ORIGINAL ARTICLE

Impact of Aerobic Vaginal Infections on Female Sexual Function

[1]Mariam E. Abd El-Gawwad, [1]Fatma M. El-Esawy, [2]Taghrid G. Kharboush*, [1]Aliaa E.M. Daifalla

[1]Department of Dermatology, Venereology and Andrology, Faculty of Medicine, Benha University, Benha 13518, Egypt

[2]Department of Medical Microbiology and Immunology, Faculty of Medicine, Benha University, Benha 13518, Egypt

ABSTRACT

Background: *Normal sexual function is a crucial element of a female sexual and mental health. Disruptions in this function for any reason can lead to emotional and interpersonal communication problems, which may impact other aspects of a woman's life. Many women who suffer from different types of vaginal infections also experience sexual dysfunction.* ***Objective****: This study was performed to evaluate the association between aerobic vaginitis (AV) and female sexual dysfunction (FSD).* ***Methodology****: A cross-sectional observational study was carried out on 150 females with vaginal infections. A microbiological examination of vaginal samples was done to identify the causative microorganisms using stains, microbiological culture, and biochemical reactions. Female sexual function was measured by the use of the Arabic version of the Female Sexual Function Index (ArFSFI) questionnaire.* ***Results****: The most prevalent isolate was Candida (55.3%). Aerobic bacteria were detected in 48.6% either mixed with Candida or as a single infection (Staph aureus 14.7%, E.coli 10.7%, Klebsiella 8.7%, Strept agalactiae 7.3%, and Neisseria gonorrheae (N gonorrheae 7.3%). Trichomonas vaginalis (T vaginalis) was only just detected among 2.6 % of the participants. 72.7% of studied females had sexual dysfunction (FSFI score ≤ 26.5). The mean full-scale score was 24.12±3.79. The presence of pain was significantly associated with lower FSFI scores in all other domains.* ***Conclusion****: Vaginal infection with various aerobic microorganisms negatively impacted females' sexual function. Thus, patients with vaginal infections should be assessed prudently for sexual dysfunction to enhance their quality of life.*

INTRODUCTION

The term "aerobic vaginitis" (AV) was coined in 2002 to refer to a previously unidentified entity of vaginal infections. Its defining characteristics include unusual vaginal microflora that contains enteric and aerobic pathogens, variable degrees of vaginal inflammation, and insufficient maturation of the epithelial lining of the vagina[1]. *E. Coli* and *group B Streptococci* (GBS) are the principal aerobic microorganisms. Co-occurrence of AV and other types of infections affecting the vagina such as; *Candida* vulvovaginitis (CVV) and bacterial vaginosis (BV) were reported in many studies[2]. Aerobic vaginitis is recognized as an important cause of symptomatic vaginitis. In females who are not pregnant, the rate of occurrence of AV ranges from 12% to 23.7%, while during pregnancy, it ranges from 4 to 8% and was linked to a higher risk of unfavorable pregnancy outcomes[3].

Over 60% of the premenopausal healthy females have *Candida* colonization, with greater rates in pregnant ladies and diminished rates in postmenopausal females and children. Approximately 60% of women are colonized, with a minority developing clinical manifestations such as curdy (non-offensive) vaginal discharge, vulval pain, itching, and superficial dyspareunia. Microscopic identification of *Candida* budding cells might present in these women in addition to asymptomatic infected women. The clinical indicators and microscopic data are utilized to make the diagnosis[4]. *T vaginalis* is a parasitic flagellated protozoon of the genital canal. 10-50% asymptomatic, 5-15% no aberrant signs, up to 70% offensive vaginal discharge, 10-30% yellow and frothy discharge, vulval itching, irritation, and dysuria were also reported [5].

Sexual dysfunction is a diverse collection of illnesses characterized by a major disruption in an individual's capability to respond to sexuality or feel pleasure during sex. In females, a meta-analytical assessment of female sexual dysfunction (FSD) revealed its prevalence to be 40.9% in premenopausal women[6].

Females who have sexual dysfunction may experience changes during the sex response cycle, phase of sexual desire, arousal, and/or orgasm, that are deemed unsatisfactory, inappropriate, or insufficient[7]. It

has a multifaceted etiology that includes biological, psychological, relational, and societal components[8].

Female Sexual Dysfunction is diagnosed mainly on subjective reporting by the woman and the physical examination. The most utilized tools include questionnaires such as the Female Sexual Function Index (FSFI), the Personal Distress Scale, the Female Sexual Function Profile, and the Decreased Sexual Desire Screener (DSDS) [9].

Some individuals with recurrent vulvovaginitis have reported diminished sexual satisfaction and desire[10]. Recurrent vulvovaginitis is a very difficult condition that causes emotional distress for women. It causes significant bodily discomfort. It affects the woman's life quality and could negatively impact her sexual life[11]. We believe that every patient with vaginal infections should have a sexual dysfunction assessment to enhance their quality of life. Therefore, this study was done to evaluate the relationship between aerobic vaginal infections identified by conventional laboratory tests and female sexual dysfunction.

METHODOLOGY

Study Design and Ethical Consideration:

This cross-sectional observational study was conducted in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) and has been accepted by the Research Ethics Committee of Benha Faculty of Medicine (MS 16-5-2017). Before being enrolled in the study, an informed consent written in Arabic language was obtained from all participants.

Study Population:

Patients were recruited from those who visited the Dermatology, Veneroelogy and Andrology Outpatient Clinic at Benha University Hospitals during one year.

Inclusion criteria were; married females, aged between 18-40 years, with signs and symptoms indicative of infection in the vagina (vulval itching, unusual discharge from the vagina of different odor, color, amount, or consistency, burning micturition, or pain in the lower abdomen), able to read Arabic language, willing to answer the questionnaire, and having a stable marital state during the last 6 months. A sexually active life is one in which there has been sexual penetration during the preceding four weeks [12].

Women refusing to cooperate, menstruating, separated from their spouses, pregnant, younger than the age of 18 or older than 40 years, suspected cases of viral or atypical bacterial infections of the vagina, women with cancer of the genitalia, or females who had started antibiotic therapy within two weeks of sample collection were excluded. Women using vaginal cream, lubricants, or spermicides within 72 hours of the study, and women with vulvovaginal abnormalities were also excluded.

The identification of vaginal infection clinically was established by medical history taking, and clinical examination of the enrolled participants.

Female Sexual Function Index:

The Female Sexual Function Index (FSFI) is a 19-item self-report inventory designed to assess female sexual function[13]. A validated Arabic version of the female sexual function index questionnaire (ArFSFI) was used in the present study [14]. It comprises six domains: desire (two items), arousal (four items), lubrication (four items), orgasm, satisfaction, and pain (three items each) [15]. Desire and satisfaction items are rated on a 5-point Likert scale, ranging from 1 to 5, and the other items are rated on a 6-point Likert scale, ranging from 0 to 5. Each FSFI question's response has values that provide a score for each domain. The overall score is the sum of the answers to each question of a given domain multiplied by a factor that strengthen the impact of the domain on the total score. The overall score (2 − 36 points) is the sum of all domains and, the greater the score, the better the respondent's sexual function. An overall score of 26.5 or less denotes a dysfunction of a woman's sexuality[16].

Sample Collection:

High vaginal swabs under aseptic techniques: Two sterile swabs were utilized to collect vaginal secretion samples from the posterior fornix by inserting the swabs into the female vagina about 1 inch, and then rolling them for 10-15 seconds. The swabs were used for smear and culture examination. Swabs were inserted into sterile screw-capped labeled tubes, and transported directly to the microbiology laboratory for immediate processing.

Identification of bacterial, protozoal, and *Candida* infections using conventional laboratory methods

I. Identification of *T. vaginalis* infections:
- **Wet mount:** The motility of *T vaginalis* was identified microscopically by examining a drop of saline containing the vaginal discharge for the jerky movements of the flagellated pear-shaped trophozoite [17, 18].
- **Giemsa stain** was applied to identify *T vaginalis*.

II. Identification of bacterial and *Candida* infections:
- **Gram-stained smear** was prepared and examined under the light microscope
- **Culture, and Biochemical reactions:**
  All studied samples were inoculated on nutrient, blood, chocolate, MacConkey, and Sabouraud dextrose agar plates. Cultured plates were aerobically incubated at 37˚C. Chocolate agar plates were also incubated at a 5% CO_2 incubator.
  All isolates were identified manually by; colony morphology, Gram stain, and conventional biochemical reactions.

For Gram-positive cocci, catalase, coagulase, CAMP test, bacitracin, and optochin disks were used.

For Gram-negative bacteria; conventional biochemical tests such as oxidase test, motility, indole, citrate agar test, triple sugar iron (TSI) Agar, and urease test were used. Other confirmatory tests such as germ tube formation test to confirm *Candida* infection.

Statistical Design

The Statistical Package for Social Science (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was utilized to analyze the data collected. A reliability test was made by using Cronbach's Alpha. Cronbach's alpha was calculated to evaluate the internal consistency of the questionnaire. The statistical significance of the difference between the means of the two research groups was evaluated using the Student T-Test. ANOVA test was utilized to determine the statistical significance of the difference between the means of more than two study groups, followed by a post hoc test. The differences between categorical variables were measured using Chi-square test. Linear regression analysis was used for the prediction of the total score of the female sexual function index. Probability of results. All tests were 2-sided and a P-value < 0.05 was considered statistically significant.

RESULTS

Patients eligible for the study, who agreed to participate and completed the ArFSFI questionnaire were 150 patients. Their mean age was 30.4±6.0 years, ranging from 19 to 39 years old. The most frequent complaint was vaginal discharge (30%), followed by vulval itching (26.7%), burning during micturition (17.3%), pain in the lower abdomen (14.7%), and bad vaginal odor (6%).

Candida vaginitis was significantly greater in patients (p-value ≤ 0.01). The results of microbiology culture among the studied subjects revealed, that the most frequent isolates were *Candida spp* (55.3%). Names and types of isolated microorganisms are shown in **Figure 1 (a &b)**. In 140 patients, isolates were single-growth (93.3%) while only in 10 cases (6.7%),it was mixed aerobic bacteria and *Candida* growth **Figure 1 (a)**.
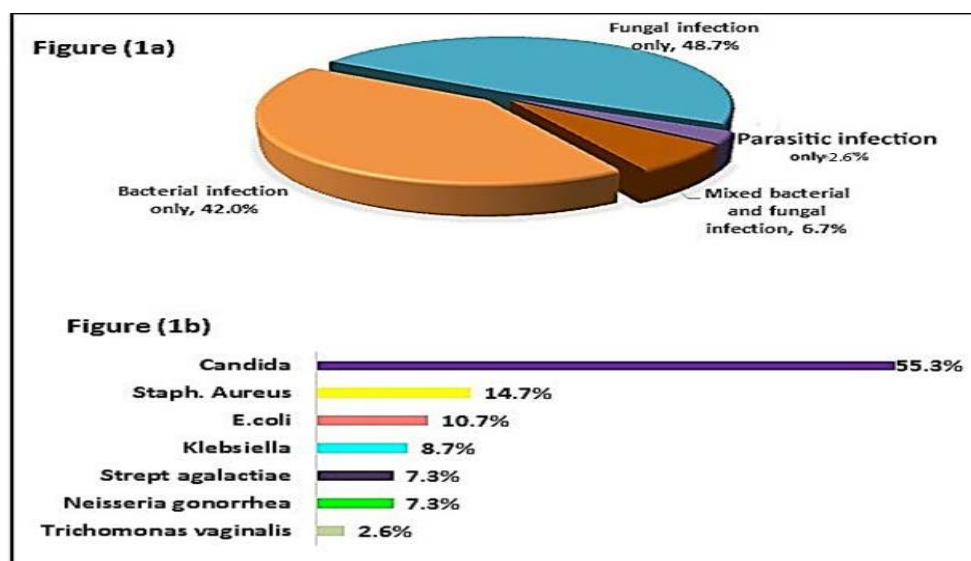

Fig 1 (a&b): Types and Names of isolated microorganisms from vaginal samples

Regarding FSFI among studied subjects, the mean Desire score, Arousal score, Lubrication score, Orgasm score, Satisfaction score, and Pain score were (3.43 ± 0.99, 3.43 ± 0.99, 3.43 ± 0.99, 4.14 ± 1.08, 4.67 ± 1.13, and 3.93 ± 0.68) respectively. 72.7% of studied females had sexual dysfunction (FSFI score ≤ 26.5).

The full-scale score was 24.12 ± 3.79. Each of the 19 questions' mean score is displayed in **Table 1.** Pain experienced during vaginal penetration was significantly linked to lower FSFI scores in desire, lubrication, and orgasm.

Table 1: Results of final questions of FSFI among all studied subjects

FSFI	Subjects n = 150 Mean ± SD.
Desire	*3.43 ± 0.99*
Q1: How often did you feel sexual desire or interest?	2.80 ± 0.96
Q2: How would you rate your level (degree) of sexual desire or interest?	2.92 ± 0.95
Arousal	3.43 ± 0.99
Q3: How often did you feel sexually aroused ("turned on") during sexual activity or intercourse?	3.08 ± 0.95
Q4: How would you rate your level of sexual arousal ("turn on") during sexual activity or intercourse?	3.01 ± 1.01
Q5: How confident were you about becoming sexually aroused during sexual activity or intercourse?	2.95 ± 1.05
Q6: How often have you been satisfied with your arousal (excitement) during sexual activity or intercourse?	3.32 ± 1.10
Lubrication	3.43 ± 0.99
Q7: How often did you become lubricated ("wet") during sexual activity or intercourse?	3.58 ± 1.10
Q8: How difficult was it to become lubricated ("wet") during sexual activity or intercourse?	3.71 ± 1.01
Q9: How often did you maintain your lubrication ("wetness") until completion of sexual activity or intercourse?	3.26 ± 1.16
Q10: How difficult was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?	3.57 ± 1.06
Orgasm	*4.14 ± 1.08*
Q11: When you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?	3.37 ± 1.05
Q12: When you had sexual stimulation or intercourse, how difficult was it for you to reach orgasm (climax)?	3.66 ± 1.00
Q13: How satisfied were you with your ability to reach orgasm (climax) during sexual activity or intercourse?	3.33 ± 1.15
Satisfaction	*4.67 ± 1.13*
Q14: How satisfied have you been with the amount of emotional closeness during sexual activity between you and your partner?	4.05 ± 1.12
Q15: How satisfied have you been with your sexual relationship with your partner?	3.68 ± 1.20
Q16: How satisfied have you been with your overall sexual life?	3.95 ± 1.11
Pain	*3.93 ± 0.68*
Q17: How often did you experience discomfort or pain during vaginal penetration?	3.69 ± 1.20
Q18: How often did you experience discomfort or pain following vaginal penetration?	3.45 ± 1.32
Q19: How would you rate your level (degree) of discomfort or pain during or following vaginal penetration?	2.69 ± 1.06
Full-scale score	*24.12 ± 3.79*

In comparing FSFI domain scores between different main isolate groups, the lowest desire score was in females with Trichomoal vaginitis (2.25±0.57). Both aerobic bacterial vaginitis and mixed infection had significantly higher desire scores than those with Trichomoal vaginitis (*p*=0.044, *p*=0.033 respectively). Moreover, patients with aerobic bacterial infection had significantly higher desire frequency than patients with *Candida* vaginitis (*p*=0.037). The *Candida* and mixed infection showed a significantly higher frequency of ability to maintain lubrication when compared to Trichomoal vaginitis (*p*=0.048, *p*=0.021 respectively). The mixed infection group showed significantly less difficulty in maintaining lubrication with a mean score 4.00 ± 0.94 **(Table 2).**

Table 2: Association between type of organism and FSFI questionnaire among all studied subjects

	Aerobic Bacterial vaginitis	*Candida* vulvovaginitis	Trichomonal vaginitis	Mixed infection	P value
	n =63	n =73	n =4	n =10	
	Mean ± SD.	Mean ± SD.	Mean ± SD.	Mean ± SD.	
Desire	*3.65 ± 0.98*	*3.25 ± 0.93*	*2.25 ± 0.57*	*3.90 ± 1.07*	*0.006**
Pairwise	P2=0.142, P3=0.044*, p4=0.922, p5=0.262, p6=0.253, p7=0.033*				
Frequency	3.01 ± 0.96	2.57 ± 0.81	2.00 ± 0.00	3.30 ± 1.25	*0.002**
Pairwise	P2=0.037*, p3=0.213, p4=0.897, p5=0.766, p6=0.123, p7=0.126				
Level	3.02 ± 0.92	2.83± 0.99	1.75 ± 0.96	3.20 ± 0.63	*0.079*
Arousal	*3.80 ± 1.14*	*3.63 ± 0.91*	*3.30 ± 0.35*	*3.78 ± 1.08*	*0.743*
Frequency	3.21± 1.01	3.04 ± 0.88	2.75 ± 1.50	2.90 ± 0.88	*0.736*
Level	3.14 ± 1.08	2.84 ± 0.90	3.25 ± 0.96	3.20 ± 1.14	*0.468*
Confidence	3.00 ± 1.21	2.91 ± 0.95	2.25 ± 0.96	3.00 ± 0.94	*0.671*
Satisfaction	3.38 ± 1.17	3.28 ± 1.06	2.75 ± 0.50	3.50 ± 0.97	*0.606*
Lubrication	*4.03 ± 1.01*	*4.37 ± 1.02*	*3.98 ± 0.29*	*4.65 ± 1.03*	*0.151*
Frequency	3.44 ± 1.06	3.62 ± 1.12	4.75 ± 0.50	3.80 ± 1.14	*0.180*
Difficulty	3.52 ± 1.07	3.82 ± 0.99	4.00 ± 0.82	3.90 ± 0.88	*0.474*
frequency of maintaining	3.12± 1.03	3.34 ± 1.24	1.75 ± 0.50	3.80 ± 0.92	*0.011**
Pairwise	P2=0.757p3=0.134, p4=0.385, p5=0.048*, p6=0.7556, p7=0.021*				
difficulty in maintaining	3.33 ± 1.06	3.71 ± 1.04	2.75 ± 0.50	4.00 ± 0.94	*0.024**
Pairwise	P2=0.265, p3=0.800, p4=0.347, p5=0.378, p6=0.921, p7=0.045*				
Orgasm	*4.08 ± 1.10*	*4.19 ± 0.99*	*3.40 ± 1.20*	*4.48 ± 1.49*	*0.503*
Frequency	3.30 ± 1.14	3.43 ± 0.91	2.50 ± 0.58	3.80 ± 1.40	*0.297*
Difficulty	3.62 ± 0.97	3.68 ± 1.02	3.25 ± 0.96	3.80 ± 1.23	*0.834*
Orgasm satisfaction	3.30 ± 1.23	3.35 ± 1.07	2.75 ± 1.50	3.60 ± 1.35	*0.761*
Satisfaction	*4.58 ± 1.23*	*4.71 ± 1.08*	*4.30 ± 0.60*	*4.84 ± 1.26*	*0.791*
with amount of closeness with partner	4.13 ± 1.14	3.99 ± 1.14	3.75 ± 0.50	4.10 ± 1.10	*0.932*
with a sexual relationship	3.50± 1.26	3.77 ± 1.18	3.75 ± 0.50	3.80 ± 1.32	*0.608*
with overall sex life	3.84 ± 1.24	4.04 ± 0.99	3.25 ± 0.96	4.20 ± 1.14	*0.363*
Pain	*4.00 ± 0.69*	*3.86 ± 0.68*	*4.40 ± 0.92*	*3.84 ± 0.60*	*0.432*
Frequency during vaginal penetration	3.81± 1.15	3.64 ± 1.27	4.00 ± 1.16	3.30 ± 1.16	*0.694*
Frequency following vaginal penetration	3.62 ± 1.32	3.25 ± 1.38	4.00 ± 1.16	3.60 ± 1.08	*0.479*
level during or following vaginal penetration?	2.53± 1.04	2.77± 1.14	3.00 ± 0.00	2.70 ± 0.82	*0.491*
Full scale	*24.18 ± 4.42*	*24.02 ± 2.99*	*21.63 ± 1.08*	*25.49 ± 5.10*	*0.383*

P1,: comparison between all groups; P2: Comparing Bacterial infection and Candidal infection; P3: Comparing Bacterial infection and Parasitic infection; P4: Comparing Bacterial infection and Mixed; P5: Comparing *Candida* infection and parasitic infection; P6: Comparing *Candida* infection and mixed; P7: Comparing parasitic infection and mixed; *: significant when *p* value ≤0.05.

There was a statistically insignificant association between age, patient complaint, type of isolated micro-organism, and FSD **(Table 3)**. An observed difference with a statistical significance was found in patients of *N. gonorrheae* vaginitis group with a higher percentage of female patients having no sexual dysfunction (*p* value=0.010). Linear Regression analysis was done to predict the FSFI total score. None of the aerobic vaginitis causative organisms was a predictor of the FSFI score **(Table 4).**

Table 3: Association between sexual dysfunction with age, complaint, and type of organism

		All participants N=150		
		FSFI Score ≤26.5 (= Female sexual dysfunction)	FSFI Score >26.5 (= No Female sexual dysfunction)	*p*
		N=109 (72.7%)	N=41 (27.3%)	
Age (years)	Mean ± SD	30.35±6.114	30.61±5.865	0.814
Complaint; N (%)	Itching	33(30.3%)	7(17.1%)	0.103
	Vaginal discharge	32(29.4%)	13(31.7%)	0.779
	Bad vaginal odour	7(6.4%)	2(4.9%)	0.723
	Burning micturition	18(16.5%)	8(19.5%)	0.667
	Lower abdominal pain	14(12.8%)	8(19.5%)	0.303
	Pain during sexual intercourse	5(4.6%)	3(7.3%)	0.507
Type of organism; N (%)	Aerobic Bacteria	43 (39.4%)	20 (48.8%)	0.302
	Fungi (*Candida*)	57 (52.3%)	16 (39%)	0.147
	Parasites (*T.vaginalis*)	4(3.7%)	0(0%)	0.214
	Mixed infection	5(4.6%)	5(12.2%)	0.096
Name of isolates N (%)	*Candida*	62(56.9%)	21(51.2%)	0.534
	Staph aureus	17(15.6%)	5(12.2%)	0.600
	Strept agalactiae	7(6.4%)	4(9.8%)	0.493
	E.coli	9(8.3%)	7(17.1%)	0.141
	Klebsiella	11(10.1%)	2(4.9%)	0.516
	Neisseria gonorrheae	4(3.7%)	7(17.1%)	0.010*
	Trichomonas vaginalis	4(3.7%)	0(0%)	0.575

Table 4: Linear Regression analysis for prediction of FSFI total score

	β	*p*
Aerobic bacterial vaginitis	0.085	0.873
Candida **vulvovaginitis**	-0.199	0.723
Trichomonal vaginitis	-2.518	0.193
Mixed infection (versus single organism)	1.516	0.229
Candida	0.186	0.764
Staph. Aureus	-0.788	0.372
Strept agalactiae	1.613	0.190
E.coli	0.455	0.652
Klebsiella	-0.572	0.616
N. gonorrheae	1.617	0.171
T. vaginalis	-2.515	0.195

β, regression coefficient.

DISCUSSION

Sexual activity is a crucial component of human existence that is influenced by numerous external circumstances[19]. Sexual dysfunction affects approximately 53% of ladies diagnosed with vaginal infections[20]. Vaginal infection may result from bacteria, viruses, fungi, or parasites. Several types of bacteria are linked to vaginitis, and the hallmark of the condition is bacterial overgrowth and the lack of *Lactobacilli*. The most common examples are; *E coli*, *Staphylococcus aureus*, GBS, *Listeria monocytogenes*, *Klebsiella pneumoniae*, the bacteria that cause BV, *N. gonorrheae*, and *Chlamydia* [21].

The current study included 150 ladies with vaginal infections, 48.7% of them have only *Candida* infections, while 42% were diagnosed with only bacterial infections, 6.7% of the cases had mixed *Candida* and bacterial infections and,2.6% had only protozoal infection. The most frequent isolates were *Candida* (55.3%), followed by *Staphylococcus aureus* (14.7%), *E. coli* (10.7%), *Klebsiella* (8.7%), *Strept agalactiae* (7.3%), *Neisseria gonorrheae* (7.3%), and *T vaginalis* (2.6%). Our results agreed in some aspects with *Abdul-*

Aziz et al., [22] who reported BV as the most common vaginal infection (27.2%), with VVC (6.6%) coming next. Also, their study revealed that *T vaginalis* was a less frequent isolate, with only three (0.9%) women testing positive. Moreover, mixed BV and VVC infections were found in around 2.6% of the studied females which is comparable to our results.

Furthermore, another study reported BV as the most common illness, accounting for 33.2%, then candidiasis and trichomoniasis (19.4% and 13.3% respectively) [23]. Additional research done in India and Ethiopia reported candidiasis as the most frequent infection of the vagina followed by BV [24, 25]. Likewise, a study conducted in 2021 showed that 39.5% of the cases diagnosed with vaginal infection were caused by bacteria. The most common isolates were distributed as follows; *Strept agalactiae* (14.1%), and *E. coli* (13.5%) which were identified by bacterial culture and biochemical tests. These results are nearly in line with our results[26]. *Dehkordi et al.,* [27] stated that the rate of occurrence of *E. coli* in the high vaginal swab samples was 14.13% which was parallel to our study. Different *E. coli* rates of vaginal infection were reported by other authors.

Bacteria like *E coli*, GBS, and *Enterococci* are the major cause of AV, while anaerobic overgrowth is the principal cause of BV. Moreover, in high vaginal swab samples, the most common isolates were bacteria {such as; *Ecoli* (15%), *Klebsiella pneumoniae* (2%), *Staphylococcus aureus* (9%)}, *Candida spp* (16%) and *Trichomonas spp* [28]. Another study conducted on 39 patients with single bacterial vaginitis revealed that the most commonly identified bacteria were; *Staphylococcus aureus*, followed by *L. monocytogenes*, *E. coli*, GBS, *Pseudomonas aeruginosa*, *K. pneumoniae*, and other bacteria[29].

The variations in isolate prevalence noted across several investigations can be accounted for by variations in the research participants, individual hygiene practices, environment, cultural and socioeconomical factors[30]. For example, detecting *T vaginalis* by the conventional wet-mount technique might reduce its prevalence[31]. Other research demonstrated that *Strept agalactiae isolated* from vaginal swabs varied from (5-40%) due to variability in the site of sampling and cultural techniques utilized[32]. The existence of extended-spectrum β-lactamase producing *K. pneumonia* in females with vaginitis may be attributed to the excessive intake of antibiotics by infected females (especially β-lactam antimicrobials) which suppress other opportunistic microbes' proliferation[33]. Consequently, a further potential cause of discrepancies in outcomes could be, under-reporting of the history of antibiotic medication.

As stated by the current study, the most common complaint of vaginal infection was discharge. It was found that 72.7% of the females with vaginal infections had sexual dysfunction (FSFI ≤ 26.5) and 27.3% did not. In a prior study, women with atypical vaginal discharge and itching had higher FSFI scores in the categories of desire, arousal, orgasm, and pain[34]. *Giraldo et al.,* [35] discovered that their cases had low FSFI scores and lower scores in all areas except desire were reported in the candidiasis group. Even though their findings appear to be consistent with ours.

The findings of this study indicate that females with aerobic bacterial infections had a substantially higher desire score than those with Trichomonal vaginitis and a higher desire frequency than those with *Candida* infections.

According to *Bilardi et al.,*[36] recurrent BV affects all aspects of female life, whether social or sexual. A few females had little influence on their lives, but the majority indicated a moderate to severe influence regarding their self-esteem and sexuality. According to the current investigation, mixed bacterial and *Candida* infection resulted in a substantially higher desire score and maintained lubrication than Trichomonal vaginitis. Furthermore, when compared to parasitic infection, patients with *Candida* infection had a much higher likelihood of sustaining lubrication. *Moshfeghy et al.,* [37] discovered that the overall sexual function values in the cases were low in all domains which is consistent with our findings. However, the type of organism did not affect desire level, arousal, or orgasm.

According to the findings of this study, desire and arousal have strong positive relationships with, lubrication, orgasm, and satisfaction. Lubrication, on the other hand, revealed substantial positive associations with orgasm and satisfaction, as well as a significant negative link with pain. A substantial positive association was found between orgasm and patient satisfaction. On the other side, a significant negative correlation with pain was displayed. Furthermore, *Jarzbek-Bielecka et al.,* [38] discovered a moderate positive correlation between desire and arousal. Additionally, arousal, orgasm, and lubrication were found to be strongly positively correlated with one another. Moreover, arousal and satisfaction were moderately positively correlated. However, lubrication, and orgasm were moderately positively correlated with one another; and lubrication and satisfaction were moderately positively correlated.

CONCLUSION

Vaginal infection with various aerobic microorganisms negatively impacts females' sexual function Thus, female patients with vaginal infection should be assessed carefully for sexual dysfunction to enhance their quality of life.

REFERENCES

1. Donders GG, Vereecken A, Bosmans E, Dekeersmaecker A, Salembier G, Spitz B. Definition of a type of abnormal vaginal flora that is distinct from bacterial vaginosis: aerobic vaginitis. BJOG 2002; 109(1):34-43.

2. Donders GG, Bellen G, Grinceviciene S, Ruban K, Vieira-Baptista P. Aerobic vaginitis: no longer a stranger. Res Microbiol 2017; 168(9-10):845-58.

3. Jahic M. Aerobic vaginitis caused by enterococcus faecalis-clinical features and treatment. Materia Socio-medica 2022; 34(4):291.

4. Fidel Jr PL, Barousse M, Espinosa T, Ficarra M, Sturtevant J, Martin DH, Quayle AJ, Dunlap K. An intravaginal live Candida challenge in humans leads to new hypotheses for the immunopathogenesis of vulvovaginal candidiasis. Infect Immun 2004; 72(5):2939-46.

5. Howe K and Kissinger PJ. Single-dose compared with multidose metronidazole for the treatment of trichomoniasis in women: a meta-analysis. Sex Transm Dis 2017; 44: 30–35.

6. McCool ME, Zuelke A, Theurich MA, Knuettel H, Ricci C, Apfelbacher C. Prevalence of Female Sexual Dysfunction Among Premenopausal Women: A Systematic Review and Meta-Analysis of Observational Studies. Sex Med Rev 2016; 4(3):197-212.

7. Aggarwal R, Mishra V, Panchal N, Patel N, Deshchougule V and Jasani A. Sexual dysfunction in women: An overview of risk factors and prevalence in Indian women. J South Asian Feder Obst Gynae 2012; 4(3):134-136.

8. Clayton A and Groth J. Etiology of Female Sexual Dysfunction.Women's Health Journal 2013; 9(2): 135-137.

9. Graziottin, A., & Giraldi, A. Anatomy and Physiology of Women's Sexual Function.ISSM 2008;289-304.

10. Belayneh M, Sehn E, Korownyk C. Recurrent vulvovaginal candidiasis. Can Fam Physician 2017; 63(6):455.

11. Lema M. Recurrent vulvo-vaginal candidiasis: diagnostic and management challenges in a developing country context. Obstet Gynecol Int J 2017; 7(5): 260.

12. Mondal S, Noori MT, Pal DK.. Sexual dysfunction in female patients of reproductive age group with recurrent urinary tract infection-a cross-sectional study. AJOG Glob Rep 2022; 2(4):100083.

13. Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, Ferguson D, D'Agostino R Jr. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. J Sex Marital Ther 2000; 26(2):191-208.

14. Anis TH, Gheit SA, Saied HS, Al kherbash SA. Arabic translation of Female Sexual Function Index and validation in an Egyptian population. J Sex Med 2011; 8(12):3370-8.

15. Arrom M, L., Girabent-Farrés, M., González, M., Palou, J., Errando-Smet, C., & Ramírez-García, I. Development and validation of a short version of the Female Sexual Function Index in the Spanish population. BMC women's health 2021; 21(1), 63.

16. Wiegel, M., Meston, C., & Rosen, R. The Female Sexual Function Index (FSFI): Cross-validation and development of clinical cut-off scores. J Sex Marital Ther 2005; 31: 1–20.

17. Segal S, Harvie HS, Siegelman E, et al. Severe atrophic vaginitis causing vaginal synechiae and hematocolpos at menopause. Menopause 2011; 18: 333–335.

18. Hobbs MM, Seña AC. Modern diagnosis of Trichomonas vaginalis infection. Sex Transm Infect 2013; 89: 434–438.

19. Panahi R, Anbari M, Javanmardi E, Ghoozlu KJ, Dehghankar L. The effect of women's sexual

functioning on quality of their sexual life. J Prev Med Hyg 2021; 62(3): E776-E781.

20. Gordon D., Gardella C, Eschenbach D, Mitchell CM. High prevalence of sexual dysfunction in a vulvovaginal specialty clinic. J Low Genit Tract Dis 2016; 20(1):80–4.

21. Stenchever MA. Comprehensive gynaecology 4th ed. Mosby Inc 2001; 668–678.

22. Abdul-Aziz M, Mahdy MAK, Abdul-Ghani R, Alhilali NA, Al-Mujahed LKA, Alabsi SA, Al-Shawish FAM, Alsarari NJM, Bamashmos W, Abdulwali SJH, Al Karawani M, Almikhlafy AA. Bacterial vaginosis, vulvovaginal candidiasis and trichomonal vaginitis among reproductive-aged women seeking primary healthcare in Sana'a city, Yemen. BMC Infect Dis 2019; 19(1):879.

23. Majigo MV, Kashindye P, Mtulo Z, Joachim A. Bacterial vaginosis, the leading cause of genital discharge among women presenting with vaginal infection in Dar es Salaam, Tanzania. African Health Sciences 2021; 21(2):531-537.

24. Narayankhedkar A, Hodiwala A, Mane A. Clinicoetiological Characterization of Infectious Vaginitis amongst Women of Reproductive Age Group from Navi Mumbai, India. J Sex Transm Dis 2015; (2):817092.

25. Mulu W, Yimer M, Zenebe Y, Abera B. Common causes of vaginal infections and antibiotic susceptibility of aerobic bacterial isolates in women of reproductive age attending at Felegehiwot Referral Hospital, Ethiopia: a cross-sectional study. BMC Womens Health 2015; 15:42.

26. Bitew A, Mengist A, Belew H, Aschale Y, Reta A. The prevalence, antibiotic resistance pattern, and associated factors of bacterial vaginosis among women of the reproductive age group from felege hiwot referral hospital, Ethiopia. Infection and Drug Resistance 2021; 2685-96.

27. Dehkordi, F. S., Tavakoli-Far, B., Jafariaskari, S., Momtaz, H., Esmaeilzadeh, S., Ranjbar, R., & Rabiei, M. Uropathogenic Escherichia coli in the high vaginal swab samples of fertile and infertile women: virulence factors, O-serogroups, and phenotyping and genotyping characterization of antibiotic resistance. New Microbes and New Infect 2020; 38: 100824.

28. Lakshmi, K., Saikumar, C., Illamani, V., & Menezes, G. A. Bacterial vaginal infections in diabetic and non-diabetic women. BMC Infectious Diseases 2012; 12(1): 63.

29. Razzak, M. S. A., Al-Charrakh, A. H., & Al-Greitty, B. H. Relationship between lactobacilli and opportunistic bacterial pathogens associated with vaginitis. N Am J Med Sci 2011; 3(4):185.

30. Koenig M, Jejeebhoy S, Singh S, Sridhar S. Investigating women's s gynaecological morbidity in India: Not just another KAP survey. Reprod Health Matter 1998; 6(11):84-97.

31. Zhu YZ, Yang YH, Zhang XL. Vaginal colonization of group B Streptococcus: A study in 267 cases of factory women. Chung Hua Liu Hsing Ping Hsuen Tsa Chinh 1996; 17(1):17–19.

32. Bedenic B, Randegger CC, Stobberingh E, Hachler H. Molecular epidemiology of extended-spectrum β-lactamase from Klebsiella pneumoniae strains isolated in Zagreb. Croatia. Eur. J Clin Microbiol Infect Dis 2001; 20:505–508.

33. Gungor A, Uludag A, Sahin M, Gencer M, Uysal A. Effects of vaginal discharge on female sexual function. Int J Gynecol Obstet 2013; 124 (1):27-29.

34. Behzad N, Huzayen R, salih L, Jaradat A, Ahmed N, Rizk D. Prevalence and Correlates of Female Sexual Dysfunction at a Gynecology Clinic in Bahrain. AGJSR 2020; 38 (1): 1-10.

35. 35.Giraldo P.C., Polpeta N.C., Juliato C.R., Yoshida L.P., do Amaral R.L., Eleutério Junior J. Evaluation of sexual function in Brazilian women with recurrent vulvovaginal candidiasis and localized provoked vulvodynia. J Sex Med 2012; 9 (3):805– 811.

36. Bilardi JE, Walker S, Temple-Smith M, McNair R, Mooney-Somers J, Bellhouse C, Fairley CK, Chen MY, Bradshaw C. The burden of bacterial vaginosis: women's experience of the physical, emotional, sexual and social impact of living with recurrent bacterial vaginosis. PLoS One 2013; 11;8(9): e74378.

37. Moshfeghy Z, Tahari S, Janghorban R, Najib FS, Mani A, Sayadi M. Association of sexual function and psychological symptoms including depression, anxiety and stress in women with recurrent vulvovaginal candidiasis. J Turk Ger Gynecol Assoc 2020; 8;21(2):90-96.

38. Jarząbek-Bielecka G, Plagens-Rotman K, Mizgier M, Opydo-Szymaczek J, Jakubek E, Kędzia W. The importance of use of the FSFI questionnaire in gynecology and venerology: a pilot study. Postepy Dermatol Alergol 2021; 38(3):480-485.