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Association between Colonization with Group B Streptococcus, Asymptomatic Bacteriuria and Preterm Labour

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ABSTRACT

Background: For neonates that survive preterm labor, neurological illness still ranks as one of the main causes of perinatal mortality. Researchers have hypothesized that maternal recto-vaginal colonization with group B Streptococcus and asymptomatic bacteriuria during pregnancy might be risk factors for preterm birth. This study is to determine whether there is any connection between preterm birth, asymptomatic bacteriuria, and maternal group B streptococcus colonization.

Patients and Methods: From January 10 to September 6, 2020, Salah Al-Deen General Hospital's obstetrics and gynecology department conducted a clinical based case control research. In the research, group 1 consisted of (50) women who had preterm labor (24–36+6 weeks), whereas group 2 consisted of (50) women who had full-term pregnancies. A questionnaire, as well as a general and abdominal examination, were used to gather the data. By collecting a high vaginal swab and sending it for microbiological analysis, all patients were screened for genital colonization with Group B streptococcus. Urine cultures were used to check all patients for asymptomatic bacteriuria.

Results: Preterm births most frequently occurred in women between the ages of 25 and 29 (46%). The majority of women who gave birth prematurely came from rural regions, 30 (60%), were moms who worked at home, 42 (84%) and just 8 (16%) were employed. Positive urine cultures were detected in 10 (20%) more preterm births than in 3 (6% of full-term laboring mothers). A 30% detection rate of Group B Streptococcus was found in premature labor. 11 (22%) of preterm-born women had positive vaginal swaps for Group B Streptococcus, which is much more than the 4 (8% of full-term-born women).

Conclusions: *E. coli* made up the majority of the bacteria that were found, followed by Group B Streptococcus colonization. Women who had preterm deliveries had considerably more positive urine cultures for Group B Streptococcus than those who had full-term deliveries.

KEYWORD: Group B Streptococcus, Asymptomatic, Bacteriuria, Preterm Labour.

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1. INTRODUCTION

Preterm labor is a key contributor to fetal neurological problems and the most prevalent cause of perinatal death.[1] Every year, an estimated 15 million infants are born too soon. That is greater than one in ten infants. Preterm delivery problems claim the lives of almost 1 million kids every year. Learning difficulties, vision and hearing issues, and other impairments are common among survivors. Prematurity is the number one cause of death for children under the age of five worldwide. Additionally, the rate of preterm births is rising in practically all nations with accessible data.[2] More and more data points to a possible role for maternal genital tract infection and colonization with certain microorganisms in premature membrane rupture and preterm birth. Endotoxin, phospholipases A and C, and cytokine cascade induction are examples of bacterial products that can trigger the formation of prostaglandins and start labor. [3] Chlamydia trachomatis and bacterial vaginosis are two pathogens that can infect or colonize the reproductive tract and cause premature birth.[4] In the vagina or rectum, GBS is colonized in around 36% of pregnant women. Pregnancy-related GBS colonization can be ongoing, sporadic, or brief. [2] Group B streptococcus (GBS) colonization was more likely in preterm delivered women, and this is a known risk factor for early onset neonatal GBS illness (GBS-EOD). However, it is unclear whether genital colonization maternal GBS is connected to preterm delivery. [3] It is logical to assume that group B streptococcal infection is a major factor in newborn sepsis, which is a substantial

cause of neonatal death and morbidity. Early onset neonatal infection transfer from the mother's reproductive system may take place right before or during labor. [4] GBS is also associated with late onset disease (LOD), which affects newborns and babies between the ages of one week and three months and results in bacteremia and/or meningitis. Additionally, GBS has been linked to stillbirths and early labor. [5]

Preterm birth (PTB), often referred to as preterm birth (PBB), is the delivery of a child before 37 weeks of gestation, as opposed to full-term delivery, which occurs at around 40 weeks.[6]. PTB is defined as birth before 37 weeks' gestation; very early PTB is defined as birth before 32 weeks; early PTB is defined as birth between 32 and 36 weeks; late PTB is defined as birth between 34 and 36 weeks; and early-term birth is defined as birth between 37 and 38 weeks. [7] 75% of all PTB comes from late PTB.[8] Given that labor is a complicated process involving several elements, it can be challenging to pinpoint the precise reason of premature delivery. Preterm birth can occur through four distinct paths, all of which have plenty of evidence: Decidual hemorrhage, intrauterine inflammation/infection, premature fetal endocrine activation, and uterine overdistension (placental abruption)[9]. By identifying women who are at a high risk of giving birth too soon, health providers can offer them specialized treatment to postpone the delivery or ensure that they are in the ideal environment for giving birth (such as a hospital with a special care newborn unit). Systems for assessing risk have been proposed as a potential method of locating these women. It is unknown, however, if the risk rating systems will lengthen pregnancy and lessen the frequency of premature deliveries because there is little study in this area. [10]

Preterm birth infection rates are negatively correlated with gestational age. Infection with Mycoplasma genitalium is linked to an increased risk of spontaneous abortion and premature delivery. [11] A technique can cause an infection that is ascending, hematogeneous, iatrogenic, or retrograde through the Fallopian tubes. They can access the fetus, amniotic fluid, and the region between the amnion and chorion from the deciduas. A chorioamnionitis might potentially cause the mother's sepsis. Preterm delivery and major long-term disability, such as cerebral palsy, are both associated with fetal infection. [12]. It has been proposed that the greater risk of preterm birth in these populations can be explained by the condition's higher prevalence among black mothers in the U.S. and the UK. Pregnancy-related bacterial vaginosis is thought to have an impact on the decidual inflammatory response that causes premature delivery. Numerous earlier studies failed to distinguish between bacterial vaginosis and aerobic vaginitis, which may account for some of the discrepancies in the results. Aerobic vaginitis is a substantial risk factor for premature labor.[13] Preterm birth is linked to untreated yeast infections [14]. A preventive antibiotic was observed to reduce the frequency of preterm births in pregnant women with bacterial vaginosis during the second and third trimesters (13–42 weeks of pregnancy). These antibiotics significantly decreased the frequency of waters breaking prior to labor in full-term pregnancies, the risk of endometritis following delivery, and gonococcal infection rates. However, there was no difference in the number of premature births or preterm waters rupture in the women without bacterial vaginosis. Since several of the studies in this evaluation lost participants during the follow-up period, they were unable to document the long-term effects of the antibiotics on mothers or newborns. To fully understand the consequences of using antibiotics throughout the second and third trimesters of pregnancy, further study is required in this field [15]. Preterm delivery is linked to a range of maternal bacterial illnesses, including pyelonephritis, silent bacteriuria, pneumonia, and appendicitis. Although the research was of extremely poor quality, it did imply that taking antibiotics during pregnancy for asymptomatic bacteriuria (urine infection without symptoms) decreased the frequency of preterm deliveries and kids with low birth weight [16]. One dosage of antibiotics didn't seem to be as effective as a course of antibiotics, according to another analysis, although fewer women experienced negative effects from one treatment. This review suggested that more study is required to determine the most effective method of treating asymptomatic bacteriuria [17]. Pregnant women who had routine testing for low genital tract infections had fewer preterm deliveries than those who underwent testing only when they manifested signs of low genital tract infections. Additionally, fewer infants with low birth weights were born to the mothers who had regular testing. Although these findings appear encouraging, the evaluation was only based on one trial, necessitating more study into regular genital tract infection screening [18]. Additionally, periodontal disease and preterm delivery have been regularly related [19]. In contrast, viral infections are not thought to be a substantial contributing risk to preterm delivery unless they are accompanied by a severe fever reaction [20].This study sought to determine the precise prevalence of ASB and GBS in the area and their relationship to premature birth. Additionally, to ascertain the percentage of GBS colonization, and associated risk factors, and association with preterm labor among women attending Salah Al-Deen General Hospital's obstetrics department, as well as to ascertain the percentage of asymptomatic bacteriuria, associated risk factors, and association with preterm labor among those women.

2. PATIENTS & METHODS

2.1 - Study design:

Clinical based case control study in Emergency Department of obstetrics and gynecology department at Salah Al-Deen General Hospital. Pregnant females with preterm labour, attending the labour unit in Salah Al-Deen General. Clinical study was carried out form 10th of January- 6th September

2020. Fifty pregnant women with full term pregnancy compared with 50 women with preterm labour [24-36+6 week]. Both groups selected randomly.

2.2- Inclusion criteria:

Cases

1-Age: between 20-40 years.
2-Gestational age: between 24-36 +6 weeks.

Controls

1-Age: between 20-40 years.
2-Gestational age: between 37-40 weeks

2.3- Exclusion criteria:

1- History of previous Preterm labour.
2- Current antibiotic intake or any medications.
3- Incompetent cervix
4- Overstretching of uterus , e.g twin, polyhydromia
5- D.M
6- Obesity
7- Smoking
8- Fever
9- Dysuria
10- Lower abdominal pain

2.4 Questionnaire

The questionnaire was prepared by the researcher. The data requested included: age, gestational age, and level of education, residency, occupational history, and family history of disease, history of systemic diseases (hypertension, and DM).

2.5 Physical examination

General clinical examination and specific abdominal examination were done for each pregnant female.

2.6 Laboratory investigations

A- vaginal swab

A-1. Procedure of sample collection [21]

- Procedure was explained to woman and consent gained.
- woman Advised to pass urine if needed
- Woman Placed in position comfortable for her, and suitable for HVS collection.
- Privacy was maintained.
- Hands Washed and sterile gloves putted on.
- Lubricated speculum with water-based lubricant passed and locate cervix using light source.
- Specimen Collected from posterior fornix of vagina using sterile swab stick.
- Open, swab placed inside tube containing transport medium immediately, and sealed.
- HVS Labeled with woman's name and medical record number and add the time, date and ward.
- Microbiology request form Completed.
- HVS Placed in biohazard plastic bag and send to microbiology.
- reusable speculum Rinsed and Sterilized
- Dispose of other equipment appropriately
- gloves Removed and hands washed.

A-2. culture media preparation.

A- Blood Agar Media : blood agar media base was prepared according to the manufacture (oxoid)after sterilizing and coding to 50 C . 3% of sheep or human blood was added and mixed then poured into sterile Petri dishes.

B- chocolate Agar media: prepared the media from heating blood agar for (65-70)% to requirement the growth factor for support fastidious bacteria e.g (α- v) factors that isliberation in RBC rupturees by heating.

C- MacConkey Agar preparation: this media was prepared according to the manufacturer instructions (Oxoid) after heating and cooling ppenerd into petridishes. It was used to detect the gram negative bacteria

A-2. 1 Biochemical media

A- Kligler's Iron Agar: prepared according to the manufacturer (Oxoid) after sterilization and cooling poured into plain tube in slant.

B- Nutrient broth: prepared according to the manufacturer (Oxoid) after sterilization and cooling poured into plain tube.

C- Simmon's citrate agar: prepared according to the manufacturer (Oxoid) after sterilization and cooling poured into plain tube.

Note: using nutrient broth in : MR, VP, Indol.

Culturing the specimens: culturing the HVS on the blood agar, Chocolate agar and MacConky agar.

Note: Chocolate agar incubated under CO2 by using candle.

-culturing the urine on blood agar and MacConky agar.

-After an overnight incubation, observation of plates for colonies and its identification. If Negative; Reincubate for an additional 24 hours before reporting a negative result. If Positive: Colonies on blood agar of B- streptococcus bacteria appears grey translucent with surrounding zone of beta-hemolysis.

B- urine examination for ASB

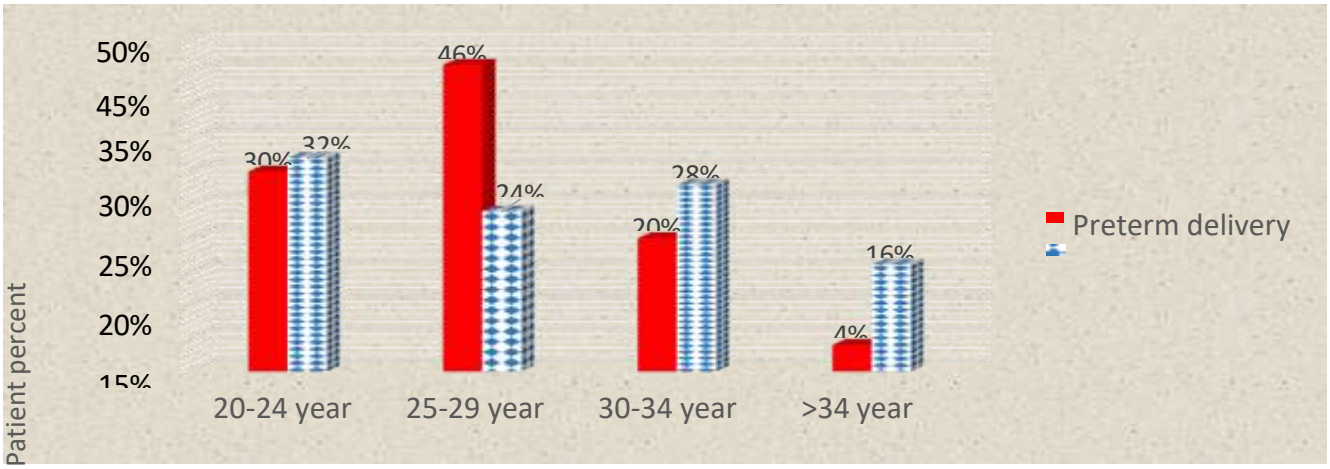
The pregnant women were given a wide mouth sterile container to collect midstream urine samples after the interview in order to diagnose ASB. After being temporarily held in an ice-packed cool box at a temperature of between 2 and 8 degrees Celsius in the clinic for an average of four hours following sample collection, the sample was then transported to the laboratory. Each sample was inspected macroscopically and recorded after being received in the lab. Completed urine culture.

2.9. Data processing and analysis

Data obtained was entered, processed and analyzed using Statistical Package for Social Sciences (SPSS) version 25, and excel program. Descriptive analysis was used to summarize data. Categorical data were summarized in percentages. Continuous variables were summarized by use of mean with their respective measures of dispersion. P value of < 0.05 was taken as cut off level of statistical significance.

3. RESULTS

Most of the preterm delivered women were aged 25-29 years 23(46%), compared to those with full term delivery 12(24%), at age group 30-34 years it was 10(20%), versus 14(28%) for cases and controls respectively, this relation was statistically significant as shown in figure 3.1.



X2=7.75, df=3, P value <0.05 significant

Figure 3.1. The age distribution among both study groups

Most of the women with preterm delivery were from rural areas 30(60%) as compared with full term 28(56%), this relation was statistically not significant as shown in table 3.1. Most of the women with preterm delivery had primary education 38(76%) as compared with full term 42(84%), this relation was statistically not significant as shown in table 3.1.

The nulliparous and primi mother had higher percentage of preterm 6(12%), 16(32%) respectively than those of full term mothers 0(0%), 12(24%) respectively, as shown in table 3.1. Housewife mothers was higher among preterm delivered mothers than worker women 42(84%), 8(16%), respectively, this relation was statistically significant as shown in table 3.1.

Table 3.1. The distribution of study groups according to general characteristics.

Variables	Preterm		Full term		P value
	Frequency	Percent	Frequency	Percent	
Residency					>0.05
Urban	20	40.00%	22	44.00%	
Rural	30	60.00%	28	56.00%	
Education					>0.05
Primary	38	76.00%	42	84.00%	
Secondary	6	12.00%	2	4.00%	
High Education	6	12.00%	6	12.00%	
Parity					<0.05*
0	6	12.00%	0	0.00%	
1	16	32.00%	12	24.00%	
≥2	28	56.00%	38	76.00%	
occupation					<0.05*
Housewife	42	84.00%	48	96.00%	
worker	8	16.00%	2	4.00%	
Total	50	100.00%	50	100.00%	

The preterm deliveries had positive urine culture 10(20%) significantly higher than full term labored women 3(6%), this relation was statistically significant as shown in table 3.2.

3.2. The relation between asymptomatic bacteriuria and labour in both groups.

Urine Culture	Preterm		Full term	
	Frequency	Percent	Frequency	Percent
Positive	10	20.00%	3	6.00%
Negative	40	80.00%	47	94.00%
Total	50	100.00%	50	100.00%

X^2=4.33, df=1, P value <0.05 significant

Most of the detected microorganisms was *E.coli* 5(50%) of the positive urine culture among preterm deliveries followed by *Group B Streptococcus* 3(30%), among the positive urine culture of the full term was 2(66%), and this relation was statistically non-Signiant, as shown in table 3.3.

3.3. The detected microorganisms by urine culture among both study groups.

Microorganisms detected by urine Culture	Preterm		Full term	
	Frequency	Percent	Frequency	Percent
Group B Streptococcus	3	30.00%	0	0.00%
Klebsiella	2	20.00%	1	33.30%
E.coli	5	50.00%	2	66.70%
Total	10	100.00%	3	100.00%

X^2=1.19, df=2, P value >0.05 not significant

Preterm delivered women had positive Vaginal swap for *Group B Streptococcus* 11(22%) significantly higher than those with full term delivered 4(8%), this relation was statistically significant as shown in table 3.4.

3.4. The relation between *Group B Streptococcus* and labour in both groups.

Vaginal swap	Preterm		Full term	
	Frequency	Percent	Frequency	Percent
Positive	11	22.00%	4	8.00%
Negative	39	78.00%	46	92.00%
Total	50	100.00%	50	100.00%

X2=3.83, df=1, P value <0.05 significant

The commonest age group with *Group B Streptococcus colonization was* 31-34 week 4(36.4%), and 35-37 week 4(36.4%), as shown in table 3.5.

3.5. The relation between *Group B Streptococcus* and gestational age in preterm labour group

Gestational age among labour group	Group B Streptococcus		Total
	Positive	Negative	
<28	0	4	4
	0.00%	10.30%	8.00%
28-30 week	3	15	18
	27.30%	38.50%	36.00%
31-34 week	4	16	20
	36.40%	41.00%	40.00%
35-37 week	4	4	8
	36.40%	10.30%	16.00%
Total	11	39	50
	100.00%	100.00%	100.00%

X2=5.128, df=3, P value >0.05 not significant

The commonest age group with positive urine culture was 31-34 week 6(60, as shown in table 3.6.

3.6. The relation between asymptomatic bacteriuria and gestational age in labour group

Gestational age among labour group	Urine Culture		Total
	Positive	Negative	
<28	0	4	4
	0.00%	10.00%	8.00%
28-30 week	4	14	18
	40.00%	35.00%	36.00%
31-34 week	6	14	20
	60.00%	35.00%	40.00%
35-37 week	0	8	8
	0.00%	20.00%	16.00%
Total	10	40	50
	100.00%	100.00%	100.00%

X2=4.306, df=3, P value >0.05 not significant

4. DISCUSSION

4.1. The age distribution among both study groups

Most of the preterm delivered women were aged 25-29 years 23(46%), compared to those with full term delivery 12(24%), this goes with previous studies done by Zeidan MA [22] (2019) in Dyala found that the higher percentage (29.0%) of preterm labour was in the age group (20-29) years, [22] and by Sarhan A Lutf Sarhan AL et al (2015) [23] among Palestinian women, who found significantly higher percentage of pretrm labour among mothers aged 20-29 years.

4.2. The distribution of study groups according to residency

Most of the women with preterm delivery were significantly from rural areas 30(60%) as compared with full term 28(56%). This goes with Shakhawan A. A (2016) in Rania [24] (56.7%) in Iraq preterm delivery was from rural areas. This finding could be explained by fact that Loss of hospital-based obstetric care in rural araes not adjacent to urban areas was significantly associated with increases in preterm births than areas with obstetric services. [25,26]

4.3. The distribution of study groups according to educational level.

No significant difference was found among both groups regarding educational level and most of both groups (preterm delivery (76%), and full term (84%)) had primary education, This goes with Zeidan MA [22] (2019) found in Dyala in Iraq found that non significant difference among both groups and most of both groups had 1ry education (17%), (24.5%) respectively . Akpan NG et al [27] (2019) in Nigeria found non-significant relation with education (14.8%) had secondary education and 1ry education was (4.8%).

4.4. The distribution of study groups according to parity.

The nulliparous and primi mother had higher percentage of preterm 6(12%), 16(32%) respectively than those of full term mothers 0(0%), 12(24%) respectively. This goes with with MacDorman MF et al [28] in (2015) who found significant association with nulliparous and preterm labour and Chang YK et al [29] (2020) who found that nulliparous (50.8%) were significantly higher than multiparous (49.2%).

While it disagree with Zhang YP [30] (2012) found both advanced maternal age and multiparty are associated with higher risk of preterm birth. This difference may be related to the fact that advanced maternal age influences the risk of preterm birth, regardless of parity.

Some studies found no effect of parity on preterm delivery as Zeidan MA [22], Sarhan A Lutf Sarhan AL et al in 2015 [23] and by Akpan NG [27] (2019).

4.5. The distribution of study groups according to occupation.

+Housewife mothers was higher among preterm delivered mothers than worker women 42(84%), 8(16%), respectively this goes with Shakhawan A. A [24] (2016) in Rania in Iraq, found it more among housewife (66 %) and by Mahapula FA, et al [31] in Tanzania 2016 (54.5%), those housewives usually do the house work and with extra work of their farms and animals they hosted, this may be explained by the fact that heavy work may lead to preterm birth, and preterm birth can be reduced by decreasing fatigue and excessive work [32].

4.6. The relation between asymptomatic bacteriuria and preterm labour.

The asymptomatic preterm deliveries had positive urine culture 10(20%) significantly higher than full term labored women 3(6%). This goes with previous studies by Farhan R. K. (2020) in Al Door city in Iraq 25.5% [33] , Abdul Kairun et al in Ethiopia [34] (2015), (16.1%) and Izuchukwu KE et al [35] (2017) (29.5%), found the prevalence of Asymptomatic bacteruria among the antenatal. But it was higher than what reported by Saraswathi and Aljabriin Hyderabad, India [36] (2013) 7.5%, Jalali M et al (2014) in Iran (6.1%) [22] and in Egypt by Kamel HA et al [37] (2018) (5%) among preterm labour group nd 2.5% among control group).

The differences in prevalence were associated to a number of variables, including regional variation, socioeconomic position, the individuals' racial or ethnic background, and the study's location (primary care, community-based, or hospital). Significant differences in rates can be seen across races, as well as between members of the same race who live in various regions or have different socioeconomic statuses. Therefore, it's critical to assess the incidence of ASB in a particular community. [36]Amnionitis that results from UTI directly affects PTL. Additionally, bacterial enzymes like collagenase might deteriorate the embryonic membranes. It was proposed that bacterial compounds like phospholipase A and C or endotoxins may increase the fetal membranes' production of prostaglandins, which would start labor. [33]

4.7. The detected microorganisms by urine culture among both study groups.

Most of the detected microorganisms was E.coli 5(50%) of the positive urine culture among preterm deliveries followed by Group B Streptococcus 3(30%). This goes with Farhan RK 2019 in Al Dour city in Iraq that the commonest pathogen identified was E coli (38.5%) followed by Klebsiella Spp (13%) [33] , Abdul Kairun et al [35] (2015); they found that The most common isolated organism was E. coli followed by Klebsiellaspp, Proteus mirabilis , whereas the least found bacteria was P. aeruginosa. [35] Adeghate et al [37] (2016) found that E coli responsible for 70-95% of upper and lower UTIs. [37] Also this study consistent with study done by Kamel HA et al [35] (2018) E. coli was the most common pathogen (55.14%) followed by proteus 28.57 followed by klebsiella (14.28%). This was clarified by the research of Saraswathi KS [35] (2013), who found that lactose and amino acid levels rise during pregnancy, specifically promoting the development of E. coli. Additionally, it could be brought on by fecal contamination from inadequate hygiene during pregnancy. The most frequent cause of both asymptomatic and symptomatic bacteriuria of pregnancy is E. coli [62, 84]. The virulence of some uropathogenic E. coli strains may be substantially attributable to their capacity to attach to uroepithelium. This compliance is thought to be a need for the beginning of the illness process. [38]

4.8.The relation between Group B Streptococcus colonization and preterm labour.

Women who gave birth preterm had a considerably higher positive vaginal swap rate for Group B Streptococcus 11(22%) than those who gave birth at term 4(8%). This is consistent with findings from several regional studies. According to Alemseged G (20.86%) [39] (2015) and J Mengist A et al [40] (2016), Ethiopia has an overall carriage rate of 19%. (23%) of preterm births in Saudi Arabia were infected with Group B Streptococcus in 2018, according to Musleh J et al [39] (2018).Our results was higher than what found by a study done in Ethiopia by Woldu ZL et al [41] (2014) the colonization rate of 9%, and Gebremeskel TK [40] in 2015 (11.3%), and by Shiferawu S [42] (2019) found the rate of GBS colonization was 8.5% among pregnant mothers with 35-37 weeks of gestation.

There is evidence to suggest that preterm birth is associated with maternal GBS colonization, particularly where there is evidence of ascending infection (bacteriuria), according to a study of systemic review done by Bianchi- Jassir F et al [43] (2017) of 45 studies on the relation between preterm labor and group B Streptococci; the relative risk was 1.98. This variation between the regions may be caused by variations in the methodology, sample size, population variation, and geographic differences, or it may reflect a decline in the prevalence of group B streptococci brought on by better access to healthcare for high-risk groups and better management of infections during pregnancy, such as urinary and genital tract infections.

5. CONCLUSIONS

1- The preterm deliveries had positive urine culture significantly higher than full term labored women.
2- Most of the detected microorganisms was *E.coli* of the positive urine culture among preterm deliveries followed by *Group B Streptococcus*, among the positive urine culture of the full term.
3- Preterm delivered women had positive high vaginal swab for *Group B Streptococcus* significantly higher than those with full term delivered.

RECOMMENDATIONS

1- Health education for patients with history of preterm labour about the effect of asymptomatic bacteruria and group B Streptoccoci infection on pregnancy outcome.
2- It's reasonable to offer intrapartum antibiotics prophylaxis based on the women's based on the women's history of colonization.
3- All pregnant women should be screened for GBS colonization and asymptomatic bacteriuria in Iraq.
4- Health education programs for the health staff on the effect of symptomatic bacteruria and group B Streptoccoci infection on the pregnancy outcome, and its management.
5- Further studies is needed to cover the risk factors associated with symptomatic bacteruria and group B Streptoccoci infection in pregnancy, and test the sensitivity to antibiotics available for management in Iraq.
6- Further studies is needed to follow up and assess the outcome of the babies of mothers with symptomatic bacteruria and group B Streptoccoci infection in pregnancy.

REFERENCES

I. Kim SM, Romero R, Park JW, Oh KJ, Jun JK, Yoon BH. The relationship between the intensity of intra-amniotic inflammation and the presence and severity of acute histologic chorioamnionitis in

preterm gestation. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2015; 28(13):1500-9.

II. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the Sustainable Development Goals. *Lancet.* 2016; 388(10063):3027-35.

III. Shabayek S, Spellerberg B. Group B streptococcal colonization, molecular characteristics, and epidemiology. *Frontiers in microbiology*. 2018;9:437.

IV. Russell NJ, Seale AC, O'Driscoll M, O'Sullivan C, Bianchi-Jassir F, Gonzalez-Guarin J, Lawn JE, Baker CJ, Bartlett L, Cutland C, Gravett MG. Maternal colonization with group B Streptococcus and serotype distribution worldwide: systematic review and meta-analyses. *Clinical infectious diseases*. 2017; 65(suppl_2):S100-11.

V. Kwatra G, Cunnington MC, Merrall E, Adrian PV, Ip M, Klugman KP, Tam WH, Madhi SA. Prevalence of maternal colonisation with group B streptococcus: a systematic review and meta-analysis. *The Lancet Infectious Diseases*. 2016; 16(9):1076-84.

VI. National Institutes of Health. Preterm Labor and Birth: Condition Information.. 3 November 2014. Archived from the original on 2 April 2015. accessed 7 March 2020.

VII. Anderson JG, Rogers EE, Baer RJ, Oltman SP, Paynter R, Partridge JC, Rand L, Jelliffe-Pawlowski LL, Steurer MA. Racial and ethnic disparities in preterm infant mortality and severe morbidity: a population-based study. Neonatology. 2018;113(1):44-54.

VIII. Fuchs F, Monet B, Ducruet T, Chaillet N, Audibert F. Effect of maternal age on the risk of preterm birth: A large cohort study. PloS one. 2018 Jan 31;13(1):e0191002.

IX. Frey HA, Klebanoff MA. The epidemiology, etiology, and costs of preterm birth. InSeminars in Fetal and Neonatal Medicine 2016 Apr 1 (Vol. 21, No. 2, pp. 68-73). WB Saunders

X. Davey MA, Watson L, Rayner JA, Rowlands S. "Risk-scoring systems for predicting preterm birth with the aim of reducing associated adverse outcomes". The Cochrane Database of Systematic Reviews (October 2015). 10 (10): CD004902.

XI. Lis R, Rowhani-Rahbar A, Manhart LE (August 2015). "Mycoplasma genitalium infection and female reproductive tract disease: a meta-analysis". Clinical Infectious Diseases. 61 (3): 418–26.

XII. Ayubi E, Sarhadi S, Mansori K. Maternal Infection During Pregnancy and Risk of Cerebral Palsy in Children: A Systematic Review and Meta-analysis. Journal of Child Neurology. 2021 Apr;36(5):385-402.

XIII. Lin JH, Hsu YH, Wang PH. Risks for preterm premature labor: Many of them are preventable. Journal of the Chinese Medical Association. 2020 May 1;83(5):421-2.

XIV. Roberts CL, Algert CS, Rickard KL, Morris JM (March 2015). "Treatment of vaginal candidiasis for the prevention of preterm birth: a systematic review and meta-analysis". Systematic Reviews. 4 (1): 31

XV. Kaambo E, Africa CW. The threat of aerobic vaginitis to pregnancy and neonatal morbidity. African Journal of Reproductive Health. 2017;21(1):109-18.

XVI. Smaill FM, Vazquez JC. Antibiotics for asymptomatic bacteriuria in pregnancy. Cochrane database of systematic reviews. 2019(11).

XVII. Kalinderi K, Delkos D, Kalinderis M, Athanasiadis A, Kalogiannidis I. Urinary tract infection during pregnancy: current concepts on a common multifaceted problem. Journal of Obstetrics and Gynaecology. 2018 May 19;38(4):448-53.

XVIII. Weckend MJ, Spineli LM, Grylka-Baeschlin S, Gross MM. Association between increased antenatal vaginal pH and preterm birth rate: a systematic review. Journal of perinatal medicine. 2019 Feb 1;47(2):142-51.

XIX. Iida H. Oral health interventions during pregnancy. Dental Clinics. 2017 Jul 1;61(3):467-81

XX. Vogel JP, Chawanpaiboon S, Moller AB, Watananirun K, Bonet M, Lumbiganon P. The global epidemiology of preterm birth. Best Practice & Research Clinical Obstetrics & Gynaecology. 2018 Oct 1;52:3-12.

XXI. Nicolle LE, Gupta K, Bradley SF, Colgan R, DeMuri GP, Drekonja D, Eckert LO, Geerlings SE, Köves B, Hooton TM, Juthani-Mehta M. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*. 2019; 68(10):e83-110.

XXII. Zeidan MA. Risk Factors for Preterm Labour in Diyala Governorate Case-Control Study. *Diyala Journal of Medicine*. 2019;17(2):41-53.

XXIII. Sarhan AL, Anini HE. Risk factors of preterm birth among Palestinian women: case–control study. *Austin J Nurs Health Care*. 2015; 2(1):1011.

XXIV. Shakhawan A. A. Assessment of Risk Factors of Associated with occurrence of Premature Deliveries in Rania City. Journal Of Raparin University (2016); 3(8): 59-67

XXV. Kozhimannil KB, Hung P, Henning-Smith C, Casey MM, Prasad S. Association between loss of hospital-based obstetric services and birth outcomes in rural

counties in the United States. *Jama*. 2018; 319(12):1239-47.

XXVI. Dastoorpoor M, Idani E, Goudarzi G, Khanjani N. Acute effects of air pollution on spontaneous abortion, premature delivery, and stillbirth in Ahvaz, Iran: a time-series study. *Environmental science and pollution research*. 2018; 25(6):5447-58.

XXVII. 27-Akpan NG, Umoyen AJ, Luka TT, Esua IS, Okon AS, Antia UE. Bacterial etiologic agents, prevalence and associated risk factors of asymptomatic bacteriuria among pregnant and non-pregnant women in primary health care centers in South-South Nigeria. *International Journal of Medical and Health Research* 2019;596: 66-76.

XXVIII. 73- MacDorman MF, Reddy UM, Silver RM. Trends in stillbirth by gestational age in the United States, 2006-2012. *Obstet Gynecol*. 2015; 126:1146–50

XXIX. Chang YK, Tseng YT, Chen KT. The epidemiologic characteristics and associated risk factors of preterm birth from 2004 to 2013 in Taiwan. BMC pregnancy and childbirth. 2020;20:1-7.

XXX. Zhang YP, Liu XH, Gao SH, Wang JM, Gu YS, Zhang JY, Zhou X, Li QX. Risk factors for preterm birth in five maternal and child health hospitals in Beijing. *PLoS One*. 2012;7(12):e52780

XXXI. Mahapula FA, Kumpuni K, Mlay JP, Mrema TF. Risk factors associated with pre-term birth in Dar es Salaam, Tanzania: a case-control study. *Tanzania Journal of Health Research*. 2016; 18(1).

XXXII. Mengesha HG, Lerebo WT, Kidanemariam A, Gebrezgiabher G, Berhane Y. Pre-term and post-term births: predictors and implications on neonatal mortality in Northern Ethiopia. *BMC nursing*. 2016; (1):1-1.

XXXIII. 67- Farhan RK. Recurrent urinary tract infections in pregnancy and its relation to preterm labour in dour city. *Annals of Tropical Medicine and Health*. 2020; 23:231-3.

XXXIV. Izuchukwu KE, Oranu EO, Bassey G, Orazulike NC. Maternofetal outcome of asymptomatic bacteriuria among pregnant women in a Nigerian Teaching Hospital. *Pan African Medical Journal*. 2017;27(1): 54-9.

XXXV. Abdukkairun N ,Alemayehu E ,Etana and Hailemichael T: Prevalence of asymptomatic bacteriuria during pregnancy in Adama city, Ethiopia. *International Journal of Microbiology and Immunology Research*(2015) ; 3(5):058-063

XXXVI. Saraswathi KS, AljabriF: Incidence of urinary tract infections in pregnant women in a tertiary care hospital. *Pharm Lett* (2013); 5:265-

XXXVII. Kamel HA, Hegab MH, Al-Sehrawey AA, Hassan HM. Prevalence of asymptomatic bacteriuria in patients with preterm labor. *The Egyptian Journal of Hospital Medicine*. 2018;73(9):7444-7.

XXXVIII. Akinloye O, Ogbolu DO, Akinloye OM. Asymptomatic bacteriuria of pregnancy in Ibadan, Nigeria: a re-assessment. *Br J Biomed sel* 2006; 63(3): 109-12

XXXIX. 38-Musleh J, Al Qahtani N. Group B Streptococcus colonization among Saudi women during labor. *Saudi journal of medicine & medical sciences*. 2018 Jan;6(1):18.

XL. Woldu ZL, Teklehaimanot TG, Waji ST, Gebremariam MY. The prevalence of Group B Streptococus recto-vaginal colonization and antimicrobial susceptibility pattern in pregnant mothers at two hospitals of Addis Ababa, Ethiopia. *journal of reproductive health*. 2014; 11 (80): 1-4. - 27

XLI. Gebremeskel TK, Zeleke TA, Mihret A, Tikue MD.Prevalence and Antibiotic Susceptibility Pattern of Streptococcus agalactiae Among Pregnant Women at Adigrat Zonal Hospital and Adigrat Health Center, Tigray, Ethiopia. *Journal of Gynecology and Obstetrics*. 2015; 3 (2): 29

XLII. Shiferawu S, Mekonen M, Baza D, Lera T. Prevalence of Group b Streptococcus, Its Associated Factors and Antimicrobial Susceptibility Pattern Among Pregnant Women Attending Antenatal Care at Arbaminch Hospital, South Ethiopia. American Journal of Health Research. 2019;7(6):104-15

XLIII. Bianchi-Jassir F, Seale AC, Kohli-Lynch M, Lawn JE, Baker CJ, Bartlett L, Cutland C, Gravett MG, Heath PT, Ip M, Le Doare K. Preterm birth associated with group B Streptococcus maternal colonization worldwide: systematic review and meta-analyses. *Clinical Infectious Diseases*. 2017 Nov 6; 65(suppl_2):S133-42