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Evaluation of serum interleukin-17 in women with vaginitis

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ABSTRACT

Background: Vaginitis is a common condition seen in the field of gynecology and is caused by a wide range of infectious agents. These include bacteria, fungi, and parasites. The immune response to these different etiologies may also differ; examining it could provide information on host-pathogen interactions. **Objectives**: To assess the serum levels of IL-17 in women with different types of vaginitis and compare these levels with those in healthy controls to try to find an immunological profile corresponding to each etiological agent. **Method**: Sixty women who had been diagnosed with vaginitis, along with 50 healthy controls, were enrolled at Al-Najaf General Hospital, Iraq, between February 2024 and March 2025. Women who had taken antibiotics or antifungals in a recent episode of chronic disease were excluded; also excluded were pregnant or lactating women. The clinical diagnosis of vaginitis was confirmed by a gynecologist through physical examination and laboratory tests (vaginal pH, wet mount, and whiff test). Serum IL-17 levels were quantified using ELISA. **Results**: Bacterial infections were identified as the leading cause of vaginitis since 45% was reported. It was followed by fungal infections at 25%, parasitic at 20%, and mixed infections at 10%. The current study found a significantly higher mean IL-17 level in patients with vaginitis (19.34 ± 11.54 pg/ml) compared to controls (14.56 ± 6.22 pg/ml) with a T value of 2.88 and P =0 .029. Subgroup analysis showed that bacterial vaginitis presented the highest concentration of IL-17 (21.7±3.09 pg/ml), significantly greater than in fungal, parasitic, or mixed infections (F =8 .34, P=0 .005). **Conclusions**: IL-17 levels are high in women with vaginitis. In bacterial infections, since there is an active immunological response mediated by IL-17, it provokes good reaction. This cytokine can also be used as a good biomarker for etiological differentiation of vaginitis as well as pathogen-specific immune responses.

KEYWORDS
Interleukin-17, Vaginitis, Bacteria, Candida, Trichomonas

INTRODUCTION

Contagious vaginitis refers to infection at the site of vaginal mucosa, caused by varied microbial pathogens, and is therefore a health concern mostly harbored among endemic female populations. Vaginitis is inflammation located at the vagina, which can be

triggered by numerous infectious and non-infectious etiologies. Among these, bacterial vaginosis and candidiasis (a yeast infection) along with trichomoniasis are the major common infectious causes of vaginitis from different microorganisms. The causative and epidemiological knowledge of vaginitis would be essential in the appropriate diagnosis, treatment, and public health intervention application. The leading typical forms of vaginitis involve Trichomonas infection, vulvovaginal candidiasis, and bacterial vaginosis (Ismail et al., 2024).

Recent research emphasizes the interleukins of cytokines, in regulating immune responses against infections caused by parasites. Therefore, this aspect is extremely relevant in the discussion concerning possible mechanisms involved in the clinical manifestations and diagnostic methodologies for parasitic vaginitis. The results obtained thus far indicate that IL-6, IL-8, and IL-10 are essential interleukins of immune response to infections caused by parasites. It has been reported that asymptomatic Plasmodium falciparum parasitemia can result in a predominant low-grade inflammation in women; therefore, this can be considered as an immune condition for the vagina (Cercamondi et al., 2010). These interleukins might mediate local immunity that would change with the etiology of parasitic vaginitis. For instance, IL-10 demonstrates protective effects by modulation against inflammation and damage to tissues it provides these effects to other tissues also, therefore it may have therapeutic potential concerning vaginal inflammation (Garzón et al., 2013). In addition, interleukin regulation does not stop at mere inflammatory action but continues with several metabolism interaction actions. The iron metabolism and inflammatory condition hold very critical considerations since it may have an important contribution to the general health status of women who have both parasitic infections and conditions such as vaginitis (Shariat et al., 2011). This further reveals that the diagnostic and therapeutic strategies for parasitic vaginitis should be based on a thorough understanding of interleukin-mediated pathways. Information about profiles of cytokines in parasitic infections may be used positively in diagnostics. High levels of interleukins could signal not only that there is an infection currently ongoing but also provide information regarding the degree to which the inflammatory response is intense (Hadi et al., 2022).

the role of interleukins in parasitic vaginitis looks hopeful, much is still unknown. Firstly, the specific cytokine profiles in parasitic infections causing vaginitis have not been described clearly. These should be defined in further studies to develop explicit markers for diagnosis. This study undertakes an assessment of serum levels of Interleukin-17 (IL-17) in women with vaginitis.

Patients and Methods

In this study, 60 women diagnosed with vaginitis at Al-Najaf General Hospital, Iraq, were included during the period from February 2024 to March 2025. Their ages ranged between 22 and 45 years. Women who had used antibiotics or undergone antifungal/vaginal treatments within the last month are excluded from the study, along with those having chronic systemic diseases and pregnant as well as breastfeeding women. Another set of 50 healthy women without any history of vaginitis was considered the control group. The women were subjected to specialized oncologist and specific laboratory investigations to determine the specific etiology of vaginitis (bacterial, parasitic, fungal and mixed).

About 3 ml of venous blood was drawn from the participants (patients and controls) into clot-activator tubes for serum separation. The samples were centrifuged at 3000 rpm for 10 minutes; the separated serum was then stored at -20°C. The concentration of IL-17 in the serum was measured using an ELISA kit as recommended by the manufacturer (Humacount-Germany).

A gynecologist confirmed the clinical diagnosis of vaginitis based on its signs and symptoms and some laboratory tests, which included vaginal pH, wet mount, and whiff test. An order was given to the patients according to the type of infection (e.g., bacterial vaginosis, candidiasis, or trichomoniasis) so as to appraise their immunological response better.

Ethical approval was obtained from the hospital administration, and informed consent was obtained from all participants, patients and healthy controls. Participant selection and diagnosis were done under the supervision of gynecological specialists of the hospital**.**

Statistical analysis

Analysis of data was done with the aid of the Statistical Package for the Social Sciences (SPSS), version 26. Results were expressed as mean ± standard deviation

(mean ± SD). Statistical significance was indicated at a p-value of less than 0.05. The chi-square(χ^2) test was used to check and compare the association between categorical variables across study groups. To compare differences in IL-17 Concentrations in patients with different severities of vaginitis ANOVA was applied (Al-Fahham, 2018).

RESULTS

Table 1 shows the age and residence distribution of women diagnosed with vaginitis compared to the control group. The age group 21–30 years was the most represented in both patients (38.33%) and controls (48%), followed by the 31–40 age group; it accounted for 36.68% of patients and 24% of controls. The over-40-year-olds constituted 25% of patients and 28% of controls. With regard to residence, 60% of both patients and controls were from urban areas; the rest were from rural settings. No statistically significant differences were revealed by the chi-square analysis between the groups concerning age and residence (P > 0.05); therefore, these demographic factors were matched well and unlikely to have an effect on any outcome in this study.

Table 1. Age and residence distribution of investigated women with vaginitis

Indicators		`Patients (No. = 60)		Control (No. = 50)		Chi Square	P value (Sig.)
		Freq.	%	Freq.	%		
Age/Years	21-30	23	38.33	24	48.0	0.71	0.44 (NS)
	31-40	22	36.677	12	24.0		
	> 40	15	25	14	28.0		
Residence	Urban	36	60	30	60.0	0.54	0.23 (NS)
	Rural	24	40	20	40.0		

Figure 1 shows the distribution of cases of vaginitis by its etiology. The infections were caused by bacteria in most cases, that is 45% of the total. Fungal causes ranked second at 25% followed by parasitic origins at 20%. Mixed infections comprised only 10%. From the above data, it can be inferred that bacterial vaginitis is the most common etiologic cause of vaginitis.

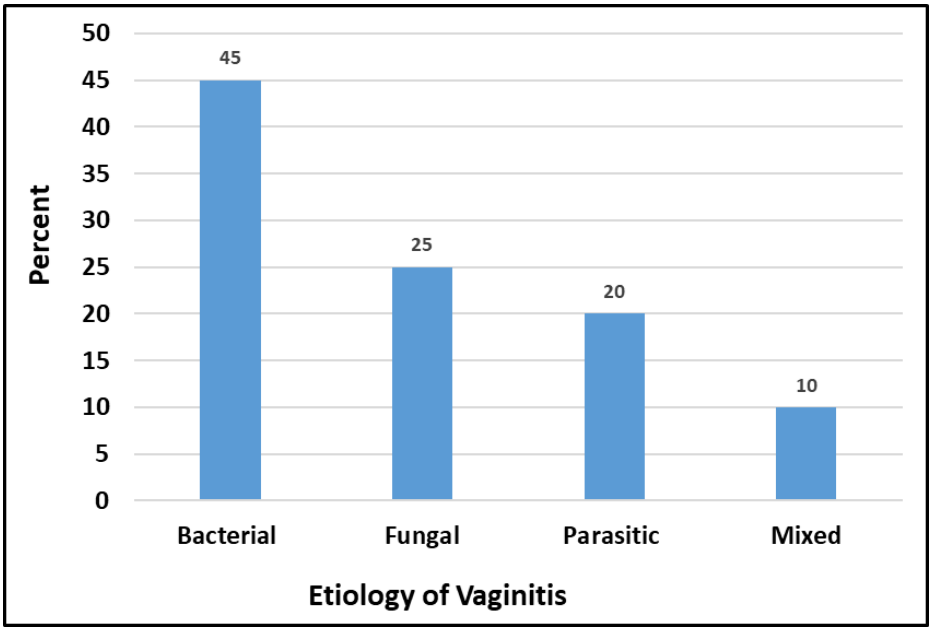

Figure 1. Distribution of vaginitis according to etiology.

Comparison of IL-17 levels in women with vaginitis and healthy controls showed a mean concentration higher in the patient group than in the control group (19.34 ± 11.54 pg/ml vs. 14.56 ± 6.22 pg/ml). It was statistically significant; T value = 2.88, P value = 0.029 (Table

Table 2. Comparison of IL-17 levels between patients and control women

Groups	No.	IL-17 (pg/ml) Mean ± SD	T Test (P Value)
Patient	60	19.34 ± 11.54	2.88
Control	50	14.56 ± 6.22	(0.029)

Findings indicate very significant variability in IL-17 levels among patients with different etiologies of vaginitis which means IL-17 could have a role in the inflammatory responses associated with bacterial infections. The mean IL-17 level in bacterial vaginitis (21.7 ± 3.09 pg/ml) was highest and significantly higher than that in fungal, parasitic, and mixed infections which are shown in Table3. Statistical analysis showed a very highly significant difference between these values (F = 8.34, P = 0.005). This obviously shows that expression of IL-17 is much more pronounced in bacterial infection as compared to other types of vaginitis; this may also reflect stronger mobilization by the immune system against bacterial pathogens (table 3).

Table 3. Comparison of IL-17 levels in patients' groups according to etiology of vaginitis

Groups	Freq.	IL-17 (pg/ml) Mean ± S.D	F test	T test P-value
Bacterial	45	A 21.7 ± 3.09	**8.34**	**0.005 (HS)**
Fungal	25	B 17.3 ± 2.11		
Parasitic	20	B 17.8 ± 1.13		
Mixed	10	B 19.2± 1.22		

A, B Different letters refer to significant difference at p <0.05

Analysis of IL-17 levels according to the residential background of patients showed no statistically significant difference between the urban and rural groups. It therefore implies that geographic or lifestyle-related factors do not have a major influence on the expression of IL-17 in patients with vaginitis. The mean level of IL-17 was slightly higher in urban patients (20.27 ± 4.24 pg/ml) than in rural patients (19.89 ± 4.92 pg/ml), but the difference is not significant (T = 0.79, P = 0.33); an indication that the immune response is uniform across these demographics.

Table 4. Differences in IL-17 levels in patients' groups according to gender

Groups	Freq.	IL-17 (pg/ml) Mean ± SD	T test P-value
Urban	36	20.27 ± 4.24	**0.79 (0.33) NS**
Rural	24	19.89 ± 4.92	

DISCUSSION

Results of the present study pointed to bacteria as the most common etiologic causes of vaginitis. Previous information reported it to be bacterial vaginosis, a very common type of vaginitis. It is an imbalance condition concerning the vaginal flora. Reduction normally associated with BV is that of Lactobacillus species and it has been replaced by anaerobic bacteria, mainly Gardnerella vaginalis (Coudray & Madhivanan, 2019). Such changes to the microbial makeup can compromise what would otherwise be good vaginal health and set the stage for bad gynecological outcomes including sexually transmitted infections and pelvic inflammatory disease (Ma et al., 2012 ; Chen et al., 2021). The healthy role in the vaginal microbiome has come into increased focus. New research shows that learning about these tiny living things working together is key to making good cures for BV (Kalia et al., 2020). It's important to note that the use of helpful bacteria has shown hope in bringing back the right balance of germs in the vagina, indicating a possible path for treatment (Lebeer et al., 2010).

Fungal vaginitis is typically Candido-based, another frequent infection in women. The control of invasive fungal infections is largely dependent on further antifungal drug research. Until this changes, the efficacy of amphotericin B will ensure its continued use in the treatment of invasive fungal infections (Cavassin et al., 2021). However, when considering the high rate of resistance to antifungals there is a rising need that calls for continuous exploration and development and even repurposing pharmaceutical strategies as alternative treatments (Miró-Canturri et al., 2019). Both bacterial and fungal infections can be chaotically immunocompromised. In other words, co-infections were reported within the COVID-19 pandemic between these two pathogens: bacteria and fungi. (Rawson et al., 2020).

This study will report that IL-17 may show a marked elevation in women with vaginitis, more precisely in those where bacteria have infected them. The principle for which IL-17 causes vaginitis has become a topic since it causes inflammation. Studies have shown that secretion of IL-17 can be made more robust through(cell) interactions with pathogens/ disease-causing agents. For example, interaction-driven between CD161 and LLT1 has been proven to increase the production of IL-17 and therefore these interactions (might) play an important role in understanding vaginitis (Germain et al., 2011). Control over levels of IL-17 via such routes may lead to useful applications for treatment strategies aimed at managing vaginitis. In terms of Candida albicans, an ordinary cause of vaginitis, secretory aspartyl proteinases (Sap2) from this organism have been shown to elicit inflammatory responses comprising neutrophil influx and IL-1β production which may influence levels of IL-17. Understanding how virulence factors like Sap2 drive IL-17 production is central to understanding what happens in the body during vaginitis (Krejsgaard et al., 2011).

Differentiation of IL-17-producing T helper cells (TH17) is basically under the control of various cytokines, mainly TGF-β and IL-6. These are indeed cardinal promoters of IL-17, and in that regulation could be key in vaginal inflammation (Willerslev-Olsen et al., 2016). More information on SEA-mediated stimulation of IL-17 production through Jak3/Stat3 signal transduction could add up to explain chronic inflammation in vaginitis conditions (Pericolini et al., 2015). The work of Hadi et al. (2022) explored the role of interleukin-17 (IL-17) in parasitic infections; this was done by measuring its levels in serum from patients with giardiasis. It was noted by the researchers that IL-17 levels were grossly elevated in those infected with Giardia lamblia as compared to healthy controls; obviously, this shows that IL-17 could be inducing an immune response against parasitic infections. Such elevation of IL-17 suggests its possible involvement in the pathogenesis of giardiasis; it may promote inflammatory responses that enhance control over the parasite.

CONCLUSION

The raise of IL-17 in women with vaginitis is a key field of study that shows the link between immune reactions and inflammation. Knowing the ways that control IL-17 making, mostly about germs like Trichomonas and Candida albicans as well as the part of probiotics, is vital for creating good treatment plans.

REFERENCE

Al-Fahham, A.A. (2018) Development of New LSD Formula when Unequal Observations Numbers of Observations Are. Open Journal of Statistics, , 8, 258-263.https://doi.org/10.4236/ojs.2018.82016.

Cavassin, F.., Baú-Carneiro, João Luiz., Vilas-Boas, Rogério R.., & Queiroz-Telles, F.. (2021). Sixty years of

Amphotericin B: An Overview of the Main Antifungal Agent Used to Treat Invasive Fungal Infections. Infectious Diseases and Therapy , 10 , 115 - 147 . http://doi.org/10.1007/s40121-020-00382-7

Cercamondi, C.., Egli, I.., Ahouandjinou, E.., Dossa, Romain A. M.., Zeder, C.., Salami, L.., Tjalsma, H.., Wiegerinck, Erwin T. G.., Tanno, Toshihiko., Hurrell, R.., Hounhouigan, J.., & Zimmermann, M.. (2010). Afebrile Plasmodium falciparum parasitemia decreases absorption of fortification iron but does not affect systemic iron utilization: a double stable-isotope study in young Beninese women.. The American journal of clinical nutrition , 92 6 , 1385-92 . http://doi.org/10.3945/ajcn.2010.30051

Chen, Xiaodi., Lu, Yune., Chen, Tao., & Li, Rongguo. (2021). The Female Vaginal Microbiome in Health and Bacterial Vaginosis. Frontiers in Cellular and Infection Microbiology , 11 . http://doi.org/10.3389/fcimb.2021.631972

Coudray, M.., & Madhivanan, P.. (2019). Bacterial vaginosis-A brief synopsis of the literature.. European journal of obstetrics, gynecology, and reproductive biology , 245 , 143-148 . http://doi.org/10.1016/j.ejogrb.2019.12.035

Garzón, E.., Holzmuller, P.., Bras-Gonçalves, R.., Vincendeau, P.., Cuny, G.., Lemesre, J.., & Geiger, Anne. (2013). The Trypanosoma brucei gambiense Secretome Impairs Lipopolysaccharide-Induced Maturation, Cytokine Production, and Allostimulatory Capacity of Dendritic Cells. Infection and Immunity , 81 , 3300 - 3308 . http://doi.org/10.1128/IAI.00125-13

Germain, C.., Meier, A.., Jensen, T.., Knapnougel, P.., Poupon, Gwénola., Lazzari, A.., Neisig, A.., Håkansson, K.., Dong, T.., Wagtmann, N.., Galsgaard, E.., Spee, P.., & Braud, V.. (2011). Induction of Lectin-like Transcript 1 (LLT1) Protein Cell Surface Expression by Pathogens and Interferon-γ Contributes to Modulate Immune Responses*. The Journal of Biological Chemistry , 286 , 37964 - 37975 . http://doi.org/10.1074/jbc.M111.285312

Hadi, W. S., Salman, R. S., Al-Fahham, A. A., Khan, M. U. F., Kadir, S., Laft, M. H., Saeed, B. Q., Kadhum, W. R., Jalil, A. T., & Kadhim, M. M. (2022). Evaluation of IL-17 and IL-35 in patients with giardiasis in Thi-Qar province, Iraq. Journal of Medicine and Life, 15(9), 1096–1099. https://doi.org/10.25122/jml-2021-0328

Ismail, M. A., Sharad, N. A., & Al-Fahham, A. A. (2024). Etiology, epidemiology and pathophysiology of vaginitis. International Journal of Health & Medical Research, 3(11), 819–822. https://doi.org/10.58806/ijhmr.2024.v3i11n06

Kalia, Namarta., Singh, J.., & Kaur, M.. (2020). Microbiota in vaginal health and pathogenesis of recurrent vulvovaginal infections: a critical review. Annals of Clinical Microbiology and Antimicrobials , 19 . http://doi.org/10.1186/s12941-020-0347-4

Krejsgaard, T.., Ralfkiaer, U.., Clasen-Linde, E.., Eriksen, K. W.., Kopp, K.., Bonefeld, C.., Geisler, C.., Dabelsteen, S.., Wasik, M.., Ralfkiaer, E.., Woetmann, A.., & Odum, N.. (2011). Malignant cutaneous T-cell lymphoma cells express IL-17 utilizing the Jak3/Stat3 signaling pathway.. The Journal of investigative dermatology , 131 6 , 1331-8 . http://doi.org/10.1038/jid.2011.27

Lebeer, S.., Vanderleyden, J.., & Keersmaecker, S.. (2010). Host interactions of probiotic bacterial surface molecules: comparison with commensals and pathogens. Nature Reviews Microbiology , 8 , 171-184 . http://doi.org/10.1038/nrmicro2297

Ma, B., Forney, L. J., & Ravel, J. (2012). Vaginal microbiome: rethinking health and disease. Annual Review of Microbiology, 66, 371–389. https://doi.org/10.1146/annurev-micro-092611-150157

Miró-Canturri, A.., Ayerbe-Algaba, Rafael., & Smani, Y.. (2019). Drug Repurposing for the Treatment of Bacterial and Fungal Infections. Frontiers in Microbiology , 10 . http://doi.org/10.3389/fmicb.2019.00041

Pericolini, E.., Gabrielli, E.., Amacker, M.., Kasper, L.., Roselletti, Elena., Luciano, E.., Sabbatini, S.., Kaeser, M.., Moser, C.., Hube, B.., Vecchiarelli, A.., & Cassone, Antonio. (2015). Secretory Aspartyl Proteinases Cause Vaginitis and Can Mediate Vaginitis Caused by Candida albicans in Mice. mBio , 6 . http://doi.org/10.1128/mBio.00724-15

Rawson, T.., Moore, Luke S.P.., Zhu, N.., Ranganathan, Nisha., Skolimowska, K.., Gilchrist, M.., Satta, G.., Cooke, G.., & Holmes, A.. (2020). Bacterial and fungal co-infection in individuals with coronavirus: A rapid review to support COVID-19 antimicrobial prescribing. Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America . http://doi.org/10.1093/cid/ciaa530

Shariat, S.., Semjonow, A.., Lilja, H.., Savage, C.., Vickers, A.., & Bjartell, A.. (2011). Tumor markers in prostate cancer I: Blood-based markers. Acta Oncologica , 50 , 61 - 75 . http://doi.org/10.3109/0284186X.2010.542174

18. Willerslev-Olsen, Andreas., Krejsgaard, T.., Lindahl, L.., Litvinov, I.., Fredholm, Simon., Petersen, D. L.., Nastasi, C.., Gniadecki, R.., Mongan, N.., Sasseville, D.., Wasik, M.., Bonefeld, C.., Geisler, C.., Woetmann, A.., Iversen, L.., Kilian, M.., Koralov, Sergei B., & Odum, N.. (2016). Staphylococcal enterotoxin A (SEA) stimulates STAT3 activation and IL-17 expression in cutaneous T-cell lymphoma.. Blood , 127 10 , 1287-96 . http://doi.org/10.1182/blood-2015-08-662353