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Prevalence of Group B Streptococcus Colonization among Pregnant Women in Gaza strip, Palestine

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Abstract

Streptococcus agalactiae (group B Streptococcus; GBS) is a significant cause of perinatal and neonatal infections worldwide. The aim of this study was to evaluate the prevalence of GBS colonization among pregnant women in Gaza strip.

A total of 200 rectovaginal swabs collected from pregnant women from Al Shifa hospital were screened for GBS colonization. Standard microbiological methods according to the Centers for Disease Control and Prevention (CDC) recommendations were used to isolate and identify GBS. Selective and chromogenic culture in addition to PCR were employed for the detection of GBS. Antimicrobial susceptibility testing (AST) was performed according to CLSI guidelines.

Out of 200 pregnant women, 42 (21%) were colonized by GBS. The sensitivity, specificity, positive predictive value and negative predictive value of PCR were 54%, 88%, 76%, and 72%, respectively. Of the GBS isolates examined 76%, 57%, 50%, 48% and 31% were susceptible to vancomycin, penicillin, erythromycin, tetracycline and clindamycin, respectively. There was no statistically significant association between GBS colonization and chronic diseases, complications (previous abortion, delivery at <37 weeks gestation, premature birth, intrauterine death and endometrtitis), and previous antibiotic intake ($p>0.05$).

In conclusion, this study showed high prevalence of GBS colonization among pregnant women in Gaza strip. Despite the fact that PCR is well known for its high sensitivity, low sensitivity was obtained in this study which may be due to the collection methods. Vancomycin was the most effective antibiotic against GBS isolates.

We recommend a screening-based strategy to detect GBS in Palestinian pregnant women.

Keywords:
Streptococcus agalactiae,
Polymerase chain reaction,
Culture,
Pregnancy,
Gaza Strip.

1. Introduction:

Streptococcus agalactiae, or Lancefield group B Streptococcus (GBS), is one of the most important causal agent of serious infections and neonatal sepsis (Schuchat, 1998; Schrag et al., 2002a; Freitas et al., 2006). Maternal streptococcal colonization is associated with increased risk of urinary tract infection and adverse pregnancy outcome,

such as endometritis (Winn, 2007), chorioamnionitis (Yancey et al., 1994; Winn, 2007), premature delivery and intrauterine death (Tyrrell et al., 2000).

The incidence of invasive neonatal GBS infection is reported to range from 0.5 to 3.0 per 1000 live births, with 4%-10% mortality associated with early-onset infections (Schrag et al., 2000; Centers for Disease Control and Prevention, 2010). Rectovaginal colonization occurs in 10 to 30% of pregnant women (Dillon et al., 1982; Boyer et al., 1983). GBS colonization rate may vary with characteristics such as age, parity, socio-economic status, geographic location (Regan et al., 1991), presence of sexually transmitted diseases (Persson et al., 1981) and sexual behavior (Foxman et al., 2007).

Guidelines from the Centers for Disease Control and Prevention (CDC) recommend that all women should be screened at 35-37 weeks of gestation and that those women found to be colonized with GBS should receive intrapartum intravenous antibiotic prophylaxis either with penicillin G or ampicillin (CDC, 2010). This was shown to be effective in reducing the incidence of early-onset neonatal GBS infections (Boyer and Gotoff, 1986).

The standard method for diagnosis of GBS colonization comprises culture of combined vaginal and rectal samples in a selective enrichment medium, such as Lim broth, i.e. Todd-Hewitt broth with colistin and nalidixic acid, followed by subculture on sheep blood agar. However, this method requires at least 48 h for fully GBS identification (Schuchat, 1998; Schrag et al., 2002a).

CDC identified various research priorities, including 'the development of media with a reliable color indicator to signal the presence of GBS to improve accuracy of prenatal culture results and facilitate prenatal culture processing at clinical laboratories with limited technical capacity (Schrag et al., 2002b). It includes a novel chromogenic agar, i.e. chromID Strepto B (formerly Strepto B ID) agar or ChromAgar, which highlights GBS as red colonies after aerobic incubation (Tazi et al., 2008).

Molecular techniques, such as PCR (polymerase chain reaction) tests, have become the focus of investigation of detection of GBS colonization in pregnant women (Wang and Richardson, 1990; Gavino and Wang, 2007) because of the relative simplicity and speed.

There are no previous studies addressing the prevalence of GBS among pregnant women in Gaza. In this study, we also investigated the antimicrobial susceptibility of the GBS isolates.

2. Materials & Methods:

Study design:

A descriptive cross sectional prospective study was conducted to determine the prevalence of GBS colonization and susceptibility pattern among pregnant women attending antenatal clinic of Al Shifa hospital, Gaza, Palestine. Four hundreds recto-vaginal swab samples were collected from 200 pregnant women at 35-37 weeks of gestation from Al Shifa hospital (Two samples from each pregnant women, one for culture and the other for PCR). This screening approach was based on universal screening of all pregnant women for GBS colonization at 35 to 37 weeks of gestation (CDC, 2010).

All participants provided informed consents. Pregnant women on any antibiotic treatment and those who were not within the range of 35 through 37 weeks of gestation, were excluded. The age of the study participants ranged from 15 to 45 years with a mean of 25.1 (±4.7). The study was conducted from May to August 2016 in Gaza strip, Palestine

The necessary approval to conduct the study was obtained from Helsinki committee in Gaza strip. All participating women were asked to sign a consent form after explaining the research nature and objectives. A questionnaire was used to collect data with the aim of determining possible risk factor associated with women who had GBS infections/colonization. A structured questionnaire was used and included questions about age, education level, medical history of patients, the number of births and the number of previous miscarriages, materials used for cleaning, and other question regarding possible risk factors of GBS colonization. The questionnaire was conducted through face-to-face interview.

Collection and culture of specimens:

Two recto-vaginal swabs were collected from each participating pregnant women in their third trimester (35-37 weeks of gestation). One of the swab contain Amies transport medium for culturing procedure and the second one contain 1 ml of phosphate buffer saline for PCR analysis. The swabs were labeled properly and transported to the microbiology laboratory within two hours of collection.

Recto-vaginal sampling was carried out by rotating a swab against the vaginal wall at the mid-portion of the vault. Subsequently, the swab was carefully withdrawn to prevent contamination with microflora from the vulva and introitus and the swab was inserted 1.5 to 2

cm beyond the anal sphincter and gently rotated to touch the anal crypts (El Aila et al., 2010).

Direct plating was carried out by inoculating the swab that was inoculated in Amies transport medium onto chromID Stepto B agar. The ChromAgar plates were incubated at 37°C for 18-24 h in aerobic conditions. The chromogenic selective medium is supplemented with three chromogenic substrates to optimize the identification of GBS, which appears red colonies that are round and pearly after 18-24 hour incubation Figure 1.

Figure 1 *Appearance after 24 h incubation of (A): Streptococcus agalactiae (Group B Streptococcus (GBS) and (B) Enterococcus faecalis on Strepto B ID® chromogenic agar*

Identification of the isolates as *Streptococcus agalactiae*:

The isolates were identified as *S. agalactiae* by the following criteria: colony morphology, cultural characteristics, formation of red colonies on ChromAgar plates, positive for the CAMP test on blood agar, and molecular identification by PCR after extraction of DNA from GBS colonies.

DNA extraction of bacterial isolates:

DNA was extracted from cultured isolates by alkaline lysis as previously described (El Aila et al, 2009). Briefly, one bacterial colony was suspended in 20 µl of lysis buffer (0.25% sodium dodecyl sulfate, 0.05 N NaOH) and heated at 95 °C for 15 min. The cell lysate was diluted by 180 µl of distilled water. The cell debris was pelted by centrifugation at 16000 xg for 5 min. and the supernatants were used for PCR or frozen at -20 °C until further use.

DNA extraction of clinical isolates:

DNA extraction from the samples was performed using the Genomic DNA Kit according to the manufacturer's instructions. Briefly, 200 µl of transport medium from each the rectovaginal swab is placed into microcentrifuge tube. 180 µL lysis buffer and 25 µL Protenase K solution were added and incubated at 56°C for 1-3 hr. Sample tube was vortex and 200 µL lysis Buffer G3 were added and incubated at 70°C for 10 min. To adjust DNA binding condition, 210 µL of ethanol were added. 500 µL wash buffer GW1 and 600 µL wash buffer GW2 were used for washing. To elute DNA 100 µL preheated Elution buffer G are added directly onto silica membrane (Bioline, UK).

Detection of GBS by PCR:

GBS nucleic acid detection is based on targeting the *cfb* gene, which encodes the CAMP, factor (Ke et al., 2000). The PCR reaction mixture contained primers specific for group B streptococci. The forward and reverse sequences of the primers Are Sag 059 (5´-TCACCAGCTGTATTAGAAGTA-3´) (369–391) and Sag 190, (5´-GTTCCCTGAACATTATCTTTGAT-3´) (500–522). The GBS-specific primers amplify a fragment of 153 bp (Ke et al., 2000).

The reactions were performed in 25µl final volumes in the presence of 1µM of each primer, 2µl DNA and 1X of the GoTaq Green MMX (Promega, USA). The thermal cycling program for detection of *cfb* gene was as follows: denaturation at 94°C for 3 minutes, followed by 40 cycles of 1 second at 95°C and 30 seconds at 55°C for the hybridization step, with a final period of extension at 72°C for two minutes. The amplified products were resolved on a 2% agarose gel. The fragments were stained with ethidium bromide and visualized and photographed using gel documentation system. A 100bp ladder was run as a molecular weight marker. Positive and negative controls were added in each run.

Antibiotic susceptibility testing:

GBS isolates were subcultured onto sheep Blood Agar plates and incubated aerobically for 24 hours at 37 °C. Antimicrobial susceptibility testing (AST) was performed according to CLSI guidelines (CLSI, 2010).

Sensi-Discs (Liofilchem, Roseto-Italy) of vancomycin (30µg), penicillin G (10IU), clindamycin (2µg), erythromycin (15µg), and tetracycline (30µg) were placed 12 mm apart to detect antimicrobial susceptibilities of 42 GBS isolates.

Data analysis

The results were tabulated and analyzed using version 20 of the Statistical Package for the Social Sciences (SPSS). Frequencies, cross tabulation, and appropriate

statistical tests as Chi-square test and fisher exact test were performed. A P-value of less than 0.05 was considered significant.

3. Results:

Prevalence of GBS using conventional methods:

A total of 200 pregnant women (from 35-37 weeks of gestation) from antenatal clinic of Al shifa hospital-Gaza, Palestine participated in this study from May to August, 2016. The overall prevalence of GBS colonization as determined by chromogenic culture was 21%. The prevalence of GBS colonization among participants with age less than 25 years was (19%), while participants that age more than 25 years was (21%). The frequency of GBS colonization among different age groups was not statistically significant by culture (p> 0.05) (Table 1).

Table 1 *Prevalence of GBS colonization in 200 pregnant women at 35 - 37 weeks*

Age group	Culture results				p-value
	Positive	%	Negative	%	
≤ 25 years	25	19.2	105	81.3	
> 25 years	17	24.2	53	74.6	0.40
Total	42	21	158	7.9	

Identification of Group B Streptococci using PCR:

Alkaline DNA extraction was done for all 42 GBS isolates that were detected by conventional methods (Chromagar). The DNA extracts were subjected to PCR. Positive and negative control were included in each run. All DNA extracts of 42 GBS isolates were positive by PCR. This confirm our results by conventional method.

Detection of Group B Streptococci using PCR directly from clinical samples:

Among 200 women included, 42 (21%) were identified as GBS positive based upon the culture results of rectovaginal swabs. Only 100 rectovaginal samples were subjected to PCR analysis. They included the 42 samples, that were positive by conventional methods, and another 58 samples were selected randomly.

Out of the 42 samples, which were positive by conventional methods, only 23 were positive by PCR (54%), but 19 (45%) were positive by culture and negative by PCR (Figure 2). Of the 58 randomly selected samples, seven (12%) were positive using PCR and negative by phenotype (culture methods).

Not all culture-positive samples were also positive with the PCR technique therefore resulting in 54% PCR sensitivity. Out of 58 culture negative samples for GBS, 7 were positive with PCR and 51 were negative with both methods, which indicate a specificity of 88%. The positive and negative predictive value were (76%,72%) respectively (Figure 2 & Table 2).

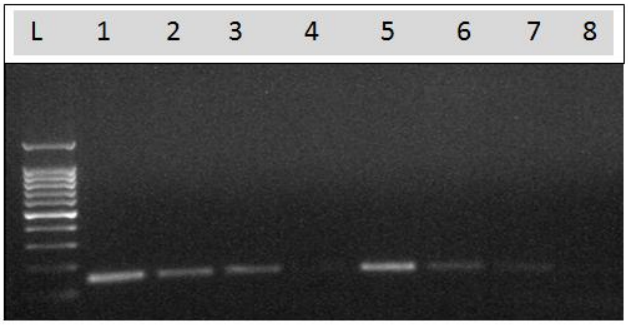

Figure 2 *A representative result of GBS PCR directly from clinical sample*

Lane L: 100 bp DNA ladder; lane 1: positive control; lanes 2, 3, 5,6 and 7 are tested isolates with positively amplified *GBS* genes; lane 4 is negative control and lane 8 is a blank.

Table 2 *Comparison between culture and PCR results*

PCR	Culture		Total
	Positive	Negative	
Positive	23	7	30
Negative	19	51	70
Total	42	58	100

Antimicrobial Susceptibilities of GBS:

Of the 42 examined GBS isolates, 32 (76%) were susceptible to vancomycin, 24 isolates (57%) were susceptible to penicillin, and 21 (50%) to erythromycin. The overall susceptibility of GBS isolates to tetracycline were 20 (48%), and to clindamycin, 13 (31%) (Table 3). Resistance to clindamycin, tetracycline, erythromycin, penicillin, and vancomycin was found to be 69%, 45%, 43%, 38%, 21% respectively. Of the erythromycin-resistant isolates, 18/47 (38%) showed cross-resistance to clindamycin. However, tetracycline resistant isolates showed 14/48 (29%) cross-resistance to clindamycin.

Table 3 *Antibiotic susceptibilities of 42 GBS isolates from pregnant women*

	No. (%) of isolates		
Agent	**Susceptible**	**Intermediate**	**Resistant**
Clindamycin	13 (31%)	0 (0%)	29 (69%)
Erythromycin	21 (50%)	3 (7%)	18 (43%)
Penicillin	24 (57%)	2 (5%)	16 (38%)
Tetracycline	20 (48%)	3 (7%)	19 (45%)
Vancomycin	32 (76%)	1 (2%)	9 (21%)

Risk factors:

Different variables associated with GBS colonization are outlined in Table 4. There was no statistically significant difference among groups based on education level (university education, level 21% by PCR and 30% by culture; secondary school level, 20% by PCR and 23% by culture and the Preparatory education level, 22% by PCR and 25% by culture).

Of women with GBS colonization, those with genital tract inflammation were 29% (p=0.59) by PCR, and 25% (p=0.65) for the culture assay. However, GBS colonization and inflammation was not statistically significant. Among GBS isolated, 33% were isolated from pregnant women had chronic disease by culture assay (0% for the PCR assay) (Table 4).

No statistically significant difference was observed in GBS colonization rate and chronic disease (p>0.05). Of the pregnant women who had previous antibiotic intake, 10 (24%) were positive for GBS by culture and 5 (17%) by PCR (p >0.05). In addition, no statistically significant correlation was observed in GBS colonization rate and previous antibiotic intake.

Out of GBS positive (by culture and PCR), 24% were from pregnant women who had complication (Previous abortion – delivery at <37weeks gestation- premature birth- intrauterine death– endometritis). No statistically significant difference was observed in GBS colonization rate and chronic disease (p >0.05).

Overall, no statistically significant association was observed for GBS colonization in the study subjects with any of the risk factors.

Table 4 *Variables associated/not associated with GBS colonization in pregnant women (35-37) weeks of gestation*

		Culture results				p-value	PCR results				p-value
		Positive	**%**	**Negative**	**%**		**Positive**	**%**	**Negative**	**%**	
Education level	University	7	21	27	79	0.979	6	30	14	70	0.834
	Secondary	25	20	97	80		13	23	44	77	
	Preparatory	8	22	28	78		6	25	17	75	
Second Wife	Yes	0	0	8	100	0.299	0	0	5	100	0.297
	No	40	22	145	78		28	30	67	70	
Chronic disease	Yes	2	33	4	67	0.557	0	0	6	100	0.267
	No	38	20	150	80		28	30	66	70	
Inflammation	Yes	21	25	62	75	0.645	12	29	29	71	0.589
	No	19	17	91	83		16	27	43	73	
Antiseptic material	Water and soap	40	21	152	79	0.777	28	15	164	85	0.419
	No	2	25	6	75		2	25	6	75	
Using of antibiotic	Yes	10	24	32	76	0.832	5	17	24	83	0.620
	No	30	20	120	80		23	32	48	68	
Complications	Yes	11	24	34	76	0.798	7	24	22	76	0.888
	No	28	19	116	81		21	30	50	70	

4. Discussion:

To prevent group B streptococcal disease in neonates, it is recommended to screen pregnant women by culturing recto-vaginal swabs at 35 to 37 weeks gestation and to treat those with positive cultures or to treat women with risk factors for disease transmission empirically (Daniels et al., 2009). A more rapid and sensitive method would be beneficial, and cost-effective approach especially in dealing with patients who present at term with unknown GBS colonization status and preterm labor conditions (Block et al., 2008; CDC, 2010).

Prevalence of Group B Streptococci using conventional methods:

Since vaginal and in particular rectal flora contains numerous microorganisms, the use of selective culture medium is recommended to maximize the isolation of

GBS and to avoid the overgrowth of other organisms. In this study, a selective chromogenic medium was used, which enables the recognition of *S. agalactiae* as pink to red, round and pearly colonies, without the need of anaerobic incubation. This medium has excellent performance for the GBS prenatal screening in terms of nutrient capacity and sensitivity of detection. It is capable of detecting all GBS strains, including non ß-hemolytic strains. Most other bacterial species are either inhibited or the colonies produced have a different color (e.g. violet, blue, colorless) (Tazi et al., 2008; Tazi et al., 2009; El Aila et al., 2010).

In our study, the prevalence rate of GBS among pregnant women was 21%. Our results were consistent with findings in the developing and developed countries as in Blantyre, Malawi, (16.5%) (Dzowela et al., 2005), in Egypt, (17.89%) (Elbaradie et al., 2009), in Kuwait (16.4%) (Al-Sweih et al., 2004), in Zimbabwe, (21%) (Mavenyengwa et al., 2010), in Dare salaam, Tanzania, (23%) (Joachim et al., 2009), in Belgium (22%) (El Aila et al., 2010), in Netherlands (21%) (Valkenburg-van den Berg et al., 2006), in Germany (23%) (Von Both et al., 2008), and in Sweden (25.4%) (Håkansson et al., 2008). However, the finding of this study is higher when compared to colonization rate from other countries like Mozambique which reported colonization rate of 1.8% (De Steenwinkel et al., 2008), 4.8% in Iran (Shirazi et al., 2014), 7.5% in the Philippines (Whitney et al., 2004) and 8% in France (van der Mee-Marquet et al., 2006). Lower GBS colonization rate have been found in some Mediterranean countries, e.g. 6.6% in Greece (Tsolia et al., 2003), 9.2% in Turkey (Eren et al., 2005) and 12.3% in Israel (Marchaim et al., 2003). But findings from different studies conducted in Trinidad found a higher colonization rate of pregnant women with GBS, 32.9% (Orrett, 2003).

The different prevalence rates may be explained by gestational age at culturing, differences in culture sites and culture techniques, a change of prevalence with time, or real differences of prevalence in different populations or ethnic groups (Valkenburg-van den Berg et al., 2006). Personal hygiene, the extensive use of antiseptics/antibiotics, standard of living, and other socioeconomic factors may contribute to the variation in colonization rates.

Numerous studies have documented that the accuracy of prenatal screening cultures in identifying intrapartum colonization status can be enhanced by careful attention to the timing of cultures, the anatomic sites swabbed and the laboratory procedures used for culture and detection of the organisms (Schrag et al., 2002a). Swabbing both the vagina and the rectum substantially increases the yield compared with sampling only the cervix or sampling the vagina without swabbing the rectum. There are several studies that find rectovaginal sampling is more appropriate than vaginal sampling only in detecting GBS (CDC, 2002; Diaz & Nieves, 2008; El Aila et al., 2010).

Detection of GBS carriage rate by PCR:

Out of 100 rectovaginal samples were subjected to PCR, 30 were positive for GBS. 23 of them were culture positive and PCR positive whereas the remaining seven samples were PCR positive and culture negative. Nineteen of the culture-positive recto-vaginal samples were PCR negative when DNA extracted directly from the rectovaginal swab. Inappropriate sample collection may explain the false negative PCR results. Also, it can be explained by the fact that we used two different swabs collected from each pregnant women (one for PCR and one for culture). The collection of these swabs although at the same time may not represent identical microbial content and may indicate poor specimen collection. Other studies performed culture and PCR from the same swab collected (Rallu et al., 2006; El Aila et al., 2011).

In contrast to our results, several studies have reported an increased GBS detection rates by PCR diagnostic tests over standard culture method (Espy et al.,2000; Sloan et al., 2002; Shabayek et al., 2010; Bakhtiari et al., 2012). El Aila et al. (2011) reported that QPCR directly on the sample significantly has increased the number of women found to be GBS-positive (27%) compared to culture (22%).

Considering culture as a gold standard, sensitivity, specificity, positive predictive value and negative predictive value of PCR was 54%, 87.9%, 76%, 72%, respectively.

Low sensitivity of PCR was reported in our study which is consistent with PCR results obtained by Chan et al, who reported that PCR sensitivity was lower than that of standard conventional culture. The sensitivity and specificity of the PCR assay were 45% and 99%, respectively (Chan et al., 2006). He claimed that the problem with their test was at the sample preparation stage and the swabs they used for collection contain charcoal in the transport medium, which has been shown to reduce the sensitivity of PCR (Cloud et al.,

2002; Chan et al., 2006). Other studies reported the rate of sensitivity and specificity of PCR was (100%, 86.88%) respectively (de-paris et al., 2011). Davies et al. (2004) reported the sensitivity, specificity, positive predictive value and negative predictive value of PCR was 94%, 96%, 84%, 99% respectively. Bergeron et al. (2000), in their study, had a sensitivity of 97%, specificity of 100% and positive and negative predictive values of 100% and 99%, respectively.

Out of 58 samples were negative for GBS detection by culture, seven (12%) were positive by PCR. False negative culture results may be explained by the presence of antagonistic microorganisms, such as enterococci, which may inhibit the growth of GBS on the selective media (Dunne and Holland-Staley, 1998). In addition, antibiotics and feminine hygiene products have been shown to inhibit the growth of GBS and scanty colonization, which would be difficult to obtain in culture (Rallu et al., 2006; Werneke et al., 2009). Furthermore, inappropriate storage and transport conditions of the samples could give false-negative culture results (Rosa-Fraile et al., 2001).

Antimicrobial Susceptibilities of GBS:

The prophylaxis currently recommended for prevention of neonatal disease is the intrapartum use of antibiotics only in women known to be colonized by GBS. The susceptibility testing revealed that 76% of GBS isolates were susceptible to vancomycin, 57% of the isolates were susceptible to penicillin. Such findings coincides with that obtained by Moyo et al. (2001); Hsueh et al. (2001); Banno et al. (2014); Gaudreau et al. (2010); Kimura et al. (2008) and Longtin et al. (2011), who reported reduced susceptibilities to penicillin. Our results were different with Brandon and Dowzicky (2013) who found that GBS isolates were 100% susceptible to both penicillin and vancomycin. Due to the widespread use of the antibiotic and the misuse of antibiotics, antibiotic-resistant organisms are in the rise. As indicated in the present study, 43% of GBS isolates were resistant to erythromycin which was higher than obtained by Joachim et al. (2009), and Azavedo et al. (2001), (29%) reported by Manning et al. (2004) and (11.8%) in Lebanon (Hannoun et al., 2009).

Azavedo et al., (2001) and Hannoun et al., (2009) have reported resistance rate >80% for tetracycline which was higher than the findings reported in the present study (45%). However the prevalence of clindamycin resistant isolates (69%) in our study, was higher than the findings reported by Andrews et al. (2000).

Verani et al. (2010) recommended the use of vancomycin for GBS-colonized mothers with a high risk of anaphylaxis to penicillin and if the isolate is resistant to clindamycin. In this study, we found that 21% of the isolates were resistance to vancomycin. This finding is comparable to those reported in other studies (Fashina, 2008; Onipede et al., 2012). CDC recommended vancomycin as alternative for pregnant women who are allergic to penicillin and clindamycin resistant isolates (CDC, 2010).

Penicillin is the first-choice of drug, while ampicillin is an alternative and, in cases of history of allergy (rash or a history of difficulty in breathing) to penicillin and at high risk for anaphylaxis, clindamycin and erythromycin were recommended (Verani et al., 2010). In GBS-colonized mothers with allergy and low risk of anaphylaxis to penicillin, the use of cefazolin is recommended. In those with a high risk of anaphylaxis to penicillin and if the isolate is resistant to clindamycin, vancomycin is recommended (Verani et al., 2010; Frohlicher et al., 2014).

Antibiotic resistance amongst GBS is considered an increasing problem so that it was recommended to test the susceptibility of other antibiotics than those recommended as part to established control measures and that could be used as alternative choices for prophylaxis or treatment of GBS infection (Quiroga et al., 2008; Verani et al., 2010).

Risk factors for GBS carriage pregnant women:

Knowledge about risk factors contributing to GBS colonization in pregnant women is relevant to minimize the morbidity, mortality associated with maternal and neonatal GBS infections. In the present study, no statistically significant association was observed for GBS colonization in the study subjects with any of socio-demographic characteristics as outlined in (Table 4). Similar findings have been reported in studies conducted by Zusman et al. (2006) and Costa et al. (2008).

In the present study, history of spontaneous abortion did not influence GBS colonization in pregnant women. Similar findings have been reported in studies conducted by Joachim et al. (2009). In contrast with our results, McDonald & Chambers (2000) demonstrated an association between the presence of GBS and spontaneous abortions.

Garland et al. (2000) did not detect an association between GBS colonization and preterm labor and premature rupture of the membranes. These results are

similar to those observed in our study. Although some investigators such as Feikin et al. (2001), who found that women with preterm delivery have a significantly higher frequency of GBS colonization.

5. Conclusion:

Our results showed high prevalence of GBS colonization among pregnant women in Gaza Strip, Palestine. This study was the first to be done in Gaza, so to obtain more information, we recommend screening for GBS in all pregnant women attending antenatal care at 35-37 weeks of gestation and a close observation for all their newborns. This could aid clinicians to rapidly determine pregnant women colonized with GBS so as to take necessary steps of treatment.

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دراسة مدى انتشار بكتيريا الستربتو كوككس اجلاكتيا بين الحوامل في قطاع غزة

كلمات مفتاحية:
ستربتو كوككس اجلاكتيا،
تفاعل البلمرة المتسلسل،
الحمل،
المزرعة،
قطاع غزة.

تعتبر بكتيريا ستربتو كوككس اجلاكتيا سببا مهما للالتهابات التي تحدث للأطفال حديثي الولادة في جميع أنحاء العالم. وقد كان الهدف من هذه الدراسة تقييم مدى انتشار هذا النوع من البكتيريا بين النساء الحوامل في قطاع غزة.

تم جمع 200 مسحة شرجية مهبلية من النساء الحوامل بمستشفى الشفاء. وقد تم عزل وتشخيص هذا الميكروب بالطرق الميكروبيولوجية القياسية وفقا لتوصيات مركز السيطرة على الأمراض والوقاية (CDC). حيث تم استخدام أوساط بيئية انتقائية مثل كروموجينيك أجار للتعرف على الميكروب. كذلك تم التشخيص باستخدام تفاعل البلمرة المتسلسل وتم ايضا إجراء اختبار الحساسية للعديد من المضادات الحيوية.

أظهرت النتائج بأن نسبة انتشار البكتيريا بين الحوامل باستخدام طريقة الزراعة على الكروم أجار21%، وقد كانت الحساسية والنوعية والقيمة التنبؤية الإيجابية والقيمة التنبؤية السلبية لفحص تفاعل البلمرة المتسلسل هي 54%، 88%، 76%، 72% على التوالي. وقد كانت نسبة استجابة هذا الميكروب للمضادات الحيوية التالية: الفانكومايسين، البنسلين، الاريثروميسين، التتراسيكلين والكليندااميسين على الشكل التالي 76٪، 57٪، 50٪، 48٪ و31٪. كما أنه لم يكن هناك ارتباط ذو دلالة إحصائية بين وجود ميكروب ستربتو كوككس اجلاكتيا وعوامل الخطورة مثل الأمراض المزمنة، والمضاعفات (ولادة مبكرة- جنين غير كامل النضوج- موت الجنين داخل الرحم)، وتناول المضادات الحيوية سابقا (P>0.05).

دللت النتائج السابقة على ارتفاع نسبة ميكروب ستربتو كوككس اجلاكتيا بين النساء الحوامل في قطاع غزة.

وأنه على الرغم من أن فحص تفاعل البلمرة المتسلسل معروف بحساسيته العالية، فإنه قد تم الحصول على نسبة منخفضة في هذه الدراسة. وقد أظهر المضاد الحيوي الفانكومايسين أعلى معدل فاعلية مقارنة بالمضادات الحيوية الأخرى. ونوصي من خلال هذه الدراسة بعمل فحوصات بشكل روتيني للكشف عن ميكروب ستربتو كوككس اجلاكتيا للنساء الحوامل في العيادات والمستشفيات الفلسطينية.