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# The Role Of Bacteria In The Occurrence Of Premature Birth In Premature Babies

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**Germ Diseases Transmitted from Mother to Infants**:

It is an infection that occurs in the newborn during the postpartum period or the first four weeks after birth. The infection is transmitted from inside the womb through the placenta or passage through the birth canal during childbirth. The infection occurs in the newborn after a period of time after birth, and in some cases develops or extends beyond the postpartum period into the weeks or first month (Azeem et al., 2022).

Some types of infections that affect the child during childbirth do not show symptoms of infection until later. There is a higher risk of premature or low-birth-weight newborns developing respiratory diseases when they are infected with germs transmitted to them from their infected mothers (Eman AL - Fatlawy and Abdul Jabbar, 2022).

The effects of these infections may extend to the long term, reaching childhood as well as adolescence. These infections weaken the body and make it easier to contract diseases, i.e., they weaken the immune system of infected individuals. In some cases, newborns infected with respiratory tract infections are more susceptible to future respiratory infections and diseases.

Antibiotics can be an effective treatment for newborn infections, especially when the causative agent is quickly identified (Elizabeth Armstrong – Mensah et al., 2021).

Premature babies are the most vulnerable to infection, and premature rupture of the membranes surrounding the fetus can be associated with newborn infection and significantly increases the risk of sepsis by allowing bacteria to enter the uterus before the baby's birth. Research and studies are ongoing to find a treatment for these infections and also a preventive treatment for the mother to avoid infection of the children (Ana et al., 2019).

Transmission of infection from mother to child can occur in the uterus (congenital), at the time of birth (perinatal period), or after birth.

Maternal infections spread to the fetus through ascending infection from the vagina through the cervix to the fluid surrounding the fetus, where the infection is acquired through the transmission of microorganisms. This causes inflammation of the placenta and amnion, which leads to premature rupture of membranes and premature birth. Often, fetal pneumonia occurs as a result of the entry of infected amniotic fluid into the lungs (Kristina, et al., 2021).

Infection during pregnancy is a major cause of morbidity and mortality in fetuses, and birth defects may occur in rare cases. However, in cases of uterine infection, it may lead to fetal or maternal death (Dimitra et al., 2021).

Infections may be asymptomatic at birth and appear only later in life, but mostly in the early years of childhood, the fetus is affected by these infections (Remco, et al., 2021). Premature birth or restricted fetal movement inside the womb (abnormal baby movement) depends on the infectious agent (type of germ) and the mother's immune status.

In general, primary infection during pregnancy is significantly more harmful because it is asymptomatic (Jawetz et al., 2019).

Maternal prenatal and antenatal examinations and examination of newborns play a major role in early diagnosis and timely treatment (Mengistu et al., 2021).

The term sexually transmitted diseases (STDs) refers to a diverse group of clinical syndromes and infections caused by diseases that can be acquired and transmitted through sex from father to mother and

vice versa. These diseases are also transmitted among those who have sex with a new sexual partner or with more than one sexual partner or with an infected sexual partner. Therefore, the pregnant mother must be examined routinely to ensure that she is free from germ infections (Kristina et al., 2021).

**Materials and Methods**

Study Population

The current study includes the collection of 60 samples from patients at the Children's Hospital in Maysan Governorate from March 1, 2025, to April 2, 2025.

The samples were distributed as follows: 20 cervical samples and 40 samples from children of women whose cervical samples were collected. The samples included 20 samples from premature infants with conjunctivitis and pneumonia, and 20 samples from children with respiratory infections only.

Sterile swabs were used, and cotton swabs were placed in dry, sterile plastic tubes, stored in a refrigerated box, and transported to the laboratory where they were cultured on the appropriate media.

They were then incubated at 37°C for (24-72 hours), as shown in Figure (2-1).

Additionally, (30) control samples were collected from healthy children and mothers, and no infection was recorded.

Information about the patients was recorded, including (sample type - patient name - address - name of the disease affecting both mother and child - child's weight - age - economic level - residence).

**RESULTS**

The results of this study showed that it is possible to isolate *Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae* from the eyes and respiratory system of premature infants and from the cervix of their mothers, as well as from preterm (premature birth), low-weight infants suffering from pulmonary diseases and conjunctivitis, in addition to infants with blindness whose mothers had acute infections in the genitourinary tract, which caused premature births and the transmission of these diseases from the mother to the child during their passage through the birth canal.Samples were collected from women giving natural birth from March 1, 2025, to April 2, 2025, at the Children's Hospital in Maysan Governorate.60 samples were collected, with four swabs taken from each premature infant: two swabs from the eyes and two swabs from the respiratory system of the same infant, and two swabs from the cervix of the mother of the affected premature infant.The infection rate was 70% for 14 cases out of 20 infections. The highest infection rate among women was with *Neisseria gonorrhoeae*, with seven cases representing 50%, followed by *Escherichia coli*, with four cases representing 29%, and finally, the current study recorded three cases of *Klebsiella pneumoniae*, representing 25%. These rates were recorded for both mother and child, indicating the transmission of bacteria during passage through the birth canal in natural births.

Statistical analysis of the results showed significant differences ($P < 0.05$).

| Bacterial species | Ratio centenary | Number of infections |
|---|---|---|
| *Neisseria gonorrhoae* | 50% | 7 |
| *Escherichia coli* | 29% | 4 |
| *Klebsiella pneumoniae* | 25% | 3 |

Table (3-1): Bacteria Isolated from the Study Samples.

Additionally, 30 control samples were collected from healthy women and children, and no type of bacteria was identified. This indicates the pathogenicity of these bacterial types.

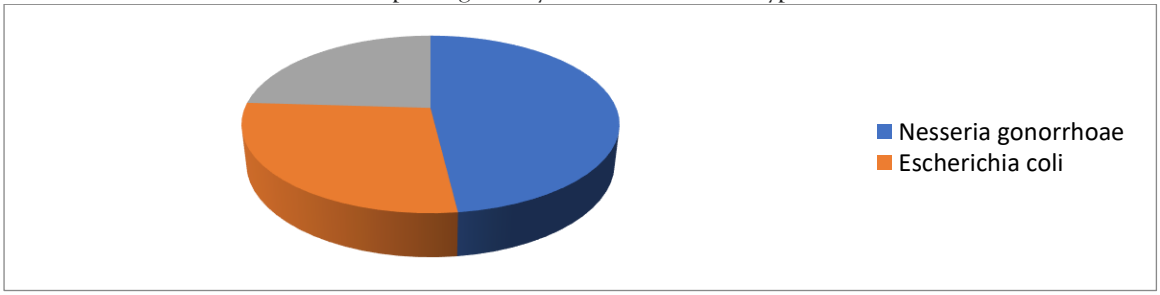


Figure (3-1): Bacteria Isolated from Study Samples

2-3 Description of *Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae* Colonies on the Culture Medium:

*Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae* colonies appeared spherical, as shown in Figures (3-2), (3-3), and (3-4).

This was observed after culturing them on routine culture media, namely Blood agar, Chocolate agar, and MacConkey agar.

Figure (3-2) shows *E. coli* colonies on the solid medium MacConkey agar.

Figure (3-3) shows *Klebsiella pneumoniae* colonies on the solid medium Blood agar.

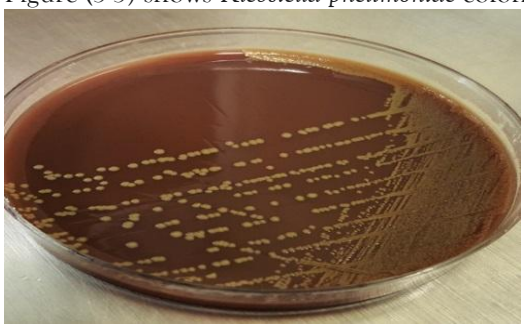

Figure (3-4) shows *N. gonorrhoeae* colonies on the solid medium Chocolate agar.

The study samples were also stained using Gram stain. Since all three types mentioned above are Gram-negative, they will stain red, as shown in Figure (3-5)

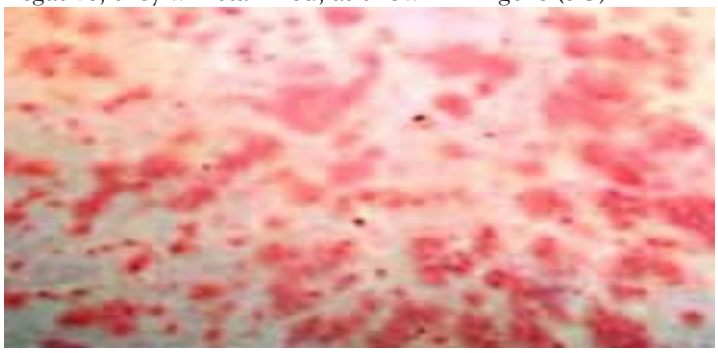

Figure (3-5) shows Gram staining of *Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae* bacteria (100X).

Figure (3-6) shows *Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae* bacteria stained with Negrosin stain (100X) [17]

3-3 Distribution of Study Samples According to the Age Groups of Mothers Infected with *Neisseria gonorrhoeae*, *Escherichia coli*, and *Klebsiella pneumoniae*.

The results of the current study showed that bacteria can be detected in the cervix of mothers, with 20 swabs collected.

The patients were divided into 3 age groups. The highest number of infections was recorded in the first age group (20-29 years) with ten cases, representing 71%, followed by 21% in the age group (30-39 years) with three cases, and the lowest number of infections was 7% in the last age group (40-49 years) with only one case.

Statistical analysis of the results showed significant differences ($P < 0.05$), as shown in Table (2-3): Number of infected individuals, percentages, and their distribution by age groups.

| Age | Ratio centenary | Number of infections |
|---|---|---|
| 20-29 | 71 | 10 |
| 30-39 | 21 | 3 |
| 40-49 | 7 | 1 |

Table (2-3): Shows the number of infected individuals, percentages, and their distribution by age

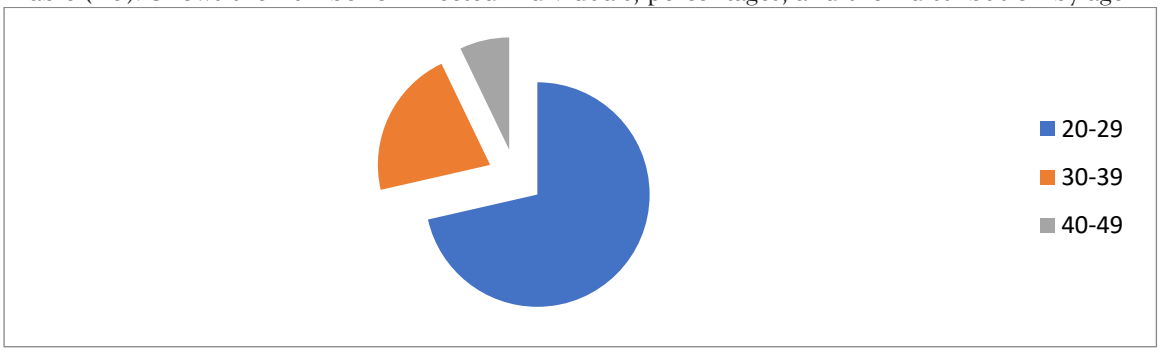


Figure (3-7): Distribution of study samples according to the age groups of infected mothers

3-4 Infection and its Relationship to Other Diseases

Table (3-3) shows the cases of bacterial infection and its relationship to some of the recurrent and associated medical conditions found in women suffering from genitourinary infections.

All bacteria showed cases of urinary tract infection, while arthritis and diabetes recorded 7 infections with a percentage of 50%. Figure (3-3) illustrates the effect of bacterial infection and its association with medical conditions in the women under study.

| Infections | Ratio centenary | Number of infections |
|---|---|---|
| Urinary tract infection | 100 | 14 |
| Arthritis | 50 | 7 |
| Diabetes | 50 | 7 |

Table (3-3): infection in mothers and its relationship to some medical conditions.

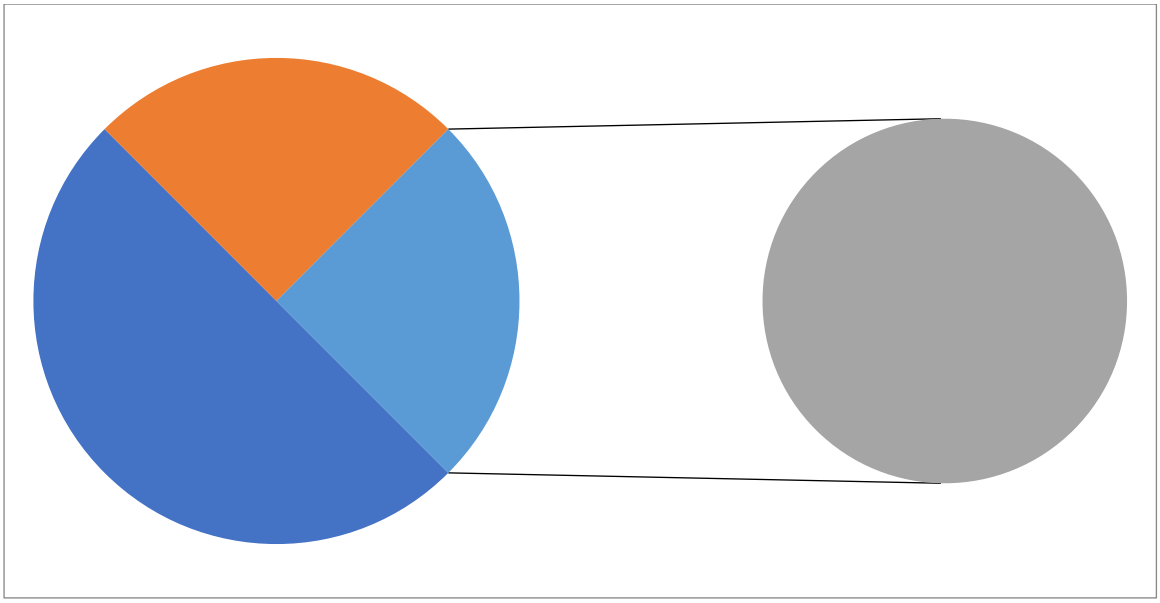

Figure (3-8) illustrates the effect of bacterial infection and its association with medical conditions in the women under study.

3-5 Diagnosis of Bacterial Isolates by Vitek 2 Compact System

The diagnosis of bacterial isolates in this study relied on the morphological characteristics of the bacteria on the culture media. Morphological characteristics were enhanced by biochemical tests using the Vitek 2 system with a (GN.+AST) card for Gram-negative bacteria, as shown in Appendix (2), and a (GP.+AST) card for samples that grow in positive media, as shown in Appendix (2).

The results of this system's testing range from excellent to very good, with very high accuracy in identifying the type of bacteria through the tests performed within this device.

The diagnosis result was excellent for 89% of the study samples and very good for 11%. The Vitek 2 device is equipped with an identification tool to obtain data for each test, which increases efficiency and improves microbial diagnosis.

The Vitek 2 diagnostic test included a Positive card and a Negative card with the presence of (46) biochemical tests (Bio Meriuex 2010)

Table (3-6) shows the type of isolate, number, and percentage. Statistical analysis of the results showed significant differences between the numbers of bacteria isolated below the probability level $P < 0.05$.

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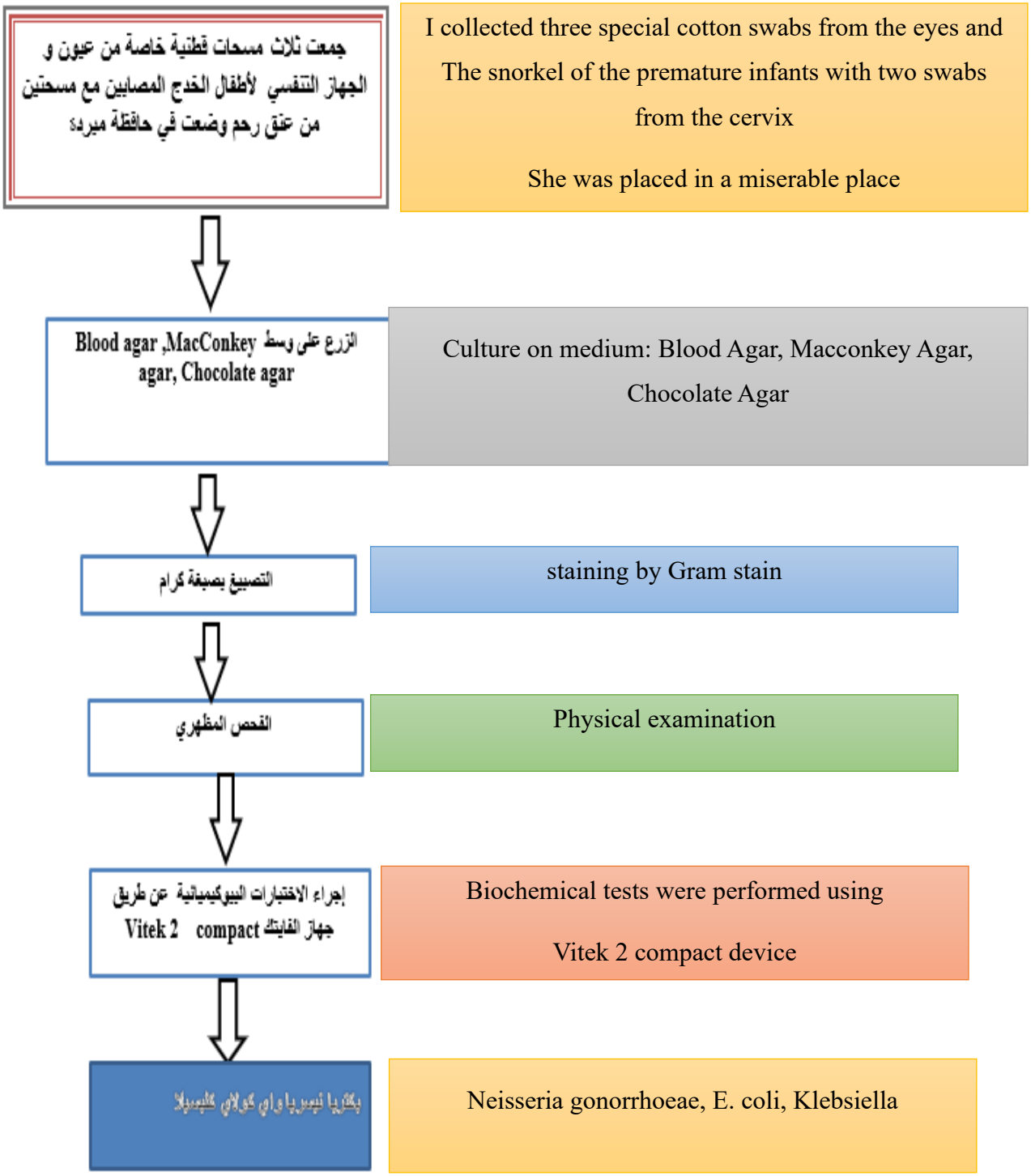


Figure (1-1) Diagram illustrating bacterial isolation and identification.

DISCUSSION

4-1 Culture Medium

A premature infant is a baby born before the 37th week, that is, three to four weeks before the expected delivery date. Premature birth is accompanied by medical problems, and the newborn requires special

care and to stay in intensive care. Newborns between 25 to 29 weeks of gestation are fed intravenously or through a tube.

Premature birth occurs due to bacterial infections in the cervix, in addition to maternal malnutrition during pregnancy or high blood pressure in the mother during pregnancy. Because many organs are incomplete and underdeveloped in the premature infant, they must be cared for in premature infant wards to receive care such as infant feeding and the provision of respiratory devices. This care reduces the risk of death for premature infants.

The current study observed that maternal genital bacterial infections play a role in the development of problems in premature infants, due to the presence of these bacteria at a rate of 70%.

*Kle. Pneumoniae E. coli N. gonorrhoeae*

4-2 Colonies Description

Using routine culture media, namely Chocolate agar, Blood agar, and MacConkey agar, all study samples appeared spherical when cultured on the above media. Two types of stains were used: Nigrosine stain and Gram stain. Negative staining was distinguished by being better, easier, and clearer, as the cells appeared filamentous and small spherical. As for staining with Gram stain, as expected, the aforementioned bacteria showed little reaction to this stain, and the cells appeared small spherical and pale red in color (Shepard et al. 1974; Kareem and Rasheed, 2011).

4-3 Distribution of Mothers with Genital Infections by Age Groups [7]

The current study recorded that most individuals infected with *Kle. Pneumoniae E. coli N. gonorrhoeae* fell within the second age group (20-29 years) and suffered from genitourinary infections. Genital infections are one of the main causes of premature birth in a high percentage of premature infants worldwide.

(Mengistu et al., 2021) These women may have contracted the bacteria from their husbands. Women are more susceptible to infection than men due to several factors, including menstruation, sexual activity, pregnancy, or the use of contraceptives (Workowski and Bolan, 2017).

Several factors contribute to the presence and spread of bacteria when one partner is infected without symptoms, because the infection is initially asymptomatic, leading to dysfunction of the sex glands and abnormal secretions in infected women (Yang et al., 2019).

The isolation rate of the bacteria under study increased in the age group (20-29) by 39%. The increase in this age group is attributed to hormonal changes and increased sexual activity.( AL – Bahli, S. (1993). Prevalence of genital Mycoplasma in women)

As for the presence of Chlamydia bacteria, it increased in the first age group (17-19) by 41.8%. This is due to the incomplete maturation of the uterus and sexual activity during this period, which causes infection with these bacteria and their transmission between partners (Remcon et al., 2021).

Most previous studies have found an increase in bacterial infection rates with age and sexual activity( chronic urinary symptoms. Urol. 74: 62-66)

. There is a relationship between bacterial infection and age groups characterized by sexual activity because it is considered a sexually transmitted disease.

4-4 Bacterial Infection and its Relationship to Other Diseases

*Kle. Pneumoniae E. coli N. gonorrhoeae*

Genitourinary tract infection occurs as a result of contamination of the genitourinary tract with bacteria. Female infections are more common than male infections due to the anatomical structure of the female reproductive system, in addition to the presence of the prostate gland in men, which, through its secretions, eliminates some germs, such as urinary tract infection, neurogenic bladder, and diabetes (Kupis et al., 2015).

This study showed a number of morbidities that were recurrent with cases of genital infections and premature births in premature infants due to maternal bacterial infection. Among these diseases is urinary tract infection, which was present in all 14 cases at a rate of 100%. As for cystitis, these cases were concurrent with bacterial infection, as individuals with bladder infections have difficulty emptying the bladder, making it difficult to flush bacteria out of the body, creating a favorable environment for bacterial growth. This is what the researcher found.

(Jensen et al., 2015) The current study also recorded arthritis and diabetes, with 7 cases each, at a rate of 50%. This is attributed to the fact that most diabetic patients suffer from bladder infections, which cause

difficulty in emptying the bladder, thus making it difficult to flush bacteria out of the body, in addition to the fact that high blood sugar levels provide a favorable environment for bacteria. Also, diabetes suppresses immunity, which is due to a functional disorder in the work of phagocytes (Chiang et al., 2014).

4-5 Control Samples

At the Children's Hospital, 30 samples were collected from healthy womenand children, and no cases of bacterial presence were recorded, indicating the pathogenicity of the bacteria under study( Nakashima, K.(2014).

# REFERENCES

1. Here's the list of sources you provided, arranged alphabetically:
2. Abusaraha, E. Awwadb, Z. and Charv, E. . cite_start. [5] Molecular detection of potential sexually transmitted pathogens in semen and urine specimes of infertile and fertle males . [6] Diagn Microbiol Infect Dis ;77:283-6.
3. AL – Bahli, S. (1993). [16] Prevalence of genital Bacteria in women with 131 131 of medicine , Basrah University .Pp 103 .
4. AL – Ghizawi, G. (2001). [17] Typical and atypical pneumonia characteristics and bacterial profile of Cassese .Ph.D. [18] Thesis, College of Education , Basrah University .Pp.108.
5. Alain , A. Bebear , and Cecil, A. (https://www.google.com/search?q=2011). [19] The evolution of bacteria . [20] New York Acad. [21] seci. [22] 1230(1): 61-64.
6. AL- Mossawi, R. (https://www.google.com/search?q=2005). [23] Genital bacteria among women attending Basrah general hospital with an evaluation of their role in selected clinical cases .M.Sc. [24] thesis, College of Education . [25] Basrah University .Pp.125.
7. AL-Sweih, A. AL-Fadli, H. AL expander, E. and Vincent, O.(2012). [26] From the departments of microbiology and obstericus and gynecology , faculty of Medicine , Kuwait University , Safar, Kuwait 33(6).
8. Altschul, S. Madden, T. Schaffer, A. Zhang, J. Zhang, Z. and Miller, W . cite_start. [27] Gapped BLAST and PSI-BLAST : a new generation of protein database search programs. [28] Nucleic Aci. [29] Res. [30] 25 : 3389-402.
9. Andersen, B. Sokolowski, I. stergaard, L. MOller, J. Olesen, F. and Jensen, J. (2007). [31] Mycoplasma genitalium : prevalence and behavioural risk factors in the general population .J.STD.83(3):237-241.
10. Askienazy-Elbhar, M. (https://www.google.com/search?q=2005). [32] Male genital tract infection: the point of view of the bacteriologist. [33] Gynecol Obstet Fertil. [34] 33(9):691-697.
11. Baka, S. Kouskouni, E. and Antonopolou, S . cite_start. [35] Prevalence of bacteria in women with chronic urinary symptoms . [36] Urol. [37] 74: 62-66.
12. Baron, R. Vandello , J. and Brunsman, B. (1996). [38] The forgotten variable in conformity research: Impact of task importance on social influence. [39] Jour. [40] of Person. [41] and Social Psychol. [42] 71:915-927.
13. Barraud – Lange, V. Pont, J. and Ziyyat, A . cite_start. [43] Seminal leukocytes are Good Samaritans for spermatozoa . [44] Fert. [45] Ster. [46] 96:1315-1319.
14. Green, L. R., Cole, J., Parga, E. F. D., & Shaw, J. G. (2022). Neisseria gonorrhoeae physiology and pathogenesis. In Advances in microbial physiology (Vol. 80, pp. 35-83). Academic Press.
15. Hook, E. W., & Bernstein, K. (2019). Kissing, saliva exchange, and transmission of Neisseria gonorrhoeae. The Lancet Infectious Diseases, 19(10), e367-e369. Inoue, T., & Tanaka, Y. (2016). Hepatitis B virus and its sexually transmitted infection-an update. Microbial cell, 3(9), 420.
16. Jefferson, A., Smith, A., Fasinu, P. S., & Thompson, D. K. (2021). Sexually transmitted Neisseria gonorrhoeae infections-update on drug treatment and vaccine development. Medicines, 8(2), 11
17. Cubero M, Grau I, Tubau F, et al. Hypervirulent Klebsiella pneumoniae clones causing bacterae- mia in adults in a teaching hospital in Barcelona, Spain (2007-2013). Clin Microbiol Infect. 2016:22:154-160.
18. Kishibe S, Okubo Y, Morino S, et al. Pediatric hypervirulent Klebsiella pneumoniae septic arthritis. Pediatr Int. 2016:58:382-385
19. Paczosa MK, Mecsas J. Klebsiella pneumoniae: going on the offense with a strong defense. Microbiol Mol Biol Rev. 2016;80:629-661
20. Happel KI, Dubin PJ, Zheng M, et al. Divergent roles of IL-23 and IL-12 in host defense