affect the FSD prevalence, with minimal effect on the sexual health.[16-18]

Partner's age: Ther was no significant association between the partner's age and FSD frequency. Studies from Turkey and Malaysia showed that women married to older husbands had an increased probability of getting FSD.[19,20]

Marriage duration: There was no significant association for the marital duration to FSD, similar to Ishak and colleagues' study.[19] Women in long-term relationships are more prone to distress by low desire, and indirectly by the long-term impact on their partner relationship.[21]Stroope et al. showed a significant, negative association of FSD with longer marriage duration, through its possible association with relationship stability.[22]

Level of education: There is a conflicting data about the association of level of education with the various components of FSD, whether it is significantly associated,[23,24] or not.[5,25]Wehad no confirmation for any association.

Legal versus Childhood Marriage: The age of consent of marriage did not affect the possibility to acquire FSD in this study. We had encountered 13.9% of the cohort (n=23) with childhood marriage under the legal age according to Iraqi Law (The Second Amendment Law to the Personal Status Law No. 188 of 1959).[26]

Even with the apparent repression to the sexual relationship by some Islamic culture, under-aged women were allowed to get married legally. For example reaching 15 years-old is accepted as a marital age with the legal parental consent according to the same aforementioned Iraqi Law.[26] There is no age restriction to marriage in Saudi Arabia, reaching puberty is generally accepted as marriageable.[27]

Parity: Women with primary infertility were excluded, to negate the effect of fertility of sexual function. The parity had no significant association for acquiring FSD. There were conflict over the number of children and the consecutive effect on the future FSD. Many scholars showed that multiparous women reported a higher incidence of sexual dysfunction.[28,29]

Frequency of sexual intercourse: This variable did not bear any significant association for acquiring FSD. Pyke R and Clayton A demonstrated that the sexual domains were not affected by the sexual intercourse frequency.[30] The intercourse frequency is not a measure of sexual satisfaction,[16] as it may undergo reduction with the advancement of marriage.[19]

Outdoor jobs: Working women were more prone to be distressed by low sexual desire.[9] Our data did not approve such significant relationship because only 27 women had outdoor governmental work (16.3%).

Polygamy: Nineteen women (11.4%) were part of a family were different homes polygamy was practiced. The polygamy (a man with several wives simultaneously) is a controversial issue. Islam limits the wives to a maximum of four. Many Islamic nations had regulated polygamy.[5] Culture influences the appropriate number of partners within a marriage.[27]

Postpartum and lactation: Women in postpartum period may experience abrupt physiological hypo-estrogenism, and relative increase of sexual inhibitory effect of hyperprolactinemia, which may contribute to high vaginal pH, vaginal dryness, dyspareunia and low desire.[31] Birth experience and perineal trauma can impair orgasm possibility, with ultimate sexual dissatisfaction.[32] Moreover, the motherhood and childcare may have a negative psychological impact on the sexual response of breastfeeding women.[33] Such women might report a lower sexual intercourse frequency and more FSD.[32]

Intimacy questions: Intimacy was very difficult to ascertain in this study, in view of the social and cultural beliefs regarding sex in our relatively conservative community. We did not have any significant association between any of the intimacy themes and the FSD frequency.

Lacking of foreplay skills, especially among men, is a problems that predispose to FSD. Men might prefer having intercourse without any foreplay relations or initiation for sexual behavior. In the communities in which familial paternalism is dominant, men's demand for sex is the primer of sexual relationships.Women may allow maladaptive vaginal intercourse for satisfactory sex to please her partner or fulfill his/her need for sex or that men must always initiate, perform, and provide a firm erection.[14,34]

Couples who were both initiators for sexual relationship had better intimate sexual performance and a highest level of quality of sex life,[34] otherwise, they might experience relationship dissatisfaction, leading to mental and physical health problems.[15]

Intimacy is a vital aspect of the marital quality, and couples' relationships become steady and exclusive, according to the intimacy level. The intimacy level may predict relationship passion, motivation, sexual frequency, and satisfaction.[12]

Effect of partner's sexual level: The partner's sexual dysfunction may impact negatively on the woman's sexual desire, although the causal link is controversial. Women may assess their own sexual desire by the extent that it matches their partner's desire.[9]

Effect of metabolic syndrome (Met-S): It appeared as if the FSD is indirectly influenced by an unknown mechanism in women with Met-S. We included BMI, lipid profile, and glucose assessments – the anchors of Met-S- in the initial assessment of women with FSD. We did not conclude any significant association between any of the parameters and the FSD in this study.

There were 91% of women in the study either overweight and/or obese. Categories of BMI had no significant association to the FSD, similar to Abidin et al. results,[28] but unlike other studies which noted higher variation in sexual behavior in overweight and obese young premenopausal women.[35-39] The relation between body weight and level of sexual activity is controversial.[35] Obesity may predispose to more peripheral conversion of estrogens to androgens (and vice versa), leading to FSD, directly or through induction of anovulatory cycles.[40]

Approximately, 11% of the enrolled women (n=19) showed aberrant glycemic levels of prediabetic (n=19), and were referred for further care. Insulin resistance was encountered in 38% of the enrolled women (n=63), and had no significant association to FSD. Krysiak et al. noticed strong association between low desire and satisfaction with insulin resistance.[41]

The negative impact of Met-S on the sexual function of women may be explained by its effect on vascular insufficiency due to chronic vascular inflammation, oxidative stresses, possible hyperglycemia, hyperlipidemia, and atherosclerosis, with reduced vaginal engorgement, vaginal dryness, dyspareunia, impaired sexual arousal, which subsequently result in vasculogenic FSD.[35,42]

We did not find any significant association between abnormal lipid profile and FSD. This finding might be related initially to the strict enrollment criteria, and the age limits. Other studies showed no significant association between TC and FSD.[28,43]

Hormonal levels: Laboratory tests are usually of limited usefulness in establishing HSDD diagnosis, although specific tests might be individualized.[7]

The participation of neuroendocrine mechanisms is essential to sexual response modulation. Thus, the hormonal role in women's sexual desire has become of significant interest.[44]

Estrogen, for example, is important in maintaining adequately lubricated vaginal mucosa, withvasoprotective effect and vasodilatation, resulting in an increase of vaginal and clitoral flow, which results in the maintenance of sexual response.[45] E2 has a central serotonergic function to regulate mood, desire, and ultimate sexual function under gonadotropin control.[46] All enrolled women had normal E2 levels with a mean value of (78.65 ± 19.48pg/mL).

Testosterone contribution on the other hand is pivotal in the sexual function of both genders. We did not conclude any significant association between any of the hormonal cascade with FSD in this study. The mean hormonal levels were within the normal ranges. Our findings were similar to that of Abidin et al.,[28] Davies et al.,[45] and Yaylali et al.[47]

Clayton et al. emphasized that testosterone is the primary influential sex steroid to motivate desire, with possible contribution to sex initiation, although the causal link is inconsistent.[3,7,8,25] Testosterone levels have shown variable association with desire disorders.[9,44,48] Many studies showed no cut-off minimal value for any androgen that can be used to identify women in different reproductive ages with HSDD.[11,16,45,48,49]Testosterone and SHBG are also not required for HSDD diagnosis but are beneficial for potential future testosterone therapy.[50]

Table (2) described the different prevalence of signs of hyperandrogenism (hirsutism, female pattern hair loss, and acne) in women with FSD. Figure (7) showed that only 30 women had hyperandrogenism with FSD, the rest had hypoandrogensm. With no association between the androgen level and the FSD, and did not change whether we consider TT or cFT as indicator for our consideration of biochemical hyperandrogenism.

Only 24 women had hyperprolactinemia in this study, although the overall mean of PRL level was within the normal reference ranges. The PRL level did not affect the possibility to have FSD. Although different studies described women with hyperprolactinemia as having lower FSFI scores, and may respond to PRL lowering medications.[46,51,52]

The inhibitory effect of PRL on gonadotropin secretion and on the dopaminergic pathway, the main central regulator of desire and arousal, which was seen in other studies,[44,50] was not seen even for women with hyperprolactinemia, or any other women, because all women in the cohort had either normal or high levels of gonadotropins.

Using very strict inclusion and exclusion criteria, as well as the blinding to thyroid function results during filling in the questionnaires, enabled us to exclude the impact of concurrent diseases and concomitant therapies and to minimize the effect of subjective determinants.

During the course of the study we excluded 42 women with subclinical and overt thyroid dysfunction to mitigate the possible contradictory direct and indirect contribution of thyroid axis on their sexual function.

Generalized versus secondary acquired HSDD: In Table 5, we performed subgroup analysis for the women with GA- and SA-HSDD. We found marked and severe reduction in all scores of sexual domain for both subgroups. We did not have any explanation why women with GA-HSDD had significantly lower orgasm and satisfaction domain scores than women with SA-HSDD, especially with such very low scores, which may need further verification by larger sample size and longer study duration.

Limitations: To the extent of our knowledge, this is the first study in Iraq which dealt with such critical issues of FSD, with many limitations. In Iraq, the sexual health centers are absent, and we did not have any pooled data about the extent of the problem in the community. The women with such complains might get female gynecologist opinion exclusively. Notably, women seek healthcare for sexual problems only if it affect their reproductive life, and not for enhanced sexual pleasure or practice.

The small sample might be not representative to the FSD extent in the population of Basrah, the second largest Iraqi city in population after Baghdad, the Capital.

The selected age range did not include old menopausal women, and only included women in the peak of sexual activity.

The FSFI and DSDS were used by the interviewing endocrinologist and not by the women of interest as planned by the original authors, because both tools are not standardized and validated for the Iraqi women. DSDS was designed only to diagnose GA-HSDD and not to diagnose or exclude other FSDs.

The responses time was relatively long and exhaustive, because we spend more time illustrating the importance of each single question for the final diagnosis. The ultimate response for the question might not reflect the exact extent of the FSD in each case.

Although all women in the study revealed severe reduction of all FSFI domains, we suspect certain amount of recall bias or under-reporting because the responses were obtained only from those help-seeking women who are keen to express their bothersome experiences at any expense.

We could not control some possible confounders, including psychological variables such as body image and interpersonal variables such as mutual relationship with partners. The desire for the same-sex could be contributory, but it could not be endorsed because of strict sociocultural and religious reasons which frown such relations.

After concluding the results of interviews, clinical assessment, laboratory finding and achieving the final diagnosis, most of women were referred to the psychiatric evaluation in view of the lack of any approved desire enhancing medication in the country.

Conclusion

There was no significant correlation between FSD and any psychosexual, physical, and biochemical variable or parameter in this cross-sectional study to be elucidated. Longitudinal multicenter larger

scale studies are needed to provide baseline data to show the extent of the FSD in the general population.

Clinicians must acknowledge the variation in cultural and personal norms that affect the help-seeking behavior for each patient. Although we need a patient-centered approach, it was imperative not to impose our own beliefs and attitudes toward the FSD.

Funding: None
Authors Disclosure Statement: The authors had nothing to disclose
Conflict of interest: None
Authors' Contribution: SAO led the study group through conceptualization, formal analysis, investigation, methodology, project administration, software, validation, visualization. SAO and NTYI did the data curation. Writing original draft and later review and editing were led by SAO with the supporting role of the study group. AAM supervised the work.

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Tables and Figures

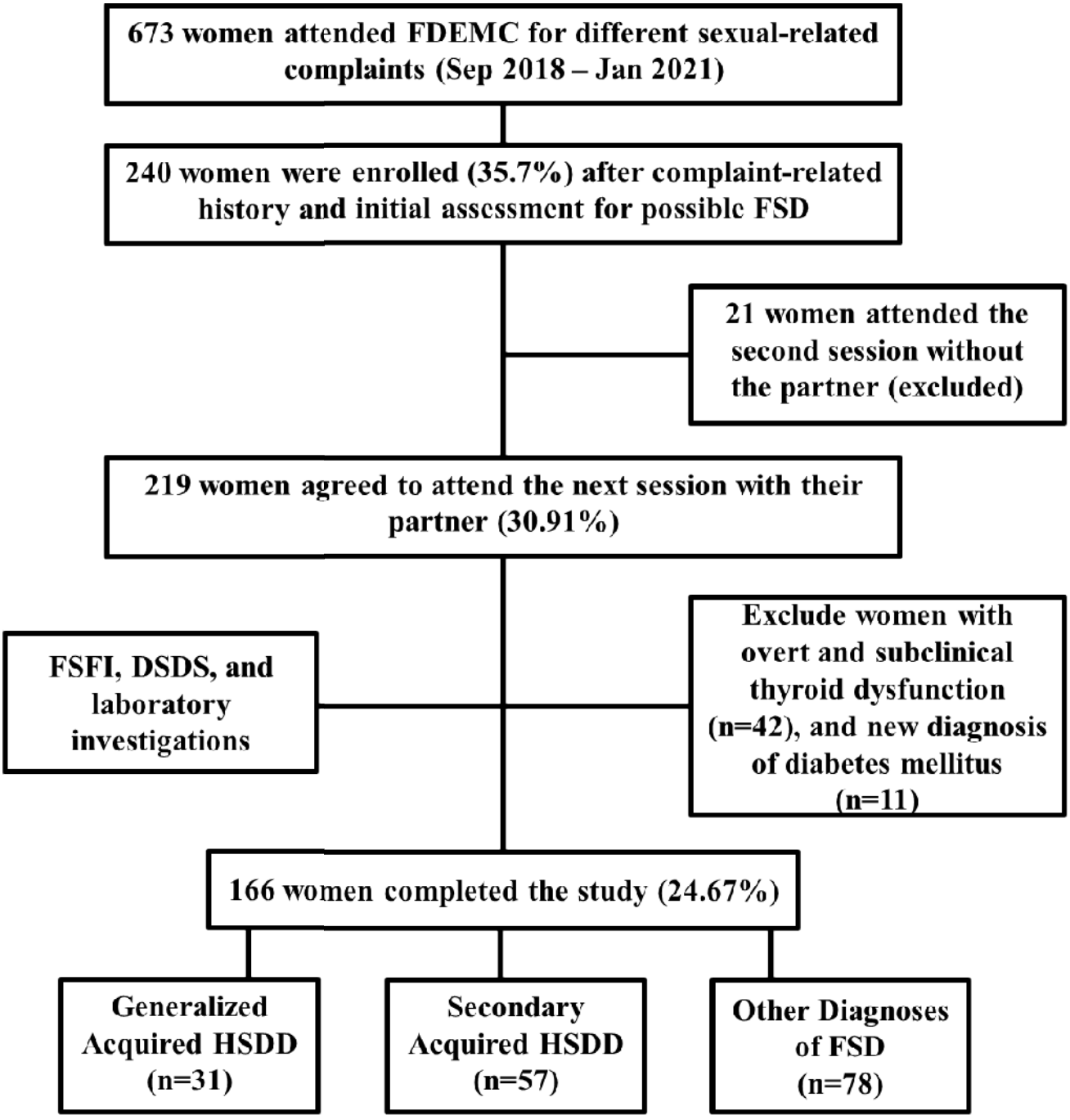

Figure 1: Flow-chart of the study

Abbreviations: DSDS, Decreased Sexual Desire Screener; FDEMC, Faiha Specialized Diabetes Endocrine Center; FSD, female sexual dysfunction; FSFI, Female Sexual Function Index; HSDD, hypoactive sexual desire disorder.

Table (1): The general characteristics of the 166 enrolled women with different female sexual dysfunction types

Variables		**Results**
Age years	**mean ± SD**	31.73 ± 6.4
Age range years	**Range**	20 48
Age at menarche years [a]		13 ± 1
Age Categories n (%)	**20 to < 30 years**	55 (33.1)
	30 to < 40 years	90 (54.2)
	≥40 years	21 (12.7)
Age of partner mean ± SD years		34.71 ± 6.56
Partner Age Categories n (%)	**20 to < 30 years**	28 (16.9)
	30 to < 40 years	104 (62.7)
	≥40 years	34 (20.5)
BMI Mean ± SD (Kg/m^2)		27.73 ± 2.29
BMI Categories n (%)	**Normal BMI**	15 (9)
	Overweight	115 (69.3)
	Obesity	36 (21.7)
Level of Education n (%)	**Less than primary**	20 (12)
	Primary	50 (30.1)
	Secondary	42 (25.3)
	Preparatory	34 (20.5)
	Higher Education	20 (12)
Age at marriage Mean ± SD years		20.51 ± 3.66
Categories of Marital Age n (%)	**≥18 years old**	143 (86.1)
	< 18 years old	23 (13.9)
Marriage duration Mean ± SDyears		11.23 ± 6.03
Marriage Duration years n (%)	**below 10 years**	70 (41.9)
	10 to <20 years	82 (49.1)
	20 to <30 years	13 (7.8)
	>30 years	1 (0.6)
ParityMean ± SD		3 ± 2
Parity Levels n (%)	**< 3 children**	74 (44.6)
	3 - <6 children	82 (49.4)
	≥6 Children	10 (6)
Complaint started after last pregnancy n (%)		20 (12)
Lactating women n (%)		20 (12)
Women had an outdoor jobs		27 (16.3)
She is currently one of two or more wives (different homes and polygamy) n (%)		19 (11.4)
Married after divorce n (%)		16 (9.6)
Menstrual Irregularities n (%)		59 (35.5)
Partner's Job n (%)	**Daily job within the same city**	127 (76.5)
	Remote Jobs outside the city	39 (23.5)
Timing of Sex n (%)	**Mostly Day Sex**	18 (10.8)
	Mostly Night Sex	115 (69.3)
	Mixed Day or Night	21 (12.7)
	No Sex	12 (7.2)

Partners Sleep after Sex n (%)	**Yes**	117 (70.5)
	No	37 (22.3)
	NA (no sex)	12 (7.2)
Initial foreplay n (%)	**Yes**	37 (22.3
	No	51 (30.7)
	NA (no sex)	78 (47)
Signs of clinical hyperandrogenism and dysmorphism	**Hirsutism n (%)**	94 (56.6)
	mFG (Median ± SE)	10 ± 1
	Female pattern hair loss n (%)	99 (59.6)
	Sinclair's Score (Median ± SE)	2 ± 1
	Acne n (%)	37 (22.3)
Signs of insulin resistance	**Acanthosis Nigricans n (%)**	47 (28.3)
	Insulin Resistance n (%)	63 (38)

Abbreviations: BMI, body mass index; FSD, female sexual dysfunction; SD, standard deviation; SE, Standard Error.

[a] Approximated to the nearest integer.

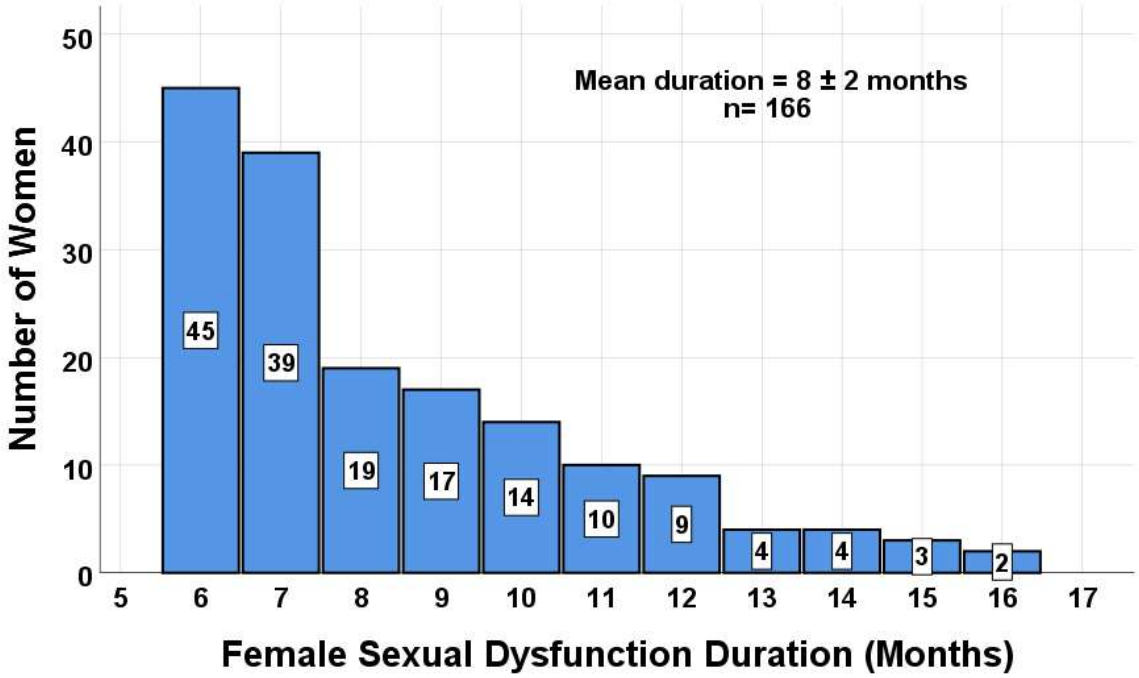

Figure 2: The duration of female sexual dysfunction in the enrolled 166 women.

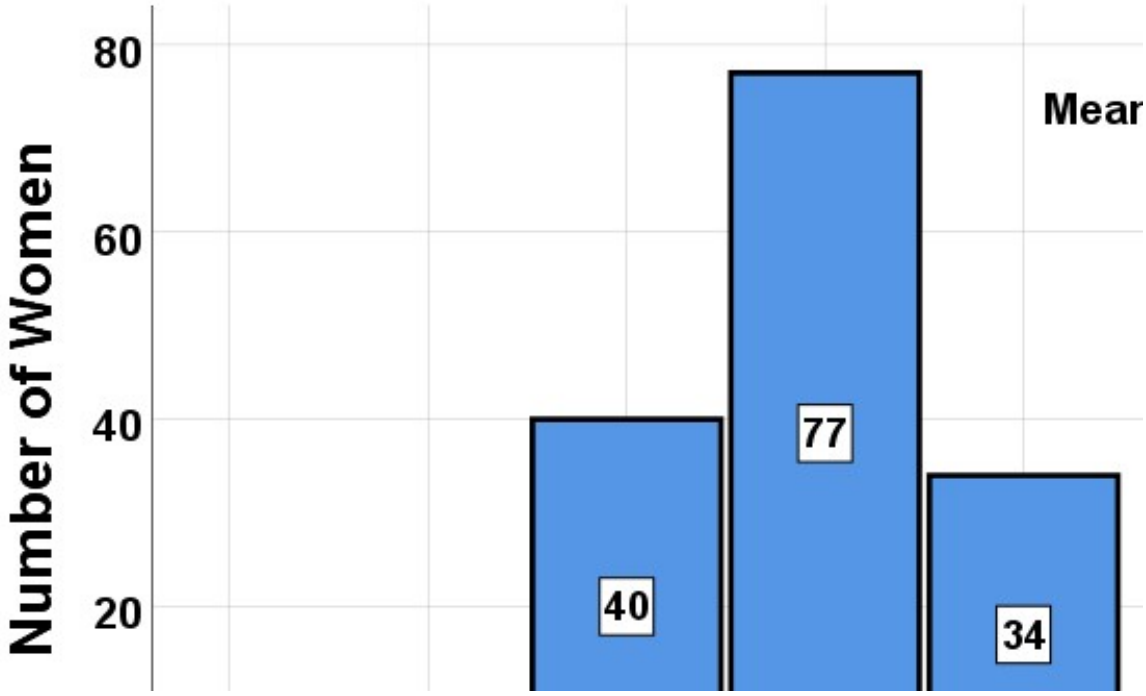

Figure 3: the frequency of sexual intercourse per week prior to the onset of any female sexual dysfunction. The thrice weekly frequency was seen in 25.3%, Thrice weekly in 39.2%, and more than thrice weekly in 35.5% of women.

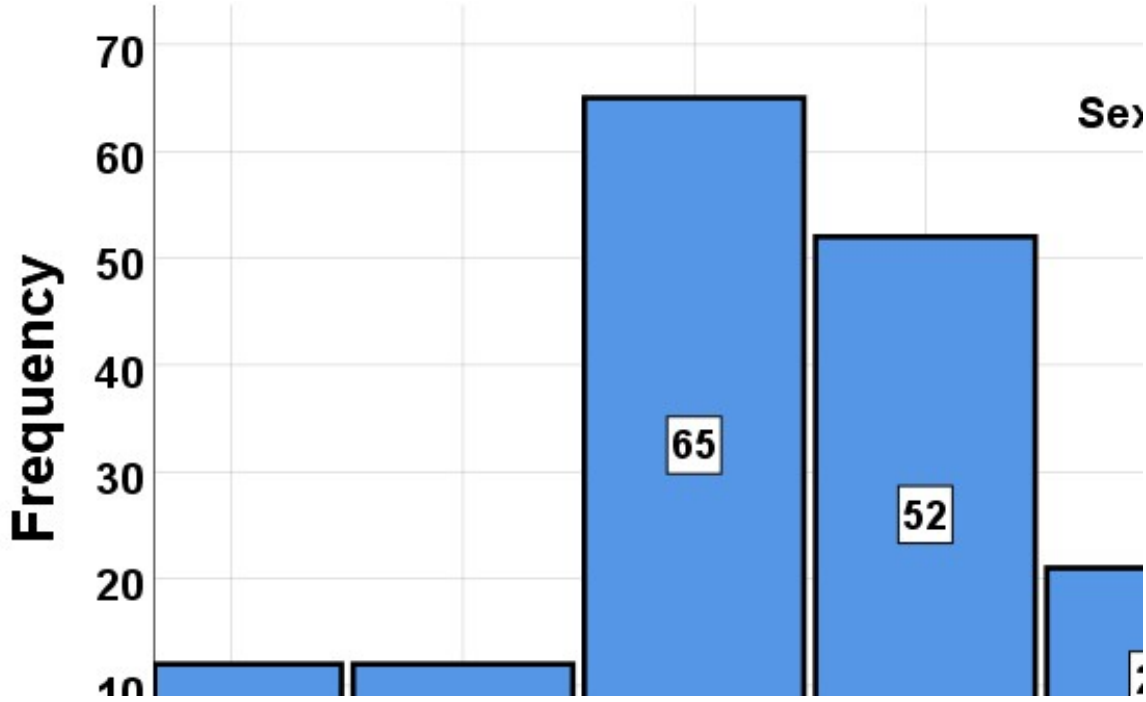

Figure 4: The frequency of sexual intercourse per month in the last month prior to presentation to the center.

Table (2): Female Sexual Function Index Scoring for the enrolled 166 women with different sexual complaints.

Domains	Q	Score=0[a]	Score=1	Score=2	Score=3	Score=4[b]	Items Score (SD)	Domains Score (SD)
Desire	Q1	0	88 (53)	62 (37.4)	16 (9.6)		1.57 (.66)	1.89 (.77)
	Q2	0	83 (50)	69 (41.6)	14 (8.4)		1.58 (.64)	
Arousal	Q3	22 (13.3)	54 (32.5)	76 (45.8	14 (8.4)		1.49 (.83)	1.94 (.9)
	Q4	12 (7.2)	56 (33.7)	79 (47.6)	19 (11.4)		1.63 (.78)	
	Q5	12 (7.2)	56 (33.7)	80 (48.2)	18 (10.8)		1.63 (.77)	
	Q6	12 (7.2)	51 (30.7)	75 (45.2)	28 (16.9)		1.72 (.83)	
Lubrication	Q7	12 (7.2)	90 (54.2)	22 (13.3)	42 (25.3)		1.57 (.95)	1.88 (.8)
	Q8	12 (7.2)	64 (38.6)	61 (36.7)	29 (17.5)		1.64 (.85)	
	Q9	12 (7.2)	106 (63.9)	26 (15.7)	22 (13.3)		1.35 (.8)	
	Q10	12 (7.2)	62 (37.3)	57 (34.3)	35 (21.1)		1.69 (.89)	
Orgasm	Q11	12 (7.2)	105 (63.3)	24 (14.5)	25 (15.1)		1.37 (.83)	1.67 (.74)
	Q12	12 (7.2)	87 (52.4)	41 (24.7)	26 (15.7)		1.49 (.84)	
	Q13	12 (7.2)	106 (63.9)	33 (19.9)	15 (9.0)		1.31 (.74)	
Satisfaction	Q14	12 (7.2)	95 (57.2)	20 (12.0)	29 (17.5)	10 (6.0)	1.58 (1.05)	1.9 (.8)
	Q15	0	108 (65.1)	24 (14.5)	34 (20.5)		1.55 (.81)	
	Q16	0	105 (63.3)	22 (13.3)	39 (23.5)		1.6 (.85)	
Pain	Q17	12 (7.2)	72 (43.4)	37 (22.3)	45 (27.1)		1.69 (.95)	1.9 (.7)
	Q18	12 (7.2)	77 (46.4)	59 (35.5)	18 (10.8)		1.50 (.78)	
	Q19	12 (7.2)	69 (41.6)	70 (42.2)	15 (9.0)		1.53 (.76)	

[a] There is no score of (0) for questions 1,2,15, and 16.

[b] Only 10 women scored (4) for question 14, and this represented the highest score in the study.

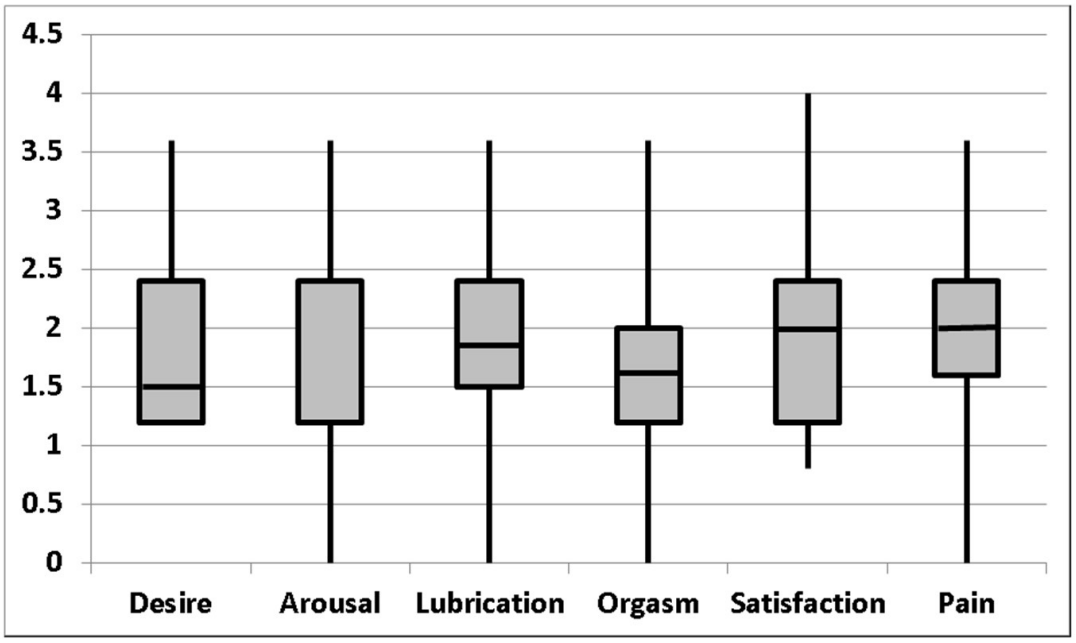

Figure 5: Boxes and whiskers plot of the different scores of the Female Sexual Function Index scoring of the enrolled 166 women.

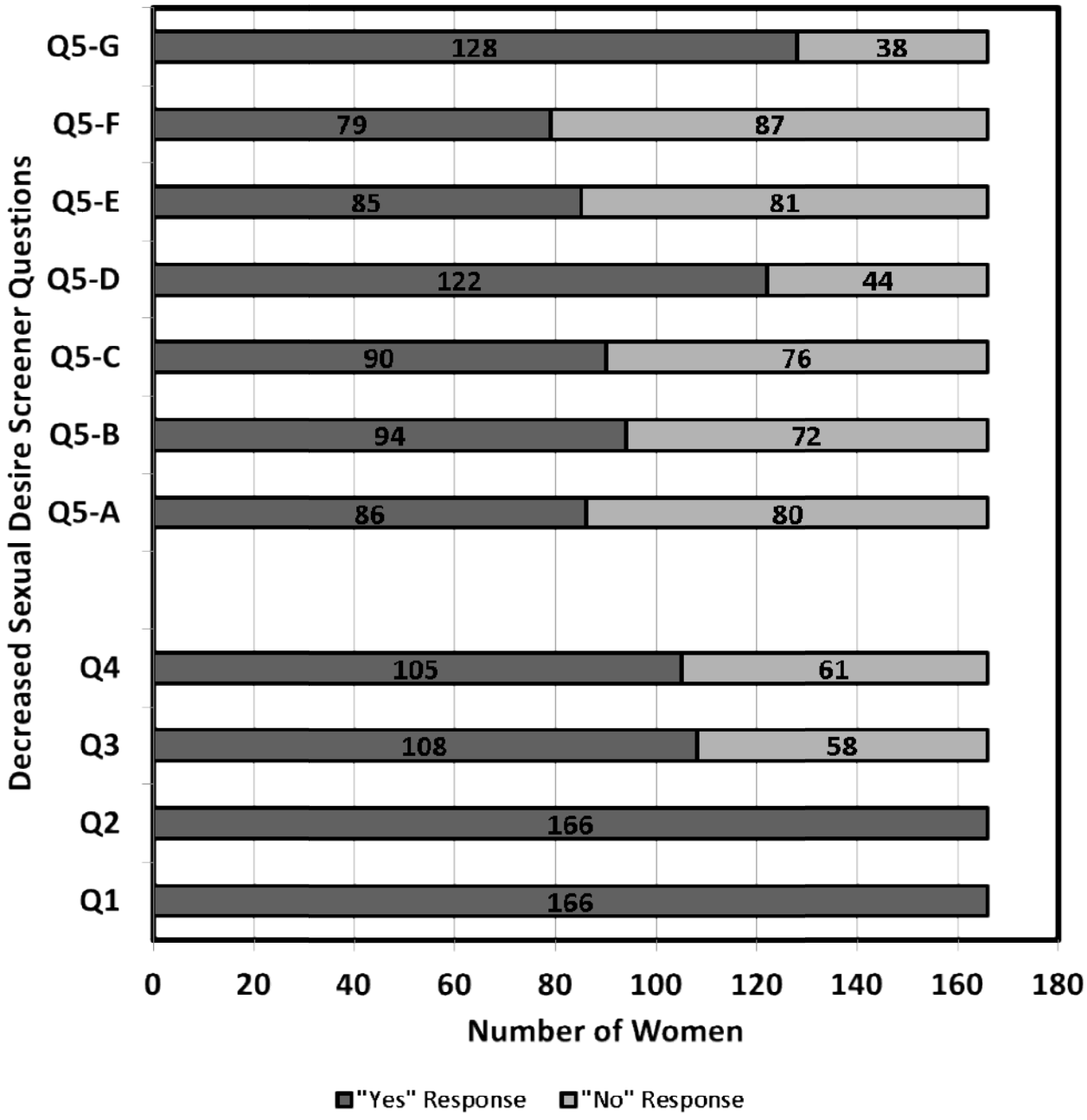

Figure (6): Responses of 166 women with different sexual complaints the Decreased Sexual Desire Screener. We diagnosed 31 women with generalized acquired HSDD, 57 women with secondary acquired HSDD, and 78 women with different sexual dysfunction which did not fulfil the diagnosis of HSD.

Table (3): Laboratory findings and further clinical assessment in 166 women with female sexual dysfunction.

Variables		Results
Sex Hormone binding globulin mean ± SDnmol/L		35.82 ± 26.20
Sex Hormone binding globulin	**Normal**	126 (75.9)
	Low	32 (19.3)
	High	8 (4.8)
Total testosterone mean ± SD ng/dL		30.20 ± 16.48
Calculated free testosterone mean ± SD ng/dL		0.58 ± 0.36
Dehydroepiandrosterone sulfate mean ± SD		165.06 ± 58.08
Estradiol mean ± SD pg/mL		78.65 ± 19.48
Normal Estradiol n (%)		166 (100)
Prolactinmean ± SDng/mL		30.86 ± 11.50
Hyperprolactinemia n (%)		24 (14.5)
Follicle-stimulating hormone mean ± SD mIU/mL		10.13 ± 3.09
Follicle-stimulating hormone n (%)	**Normal**	115 (69.3)
	High	51 (30.7)
Luteinizing hormone mean ± SD mIU/mL		13.15 ± 3.58
Luteinizing hormone n (%)	**Normal**	156 (94)
	High	10 (6)
Progesterone (Luteal) mean ± SD ng/mL		6.08 ± 2.62
Progesterone n (%)	**Normal**	156 (94)
	Low	10 (6)
Total Cholesterol mean ± SD mg/dL		175.01 ± 41.67
Total Cholesterol Levels n (%)	**Normal**	151 (91)
	High	15 (9)
Triglycerides mean ± SD mg/dL		117.23 ± 23.08
Triglycerides Levels n (%)	**Normal**	152 (91.6)
	High	14 (8.4)
Low-density Lipoprotein mean ± SD mg/dL		102.52 ± 30.30
Low-density Lipoprotein Levels n (%)	**Normal**	142 (85.5)
	High	24 (14.5)
High-density Lipoprotein mean ± SD mg/dL		45.48 ± 7.55
Very low-density Lipoprotein mean ± SD mg/dL		23.45 ± 4.62
Hypertension n (%)		19 (11.4)
Fasting Plasma Glucose mean ± SD mg/dL		90.89 ± 27.85
Glycated Hemoglobin mean ± SD		5.96 ± 1.09
Glycemic Status n (%)	**Prediabetes**	19 (11.5)
	Normal	136 (81.9)
thyroid stimulating hormone Mean ± SE mIU/L		2.17 ± .23

Abbreviations: SD, Standard Deviation; SE, Standard Error

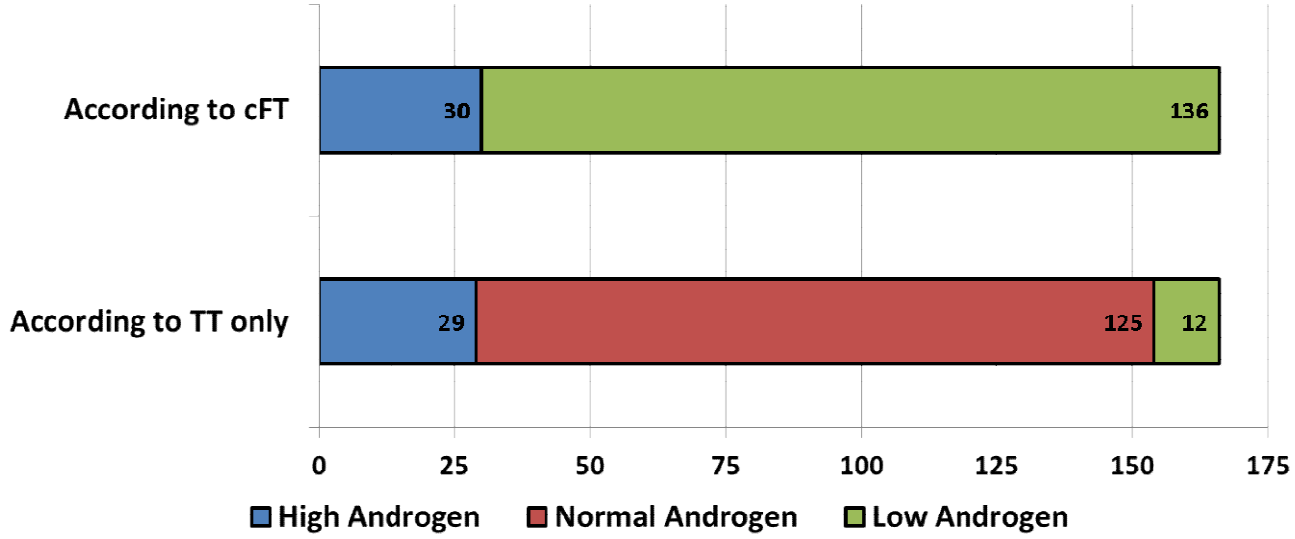

Figure 7: The androgen level in 166 women with different types of female sexual dysfunction. The lower bar represent the distribution according to total testosterone (TT) levels. The upper bar represent the distribution according to the calculated free testosterone (cFT) levels.

Table (4): Pearson's Correlational Analysis for the different parameters in women with diagnosis of hypoactive sexual desire syndrome

Variables	r	p
Age categories	.094	.229
Body mass index	.015	.843
Level of education	-.010-	.902
Age at marriage	.034	.662
Marriage duration	-.166-	.033
Parity level	-.105-	.180
Frequency of sexual intercourse prior to the onset of FSD	-.093-	.232
Relation to the last pregnancy	.114	.145
Lactation	.114	.145
Outdoor job	.100	.201
She is one of two or more wives (polygamy)	-.040-	.605
Married after divorce	.068	.384
Hirsutism	-.038-	.625
Female pattern hair loss	-.048-	.539
Acne	.009	.908
Acanthosis nigricans	.023	.768
Insulin resistance	-.003-	.973
Any menstrual irregularities	-.038-	.626
Partner job	.055	.479
Day or night sex prior to complain	.020	.796
Partner sleep after sex prior to complain	.061	.434
Initial foreplay	-.116-	.137

Sex hormone binding globulin levels	-.037-	.632
Hyperprolactinemia	.063	.420
Follicle-stimulating hormone levels	-.008-	.923
Luteinizing hormone level	.039	.618
Progesterone levels	.106	.175
Total Cholesterol levels	-.007-	.930
Triglycerides levels	.030	.705
Low-density Lipoprotein levels	.050	.524
Hypertension	-.090-	.248
Hyperandrogenism due to total testosterone only	-.068-	.382
Hyperandrogenism due to total testosterone and calculated free testosterone	-.114-	.145

Table (5): Female Sexual Function Index Score in women with generalized and secondary acquired hypoactive sexual desire syndrome using Mann-Whitney U test. All scores are described as (mean±standard deviation)

Domains	**GA-HSDD (n=31)**	**SA-HSDD (n=57)**	**Z**	**p**
Desire	1.99 ±.73	1.85±.83	-1.023-	.306
Arousal	1.97±.94	1.96±.93	-.400-	.689
Lubrication	1.54±.69	1.80±.78	-1.687-	.092
Orgasm	1.27±.68	1.64±.75	-2.860-	.004
Satisfaction	1.33±.59	1.80±.74	-3.413-	.001
Pain	1.70±.62	1.87±.72	-1.221-	.222
Total score	9.80±3.30	10.92±3.39	-1.560-	.119

Abbreviation: GA-HSDD, Generalized Acquired Hypoactive Sexual Desire Syndrome; SA-HSDD, Secondary Acquired Hypoactive Sexual Desire Syndrome.

Appendix

Table 1: Age-specific ranges of dehydroepiandrosterone sulfate, according to FDEMC central laboratory.

Age ranges (years)	**Concentration (µg/dL)**
18 – 19	145 – 395
20 – 29	65 – 380
30 – 39	45 – 270
40 – 49	32 – 240
50 – 59	26 – 200
60 – 69	13 – 130
69 and older	17 – 90