

# Group B Streptococcal Vaginal Colonization in the Third Trimester of Pregnancy

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**OBJECTIVE:** The presence of vaginal infections and Group B Streptococcus in the vaginal flora during pregnancy, bears importance because various resultant complications can be observed in pregnant women and their infants. The aim of our study is to determine the incidence of Group B streptococcal colonization among third trimester pregnant women who were admitted to the antenatal clinics of the Department of Gynecology and Obstetrics of the Medical Faculty of Kahramanmaraş Sutcuimam University.

**STUDY DESIGN:** In this study, vaginal smears were obtained from 97 of the 126 third trimester pregnancies within a period of two months and they were examined by microbiological methods. The specimens were cultivated in 5% sheep blood agar and incubated at 37 °C for 24 hours in an anaerobe environment. The streptococci isolated from the cultures were identified as Group B streptococcus by standard bacteriological methods and commercial latex agglutination kits.

**RESULTS:** Mean age of the study group was 26.4±5.9 (range:18-44) years and mean gestational age was 36.7±3.3 (range: 27-42) weeks. Median gravida was 2 (range: 0-8), whereas median parity was 1 (range: 0-6). Amniotic membrane was ruptured in 14.4% of the pregnancies. 33.0% of the pregnancies had Group B streptococcal colonization. There was no significant difference with regard to age, gestational age, and gravida ( $p<0.05$ ). 71.4% of the women with ruptured amniotic membrane and 26.5% of those with unruptured membrane were positive for Group B streptococcus; the difference between the groups was significant ( $p<0.05$ ).

**CONCLUSION:** Group B streptococcal colonization in our study group was found to be high. During and after pregnancy, in order to prevent infections and complications likely to form both in the mother and the infant, it is important to screen pathogenic factors by routine vaginal smears.

**Key Words:** Pregnancy, Group B streptococci, Vaginal colonization

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## Introduction

Although genital flora of women constantly undergoes changes, normal vaginal flora protects the pregnant woman and the infant against infections by preventing colonization of pathogenic microorganisms. During the fertile period, the microorganisms present in the vaginal flora are *Lactobacillus spp.*, staphylococci, streptococci, coliform bacteria, and anaerobes. Group B streptococcus (GBS, *Streptococcus agalactiae*) which can inhabit genitourinary and gastrointestinal flora of

humans, is particularly important in terms of the health of pregnant women and neonates.<sup>1,2</sup> GBS transmits through exogenous ways such as rectal route, and by colonizing in the vagina, it may lead to maternal and neonatal infections. If a third trimester pregnant woman is a carrier of vaginal GBS, she may transmit it to the infant during vaginal delivery by vertical transmission as a result of which the pathogen finds the opportunity to colonize in the respiratory system of the infant and causes neonatal complications.<sup>3,4</sup> Those complications include preterm delivery, early membrane rupture, low birth weight, postpartum endometritis, intraamniotic infections as well as puerperal sepsis, pneumonia, meningitis, osteomyelitis. Moreover, there are reports of non-invasive GBS infections in non-pregnant adults.

The incidence of GBS colonization is estimated to be 5-35% across the world and 1.63-37.2% in our country.<sup>5,7-10</sup> About 50% of newborns from those pregnant women are known to develop GBS colonization, among which 1-2% exhibit infections with majority of them having a fulminant character.<sup>4</sup> GBS are regarded as an important etiological factor in

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the development of meningitis and sepsis which are known to be among neonatal infections with high mortality rates.<sup>11</sup>

The aim of our study was to determine the incidence of Group B streptococcal colonization among third trimester pregnant women who were admitted to the antenatal clinics of the Department of Gynecology and Obstetrics of the Medical Faculty of Kahramanmaraş Sutcuimam University.

## Material and Method

In the current study, we planned to enroll the entire third trimester (range of gestational age: 27-42 weeks) pregnancy cases (n=126) that applied to the antenatal clinics of the Department of Gynecology and Obstetrics of the Medical Faculty of Kahramanmaraş Sutcuimam University. However, 29 pregnant women, 15 due to usage of antibiotics in the recent 3 days and 14 due to their objection to participate in the study, were excluded from the study. Thus, our study population was consisted of 97 (76.9%) pregnancies.

Vaginal smears of the pregnant women were examined with microbiological methods. Vaginal specimens were acquired by positioning the pregnant women on the gynecologic examination table at lithotomy position and using a sterile swab. Obtained specimens were cultivated in the Todd-Hewitt fluid culture and dispatched to the Research Laboratory of Kahramanmaraş Sutcu Imam Medical School. Subculturing was performed from Todd-Hewitt medium to 5% sheep blood agar and resultant cultures were incubated at 37°C in aerobic conditions for 24 hours. The growths observed after the incubation were evaluated by routine microbiological methods.

Thus, colonies showing a morphology consistent with streptococci and positivity for Beta hemolysis, were subjected to Gram staining and catalase tests. Cocci demonstrating negative catalase test and Gram positive chains under light microscope, were regarded as streptococci. Pure cultures were obtained by growing subcultures from those colonies in 5% blood agar and the streptococci were tested for Group B positivity through bacitracin sensitivity and latex agglutination (*Dryspot Streptococcal Grouping Kit, Oxoid*).<sup>12,14</sup>

## Statistical analyses

All data were analyzed using the Statistical Package for the Social Sciences for Windows version 15.0 (SPSS, Chicago, IL). Chi-square and Fisher's exact tests were used for statistical comparisons of the groups. Statistical significance was defined as  $p < 0.05$ .

## Results

Mean age of the study group was  $26.4 \pm 5.9$  (range: 18-44 years) and mean gestational age was  $36.7 \pm 3.3$  (range: 27-42 weeks). Median gravida was 2 (range: 0-8), whereas median parity was 1 (range: 0-6). While 74.2% of the pregnant women were in the 18-29 age group, 25.8% were in the 20-44 age group. 5.2% of the study population were at 27-31 gestational weeks, whereas 29.9% and 64.9% were at 32-36 and 37-42 gestational weeks, respectively. 14.4% of the women included in the study had ruptured amniotic membrane. 33.0% of the pregnant women demonstrated positivity for vaginal streptococcal Group B colonization (Table 1).

Table 1: The distribution of pregnant women with regard to age, gestational week, Group B streptococcus positivity and amniotic membrane status

Parameters	n	%
<b>Age group</b>		
18-29	72	74.2
30-44	25	25.8
<b>Gestational week</b>		
27-31	5	5.2
32-36	29	29.9
37-42	63	64.9
<b>GroupB streptococcus</b>		
Positive	32	33.0
Negative	65	67.0
<b>Amniotic membrane</b>		
Rupture	14	14.4
Unrupture	83	85.6
<b>Total</b>	<b>97</b>	<b>100.0</b>

There was no significant difference relative to the age group, gestational week, and gravida among the pregnant women who had Group B streptococcal colonization ( $p>0.05$ ). 71.4% of the women with ruptured amniotic membrane and 26.5% of women with unruptured amniotic membrane were positive for Group B streptococcus, and the difference between the groups was significant ( $p<0.05$ ) (Table 2).

## Discussion

GBS (*Streptococcus agalactiae*) which is known to be pathogenic particularly for domestic animals, have recently gained importance because of resultant diseases in pregnant women and newborns.<sup>8,15</sup> Authors estimate the incidence of cervicovaginal GBS colonization during pregnancies, as 5-40% (5). GBS can be transmitted through mother-to-child at delivery and may lead to various diseases by inhabiting the respiratory tract of infants.<sup>8</sup>

In presence of advanced vaginal GBS (*Streptococcus agalactiae*) colonization among pregnant women, colonization in the infants shows a parallel increase which may lead to development of neonatal diseases with a mortality rate of 20-50%.<sup>16</sup> In adults, those diseases include puerperal infection, postpartum endometritis, maternal urinary system infections, sepsis, chorioamnionitis, intraamniotic infections, and necrotizing fasciitis which are likely to develop particularly after gynecological manipulations; whereas in newborns, important complications that may arise include puerperal sepsis, pneumoniae, meningitis, osteomyelitis, and arthritis.<sup>3-5,7,17</sup> *S. galactiae* infection is rarely observed in non-pregnant adults and as-

sociated with wound infection, osteomyelitis, pyogenic arthritis, cellulitis, and urinary tract infection.<sup>18</sup> In view of all those data, standard prevention and treatment strategies and guidelines against infections associated with those bacteria have been developed by the *Centers for Disease Control and Prevention* (CDC). Prevention methods are mostly immunoprophylaxis and chemoprophylaxis. Antibiotics are used for intrapartum prophylaxis or penicillin prophylaxis, while being administered to the mother and infant during antenatal period or delivery.<sup>19,20</sup>

In our country, several studies have been conducted on the incidence of GBS colonization in pregnant women. Karaeminogullari et al.<sup>7</sup> analyzed cervicovaginal smears of 80 pregnancies and isolated GBS in 4% of them. Elci et al.<sup>8</sup> found 10% GBS positivity among 60 healthy pregnant women. Karakus et al.<sup>5</sup> examined 112 pregnancies with gestational ages  $\geq 24$  weeks between 2002-2006 and determined GBS colonization in 8% of them. Moreover, the same authors found the highest rate of colonization in 20-24 age group (44.5%) and showed that this rate was inversely proportional with a gravida value  $\geq 5$  in all the age groups (11.2%). In a comprehensive study focused on rectovaginal GBS carriers and performed on 500 third trimester pregnant women at Bakırköy Obstetrics, Gynecology, and Pediatrics Teaching and Research Hospital in Istanbul, colonization was detected in 41 (8.2%) cases. In the same study, colonization rate was not found to have a significant correlation with factors involving mothers' characteristics such as age, gravida, parity, length of marriage, and preterm delivery.<sup>11</sup> In the present study, we found GBS positivity in 33.0% of the pregnancies. Moreover, no signifi-

Table 2: Vaginal Group B streptococcal colonization in pregnant women relative to several variables

Variables	Vaginal GBS Colonization						p
	Positive		Negative		Total		
	n	%	n	%	n	%	
<b>Age group</b>							
18-29	24	33.3	48	66.7	72	100.0	0.90
30-44	8	32.0	17	68.0	25	100.0	
<b>Gestational week</b>							
27-31	3	60.0	2	40.0	5	100.0	0.24
32-36	7	24.1	22	75.9	29	100.0	
37-42	22	34.9	41	65.1	63	100.0	
<b>Gravida</b>							
0-1	10	37.0	17	63.0	27	100.0	0.43
2	13	38.2	21	61.8	34	100.0	
$\geq 3$	9	25.0	27	75.0	36	100.0	
<b>Amniotic membrane</b>							
Rupture	10	71.4	4	28.6	14	100.0	0.001
Unrupture	22	26.5	61	73.5	83	100.0	
<b>Total</b>	<b>32</b>	<b>33.0</b>	<b>65</b>	<b>67.0</b>	<b>97</b>	<b>100.0</b>	

cant correlation was observed between the incidence of vaginal GBS and factors such as gravida and age of mothers. In our study, we found a significantly higher incidence of GBS in pregnancies with ruptured amniotic membrane (71.4%), however, we failed to reveal the influence of this condition over the health of mothers and infants.

In conclusion, one third of our study group were positive for vaginal colonization of Group B streptococci. Pregnancies with ruptured amniotic membrane demonstrated significantly higher rates of GBS positivity. Despite advances in diagnostic and therapeutic techniques in medicine, GBS infections remain to exhibit an increasing mortality in pregnant and puerperal women, newborns, and nursing infants. Therefore, in order to manage GBS carriership and potential risk factors associated with GBS which threaten both maternal and infant health, developing eradication strategies such as routine screenings, immunoprophylaxis, and chemoprophylaxis bears great importance.

### Üçüncü Trimester Gebelerde B Grubu Streptokokların Vajinal Kolonizasyonu

**AMAÇ:** Gebelerde görülen vajinal enfeksiyonlar ile vajinal floradaki Grup B grubu streptokokların varlığı, gebelerde ve bebeklerde çeşitli komplikasyonlara neden olabilmesi yönüyle önem taşımaktadır. Bu çalışmanın amacı Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi gebe polikliniğine kabul edilen üçüncü trimester gebelerde, B grubu streptokokların kolonizasyon sıklığının belirlenmesidir.

**GEREÇ VE YÖNTEM:** Bu çalışmada, iki aylık süre içinde üçüncü trimesterdeki 126 gebeden çalışmaya katılmayı kabul eden 97 gebenin vajinal sürüntü örnekleri alınarak mikrobiyolojik yöntemler ile incelendi. Örnekler, %5 koyun kanlı agara ekilerek 37 °C'de aerop ortamda ve 24 saat süreyle inkübe edildi. Kültürlerden izole edilen streptokoklar klasik bakteriyolojik yöntemler ve ticari lateks aglütünasyon kitleri ile B grubu streptokok olarak tanımlandı.

**BULGULAR:** Çalışma grubunun yaş ortalaması 26,4±5,9 (Min.-Max:18-44) ve gebelik haftası ortalaması ise 36,7±3,3 (Min.-Max:27-42) idi. Gebelik sayısı ortancası 2 (Min.-Max:0-8), doğum sayısı ortancası 1 (Min.-Max:0-6) idi. Gebelerin % 14,4'ünün amniyon mayisi gelmişti. Gebelerin %33,0'ında B grubu streptokok kolonizasyonu bulunmaktaydı. Yaş grubu, gebelik haftası ve gebelik sayısına göre anlamlı farklılık yoktu (p>0,05). Amniyon mayisi gelmiş olan gebelerin %71,4'ünde, gelmemiş olanların %26,5'inde B grubu streptokok pozitif olup, gruplar arasındaki fark anlamlı idi (p<0,05).

**SONUÇ:** Çalışma grubunda B grubu streptokokların vajinal kolonizasyonu yüksek bulundu. Gebelik sırasın da ve sonrasında, anne ve bebekte oluşabilecek enfeksiyonlar ile komplikasyonları önlemek amacıyla, rutin olarak alınan vajinal sürüntü örneklerinde patojen etkenlerin araştırılması önem taşımaktadır.

**Anahtar Kelimeler:** Gebelik, B Grubu Streptokok, Vajinal kolonizasyon

### References

1. Sürücüoğlu S, Kara L, Türker M, et al. Kontrasepsiyon yöntemleri ile vajinanın maya kolonizasyonu arasındaki ilişki. *İnfek Derg* 1997;11(1):71-4.
2. Hammoud MS, Thalib L, Maiyegun SO. The Epidemiology of Group Streptococcal Colonization Among Obstetrical and Newborn Population in Kuwait. *Int J Gynecol Obstet* 2002;76:315-6.
3. Jeremy A. Frank JA, Yeater KM, Biggs DR, et al. Heterogeneity of Vaginal Microbial Communities within Individuals. *J Clin Microbiol* 2009;20:1181-9.
4. Aynur Topkaya A, Küçükercan M, Oğuzoğlu N. Vajinal ve rektal kolonizasyonu olan gebelerden izole edilen B Grubu Streptokokların antibiyotiklere duyarlılıkları. *Türk Mikrobiyol Cem Derg* 2003;33:242-5.
5. Karakus M Karaca Dericci Y Günçiner S. Colonization and antimicrobial resistance patern of group B streptococcus in pregnant women. *Ege J Med* 2007;46(3):151-4.
6. Farley MM. Group B streptococcal disease in non pregnant adults. *Clin Infect Dis* 2001;33:556-61.
7. Karaeminoğulları M, Memiş S. Üçüncü trimester gebelerde hızlı tarama testi ve B Grubu streptokok kolonizasyonunun saptanması. *Klimik Derg* 1992;5(2):99-100.
8. Elçi S, Gül K, Özerdem Akpolat N, Göçmen A. Gebe kadınlarda ve B Grubu streptokok kolonizasyonu. *Klimik Derg* 1997;10(2):76-7.
9. Arıbaş E T, Altındiş M, Yılmaz A, Acar A, Bitirgen M. Gebelerde vajinal B grubu streptokok kolonizasyonu. *Türk Mikrobiyol Cem Derg* 1998;31:149-51.
10. Ceran N, Göktaş P, Ceran Ö, Güven H. Gebe kadınlar ve yenidoğan bebeklerinde grup B streptokok taşıyıcılığı. *Mikrobiol Bül* 1999; 33: 21-7.
11. Can MK. Son trimester gebelerde, rekto-vajinal florada Grup B streptokok taşıyıcılığı sıklığı ve antibiyotik duyarlılığının araştırılması. Sağlık Bakanlığı Bakırköy Doğumevi Kadın ve Çocuk Hastalıkları Eğitim ve Araştırma Hastanesi Uzmanlık Tezi, İstanbul, 2005.
12. Koneman EW, Allen SD, Janda WM, et al. Guidelines for the Collection, Transport, Processing, Analysis, and Reporting of Cultures From Specific Specimen Sources. In: Winn WC, Allen S, Janda W, Koneman EW, Procop G, eds. *Color Atlas and Textbook of Diagnostic Microbiology*. Philadelphia: Lippincott Co.,2006:2-66.
13. Morven S E, Carol J B. Streptococcus Agalactiae (Group B Streptococcus), In: Mandell GL, Douglas RG, Bennett JE, eds. *Principles and Practise of Infection Diseases*. New York: Wiley Med Pub., 1990:1554-63.
14. Fenton LJ, Harper MH. Evaluation of colistin and nalidixic acid in Todd Hewitt broth for selective isolation

- of group B streptococci. *J Clin Microbiol* 1979; 9: 167-9.
15. Yücesoy GE. Gebelerde Group B Streptokokal Kolonizasyonun Önemi. *Jinekoloj Obstet Bülteni* 2002;10:51-7.
  16. Douglas EJ, Keith K, Daniel VL. Group B streptococcal colonisation pattern in mothers and their infants. *J Clin Microbiol* 1984;20:438-40.
  17. Gibbs RS, Schrag S, Schuchat A. Perinatal Infections Due to Group B Streptococci. *Obstet Gynecol* 2004;104:1062-76.
  18. Bilgehan H. *Klinik Mikrobiyoloji*, 8. baskı, İzmir, 1994; 212-9.
  19. CDC. Center for Disease Control and Prevention. Decreasing incidence of perinatal group B streptococcal disease-United States 1993-1995 *MMWR* 1997;46:473-7.
  20. Edwards MS, Baker CJ. *Streptococcus agalactiae* (Group B Streptococcus). In: Mandell GL, Bennet JE, Dolin R, eds. *Principles and Practice of Infectious Disease*. Philadelphia: Churchill Livingstone, 2000:2156-67.