DOI: 10.7860/JCDR/2024/74427.20370

Letter to Editor

Obstetrics and Gynaecology Section

"Can Vaginal Microbiota Act as a Biomarker for the Risk of Gynaecological Precancer and Cancer?"

BHAGYASHRI PATIL TAKBHATE[1], SWATI BHAKARE[2]

Keywords: Cervical cancer, Endometrial cancer, Lactobacilli, Ovarian cancer

Dear Editor,

The female reproductive system hosts unique microbial communities that are crucial for maintaining women's vaginal health and safeguarding the vaginal environment from numerous genitourinary infections [1,2]. The Vaginal Microbiota (VMB) interacts continuously with both the host and its surroundings, forming a complex system. Recently, the correlation between microbiota and various health conditions has gained considerable attention. While the gastrointestinal microbiota has been the primary focus, research has increasingly explored other areas of the body, including the female genital tract. Dysbiosis in the female genital tract, marked by an imbalance in microbial communities, has been identified as a potential contributor to several gynaecological disorders, like endometriosis, inflammatory diseases of the pelvis, Polycystic Ovary Syndrome (PCOS) and gynaecological malignancies [1]. Disruption of the VMB can trigger inflammation and weaken immune defences, potentially creating conditions conducive to cancer development.

The normal function of the VMB is affected by numerous factors, such as ethnicity, genetic background, epigenetic modifications, multiple pregnancies, lifestyle choices, hygiene practices, infections, antibiotic use, age at first sexual intercourse, number of sexual partners, smoking and prolonged use of contraceptives and hormonal medications [1]. The VMB plays a key role in safeguarding women from various infections. The composition of the VMB could potentially serve as a biomarker for Human Papillomavirus (HPV)-related diseases, aiding in guiding clinical treatment [1]. *Lactobacillus* bacteria compete with other microorganisms for space and nutrients, either encouraging or inhibiting the entry of other bacteria. Regulating local defence mechanisms, maintaining VMB balance and enhancing local cervical immune function can help to decrease the risk of cervical abnormalities [2,3].

Gynaecological cancers, such as cervical, endometrial and ovarian cancer, are of particular concern. While these cancers can occur in women of any age, they are more common in postmenopausal women. Research suggests that a low presence of *Lactobacilli* may correlate with a higher risk of gynaecological pathology and contribute to an increased incidence and worse prognosis of gynaecological cancers [4]. A study conducted by Lindquist S et al., encompassing over 455,000 women with cervical high-risk HPV test results, investigated the association between positive cervical high-risk HPV tests and the increased risk of developing vulvar, vaginal and anal precancer or cancer [1].

The invasion of pathogenic microbes disrupts the vaginal ecological balance, leading to inflammation and weakening the immune defence, which may create conditions favourable for cancer development [4]. Potential interventions such as probiotics, prebiotics, Vaginal Microbiota Transplantation (VMT) and biofilm disruptors could help mitigate to the risk of further progression. The relationship between the gut microbiota and systemic inflammation adds another layer of complexity to this understanding [4,5].

Finally, the assessment of vaginal microflora can act as a valuable marker for the follow-up of HPV-positive patients and for proposing interventions to address dysbiosis. *Gardnerella*, in combination with the *Prevotella* genus, has been identified as the highest-risk factor for HPV-positive women. Additionally, a positive association has been found between *Gardnerella* and Cervical Intraepithelial Neoplasia (CIN2)-CIN3, potentially due to increased VMB diversity [6,7]. These studies highlight the significance of a well-balanced VMB in protecting against HPV infection [6,7].

Additionally, *Chlamydia trachomatis* and *Ureaplasma urealyticum* may work synergistically with HPV in the progression of cervical cancer [8]. By gaining a deeper understanding of the association between VMB and gynaecological malignancies, researchers aim to develop more effective diagnostic and therapeutic strategies for these diseases in the future [9]. We must unite as a collective force to alleviate the worldwide cancer burden, operating under the "One Health Mission."

REFERENCES

[1] Lindquist S, Frederiksen K, Petersen LK, Kjær SK. The risk of vaginal, vulvar and anal precancer and cancer according to high-risk HPV status in cervical cytology samples. Int J Cancer. 2024;155(1):61-70. Doi: 10.1002/ijc.34896. Epub 2024 Feb 28. PMID: 38418719.

[2] Kyrgiou M, Moscicki AB. Vaginal microbiome and cervical cancer. Semin Cancer Biol. 2022;86(Pt 3):189-98. Doi: 10.1016/j.semcancer.2022.03.005. Epub 2022 Mar 8. PMID: 35276341.

[3] Anahtar MN, Byrne EH, Doherty KE, Bowman BA, Yamamoto HS, Soumillon M, et al. Cervicovaginal bacteria are a major modulator of host inflammatory responses in the female genital tract. Immunity. 2015;42(5):965-76. Doi: 10.1016/j.immuni.2015.04.019. PMID: 25992865; PMCID: PMC4461369.

[4] Holdcroft AM, Ireland DJ, Payne MS. The vaginal microbiome in health and disease-what role do common intimate hygiene practices play? Microorganisms. 2023;11(2):298. Doi: 10.3390/microorganisms11020298. PMID: 36838262; PMCID: PMC9959050.

[5] Saraf VS, Sheikh SA, Ahmad A, Gillevet PM, Bokhari H, Javed S. Vaginal microbiome: Normalcy vs dysbiosis. Arch Microbiol [Internet]. 2021;203(7):3793-802. Available from: https://dx.doi.org/10.1007/s00203-021-02414-3.

[6] Li X, Wu J, Wu Y, Duan Z, Luo M, Li L, et al. Imbalance of vaginal Microbiota and immunity: Two main accomplices of cervical cancer in Chinese women. Int J Womens Health. 2023;15:987-1002. Available from: https://dx.doi.org/10.2147/IJWH.S406596.

[7] Głowienka-Stodolak M, Bagińska-Drabiuk K, Szubert S, Hennig EE, Horala A, Dąbrowska M, et al. Human Papillomavirus infections and the role played by cervical and cervico-vaginal Microbiota-evidence from next-generation sequencing studies. Cancers (Basel). 2024;16(2):399. Available from: https://dx.doi.org/10.3390/cancers16020399.

[8] Cocomazzi G, Del Pup L, Contu V, Maggio G, Parmegiani L, Ciampaglia W, et al. Gynaecological cancers and Microbiota dynamics: Insights into pathogenesis and therapy. Int J Mol Sci. 2024;25(4):2237. Available from: https://dx.doi.org/10.3390/ijms25042237.

[9] Zhang Z, Ma Q, Zhang L, Ma L, Wang D, Yang Y, et al. Human papillomavirus and cervical cancer in the microbial world: Exploring the vaginal microecology. Front Cell Infect Microbiol. 2024;14:1325500. Doi: 10.3389/fcimb.2024.1325500. PMID: 38333037; PMCID: PMC10850380.

PARTICULARS OF CONTRIBUTORS:
1. Research Fellow, Department of Central Research Facility, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Dr. D. Y. Patil Vidyapeeth (Deemed to be University), Pune, Maharashtra, India.
2. Senior Resident, Department of Obstetrics and Gynaecology, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Dr. D. Y. Patil Vidyapeeth (Deemed to be University), Pune, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Swati Bhakare,
Senior Resident, Department of Obstetrics and Gynaecology, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Dr. D. Y. Patil Vidyapeeth, (Deemed to be University), Pune-411018, Maharashtra, India.
E-mail: dr.swatibjmc@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jul 25, 2024
- Manual Googling: Sep 14, 2024
- iThenticate Software: Sep 20, 2024 (22%)

ETYMOLOGY: Author Origin

EMENDATIONS: 5

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Jul 23, 2024**
Date of Peer Review: **Sep 17, 2024**
Date of Acceptance: **Sep 23, 2024**
Date of Publishing: **Dec 01, 2024**