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Prevalence of different vaginal bacterial spp. in pregnant women in Al-Ajalat city, west of Libya

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Abstract:
Pregnancy-related vaginal bacterial infections pose serious risks to both mother and child. This study examined pathogenic bacterial species in pregnant women and looked for relationships with demographics and trimesters. The study examined the prevalence of Streptococcus agalactiae (GBS) and E. coli, Staphylococcus aureus, Pseudomonas aeruginosa, and mixed infections about age, income, education, medical issues, and pregnancy. This cross-sectional study included 70 pregnant women from Al-Ajalat prenatal clinics. The researchers collected demographic data, pregnancy stages, and bacterial infection rates. Standard culture and biochemical testing identified bacterial species. The study examined bacterial prevalence and trimester of pregnancy using correlations and p-values. The findings indicate that Streptococcus agalactiae (GBS) was the predominant bacterial species, comprising 41.42% of the observed cases. This was followed by E.coli, which accounted for 25.71% of the cases, and Staphylococcus aureus, which constituted 12.85% of the cases. There were statistically significant connections found between the prevalence of bacteria and pregnant trimesters (p-value 0.008728 .This investigation highlights the significant occurrence of bacterial species in pregnant women, with a special emphasis on *Streptococcus agalactiae (GBS).* Nevertheless, the presence of substantial connections between the incidence of bacteria and trimesters suggests the necessity for more comprehensive investigations with bigger sample sizes to establish definitive links. Comprehending these associations is imperative for the implementation of customized preventative interventions and the proficient administration of bacterial illnesses throughout pregnancy to protect the health of both the mother and the newborn.

Keywords: GBS, Pregnancy trimesters, vaginal infection, west of Libya.

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انتشار الأنواع المختلفة من البكتريا المهبلية بين النساء الحوامل في مدينة العجيلات غرب ليبيا

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الملخص

تعتبر العدوى البكتيرية أثناء فترة الحمل، وتحديداً العدوى المهبلية، مصدرًا لمخاطر كبيرة على صحة الأم والرضيع الحديث الولادة. تهدف هذه الدراسة إلى استكشاف انتشار أنواع البكتيريا الضارة بين النساء الحوامل، وتحديد العلاقات المحتملة مع العوامل الديمغرافية وفصول الحمل. تم إجراء فحص لتحديد انتشار العدوى ببكتيريا *Streptococcus agalactiae (GBS)*، بالإضافة إلى *E.coli* و *Staphylococcus aureus* و *Pseudomonas aeruginosa* والعدوى المختلطة، بناءً على العوامل المتعلقة بالعمر والدخل ومستويات التعليم والحالات الطبية وفصول الحمل. ساهم في هذه الدراسة 70 امرأة حامل من المترددات على عيادات متابعة الحمل في مدينة العجيلات. تم تسجيل البيانات الديمغرافية للمشاركين، بالإضافة إلى توثيق فصول الحمل وانتشار البكتيريا. تم تحديد أنواع البكتيريا باستخدام الاوساط الغذائية القياسية والاختبارات الكيميائية. تم استخدام تحليل إحصائي يشمل الارتباطات والقيم *P* لاستكشاف العلاقات بين انتشار البكتيريا والمتغيرات الديمغرافية وفصول الحمل. ظهرت *Streptococcus agalactiae (GBS)* كأكثر أنواع البكتيريا انتشاراً، بنسبة 41.42% من الحالات، تليها *E.coli (25.71%)*و *Staphylococcus aureus (12.85%).* ، وقد وجد ارتباط بين انتشار البكتيريا وفصول الحمل الثلاث (*0 .008728*). نستنتج من هذه الدراسة انتشار أنواع متعددة من البكتيريا بنسبة عالية بين النساء الحوامل، وتحديداً البكتيريا المعروفة باسم *Streptococcus agalactiae (GBS)*. ومع ذلك، يشير وجود الارتباطات الكبيرة بين انتشار البكتيريا وفصول الحمل إلى ضرورة إجراء دراسات أوسع نطاقًا بمشاركة مجموعات أكبر. فهم هذه العلاقات يعتبر أمرًا حاسمًا لتطبيق تدابير وقائية مخصصة وإدارة فعالة للعدوى البكتيرية أثناء فترة الحمل، بهدف الحفاظ على صحة الأم والمولود.

الكلمات المفتاحية: *GBS*، فصول الحمل، العدوي المهبلية، غرب ليبيا.

Introduction

Throughout pregnancy, there are notable alterations in the composition of the vaginal bacterial flora [1]. These changes are mostly marked by an augmentation in certain species of Lactobacillus. These bacteria are essential for the maintenance of a harmonious and optimal vaginal microbiome. *Lactobacilli* play a crucial role in the regulation of vaginal pH, as they produce lactic acid and establish an unfriendly environment for pathogenic microbes [2]. Maintaining this equilibrium is of utmost importance to mitigate the risk of potential complications such as vaginal bacterial infections, so ensuring the well-being of both the mother and the newborn [3].

Nonetheless, the vaginal microbiota can experience variations as a result of diverse circumstances such as hormone fluctuations, sexual behavior, and the utilization of antibiotics. This highlights the ever-changing character of the typical microbial community present in the vaginal environment [4, 5].

Pregnant individuals may encounter an elevated susceptibility to illnesses such as the proliferation of pathogenic bacteria [6]. Pathogenic bacteria present in pregnant women can comprise a diverse range of species, which may include, *group B Streptococcus (GBS), Escherichia coli, Streptococcus agalactiae*, and a variety of anaerobic bacteria. Microorganisms have the potential to present hazards to the health of both mothers and newborns, potentially resulting in many disorders including urinary tract infections, premature birth, and neonatal illnesses [7, 8].

The occurrence of these bacterial species may exhibit substantial variation depending on geographical location, socioeconomic variables, and demographic attributes. Differential prevalence of bacterial illnesses across various locations can be attributed to a combination of factors including environmental factors, healthcare accessibility, and cultural customs. Furthermore, it is worth noting that the prevalence of these infections can be influenced by several demographic characteristics, including age, medical conditions, and lifestyle choices [9, 10].

Bacterial infections occurring during pregnancy can have a substantial influence on the health of both the mother and the developing fetus. The well-being of mothers can be jeopardized, resulting in a range of issues including urinary tract infections, preterm labor, premature rupture of membranes, and systemic infections [11, 12].

If bacterial infections are not treated, there is an elevated chance of maternal sepsis, a condition that poses a significant threat to the life of the mother [13].

In the case of the fetus, these infections can lead to unfavourable consequences, such as reduced birth weight, premature birth, and fetal discomfort. Certain bacteria, such as *Group B Streptococcus (GBS)*, have the potential to induce severe neonatal infections, resulting in diseases such as pneumonia, sepsis, or meningitis in the newborn infant [14, 15, 16] .

The implementation of efficient management and treatment strategies for bacterial infections during pregnancy is crucial in order to mitigate the potential difficulties that may arise for both the expectant woman and the growing child [17].

Ensuring the health of both the pregnant lady and her unborn child necessitates the implementation of prenatal care that encompasses screening, prompt diagnosis, and the administration of appropriate

antibiotic therapy when deemed essential. The primary objective of this study is to assess the variety of different bacterial species in pregnant women, with a specific emphasis on demographics that have received less attention or have been insufficiently investigated. The aim of this study is to conduct a thorough evaluation of the occurrence of these bacterial species, while also examining potential disparities in relation to socio-economic factors, and demographic attributes. The objective of this study is to enhance comprehension of the microbial composition during pregnancy and identify any potential variations in bacterial prevalence among group of pregnant women.

Material and methods

This study utilizes a cross-sectional research methodology to investigate the prevalence of different bacterial species in a cohort of 70 pregnant women, irrespective of the trimester, who are receiving care at prenatal clinics in the city of Alajlat. The researchers have decided that the sample size is sufficient to accurately represent the community of pregnant women who are receiving care at these facilities. This will enable a thorough examination of the prevalence of bacterial species.

Pregnant women in any trimester are the target sample of this investigation, so assuring a comprehensive coverage of various gestational phases. Additionally, this study acknowledges the potential presence of pre-existing medical issues among certain subjects. The data collection method will encompass the recording of these characteristics in order to assess potential correlations between these conditions and the composition of vaginal microbiota.

Inclusion criteria:This study will encompass a sample size of 70 pregnant women who are attending prenatal clinics, regardless of the trimester of their pregnancy. To ensure a comprehensive representation of the pregnant community, individuals from different gestational phases (first, second, or third trimester) will be recruited as participants. Particular emphasis will be given to the recruitment of pregnant women who possess a range of medical backgrounds, encompassing individuals with pre-existing diseases such as diabetes, asthma, or hypertension. The objective of this study is to examine the range of medical histories in order to investigate potential associations between these medical disorders and the occurrence of various bacterial species in the vaginal microbiota. The study will only include persons who voluntarily choose to participate, have given informed consent, and are available for sample collection and questionnaire administration.

Exclusion criteria: The exclusions will apply to women who are neither pregnant nor receiving antenatal care. Furthermore, ladies who decline to participate or withhold consent, those who are not available for sample collection, or individuals who are presently undergoing treatment for bacterial illnesses or taking antibiotics during the sampling period will be excluded from the study. Pregnant individuals with diabetes, asthma, or hypertension will be eligible for inclusion in the study. However, individuals with severe immunocompromised conditions, not falling within the aforementioned medical backgrounds, will be excluded from the study due to potential difficulties that could impact the microbiological analysis. The purpose of establishing these criteria is to uphold the credibility and integrity of the study's findings about the prevalence of bacterial species in pregnant women with varying medical histories throughout different trimesters.

The process of data collecting entails the utilization of a meticulously designed questionnaire that systematically captures essential demographic information, comprehensive medical history (including any pre-existing diseases), and pertinent lifestyle factors. Vaginal swab samples will be obtained from each participant and subjected to biochemical analysis to identify the bacterial species that are present in the vaginal microbiota.

The data that has been gathered will undergo statistical analysis. Statistical methods will be utilized to ascertain the prevalence rates of bacterial species within the cohort.

Results and discussion

Age of participant women distribution:

As demonstrated in table 1, the observed range of participant ages is noteworthy. The data suggests that a significant proportion of the participants, specifically 42.85%, belong to the age group of 31-40 years. This discovery may suggest that women within this specific age range exhibit a higher representation within the studied population. Moreover, it is noteworthy that the age cohort ranging from 21 to 30 years constitutes 27.14% of the total sample, while the group aged over 40 years comprises 30.01%. The mean age is 35.29 ± 7.55.

Table 1: Age distribution among women participants.

	No.	%
21-30	19	27.14%
31-40	30	42.85%
>40	21	30.01%
	70	100.0

Income level variation between women participants:
The observed disparity in income levels among female participants is deserving of attention as shown in table 2 and figure 1. It is evident that a significant proportion, specifically 51.42%, belongs to the "Poor" income classification. This implies that a significant proportion of the study sample is comprised of individuals from a lower socioeconomic status.

Additionally, it is worth noting that 28.57% of the participants can be classified as belonging to the "Moderate" income category, while 20.01% of the participants are situated within the "High" income bracket. The observed distribution of participants in this study suggests a heterogeneous representation of income groups, with a predominant presence of those from lower-income backgrounds.

Table 2: a variety of income levels and their distribution among women.

	No.	%
Poor	36	51.42%
Moderate	20	28.57%
High	14	20.01%
	70	100.0

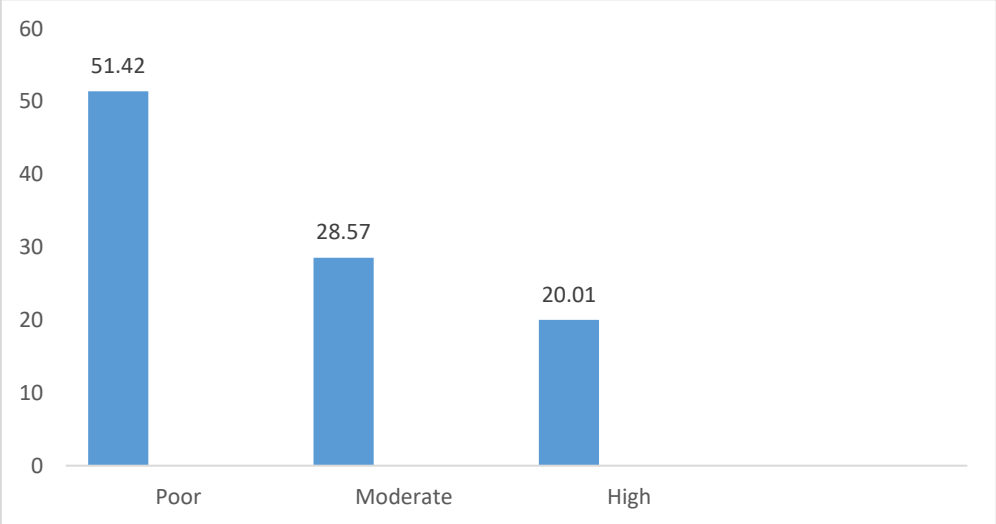

Figure 1: Distribution of participants according to income level.

The degree of income can exert a significant influence on multiple dimensions of health, encompassing factors such as healthcare accessibility, nutritional status, living conditions, and stress levels. Individuals with lower socioeconomic status frequently encounter more obstacles in obtaining high-quality healthcare and sustaining their general state of well-being. These circumstances may potentially impact their vulnerability to bacterial infections, including those that occur during pregnancy.

Education level of participants:
Table 3 reveals a varied distribution of education levels among the participants. A considerable fraction, specifically 44.28%, exhibits educational attainment at the "Primary" level, indicating that a substantial number of participants may have either completed their basic schooling or have educational qualifications up to that level. Furthermore, a significant proportion of individuals,

specifically 31.44%, have attained a level of education classified as "secondary." In contrast, a somewhat lower percentage of 24.28% can be categorized under the educational bracket of "University." The diverse range of education levels seen among the participants reflects a heterogeneous representation of educational backgrounds.

Table 3: Distribution of education levels among the participants.

	No.	%
Primary	31	44.28%
Secondary	22	31.44%
University	17	24.28%
	70	100.0

The level of education can serve as a notable determinant of individuals' level of awareness, access to information, and health literacy. These factors, in turn, can have an impact on their healthcare-seeking behavior, comprehension of hygienic practices, and ability to effectively manage their health. There is a positive association between higher levels of education and improved health awareness and behaviors.

Medical conditions distribution among women:

Table 4 indicates that the prevalence of medical issues among the participants is noteworthy. The findings of the study revealed that a significant proportion of the participants, specifically 65.71%, reported not having any specific medical disorders. Conversely, 34.29% of the participants claimed that they had at least one medical ailment.

Among the group of individuals with medical disorders, the prevalence of diabetes was found to be 14.28%, asthma was reported by 8.57% of participants, and hypertension was observed in 11.43% of the sample. Although these conditions are not the prevailing factors, they are nonetheless evident in a significant fraction of the participants. The influence of certain medical problems, such as diabetes, asthma, and hypertension, on immune function and overall health can have implications for susceptibility to infections, including bacterial infections, in the context of pregnancy.

Table 4: distribution and prevalence of medical conditions among the participants.

	No.	%
No medical conditions	46	65.71%
Diabetes	10	14.28%
Asthma	6	8.57%
Hypertension	8	11.43%
	70	100.0

Distribution of women according to Pregnancy trimester:

The study reveals a rather even distribution of participants across the several pregnancy trimesters as shown in table 5 and figure 2.

The greatest group of participants, comprising 44.3%, is observed in the 3rd trimester, with the 2nd trimester closely following at 31.42%. The proportion of participants in the first trimester of the study population is 24.28%.

The several trimesters of pregnancy may be associated with unique physiological circumstances, fluctuations in hormonal levels, and alterations in the vaginal environment, which could potentially influence the vulnerability to bacterial infections. For example, the third trimester, which is characterized by a more advanced stage of gestation, may provide distinct problems in comparison to the preceding trimesters.

Table 5: women's distribution according to pregnancy trimester.

	No.	%
1st trimester	17	24.28%
2nd trimester	22	31.42%
3rd trimester	31	44.3%
	70	100.0

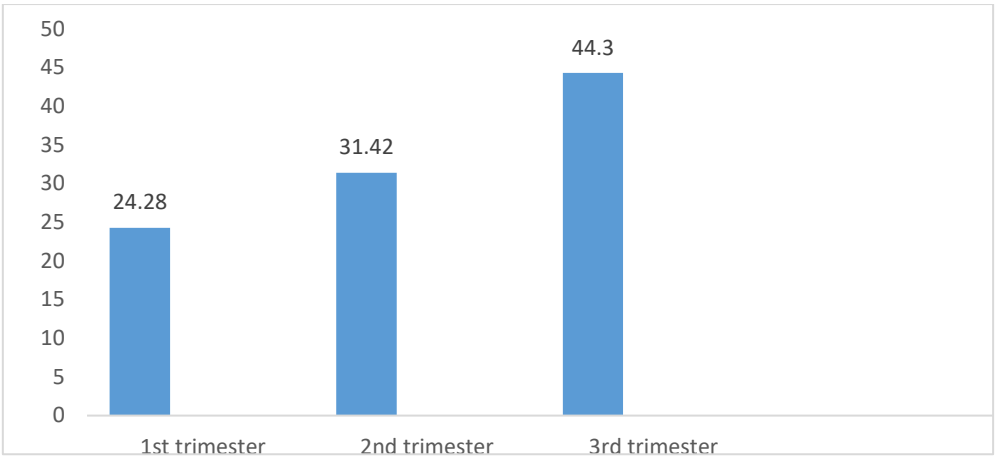

Figure 2: Distribution of women according to pregnancy trimester.

Bacterial spp. prevalence among women participants:
The predominance of different bacterial species demonstrates a wide range of bacterial infection as table 6 and figure 3 indicates. *Streptococcus agalactiae (GBS*) was found to be the most commonly encountered bacterial species, accounting for 41.42% of the cases among the participants. *Group B Streptococcus (GBS)* is acknowledged as a noteworthy issue in the context of pregnancy owing to the possible hazards it presents to the health of both the mother and the newborn throughout the process of childbirth.

Furthermore, *Escherichia coli*, commonly referred to as *E.coli*, is found in 25.71% of the instances, with *Staphylococcus aureus* trailing behind at a prevalence rate of 12.85%. *Pseudomonas aeruginosa* accounts for 8.57% of the reported cases, whilst mixed infections are detected in 11.45% of the cases.

Table 6: prevalence of different bacterial spp. among women.

	No.	%
E.coli	18	25.71%
Staphylococcus aureus	9	12.85%
Streptococcus agalactiae (GBS)	29	41.42%
Pseudomonas aurginosa	6	8.57%
Mixed infection	8	11.45%
	70	100.0

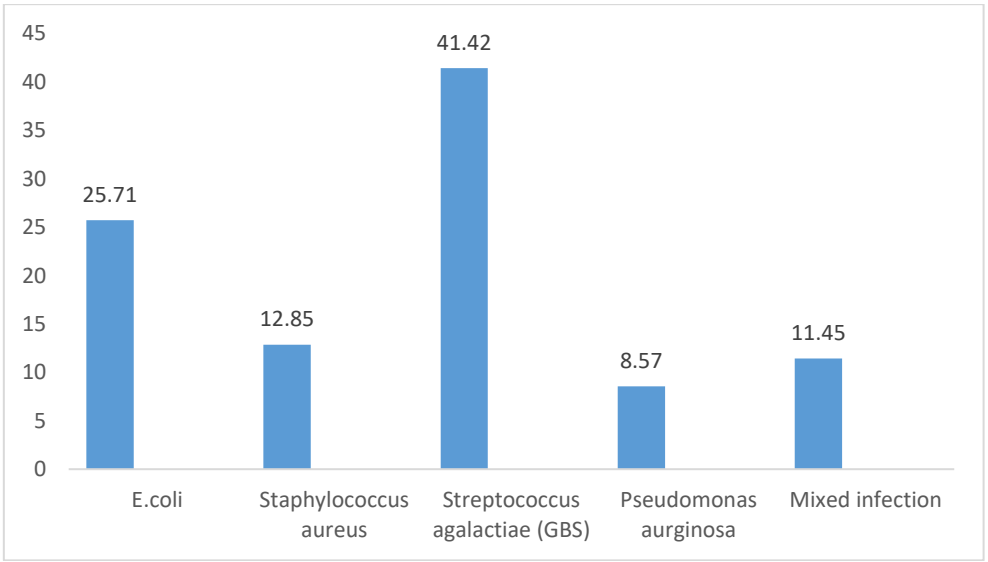

Figure 3: Different bacterial spp. prevalence between participated women.

Correlation between pregnancy trimester and different bacterial spp. prevalence:
Table 7 illustrates the prevalence of different bacterial species between pregnant trimesters within the study population. The statistical analysis demonstrates a substantial correlation between pregnant trimesters and the prevalence of certain microorganisms, as indicated by a p-value of 0.008728. The prevalence of Staphylococcus aureus demonstrates a notable rise from the first to the third trimester, indicating a possible elevation of this bacterium as pregnancy advances. In a similar vein, it is seen that *Streptococcus agalactiae (GBS)* exhibits a notable increase in prevalence throughout the third trimester of pregnancy in comparison to earlier stages, suggesting an augmented abundance of this bacterium in the latter stages of gestation. The prevalence of *E. coli* is most pronounced during the second trimester of pregnancy, suggesting a peak incidence at this specific period of mid-pregnancy. The incidence of *Pseudomonas aeruginosa* exhibits variability among trimesters, whereas mixed infections have generally stable values.

Table 7: pregnancy trimester and prevalence of species of bacteria correlation.

	1st	2nd	3rd	P-value
E.coli	4	11	3	
Staphylococcus aureus	1	2	6	
Streptococcus agalactiae (GBS)	5	6	18	0 .008728
Pseudomonas aurginosa	4	1	1	
Mixed infection	3	2	3	

Discussion:
Pregnancy-related bacterial vaginal infections are a serious health risk that affects both the mother and the fetus. This conversation centers on an assortment of varied research from different areas examining the frequency of bacterial species in expectant mothers, along with related variables including age, income, education, health issues, and trimesters of pregnancy. These investigations provide thorough understanding of the complex connections between these variables and the frequency of particular bacterial species, illuminating the complex character of these diseases.

The study elucidates notable age-related trends in the occurrence of bacterial vaginal infections among pregnant women. The predominant age cohort in the present investigation, ranging from 31 to 40 years, constitutes 42.85% of the sample, which closely corresponds to the results of a previous study conducted in 2020 that reported an average age of 34.2 ± 6.7 for women afflicted with these diseases during gestation [18].

The study conducted in Ghana revealed a notable incidence of bacterial infections among pregnant women, particularly in the age group of 20-34 years, accounting for 71.3% of the reported cases. This particular age range aligns with the most favorable reproductive period for women, which is marked by notable hormonal variations, heightened sexual engagement, and the intrinsic physiological transformations associated with pregnancy [19].

In contrast, it is noteworthy that in India, a significant proportion of instances were primarily observed among younger women, with 88% of cases occurring within the age group of 20-29, while 7.7% were reported among those aged 30-39 [20].

The alignment seen between the present analysis and other studies for the predominant age groups involved highlights the enduring vulnerability of certain age ranges to bacterial vaginal infections during pregnancy. The difference seen in India, characterized by a higher incidence of infections among younger women, indicates the influence of certain socioeconomic, cultural, and lifestyle factors on infection rates. The incidence of bacterial vaginal infections among younger pregnant women in this region may be influenced by various factors, including early sexual debut, cultural norms, and healthcare access disparities.

The relationship between economic levels and the occurrence of bacterial vaginal infections during pregnancy exhibits varied patterns across different studies. The outcomes of our study indicate a notable representation of those who are economically disadvantaged, which is consistent with previous research findings. One study demonstrated a significantly elevated occurrence of bacterial infections in pregnant women residing in low-income nations, such as Pakistan [21]. Furthermore, it is worth noting that in the city of Bukavu, located in the Democratic Republic of Congo, a significant

proportion of 71% of women who were diagnosed with bacterial vaginal infections belonged to socioeconomically disadvantaged families [22]. This observation underscores a potential correlation between poverty and increased prevalence of infections in low-income environments.

In contrast to these observed tendencies, a distinct study conducted in Uganda in 2020 revealed that there was no significant association between income levels and infection rates [23]. This specific discovery presents a challenge to the prevailing belief that income is a determining factor in the occurrence of bacterial vaginal infections among pregnant individuals.

The elevated incidence of these illnesses among socioeconomically disadvantaged pregnant women in low-income nations like Pakistan and Bukavu city, Congo, implies a plausible association between poverty and heightened susceptibility to these infections. The presence of inadequate finances, restricted availability to high-quality healthcare, insufficient sanitation, and substandard living circumstances commonly observed in low-income environments may potentially contribute to this difference, as these variables frequently influence general health and vulnerability to infections.

The distribution of educational attainment among female participants in the studies shown considerable variation across multiple investigations. Within the scope of our investigation, it was observed that 44.28% of the female participants possessed a primary level of education, whilst individuals holding a university degree constituted the smallest proportion, amounting to 24.28%. A research investigation carried out in Nigeria revealed a statistically significant disparity (p-value of 0.002), suggesting a greater occurrence of bacterial vaginal infections among women with primary education [24]. A parallel investigation conducted in Tanzania yielded comparable results, indicating a significantly elevated occurrence of these illnesses among women with primary education, constituting 44.2% of the total cases [25].

In contrast, an alternative study yielded contradictory findings, indicate that women with secondary education had the highest prevalence, with a rate of 49.3%. This was followed by women with higher levels of education, who had a prevalence rate of 39.1%. In contrast, women with primary education had a significantly lower prevalence rate of only 11.6% [22]. The different observations highlight the necessity of acquiring a full comprehension of the fundamental elements that impact infection rates among women with diverse educational levels. Various factors outside formal schooling, including cultural traditions, access to healthcare, standards of hygiene, and regional differences, may potentially contribute to the observed variations in trends.

The correlation between medical disorders, including diabetes, and the incidence of bacterial vaginal infections during pregnancy is a topic that has yielded varied results across numerous research papers. The findings of our inquiry revealed that a majority of the participants, specifically 64%, did not disclose any concurrent medical conditions.

A research study conducted at Vienna University revealed a 9% incidence rate of vaginal infections among women, irrespective of their diabetic or non-diabetic status [26]. However, several research papers propose a more significant influence of diabetes on vaginal infections. A study revealed a notable disparity, indicating that 62.7% of pregnant women with diabetes exhibited vaginal infections, but only 26.3% of non-diabetic women experienced such infections [27]. This finding suggests a considerably greater frequency of vaginal infections among women with diabetes.

Furthermore, research conducted in Saudi Arabia encompassing a sample size of 500 women demonstrated that 50.6% of the participants were diagnosed with vaginal infections. Of the observed instances, 30.6% were identified as having diabetes, whereas 20% were found to be without diabetes [28]. The aforementioned disparities underscore the significance of taking into account particular medical disorders, notably diabetes, within the framework of bacterial vaginal infections during pregnancy.

The current investigation found that 44.3% of instances of bacterial vaginal infections occurred during the third trimester of pregnancy. This discovery is consistent with a study conducted in India, which revealed that 67% of pregnant women who had bacterial vaginal infections were detected during the third trimester [20]. In contrast, a study conducted in Nigeria revealed a greater incidence of bacterial vaginal infections during the second trimester, with 71.7% of cases observed during this specific period [24].

The infection is more common in the third trimester, according to our study and the Indian study. Due to physiological changes and increased vulnerability in late pregnancy, this association exists. The third trimester is marked by hormonal changes, vaginal environment changes, and decreased immune response, which may raise the risk of bacterial vaginal infections. However, the Nigerian study found a higher incidence in the second trimester, suggesting that regional variations, cultural factors, or unique healthcare practices may affect infection rates at different pregnancy stages in that population.

The current investigation revealed that *Group B Streptococcus (GBS)* was the predominant bacterium, with *Escherichia coli (E. coli), Staphylococcus aureus,* and *Pseudomonas aeruginosa* following in prevalence. Mixed infections were observed at a comparatively lower frequency. These findings are consistent with observations made in other research conducted in other geographical areas. Our findings align with previous reports indicating a significant occurrence of Group *B Streptococcus (GBS), Escherichia coli (E. coli),* and *Staphylococcus aureus* in Senegal [29]. In Romania, the predominant Gram-negative pathogen identified among pregnant women was *Escherichia coli (E. coli),* but Gram-positive bacteria, specifically *Group B streptococci (GBS)*, exhibited the highest prevalence [30].

Our study and those in Senegal and Romania found geographical variations in the vaginal microbiome of pregnant women. Our analysis found that *Group B Streptococcus (GBS)* was a significant bacterium and common in many regions. *Group B Streptococcus (GBS)* is common in pregnant women and can harm newborns, emphasizing its clinical importance and health risks. The leading cause of neonatal infections is *Group B Streptococcus (GBS),* emphasizing the importance of prenatal screening and preventative measures to reduce transmission.

E. coli, Staphylococcus aureus, and *Pseudomonas aeruginosa* are widespread in pregnant women's vaginal flora throughout regions, indicating their typical presence and potential health risks.

Our investigation found varied bacterium prevalence trends across pregnant trimesters. *Streptococcus agalactiae (GBS)* increases in the third trimester, while *E. coli* dominates in the second. *Staphylococcus aureus* prevalence rises from first to third trimester. These findings match other studies. In Rwanda, Staphylococcus aureus was prevalent throughout pregnancy, whereas *E. coli* was more prevalent in the second trimester. Since urinary tract infections (UTIs) are less common in pregnant women without UTIs, their increased prevalence is due to them [31].

Cohort research on *Group B streptococcus* prevalence in the second and third trimesters found an increase in *GBS* in the third trimester [32]. In contrast, an Ethiopian study found that older maternal age and lower gestational age may increase the likelihood of bacterial colonization [33].

The vaginal and rectal microbiota naturally shift throughout pregnancy, which explains the third trimester GBS increase. Hormonal and vaginal changes may encourage GBS colonization during this phase. GBS can also be a commensal bacterium in healthy people's gastrointestinal and vaginal tracts, but its prevalence increases closer to birth, suggesting a role in perinatal infections.

E. coli, a gut bacterium, may have grown in the second trimester due to urine and gastrointestinal tract alterations. The anatomical and hormonal changes during this time may affect bacterial population dynamics, increasing *E. coli* colonization. UTIs, commonly caused *by E. coli,* are more common during pregnancy due to bladder function abnormalities, which may explain why. *Staphylococcus aureus* may be normal and resistant to hormonal and physiological changes throughout pregnancy due to its stability across trimesters.

Conclusion

The present study offers a thorough examination that yields useful insights into the prevalence of bacterial species among pregnant women, as well as their potential associations with demographic and trimester-related variables. Although *Streptococcus agalactiae (GBS)* emerged as the predominant bacterial species, this study did not establish any significant correlations between bacterial prevalence and pregnancy trimesters, age, income, or education levels. The presence of statistical significance suggests that the observed correlation in bacterial prevalence may be attributed to trimester characteristics and physiological changes in each trimester of pregnancy.

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