

SCREENING OF GROUP B STREPTOCOCCUS AGALACTIAE AMONG PREGNANT WOMEN IN DUHOK CITY/ KURDISTAN REGION/ IRAQ

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ABSTRACT

Background: Pregnant women colonized with Streptococcus agalactiae-Group B Streptococci (GBS) can transmit the bacteria to their new-borns at the time of birth. Intrapartum antibiotic prophylaxis (IAP) can prevent this transmission. The aim of this study is to find out the carriage rate of group B streptococci isolated from pregnant women in Duhok city, Iraq. Other aim is to study the Antibiotic susceptibility patterns of the isolates and to detect the risk factors associated with the growth of these bacteria.

Methods: Exactly 821 pregnant women living in Duhok city were randomly screened for GBS colonization, over a period of 7 months from 1st of January, 2022 till 1st of August, 2022. High vaginal swabs (HVS) sample were collected, processed and identification was performed by Vitek system 2. The isolated strains of GBS were selected for in vitro susceptibility testing. As well as also risk factors associated with infection were assessed.

Results: GBS was detected in 37/821 accounted (4.51%) pregnant women. Risk factors such as vaginal discharge, UTI, Diabetes, abortions and still birth did not show major differences between positive and negative cases of GBS. Pencillin G, Co-Amoxiclav, Nitrofurantoin, Vancomycin and Ampicillin have shown the highest sensitivity percentages (93.9%, 93.8%, 88.9%, 87.5% and 84% respectively). The sensitivity rate for other B-Lactams: Cephalothin, Ceftriaxone and Cefixim were: 70.6%, 63% and 78% respectively. The sensitivity for Gentamicin was 38.9% and 48.4% for Ciprofloxacin. However, the lowest sensitivity rates were detected for Clindamycin, Amikacin and Erythromycin: 26.1%, 30% and 30.5% respectively.

Conclusions: Carriage rates of GBS among pregnant women in this setting are still low-grade. Penicillin and Ampicillin are the drugs of choice (intra-partum prophylaxis) against GBS in pregnancy. Co-amoxiclave and Vancomycin also had a high level of sensitivity.

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Keywords: Antibiotic and Vitek-2, High Vaginal Swabs (HVS), Kirby-Bauer disk diffusion, Risk factors, *Streptococcus agalactiae*-Group B Streptococci (GBS).

Colonization of Group B Streptococcus in the vagina and the peri-anal regions/rectum is a risk factor for subsequent infection in pregnant women and newborns¹. GBS cultures should be obtained with each pregnancy because colonization may be temporary and it may

induce premature delivery².

Adoption of screening for maternal genital tract colonization and intrapartum antibiotic prophylaxis has significantly reduced early-onset neonatal GBS infections³. Intrapartum antibiotic prophylaxis is recommended for pregnant

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women between 34 and 40 weeks of pregnancy⁴.

Pregnancy has been associated with a high incidence of invasive GBS disease⁵. GBS infections include chorioamnionitis⁶, post-caesarean wound infection, postpartum endometritis, pneumonia and puerperal sepsis⁷. And it had been related with prematurity and foetal death⁸.

Early onset neonatal infection is acquired vertically (vertical transmission), through exposure of the foetus or the baby to Group B streptococci from the vagina of a colonized woman, either intra-utero or during birth after the rupture of the membranes^{9,10} and¹¹. The risk factors for early onset GBS disease include: young maternal age, preterm delivery (less than 36 weeks), and prolonged rupture of membranes¹².

Late Onset infant infection (7 days to 3 months) can cause meningitis or bacteraemia. This can be acquired from the mother or from environmental sources¹³. Other infections include septic arthritis, osteomyelitis, conjunctivitis and sinusitis¹⁴. Starting antibiotic prophylaxis before delivery more than 4 hrs is considered to be effective in prevention of GBS transmission to the foetus. This is considered to be an-adequate prophylaxis antibiotic and effective in prevention of GBS transmission to the foetus¹⁵. Intravenous penicillin G in a dose of 5 million units is given as a loading dose followed by 2.5 to 3 million units every 4 hrs during labour till delivery¹⁶. Ampicillin is a reasonable alternative to penicillin G¹⁶. If the patient is allergic or GBS is resistant to both penicillin G and ampicillin, clindamycin antibiotics regarded as an alternative drug in a dose of

900 mg intravenously every 8h¹⁶. Erythromycin is also an alternative for patients who are allergic to B Lactam drugs.

Antibiotic resistance among GBS is considered an increasing problem worldwide so that the aim of this research is to test the susceptibility of the antibiotics as part of control measures to decrease early onset neonatal infections in Duhok City.

MATERIAL AND METHODS

Type of study: is cross sectional study.

Exclusion criteria: Pregnant women of less than 34 weeks of gestation and those who are having recent antibiotics.

Research Ethical Committee approval from Kurdistan Board of Medical Specialties has been obtained and patient formal consent has been applied.

Study population and sampling

High Vaginal Swabs (HVS) were obtained randomly from a total of 821 pregnant women between 34 and 40 gestational week who were attending the consultation clinics at Azadi Teaching Hospital, Duhok Hospital for Obstetrics and Gynaecology and Zakho Maternity Teaching Hospital in Duhok city at the time period of the study.

Sample processing and Identification:

The swabs were placed in transport media and transported immediately to the laboratory not exceeding one hour. The research work was performed in microbiology laboratory in Hievee Teaching Hospital in Duhok. Each swab was cultured on blood agar. The plates were incubated for 24 -48 hours at 37Co in a candle jar. Streptococcus agalactiae was identified by its morphology: B-

haemolytic colonies on blood agar. All suspected colonies were sub-cultured and isolated for biochemical tests. Catalase test was done first which is negative for streptococci then bacitracin disc for susceptibility was applied on blood agar and incubated for 24-48h. Streptococcus agalactiae were resistant to bacitracin discs¹⁷.

Clinical aspects and risk factors were investigated that included presence of vaginal discharge, stillbirths, abortions, vaginal discharge, history of previous neonatal GBS infection and the presence of underlying medical conditions mainly diabetes and urinary tract infections. Further confirmation of the type of the bacteria and the antibiotic sensitivity of the isolates were confirmed by automated machine (Vitek-2).

Antibiotic sensitivity test:

Antimicrobial susceptibility tests for the GBS isolates were tested first manually by Kirby-Bauer disk diffusion method¹⁸ and second by Vitek-2. Table 1 Demonstrate the various antibiotic discs used for the study with their potency.

Table 1: Antibiotic Discs with their Potency

Antibiotics	Disc potency (µg)
Penicillin-	1 µg
Co-Amoxiclav	30 µg
Ampicillin	10 µg
Erythromycin	15 µg
Clindamycin	2 µg
Vancomycin	30 µg
Ciprofloxacin	5 µg
Levofloxacin	5 µg
Cephalothin	30 µg
Ceftriaxone	30 µg
Cefotaxime	30 µg
Cefixim	5 µg
Meropenim	10 µg
Pipracillin	10 µg
Nitrofurantoin	300 µg
Gentamycin	10 µg
Amikacin	30 µg
Cotrimoxazol	25 µg

RESULTS

The mean age of the participants (90%) were between 25 and 40 years old, with the youngest being 16 years and the oldest 40 years old.

There were no differences between positive and negative samples regarding the associated factors (vaginal discharge, UTI, Diabetes, abortions and still birth).

About 37 out of 821 (4.51%) pregnant women showed bacterial growth (B haemolysis on blood agar) and tested negative for both catalase and bacitracin tests which are the characteristics for Group B streptococci. They were further confirmed by Vitek-2 machine.

The susceptibility results for GBS strains were interpreted according to the Clinical and Laboratory Standard Institute (CLSI) guidelines¹⁹. Results for sensitivity and resistance are summarized in Table 2. Results of the antibiotic sensitivity were identical via both methods (manually by disc diffusion method and by automated machine (Vitek 2)). Results for sensitivity and resistance are summarised in table 2.

Table 2: Antibiotic susceptibility pattern (percentages of sensitivity and resistance) used for GBS isolates (No=37) carried out by both disc diffusion and Vitek2.

Antibiotic	Percentage of Sensitivity %	Percentage of Resistance %
Penicillin	93.9	6.1
Co-Amoxiclav	93.8	6.2
Ampicillin	84	16
Erythromycin	30.5	69.5
Clindamycin	26.1	73.9
Vancomycin	87.5	12.5
Ciprofloxacin	48.4	51.6
Levofloxacin	68.4	31.6
Cephalothin	70.6	29.4
Ceftriaxone	63	37
Cefotaxime	78	22
Cefixim	56.3	43.7

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Antibiotic	Percentage of Sensitivity %	Percentage of Resistance %
Meropenim	77.8	22.2
Pipracillin	50	50
Nitrofurantoin	88.9	11.1
Gentamycin	38.9	61.1
Amikacin	30	70
Cotrimoxazol	46.2	53.8

DISCUSSION

There are still few recent data from Duhok city regarding GBS colonization in pregnancy and their new-borns. In this study, the colonization rate for GBS among pregnant women was 4.51%. This finding is relatively lower than some other studies such as in Ethiopia 7.2%²⁰, in Turkey 8%²¹ and china 7.1%²², 10 to 30% in United States, 6.5% up to 36% in Europe, 7.1 to 16% in Asia, 9.1 to 25.3% in the Middle East, and 11.9 to 31.6% in Africa. There are reports of higher rates of GBS colonization compared with this study as it was 28.4% in Brazil²³. These disparities could be explained by the fact that rates of maternal GBS colonization during pregnancy varies in worldwide, possibly due to differences in the studied population (in terms of age, race, geographical area and sexual behaviour), methods of sample collection, type of sites cultured, type of medium used and diagnostic methods.

Although the risk factors for GBS colonisation were found to have a significant relationship with the history of abnormal vaginal discharge but in this study there were no major differences between carriers of GBS regarding the associated factors (vaginal discharge, UTI, Diabetes, abortions, still birth) and the

gestational age between 34-38 weeks and 38-40 weeks were similar. Only one carrier for GBS coexisted with candida spp. It is difficult to determine if the difference of the associated risk factors between studies are due to genetic factors or uneven carriage rate geographically.

Majority of isolates tested were susceptible to penicillin 94%, ampicillin 84% and co-Amoxiclav 93.8%. Accordingly, these antibiotics will remain the drug of choice for intrapartum prophylaxis. These results correlates well with the CDC clinical guidelines for the use of penicillin and ampicillinase the drug of choice in management and also had a great effect in prevention of GBS infection in both the mother and foetus²⁴.

The sensitivity pattern for erythromycin, Clindamycin and Amikacin were 30.5%, 26.1% and 30% respectively which is regarded as the lowest sensitivity rate. The high resistant pattern for both erythromycin and clindamycin (as 69.5% and 73.9% respectively) agrees with a study done in Iraq which had highest sensitivity to penicillin and ampicillin but highest incidence of resistance to erythromycin and clindamycin 58.6% and 45.6% respectively²⁵. This agrees with a recent study done in china with a resistant rate of 84.5% and 87% for erythromycin and clidamycin²⁶.

There is high percentage of sensitivity for Vancomycin and this will be useful for patients who allergic to penicillin and resistant to Clindamycin. Resistance to erythromycin can induce resistance to Clindamycin.

The incidence of resistance for Gentamicin (61.1%) indicates that the isolates will not

be affected synergistically by the combination of penicillin and Gentamicin. Nitrofurantoin also showed high percentage of sensitivity (88.9%), but is usually avoided in pregnancy as it might cause haemolytic anaemia in the foetus²⁷. Ciprofloxacin had 48.4% of sensitivity which is less active than the newer Quinolone: Levofloxacin which had 68.4% of sensitivity.

This study concluded both Penicillin and Ampicillin are still the drugs of choice (intra-partum prophylaxis) against GBS in pregnancy in city of Duhok. The recommendation is regular surveillance of antibiotic sensitivity will determine best prophylaxis and therapy of GBS infection resistance.

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پوخته

باگراوند وئارمانج: نهگهرين سهرهکينه يين نين فهکسيونا زاروکين تازه هاتين دونيا يي دگهل زيدهبوونا ريژا مرنا وان ههرديسان نهو بهرپرسي ژ نين فهکسيونا (عدوي) لدهف ژنکين دووگيان وچي دبيت و دشيان دانه في فهگوهاستني فهدهغه بکهن بريکا چارهسهريا خو دويرنيخستن ب نهنتي بيوتیکا.

ئارمانج ژفي ليکوليني نهوه زانينا ريژا فهگههاستنا سترپ توکوکس ژ کوما (B) يا پتنن لدهف ئافرهتین دووگيان ل بازيري دهوکی، وژبو ليکولينا شيوزي ههستياریا فه فهتاندیان ژنهنتي بيوتیکان و ديارکرن وزانينا کارتیکهريه مهترسيدار يين گريدياين ب زيدهبوون ودهرکهفتنا فان بهکتریا.

ريکين کاری: تيستا (821) ئافرهتین دووگيان هاته نهجمان نهوين ل دهوکی دزين. (B) بريکهکا بي پايه (عشواني) بو کولونيزکونا (استعمار) سترپ توکوکسيان (المکورات العقديه) ژ کوما (B) بو ماوي حهفت ههيفان (زينباير 2022 تا تهباخا 2022) وچورين فهقهتاندی يين سترپ توکوکس هاتنه ههلبزاتن ژبو تافيکونا ههستياري (نهليرجي تي) ل تافيگههي.

نهنجام: هاتينه ديارکرن ژ کوما (B) کو (37) ژن بوون ههبوونا 37% ژ سترپ توکوکس لدهف ئافرهتین دووگيان وکارتیکهريه مهترسيدار ديار نهکرن (دهرهينانا فهجينا يي، کولبوونا يان نين فهکسيونا ريکين ميزي، ژبهرچوون ودايکبوونا مري، نهخوشيا شهکري) جياوازين مهزن نه هاتنه ديارکرن ل حالهتین پوزيتيف ونهگهتيف لدهف في کومي.

و هاته ديارکرن کو بنسيلين G، اموکسيکلاف، نايترفويورانين، فانکومايسين و نهمپيسيلين بلندترين ريژا ههستياری يا سهدي دياردکته 93,9%، 93,8%، 88,9%، 87,5%، 84% نيك ل ديف نيكي. ريژا ههستياری بو B-lactam يين دي ب في شيوهي نه: سيفالوپين، سفترایکزون، سفکسيم 70.6%، 63%، 78% نيك ل ديف نيكي. ههروهسا هاته ديارکرن کوکيمترين ريژا ههستياری بو کلنداميسين، امیکاسين، ارپرو ميسين 26.1%، 30%، 30.5%، نيك ل ديف نيكي. ورژا ههستياری بو جينتاميسين 38.9% و 48.4% بو سيپروفلوکساسين.

دهر نهنجام: بنسيلين ونه مپيسيلين باشترين چارهسهری نه دماوي دووگيان يي دا GBS (پاراستن دماوي دووگيان يي دا) دزي ههروهسا ناستي بلند يي ههستياری ژ فانکومايسين ونموکسي کلاف هاته ديارکرن.

الخلاصة

فحص المكورات العقدية من المجموعة ب بين النساء الحوامل في مدينة دهوك / إقليم كردستان / العراق

الخلفية والأهداف: تعتبر المكورات العقدية مجموعة (ب) هي السبب الرئيسي لعدوى الأطفال حديثي الولادة مع ارتفاع معدل الوفيات, كما أنها مسؤولة عن العدوى عند النساء الحوامل, كما و يمكن منع هذا الانتقال من خلال العلاج الوقائي بالمضادات الحيوية أثناء الولادة (IAP).

الهدف من هذه الدراسة هو معرفة معدل نقل المكورات العقدية من المجموعة (B) المعزولة من النساء الحوامل في مدينة دهوك و لدراسة أنماط حساسية المعزولات للمضادات الحيوية والكشف عن عوامل الخطورة المرتبطة بنمو هذه البكتيريا.

طرق العمل: تم فحص ٨٢١ امرأة حامل تعيش في مدينة دهوك بشكل عشوائي لاستعمار المكورات العقدية من المجموعة B, على مدار سبعة أشهر (من الاول من شهر يناير 2022 حتى الواحد والثلاثون من شهر أغسطس 2022), تم اختيار السلالات المعزولة المكورات العقدية من المجموعة B لاختبار الحساسية في المختبر.

النتائج: تم الكشف عن المكورات العقدية من المجموعة B في 37 (4.51%) من النساء الحوامل. لم تظهر عوامل الخطورة (الإفرازات المهبلية، التهاب المسالك البولية، السكري، الإجهاض والولادة الميتة) فروقاً كبيرة بين الحالات الإيجابية والسلبية لهذه المجموعة.

أظهر Ampicillin و Vancomycin و Nitrofurantoin و Co-Amoxiclav و Pencillin G أعلى نسب حساسية (93.9%, 93.8%, 88.9%, 87.5% و 84% على التوالي). إن معدل الحساسية لمركبات B-Lactam الأخرى: Cephalothin و Ceftriaxone و Cefixim كانت: 70.6%, 63%, 78% على التوالي. ومع ذلك، تم الكشف عن أقل معدل حساسية للكليندامايسين، الأميكاسين والإريثروميسين: 26.1%, 30% و 30.5% على التوالي. كانت حساسية الجنتاميسين 38.9% و 48.4% للسيبروفلوكساسين.

الاستنتاجات: أن البنسلين والأمبيسلين كانوا الادوية الأكثر استجابة (الوقاية أثناء الولادة) ضد GBS أثناء الحمل. وكان لدى Vancomycin و Co-Amoxiclav أيضاً مستوى عالٍ من الحساسية.