# Study the effect of Chlorhexidine using in prevention of neonatal morbidity associated with Group B-Streptococcal vaginal colonization

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## Abstract:

**Objective:** The aim of this study is to determine the effects of chlorhexidine to minimize streptococcal vaginal colonization and to find the effect of chlorhexidine on neonatal morbidity.

**Design**: A prospective and case controlled study.

**Setting:** this study was done in Elwiyah teaching hospital and Tikrit teaching hospital, Iraq.

**Tools and Methods:** Eighty women were chosen with vaginal group B-streptococcal colonization through vaginal swab for culture and sensitivity; and included in this study.

Fifty patients were considered as a study group and thirty patients were considered as a control group. Study group offered vaginal disinfection with chlohexidine while control group deprived from disinfection with chlorhexidine.

Buccal and conjunctival swabs were collected from newborns following delivery and sent for culture and sensitivity for detection of presence of group Bstreptococcus infection in these swabs.

**Result:** In the study group 20% of neonates were affected while in the control group 50% of neonates were affected .

Repeating disinfection with chlorhexidine is better than single disinfection .

**Conclusion:** Disinfection of vagina with chlorhexidine was effective in reducing infant morbidity.

## Introduction:

Group B-Streptococcus is a commensal in gut and genital tract and found in 20-40% of women, it may cause sever neonatal infection leading to neonatal death and can cause upper genital tract infection progressing to septicemia and maternal death.(1),(2)

These organisms include aerobes such as Coliforms, group B and D-Streptococci, Staphylococci and Haemophilus influenza and anaerobes such as Peptococci and Streptococci (gram positive cocci),its either primary or secondary infection as described by Mardh (3)since 1980, they are seen more frequently with prolonged or recurrent infection as described by Paavonen (4)since 1981.

Group B-Streptococcus can cause pelvic infection with tubo-ovarian abscess, septic thrombophlibitis after abortion or certain surgery (5),(6).

Vaginal pathological colonization with group B-Streptococcus is detected in around 10% of non-pregnant women, during pregnancy the percentage is slightly higher (around 12%)which is explained on the bases of changes which occur in the PH due to hormones of pregnancy (7),(8).

Pathological colonization of vagina dose not mean symptomatic infection (bacterial vaginosis) because a lot of females harbor the bacteria, but do not show symptoms and signs of infection (9),(10).Nevertheless, they can affect the fetal tissues during its passage through the birth canal during labour(11).

Fetal organs that can be infected from vaginal colonization with group B-Streptococcus include Buccal mucosa, upper respiratory passages, pharynx, larynx, conjunctiva(11)

Systemic and local infection are common in the newborn periods, infection may be acquired in utero through the tranceplacental or transecervical routes and during and after birth as described by Richard.

Ascending infection through cervix with or without rupture of amnionitis fluid membranes, may result in amnionjitis,funisitis(infection of umbilical cord),congenial pneumonia and sepsis. The bacteria responsible for ascending infection of the fetus are common bacterial organisms of the maternal genitourinary tract such as group B-Streptococcus.

Maternal humoral immunity may protect the fetus against neonatal pathogens such as group B-Streptococcus. Newborn infants also demonstrate A deficit in phagocytic migration to the site of infection (eig,to lung) and in the bone marrow, reserve pool of (leukocytes).

In the presence of suboptimal activation of complement, neonatal neutrophils ingest and kill the bacteria less effectively than adult neutrophil do and defence mechanisms against viral pathogens, also may be deficient in the newborn infant.(12)

Neonatal sepsis due to B-Streptococcal infection often begins in utero, its more common at time of birth to seven days after delivery. It is overwhelming multiy organ systems disease frequently manifested as respiratory failure and shock, meningitis (30% of cases) disseminated intravascular coagulopathy,acute tubular necrosis and symmetric peripheral gangrene(12).

Early manifestation: grunting poor feeding, pallor apnea, lethargy hypothermia and abnormal cry.Antepartum vaginal disinfection with chlorhexidine has reduced the rate of early onset infection(12).

B-Streptococcus can be detected on culture of vaginal swabs but colonization of the vagina can occur at any stage of pregnancy. Attempts have been made to screen for infection in early pregnancy and eradicate the organism with penicillin. The current recommendation is that the organism should be sought by culture of vaginal swabs in complicated pregnancies or those with a prior preterm birth, if the organism is present, penicillin should administrated intravenous at time of delivery(1).

Vaginal swabs can be done by lubricated bivalve vaginal speculum inserted until swab was taken and can be placed in special media as described by Amies. The swab keep at room temperature and do not refrigerate and swab is subsequently cultured for aerobes and anaerobes organisms.(6)

Chlorhexidine one of antiseptics and disinfectant groups it is non toxic and safe material, can be used in the hospital for prophylaxis methods to prevent any type of infection either in labour room specially in high risk patients like those with prolong rupture of membrane and chorioamnitis Chlorhexidine can be used in surgical theater before surgical operations to prevent postoperative infections specially after obstetrical and gynaecological operations and can also used in house. For many uses its concentration 5 % can be diluted as aqueous solutions 2 % (13).

Chlorhexidine gluconate is a topical antimicrobial agent can be used as a treatment of gingivitis and periodontitis and topically as surgical scrub, health hand wash, patient preoperative skin preparation, skin wound cleanser, treatment of acne vulgaris. It is also available as (2 %) cloth and as a swab chlorhexidine gluconate and 70 % isopropyl alcohol both are indicated for use as a skin preparation also used for prophylaxis and treatment of denture stomatitis, mucositis and also as dental implant I adult with periododontitis. It is prophylactic method against both gram-positive and gram-negative organisms, some viruses as HIV its topical antiseptic due to activity on skin, rapid and broad bactericidal activity (14).

Chlorhexidine is applied topically, should never be ingested or used in the eye, its slowly released over 24 hours, 40 % of chlorhexidine released in the first 24 hours. It poorly absorbed through Gastro-intestinal (GI) tract (15).

# **Tools and Methods:**

Cases were collected from Elwiyah teaching hospital and Tikrit teaching hospital during the period from May 2004 to May 2005.

Cases were chosen from women regularly visiting antenatal care unit and around term(ready to deliver within week to 10 days).

Fifty patients were chosen with vaginal group B-Streptococcus colonization as a study group while thirty patients with group B-Streptococcus colonization were chosen as a control group.

The patients putted in lithotomy position and by using bivalve speculum in the vagina, the swab was taken from the vagina and sent for culture and sensitivity for detection of presence of group B-Streptococcus infection in these swabs, so that 80 patients were chosen with group B-Streptococcus colonization depending on the results of these vaginal swabs.

Patients in our study shouldn't be on any type of antibiotics or any local vaginal disinfecting agents for at least one week before taken high vaginal swabs as described by MacLean A.B.(6)

Patients in both group (Study and Control groups)were characterized by :

1-Age between 20-40 years.

2-Parity:both primi and multiparous women

3-High risk pregnant patients were excluded from the study like sever hypertension, uncontrolled diabetes, immunocompromised patients, history of leaking liquors or rupture membrane and patients who were expected to delivered by caesarian section.

Study group offered vaginal disinfection with chlorhexidine in the concentration of 2g/l as described by Albandar J.M.(13) and HaffaJeeAD.(15)

From 50 patients in study group, 35 patients arrived early in labour we had a chance to do disinfection twice(early at labour and about 5cm cervical dilatation) while 15 patients arrived late(5cm or more cervical dilatation) so we did disinfection once while control group deprived from disinfection with chlorhexidine for comparison purposes and expectation of differences in the results.

From the ethical point of view all patients in this study had a full explanation about the nature of examination and investigations done for them so that the patient still inside the hospital for follow up after this explanation for her at least 4hours after delivery.

Buccal and conjunctival swabs were collected from newborns two hours following delivery and sent for culture and sensitivity in the lab of Elwiyah and Tikrit teaching hospital by special senor staff in these lab. For detection of presence of group B-Streptococcus infection in these swabs

# **Results and Discussion:**

Disinfection of vagina with 2g/l chlorhexidine, its concentration 5% can be diluted as aqueous solution 2% as described by GJermop. FeresM (13) and (15).

In the study group from 35 patients whom had disinfection twice by chlorhexidine, we found the infection in 5 neonates while in 15 patients whom had disinfection once we found the infection in 5 neonates as in fig 1.



Figure (1)

The total number of affected newborns were10 n the study group(20%),40% were not affected(80%)as in fig 2.



Figure (2)

In the control group we found B-Streptococcus in 15 neonates(50% of neonates were affected )as in fig 3.



#### Figure (3)

Fig 2 and fig 3 shows distribution of cases among the study and control group, this means that ante partum disinfection of vagina with chlorhexidine 2g/l was more affective than non disinfection which is consistent with the findings of Australian study since 1995 (8) and findings of Goodson J.M.(16)

In study group 35 patients arrived early in labour and disinfection was done twice, only 5 newborns were affected while 15 patients arrived late and disinfection was done once 5 newborns were affected, this mean that repeating disinfection twice with chlorhexidine is better than single disinfection which is consistent with Americans study since1995 (10) and findings of Duerden B.I.(17) as in table 1.

Table 1.

Arrival	Positive	Negative	Total
Early	5	30	35
Late	5	10	15
Total	10 (20 %)	40 (80 %)	50

Ante partum disinfection of vagina with chlorhexidine 2g/l reduce neonatal morbidity by 30%.

The prophylactic methods of ante partum vaginal disinfection with chlorhexidine is cheap methods, safe and effective. It is regarded to be better than antibiotics with its high cost and side effects and limitation on many antibiotics during pregnancy because of hazards on fetus, this which is consistent with findings in Americans study since 1992 (18).

Our results confirm that chlorhexidine is very effective in reducing the infection of B-Streptococcus in newborns by penetration and destabilization of bacterial cell wall, precipitates the cytoplasm and interferes with membranes functions by oxygen utilization leading to a decrease in cellular ATP levels and cell death which is consistent with conformation of Childs and Gibbons (19).

Our study confirms that Streptococcus micro-organism had good sensitivity to chlorhexidine by reduction of its number and reduction of the incidence of infection in neonates, so we can use chlorhexidine as a medical advice for infection prophylaxis which is consistent with findings of Rhahan and Diehl.(20)

## **Conclusions:**

- Disinfection of vagina with chlorhexidine was effective in reducing infant morbidity.
- Prophylactic method of ante partum vaginal disinfection with chlorhexidine is a cheap, safe and effective method.
- Repeating disinfection twice with chlorhexidine(at onset of labour and about 5cm cervical dilatation) is better than single disinfection.

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دراسة تأثير استخدام الكلورهيكسيدين في وقاية حديثي الولادة من الإصابة ببكتريا مجموعة ب – المكورة العقدية

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الملخص:

**الهدف من الدراسة**: معرفة تأثير الكلورهيكسيدين في النقليل من الإصابة بالالتهاب البكنيري من مجموعة ب – المكورة العقدية لدى المولودين حديثاً. **نوع الدراسة**: دراسة مستقبلية مسيطرة.

مكان الدراسة: أجريت الدراسة في مستشفى العلوية التعليمي ومستشفى تكريت التعليمي / العراق.

المواد وطرائق العمل: تم اختيار ثمانين (٨٠) امرأة في هذه الدراسة مصابات بالالتهاب البكتيري من مجموعة ب – المكورة العقدية من خلال مسحات مهبلية تم إرسالها الى الزرع المختبري.

خمسون (٥٠) مريضة تم اعتبارهم في مجموعة الدراسة وثلاثون (٣٠) أخرى في مجموعة السيطرة.

مجموعة الدراسة تعرضت الى التعقيم المهبلي بمادة الكلورهيكسيدين ، أما مجموعة السيطرة لم تتعرض الى التعقيم المهبلي بمادة الكلورهيكسيدين. مسحات التجويف الفمي والغشاء المخاطي للعين تم جمعها من المولودين حديثا بعد الولادة وأرسلت للزرع المختبري للتأكد من وجود بكتريا ب – المكورة العقدية في هذه المسحات.

النتائج: في مجموعة الدراسة تم التوصل الى أن ( ٢٠ % ) من المولودين حديثا كانوا مصابين ، أما في مجموعة السيطرة فإن ( ٥٠ % ) من المولودين حديثاً كانوا مصابين.

التعقيم المتكرر بمادة الكلورهيكسيدين أفضل من التعقيم الانفرادي.

الاستنتاج: التعقيم المهبلي بمادة الكلورهيكسيدين فعال جدا في وقاية حديثي الولادة.