Original Article

The prevalence of Group B Streptococcus colonization in pregnant women in Jahrom, 2014

Kabiri Sepideh[1], Kargar-Jahromi Zahra[2*], Solhjoo Kavous[3], Sadeqi-Jahromi Sodabeh[4]

Received: 4/22/2015 Revised:5/14/2016 Accepted:6/4/2016

1. Student Research Committee, Jahrom University of Medical Sciences,Jahrom, Iran
2. Research Laboratory, Jahrom University of Medical Sciences, Jahrom, Iran
3. Dept of Microbiology, Faculty of Medicine, Jahrom University of Medical Sciences, Jahrom, Iran
4. Dept of Gynecology, Faculty of Medicine, Jahrom University of Medical Sciences, Jahrom, Iran

Pars Journal of Medical Sciences, Vol. 14, No.1, Spring 2016

Pars J Med Sci 2016;14(1):15-21

Abstract

Introduction:
Group B Streptococcous (GBS) is a causing agent for neonatal infections such as meningitis and septicemia, and plays a significant role in maternal infections including pyelonephritis, chorioamnionitis and postpartum infections. The aim of this study was to determine the prevalence of GBS colonization in pregnant women in Jahrom in 2014.

Materials & Methods:
A total of 403 pregnant women in their 35–37th gestational week, presenting to Honari Clinic in Jahrom participated in this study. Rectal and vaginal samples were taken, placed in transport media, and transported to the laboratory and tested for GBS. The results were analyzed in SPSS software.

Results:
In this study, the prevalence of positive vaginal, rectal and rectovaginal GBS cultures in pregnant women were 16.4%, 5.2%, and 1.7%, respectively. There was a significant correlation between the positive cultures and maternal age, history of genital diseases, and gestational hypertension, but not between positive cultures and abortion status, diabetes mellitus, preterm delivery, urinary infection, place of residence, nationality, education level, neonatal diseases after birth and cesarean section.

Conclusion:
Given the high prevalence of GBS colonization (19.9%) in pregnant women in Jahrom, it is suggested that obstetricians and gynecologists take appropriate measures to prevent this infection in pregnant women and infants.

Keywords: Colonization, Group B Streptococcus, Pregnant Women

Introduction

Streptococcus is an encapsulated aerobic gram-positive coccoid bacterium. Its important pathogenic species in humans include Group A (streptococcus pyogenes), Group B (GBS or streptococcus agalactiae), Group C (enterococci), streptococcus pneumoniae and streptococcus viridans (1). Group B streptococcus (GBS) is an important pathogen in newborns and pregnant women, introduced as the most prevalent cause of neonatal infections in 1970 (2-3).

* Corresponding author, Address: Research Laboratory, Jahrom University of Medical Sciences, Jahrom, Iran

Tel: +989378708747 Email: sima.kargar@yahoo.com

Female reproductive tract colonization occurs in 10-30% of pregnant women and is usually asymptomatic, but it can lead to urinary tract infection, chorioamnionitis, septicemia, endometritis and infectious abortion (4-9). The colonization of the lower genital tract in women over 20-year-old or women with multiple pregnancies is lower, but it is more in black women and diabetic patients (10). Pregnant women may carry GBS in their rectum and vagina and 50-70% of women transmit the bacteria to the infants (11). Infection in infants is significantly associated with maternal vaginal colonization and GBS infection during pregnancy (12). Infants' infection with GBS that occurs in 15-50% of infants born to infected mothers can lead to colonization of the skin or mucous membranes (13). In 1-3% of cases, the disease develops in infected infants (14). GBS infection in infants appears in two forms: Early Onset Disease (EOD) that occurs in infants younger than seven days old and Late Onset Disease (LOD) that occurs in infants of one-week-old to three-month-old and rarely in older infants (15-17). Clinical manifestations of EOD and LOD are different. Aggressive clinical signs such as pneumonia, bacteremia and meningitis appear in the infants. EODs occur in the first 24 hours after birth (18). Colonization during pregnancy is associated with early neonatal infection and transmission of bacteria to the infant that occurs during delivery or by ascending into the amniotic fluid (17). Premature birth can be associated with some sociodemographic and pathologic factors such as low socioeconomic levels and genitourinary infection (19-20). More than half of the reported cases of perinatal GBS diseases are LODs (21). LOD pathogenesis is poorly understood, but in most cases, the mother is the source of infection and the passing of fetus through the birth canal is known as the primary cause of the disease in neonates (18). Late acute infections include deafness, blindness, mental retardation and delayed growth in children (22). Premature birth rates in developed countries increased from 9.7% in 1990 to 10.8% in 2004 (23-24). The premature birth rate in Iran is about 13.9% (44) and GBS colonization rate in women is estimated 15-18% (25-27). Yet there are other different statistics on the prevalence of GBS colonization in and out of Iran. For example, a study by Fatemi at Hedayat Hospital in Tehran and a study by Rabie in Hamedan reported the prevalence 20.6% (28) and 26.7% (29), respectively. Centers for Disease Control and Prevention released guidelines for the prevention of this disease in women during prenatal period in 1996 that recommended prophylactic antibiotics during labor in women with risk factors such as fever, premature rupture of membrane, preterm delivery earlier than 37th gestational week and screening for GBS colonization (30). The CDC guidelines were revised in 2002 to make bacteriological screening mandatory for all pregnant women of 35-37 gestational week (31). Thus, the detection of GBS colonization in pregnant women is essential to prevent newborn infection. GBS incidence is significantly different in different geographical locations and among different ethnic groups. Thus, it has been suggested that its relationship with preterm birth be evaluated separately in each country (32). Given the prevalence of the bacteria in different regions of the world, and infection caused by GBS in pregnant women and their infants, and the resulting mortality, it is necessary to determine its prevalence in different regions. The present study aimed to determine the prevalence of GBS colonization in pregnant women of 35-37 gestational week presenting to Honari Clinic in Jahrom in 2014.

Methods and Materials

This cross-sectional study recruited 403 pregnant women selected by convenient sampling from March 2014 to March 2015 and considering the incidence rate of 30%.

Inclusion criteria were gestational age of 35-37 weeks presenting to Honari Clinic in Jahrom. Patients who were being treated with antibiotics were excluded. The pregnant women lived in Jahrom and 11 surrounding villages (Hyderabad, Qir, Qotbabadi, Mobarakabad, Manian, Hakan, Yousefabad, Hanna, Baroos, Doozeh and Simakan). Pregnant women had Iranian and Afghan nationalities. Vaginal and rectal samples were taken by sterile swabs after obtaining informed consent and completing a questionnaire including variables of gestational hypertension, history of diseases after birth, history of preterm labor, history of abortion, history of urinary infection, history of genital disorders, history of antibiotic use, cesarean section, gestational age, occupation, education, place of residence and nationality.

In order to detect infection and to culture, sampling swabs in transport media (Stuart Medium) were transferred to the selective media of Todd-Hewitt broth containing 10mg/ml of gentamicin and 15 mg/ml of nalidixic acid, and incubated for 24 hours at 37°C (33). Then **an amount** of these media was inoculated by sterile loops into blood agar media (Merck) supplemented with 5% defibrinated sheep blood and was incubated at 37 °C. After 24 hours, gram-positive, catalase-negative, and beta-hemolysis cocci were selected from blood agar cultures and specific tests of resistance to bacitracin discs, no hemolysis in bile esculin medium (Merck), sodium hippurate hydrolysis and finally Camp test were used to detect GBS (34). The SPSS software and chi-square and Fisher's exact test were used for statistical analysis.

Results

The present study was conducted on 403 women with a mean age of 27.26±4.85 years (range: 16-40). In general, 80 subjects (19.9%) women tested positive for GBS, of whom 66 (16.4%) had positive vaginal samples, 21 (5.2%) had positive rectal samples and 7 (1.7%) had positive rectovaginal samples. Among all subjects, 17 (4.2%) had gestational hypertension, 33 (8.2%) had diabetes, 79 (19.6%) had cesarean section history, 20 (5%) had preterm labor, 86 (21.33%) had abortion history, 115 (28.53%) had urinary infection history, 82 (20.3%) had genital diseases history, 251 (62.4%) were living in Jahrom and 151 (37.6%) were living in villages surrounding Jahrom, 400 (99.3%) were Iranian, 3 (0.7%) were Afgan, 26 (6.5%) were employed, and 377 (93.5%) were housewives. In terms of education, 316 (78.4%) had under high school diploma, 81 (20.1%) had a B.A. and 6 (1.5%) had higher degrees. Mothers were divided into three age groups: 24 (6%) were under 20 years old, 260 (64.5%) were 20-30 years old, and 119 (29.5%) were 30-40 years old. The relationship of GBS infection in the three groups of vaginal, rectal, and rectovaginal culture was studied with the variables (Table 1). The study found a statistically significant relationship between GBS colonization in pregnant women with gestational hypertension in rectal and rectovaginal culture; with genital diseases history in vaginal culture; and mother's age in vaginal cultures ($p<0.05$). There was no statistically significant relationship between GBS colonization and the variables of diabetes, premature labor, abortion, urinary infection, place of residence, nationality, job, education, disease after birth, and cesarean section history ($p>0.05$).

Table 1: Prevalence of group B streptococcus colonization in vaginal, rectal, and rectovaginal of 403 pregnant women according to different variables

Variable		Vaginal culture			Rectal culture			Rectovaginal culture		
		Positive	Negative	P	Positive	Negative	P	Positive	Negative	P
Gestational hypertension		5(29.4%)	12(70.6%)	0.138	5(29.4%)	12(70.6%)	0.001	2(11.8%)	15(88.2%)	0.001
Diabetes		7(21.2%)	26(78.8%)	0.433	3(9.1%)	30(90.9%)	0.295	0(0%)	33(100%)	0.425
Preterm labor		3(15%)	17(85%)	0.864	0(0%)	20(100%)	0.282	0(0%)	20(100%)	0.542
Abortion		15(17.4%)	71(82.6%)	0.764	5(5.8%)	81(94.2%)	0.777	1(1.2%)	85(98.8%)	0.646
Urinary infection history		20(17.4%)	95(82.6%)	0.728	8(7%)	107(93%)	0.319	4(3.5%)	111(96.5%)	0.091
Genital diseases history		7(8.5%)	75(91.5%)	0.032	6(7.3%)	76(92.7%)	0.336	2(2.4%)	80(97.6%)	0.586
Place of residence	Jahrom	40(15.9%)	211(84.1%)	0.737	12(4.8%)	239(95.2%)	0.607	3(1.2%)	248(98.8%)	0.433
	Suburban Jahrom	26(17.2%)	125(82.8%)		9(6%)	142(94%)		4(2.6%)	147(97.4%)	
Nationality	Iranian	66(16.5%)	334(83.5%)	0.442	21(5.3%)	379(94.8%)	0.684	7(1.8%)	393(98.3%)	0.817
	Afghan	0(0%)	3(100%)		0(0%)	3(100%)		0(0%)	3(100%)	
Occupation	Housewife	64(17%)	313(83 %)	0.216	21(5.6%)	356(94.4%)	0.216	7(1.9%)	370(98.1%)	0.483
	Employed	2(7.7%)	24(92.3%)		0(0%)	26(100%)		0(0%)	26(100%)	
Education	Under high school diploma	57(18%)	259(82%)	0.178	20(6.3%)	296(93.7%)	0.155	7(2.2%)	309(97.8%)	0.375
	B.A.	9(11.1%)	72(88.9%)		1(1.2%)	80(98.8%)		0(0%)	81(100%)	
	Higher than B.A.	0(0%)	6(100%)		0(0%)	6(100%)		0(0%)	6(100%)	
Mother's age	<20-yeat-old	1(4.2%)	23(95.8%)	0.019	0(0%)	24(100%)	0.486	0(0%)	24(100%)	0.477
	30-20	37(14.2%)	223(85.8%)		14(5.4%)	246(94.6%)		6(2.3%)	254(97.7%)	
	40-30	28(23.5%)	91(76.5%)		7(5.9%)	112(94.1%)		1(8%)	118(99.2%)	
Disease after birth		1(12.5%)	7(87.5%)	0.76	0(0%)	8(100%)	0.503	0(0%)	8(100%)	0.704

Discussion

The results showed that the prevalence of GBS colonization was 19.9% in pregnant women presenting to Honari Clinic in Jahrom. In the present study, GBS colonization was much lower in employed women than that of housewives and reached zero. Higher educational levels decreased infection in pregnant women to zero. The lowest prevalence belonged to the under 20-year-old age group in all three vaginal, rectal and rectovaginal groups, while the highest prevalence was in women of 20-30-year-old. The prevalence of infection was reduced in the 30-40-year-old age group. The prevalence of infection was higher in pregnant women living in the suburbs of Jahrom compared to those living in Jahrom in the three groups. Infection was detected in Iranian pregnant women, but none was detected in non-Iranian women. However, the number of non-Iranian pregnant women who entered the study was very low (3 people). Less prevalence of GBS colonization in younger mothers could be due to the lower frequency of sexual intercourse and enough time for colonization of natural vaginal flora (35). Epidemiological studies showed that GBS colonization in Iranian women varied from 9.1% to 26.7% (29 and 36-38). Aali et al. reported the prevalence 9.2% (36) which was lower than the results of the present study. The results of the present study are consistent with the results of a study by Absalan et al. which reported a prevalence of 19.6% (39). The prevalence of this bacteria significantly varies throughout the world. For example, the prevalence was reported 2.3% in India (40), 16.7% in a 3-year study in France (41), 17.2% in Poland (42), and 12.9% in Thailand (43). In a study by Nahaei et al. on 250 pregnant women in Tehran in 2011, history of

abortion in pregnant women did not have a significant relationship with the prevalence of GBS colonization, which is consistent with the present study (44). No significant relationship was reported between nationality and the level of education in another study by Bozorgan et al. on 246 pregnant women of 35-37 gestational weeks presenting to Mahdieh Hospital in Tehran, which is consistent with the present study. In that study, unlike the present study, age had also no significant relationship with GBS colonization (45). In a study by Yassini et al. on 382 pregnant women in Shahid Beheshti Hospital of Kashan in 2011-2012, there was no significant relationship between GBS colonization and a history of genital diseases, abortion, nationality and education level ($p<0.05$), which is consistent with the present study except for genital diseases that was significant in the present study (46). In a study by Nazer et al. on 100 pregnant women in their third trimester in Khoramabad, the frequency of positive vaginal culture was 14%, which is in line with the present study (16.4%). Similar to the present study, they reported no significant relationship between positive culture and gestational age, history of abortion, diabetes and gestational hypertension in the vaginal culture, while there was a significant relationship between the level of colonization and parity, which was not measured in the present study. Unlike the present study, they found no significant relationship between positive culture and mothers' age (47). In a study by Nakhaei Moghadam from 2005 to 2007 in Mashhad on 201 pregnant women, 7 of whom had diabetes, GBS colonization was reported in 25 patients (12.4%), while the colonization of 2 patients with diabetes was positive (28.57%). In the present study that examined twice that population, 33 patients (8.2%) had diabetes and 7 patients (21.2%) and 3 patients (9.1%) were infected with GBS in the vaginal and rectal culture, respectively. In another study by Sarafrazi et al. on 400 pregnant women of 35 gestational week of and higher in Kashan, GBS was isolated from vaginal culture of 23 cases (5.8%), which is less than in the present study (16.4%). Similar to the present study, factors such as diabetes, abortion, nationality, occupation, premature rupture of membranes, the level of education and place of residence had no effects on the vaginal colonization with GBS (49). The studies of Zarean et al. in 2010-2011 (50) and Nomura et al. (51) reported more GBS colonization in women with lower educational levels, like the present study. In a study in the Netherlands in 2010, GBS prevalence was 21%, which is in line with the present study. Unlike the present study, there was no relationship with age, but a significant relationship with preterm labor was reported similar to the present study (52). In a study conducted by EL-Kersh et al. in 2002 in Saudi Arabia on 217 pregnant women, the prevalence of GBS in the vaginal and rectal samples was 22 (33%) and 11 (17%), respectively, which are higher than those in the present study, i.e. 66 vaginal (16.4%) and 21 rectal (5.2%) samples (53). Different results could be due to sexual activities, age, inherent differences in research and higher use of antibiotics in some communities and the culture method (54). Guidelines for GBS infection prevention released by the Centers for Disease Control and Prevention in 2002 led to 65% reduction in EOD infection of the infants in the United States (55). Therefore, through such studies and the use of timely preventive measures, especially between 35 and 37 gestational weeks, the disease and its acute complications can be prevented.

Conclusion

The results showed a relatively high prevalence (19.9%) of GBS colonization in pregnant women of Jahrom. Due to the potential mother-infant transmission, as well as the risks for the mother, it is necessary that the gynecologists take

proper measures to prevent invasive infections in mothers and infants by timely detection of GBS infection during pregnancy and before delivery.

Acknowledgments

This paper is extracted from a Ph.D. thesis at Jahrom University of Medical Sciences. The research deputy of Jahrom University of Medical Sciences is sincerely appreciated for funding this study.

Conflict of Interest

The authors declare no conflicts of interest.

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