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Original article

Prevalence of Group B Streptococcal Carriage in Women at Al-Bayda Medical Centre at 35–37 Weeks of Gestation

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ABSTRACT

Group B Streptococcus colonisation in the maternal upper vagina is associated with neonatal morbidity, with considerable prevalence. This study investigated the Carriage rate of group B streptococci among pregnant women attending Al-Beyda Medical Centre at 35-37 weeks and its association with neonatal colonisation and early-onset neonatal group B streptococcal sepsis. This case series included 100 mothers screened for group B streptococci; babies of positive mothers were then screened and followed for early events. Statistical analysis was done using SPSS 23.0. The rate of mothers positive for group B streptococci was 25%. Neonates who were group B Streptococci positive and born to positive mothers were 6%, but only one-third of them contracted early neonatal sepsis. Maternal colonisation was associated with lower age, a higher rate of previous history of neonatal intensive care admission, and a higher rate of gestational diabetes mellitus. Neonatal colonisation was associated with a history of previous preterm siblings, cervical cerclage in this pregnancy, and low birth weight. Early neonatal sepsis was associated with lower maternal age and neonatal GBS colonisation.

Introduction

Healthy people's guts and urinary systems may include a form of Gram-positive bacteria known as Group B Streptococcus (GBS), or Streptococcus agalactiae. GBS poses a serious risk to babies, especially during the time of birth, even if many adults continue to be asymptomatic. A newborn born to a woman who has GBS during pregnancy is more prone to experience GBS disease with early onset, se, which can lead to major health issues like meningitis, sepsis, and pneumonia [1]. These illnesses may cause long-term health problems or even death if they are not properly and quickly treated. GBS is typically transferred from moms to newborns during childbirth. Early-onset GBS disease, which usually manifests within the first week following birth, can be caused by this route of transmission; vaginal deliveries carry the highest risk. Many nations have put in place screening programs to check for GBS colonisation during the latter stages of pregnancy in women, typically between weeks 35 and 37, in an effort to reduce this risk [2]. Intrapartum antibiotic prophylaxis (IAP), usually in the form of penicillin, is characteristically administered to women who test positive to protect their unborn children from illness. Due to a variety of factors, including age, pregnancy history, sexual behaviour, economic level, and cleanliness practices, the frequency of GBS among mothers varies greatly depending on geographic locations and particular demographics. Colonisation rates might range from 10% to 30%, according to global research, highlighting the need for local epidemiological data to guide effective preventive measures [3].

For the purpose of creating successful public health campaigns and encouraging the proper use of antibiotic prophylaxis, accurate data regarding the prevalence of GBS in different regions is crucial. Even though GBS is a serious worldwide health concern, little is known about maternal colonisation, particularly in areas with low resources. Due to infrastructure, financial, or logistical issues, universal screening might not be possible in some places. Targeted screening or risk-based tactics may be used in certain circumstances. However, these strategies work best when complemented by trustworthy local data on the prevalence of GBS and related hazards [4]. Group B Streptococcus (GBS), commonly referred to as Streptococcus agalactiae, has been recognised as a significant cause of disease and mortality in neonates since the 1970s. Early-onset GBS infection still poses a substantial risk to infants and can cause serious neurological impairment, even though mortality rates have recently decreased [5]. GBS primarily causes severe invasive diseases such as early-onset sepsis and pneumonia in infants. These infections usually happen when GBS travels to the vagina from the rectum and perineum. Pregnancy-related GBS can be transient, persistent, or intermittent, and it typically doesn't cause any symptoms. Furthermore, GBS-related urinary tract infections—whether symptomatic or not—are thought to put babies at risk for infections. Maternal colonisation at birth is the main risk factor for early-onset GBS illness. Intrapartum antibiotic prophylaxis is crucial for preventing perinatal transmission [6]. Guidelines for reducing early-onset GBS disease in babies have been developed by the Centres for Disease Control (CDC), the American Academy of Pediatrics, and the American College of Obstetricians and Gynaecologists. Pregnant women at risk of GBS transmission can be identified through universal prenatal bacterial screening or a clinical risk-based approach.

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Since there is evidence that the screening-based strategy is more effective than the risk-based approach, recommendations have been made for it [7]. A screening-based strategy may lower the incidence of early-onset neonatal GBS disease by as much as 78%, according to research. The sampling locations, the time of collection, and the sensitivity of the microbiological methods all affect how successful this approach is. When cultures are obtained within five weeks of delivery and contain both vaginal and rectal samples, the accuracy of detecting GBS at delivery is increased. Conventional cultures can use selective broth media or direct plating onto solid media like blood agar plates [8]. The CDC suggests using selective enrichment broth cultures to increase the accuracy of prenatal screening in detecting intrapartum colonisation. Even though this approach is becoming more and more acceptable, it is still not the norm in every situation, particularly in Italy. More modern methods have been created to speed up or improve the sensitivity of GBS detection. These include a variety of nucleic acid amplification methods, RNA probe assays, selective or differential agar media, and direct latex agglutination tests on selective broth. Combination techniques (e.g., identifying GBS antigens along with PCR on LIM broth after 24 hours of enrichment) seem promising, even though only a few of these methods surpass the sensitivity of selective broth cultures [9]. However, nucleic acid amplification techniques are typically more costly and require specific knowledge and tools that aren't always available for routine testing.

As a result, the traditional culture-based method remains the gold standard for detecting the live bacteria responsible for maternal colonisation, serving as an efficient way to prevent infections in newborns [10]. The purpose of this study is to determine the prevalence of GBS colonisation in pregnant women between weeks 35 and 37. We seek to improve obstetric and neonatal care practices, advance global knowledge of GBS epidemiology, and assist programs that reduce the incidence of newborn GBS disease by identifying the prevalence of maternal carriage during this critical period. Additionally, analyzing colonization patterns at this time of gestation can help guide the use of IAP and other preventive interventions by offering crucial insights into possible effects for mothers and newborns.

Methods

Study Design and Settings

Case series study over one year at the obstetrics and gynaecology ward in Al-Beyda Medical Centre. After ethical review approval and obtaining consent from the patient during the period from 1/1/ 2024 to 31/12/2024 in a prospective way. Taking a swab for the Streptococcal culture for all pregnant Women who visit Al-Bayda Medical Centre at 35 to 37 gestations The requirements for inclusion: All expecting women attending Al-Bayda Medical Centre at 35-37 weeks.

Exclusion Criteria

Pregnant women less than 35 weeks, More Than 37 weeks gestation, patients who were on antibiotics, had ruptured Membranes, Multiple pregnancy or were already in Labor were excluded from the study.

Ethical Issues

Approval was obtained from the general manager of Al-Beyda Medical Centre to perform screening with use of swabs and interview the patients, as well as access files. In addition, the appropriate authority provided ethical approval for this work. In the Libyan Ministry of Health. Furthermore, before the interview, each respondent provided written informed consent.

Data Analysis

Version 23.0 of IBM's statistical package for social science (SPSS) software has been utilised to examine data using Chi-square (and the corresponding Fisher exact test). Mann-Whitney U test or Student t test were employed to compare numerical variables between groups.

Results

Analysis of Associations for Maternal GBS Findings

(Table 1) shows the analysis of associations for maternal GBS positivity. GBS-positive mothers had statistically significantly lower age, a higher rate of history of GDM and babies with NICU admission. AMA: advanced maternal age; GBS: group B streptococci. SD stands for standard deviation. Gestational diabetes mellitus is known as GDM. Pregnancy-induced hypertension, or PIH. PROM stands for premature rupture of the membranes. Intrauterine growth restriction is known as IUGR. Intrauterine fetal death is known as IUFD. Neonatal intensive care unit, or NICU. Urinary tract infection, or UTI. M: The Mann-Whitney U test. F: The Fisher exact test. * Statistically significant at a 95% confidence level. C: Chi-square test.

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Table 1. Comparison of case characteristics according to maternal GBS colonisation

Characteristic	Maternal GBS		Total
	Positive	Negative	
Age: Mean ± SD (Median) in years	25.16±4.53(25.00)	28.64±4.314(28.00)	0.002M*
AMA	4.0%	14.7%	0.285F
Education: Below secondary Secondary Beyond secondary	40.0% 32.0% 28.0%	48.0% 17.3% 34.7%	0.296C
Nulliparity	20.0%	20.0%	1.000C
History: Abortion	8.0%	4.0%	0.596F
History: Previous caesarean section	8.0%	9.3%	1.000F
History: GDM	4.0%	0.0%	0.250F
History: PIH	4.0%	9.3%	0.675F
History: Preterm	24.0%	17.3%	0.557F
History: PROM	8.0%	0.0%	0.061F
History: IUGR	0.0%	1.3%	1.000F
History: IUFD	4.0%	8.0%	0.677F
History: NICU	16.0%	0.0%	0.003F*
Current pregnancy: GDM	24.0%	4.0%	0.007F*
Current pregnancy: UTI	20.0%	22.7%	0.780C
Current pregnancy: Vaginal discharge	16.0%	16.0%	1.000F
Current pregnancy: Cerclage	16.0%	6.7%	0.222F

Table 2 shows the analysis of associations for neonatal GBS positivity. GBS-positive newborns had statistically significant associations with a history of previous preterm siblings, cervical cerclage in this pregnancy and low birth weight. AMA: advanced maternal age; GBS: group B streptococci. SD stands for standard deviation. Gestational diabetes mellitus is known as GDM. Pregnancy-induced hypertension, or PIH. PROM stands for premature rupture of the membranes. Intrauterine growth restriction is known as IUGR. Intrauterine fetal death is known as IUFD. Neonatal intensive care unit, or NICU. Urinary tract infection, or UTI. CS stands for cesarean section. Intrapartum antibacterial prophylaxis is known as IAP. M: Mann-Whitney U test. F: The Fisher exact test. * Statistically significant at a 95% confidence level (C: Chi-square test). NA stands for not applicable.

Table 2. Comparison of case characteristics according to neonatal GBS colonisation

Characteristic	Neonatal GBS		Total
	Positive	Negative	
Age: Mean ± SD (Median)in years	23.5±4.6 (22.5)	25.7±4.5 (25.0)	0.322M
AMA	0.0%	5.3%	1.000F
Education: Below secondary Secondary Beyond secondary	66.7% 33.3% 0.0%	31.6% 31.6% 36.8%	0.164C
Nulliparity	0.0%	26.3%	0.289F
History: Abortion	16.7%	5.3%	0.430F
History: Previous caesarean section	0.0%	10.5%	1.000F
History: GDM	0.0%	5.3%	1.000F
History: PIH	0.0%	5.3%	1.000F
History: Preterm	66.7%	10.5%	0.015F*
History: PROM	0.0%	10.5%	1.000F
History: IUGR	0.0%	0.0%	NA
History: IUFD	0.0%	5.3%	1.000F
History: NICU	16.7%	15.8%	1.000F
Current pregnancy: GDM	0.0%	31.6%	0.278F
Current pregnancy: UTI	33.3%	15.8%	0.562F
Current pregnancy: Vaginal discharge	16.7%	15.8%	1.000F
Current pregnancy: Cerclage	50.0%	5.3%	0.031F*
Mother febrile during labour	16.7%	5.3%	0.430F

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Mode of delivery (CS)	0.0%	31.6%	0.278F
Male baby gender	33.3%	57.9%	0.378F
Low birth weight	33.3%	0.0%	0.050F*
Birth weight (Kilogram)	2.9±0.5 (3.0)	3.4±0.5 (3.2)	0.067M
IAP adequate	66.7%	78.9%	0.606M
Maternal GBS	100.0%	100.0%	NA

Table 3 shows the analysis of associations for early onset neonatal sepsis (EONS). EONS occurrence had a statistically significant association with lower maternal age and neonatal GBS colonisation.

Characteristic	EONS		Total
	Positive	Negative	
Age: Mean ± SD (Median) in years	19.0±0.0 (19.0)	25.7±4.3 (25.0)	0.035M*
AMA	0.0%	4.3%	1.000F
Education: Below secondary Secondary Beyond secondary	50.0% 50.0% 0.0%	39.1% 30.4% 30.4%	0.643C
Nulliparity	0.0%	21.7%	1.000F
History: Abortion	0.0%	8.7%	1.000F
History: Previous caesarean section	0.0%	8.7%	1.000F
History: GDM	0.0%	4.3%	1.000F
History: PIH	0.0%	4.3%	1.000F
History: Preterm	50.0%	21.7%	0.430F
History: PROM	0.0%	8.7%	1.000F
History: IUGR	0.0%	0.0%	NA
History: IUFD	0.0%	4.3%	1.000F
History: NICU	50.0%	13.0%	0.300F
Current pregnancy: GDM	0.0%	26.1%	1.000F
Current pregnancy: UTI	50.0%	17.4%	0.367F
Current pregnancy: Vaginal discharge	0.0%	17.4%	1.000F
Current pregnancy: Cerclage	50.0%	13.0%	0.300F
Mother febrile during labour	50.0%	4.3%	0.157F
Mode of delivery (CS)	0.0%	26.1%	1.000F
Male baby gender	100.0%	47.8%	0.480F
Low birth weight	50.0%	4.3%	0.157F
Birth weight	2.6±0.6 (2.6)	3.3±0.5 (3.2)	0.061M
IAP adequate	50.0%	78.3%	0.430F
Maternal GBS	100.0%	100.0%	NA
Neonatal GBS	100.0%	17.4%	0.050F*

Discussion

Group B Streptococcus (GBS) or Streptococcus agalactiae is a Gram-positive bacterium that can be present in the gut and urinary systems of healthy individuals. Many adults remain asymptomatic, but GBS can be a significant threat to newborns, particularly around the time of birth. If a mother carries GBS during her pregnancy, her infant faces an increased risk of developing early-onset GBS disease, potentially resulting in serious health complications such as sepsis, pneumonia, and meningitis [1]. Global research indicates that colonisation rates can range from 10% to 30%[3].The current study is a case descriptive study that included 100 mothers screened for GBS, and the babies of GBS mothers were screened for GBS and followed for early events.The rate of GBS among mothers was 25%, which was consistent with global figures according to Brokaw A et al. (2021) [3] and consistent with Alshengeti et al. (2022)[11], who found GBS colonisation prevalence among pregnant women ranged from 2.1% to 32.8%. However, the current study gives a figure higher than 14.6%, as reported by Assefa, S et al. (2018) [12].

Mothers in the study population have an age range of 19 - 39 years (mean 27.8±4.6, median 28.0 years). The rate of mothers within the advanced maternal age group was 12.0%. Regarding educational level, 33.0% of mothers had education beyond

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secondary level and 46.0% were below secondary level. In the present study, 20.0% of the study population were primigravida. Only 5.0% had a history of previous abortion. Regarding past obstetric history, 9.0% had delivery by caesarean route; only 1.0% reported gestational diabetes, 8.0% reported pregnancy-induced hypertension, 19.0% reported previous preterm delivery, 2.0% reported preterm rupture of membranes, only 1.0% reported intrauterine growth restriction, 7.0% reported intrauterine fetal death, and 4.0% reported neonatal intensive care unit admission.

Regarding the current pregnancy, gestational diabetes was documented among 9.0%, while urinary tract infection was found among 22.0% of the study population. Noticeably, vaginal discharge was reported by 16.0% of the study population. Cerclage was done for 9.0% of the study population. The rate of mothers with GBS-positive results was 25% of the total study population. Neonates who were GBS-positive and born to GBS-positive mothers were 24%, but only one-third of them (8% of the total study population) contracted EONS. Regarding intrapartum and fetal characteristics of mothers with group B streptococcus-positive swabs, febrile illness was documented among 8.0%; The rate of caesarean delivery was 24.0% among the study population; More than half of newborns were males (52.0%); Newborns of Low birth weight were only 2% of the study population, and Most of the mothers (76%) received sufficient IAP. Preterm delivery was 64.0% among the study population. The analysis of associations for maternal GBS positivity shows that GBS-positive mothers had statistically significantly lower age, a higher rate of history of GDM, and babies with NICU admission.

Maternal GBS positivity was associated with a lower maternal Mean ± SD25.16±4.53 in comparison to GBS-negative mothers (28.64±4.31), a higher rate of previous history of neonatal intensive care admission (16.0% versus 0.0%) and a higher rate of gestational diabetes mellitus, it was documented in 9.0% of the total study population and was significantly more frequent among GBS-positive mothers than GBS-negative mothers (24.0% versus 4.0% $P = 0.007$); $P < 0.05$). In concordance with Chen, X. et al. (2023), who concluded that pregnant women with diabetes are at high risk of GBS infection. However, in the present study, IAP was not found to be effective in the prevention of adverse pregnancy and neonatal outcomes [13]. The analysis of associations for neonatal GBS positivity. GBS-positive newborns had statistically significant associations with a history of previous preterm siblings, cervical cerclage in this pregnancy and low birth weight. Neonatal GBS positivity was associated with a higher rate of history of delivery of a preterm infant than negative GBS (66.7% versus 10.5%), with a higher rate of cervical cerclage (50.0% versus 5.3%) and a higher rate of low birth weight (33.3% versus 0.0%); $P < 0.05$. The analysis of associations for early-onset neonatal sepsis (EONS).

EONS occurrence had a statistically significant association with lower maternal age and neonatal GBS colonisation. All infants with EONS were GBS positive, while only 17.4%of those without EONS were GBS positive; in addition, mothers of infants with EONS had a lower age (mean 19.0±0.0 years) than those without EONS (mean 25.7±4.3 years). The association between lower maternal age and GBS colonisation and EONS can be explained by less experience and adherence of mothers to hygienic practices during pregnancy. The study confirms the role of GBS colonisation in developing EONS. History of gestational diabetes and neonatal intensive care admissions may be associated with higher odds of maternal GBS colonisation. The history of preterm deliveries and current cerclage may increase the risk of neonatal GBS colonisation within neonates born to GBS-positive mothers. Low birth weight is also associated with GBS colonisation among infants born to GBS-positive mothers. The limitations of the study include a limited number of cases due to limited resources, lack of sufficient follow-up, and lack of screening for infants of GBS-negative mothers. Therefore, direct comparison of neonatal GBS colonization rates between infants of GBS-positive and GBS-negative mothers was not possible.

Conclusion and Future Recommendation

The study confirms the role of group B streptococci colonisation in developing early neonatal sepsis. History of gestational diabetes and neonatal intensive care admissions may be associated with higher odds of maternal group B streptococci colonisation. The history of preterm deliveries and current cerclage may increase the possibility of group B streptococci colonisation in newborns born to group B streptococci-positive mothers. Screening of mothers for group B streptococci and infants of positive mothers should be considered to develop a preventive policy and select cases. Further multicenter study with optimal resources should be considered.

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