Original Research Paper Gynaecology

A Study on Screening of Antenatal Women for Group B Streptococci and the Effect of Group B Streptococcal Colonization on Maternal and Fetal Outcome

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KEYWORDS :

INTRODUCTION

Bacterial infections can affect pregnant women prior to implantation of the fertilized ovum, during pregnancy and delivery. These infections can also affect the fetus and newborn. Many women with these infections are asymptomatic necessitating. both a high degree of clinical suspicion and adequate screening tests.

Group B streptococcus (GBS) in recent times, has emerged as a leading cause of invasive bacterial infections in newborn globally. The recognition, that maternal colonization with the organism is a key factor, in the occurrence of group B streptococci associated neonatal morbidity and mortality has thus made the pathogen the primary focus of discussion about infection and pregnancy.

While advances in prevention strategies have let to the decline in the incidence of neonatal disease in the recent times, Group B streptococcus still remains a major pathogen for neonate, pregnant women and immuno compromised non pregnant adults.

Epidemiology

Before the wide spread use of intrapartum antibiotics, group B streptococcus emerged as the leading cause of invasive bacterial infections in the newborns ranging from 20 to 50% in different parts of the globe. However, in the present era of antibiotics, the incidence of perinatal group B streptococcal disease ranges from 12 to 26% depending upon the prevailing health facilities and socio economic conditions in that part of the world.

Epidemiological studies in India have shown maternal colonization rates ranging from 12 -18%. Reported perinatal transmission rates in the newborn ranges from 53 to 56%. However the incidence of invasive perinatal disease is only 0.17 per thousand live births. This number represents only those cases occurring in a tertiary care hospital. In India where there is a limited system of national registry, the true incidence of the disease remains largely unknown. Since all the preterm and still births are not adequately investigated, the total burden of this particular infection remains largely under estimated.

Etiology:

Streptococcus agalactiae or Group B streptococcus is a facultative beta hemolytic fastidious, gram-positive capsulated coccus.

When cultured on sheep blood agar they form glistening gray white colonies, with a narrow zone of beta hemolysis.

The organism contains a Lancefield grouping antigen, a type specific cell surface polysaccharide and protein antigens. The group B antigen is composed of rhamnose- glucosamine polymer attached to peptidoglycan layer. The type specificity is provided, by both capsular polysaccharide and protein antigens. Group B streptococci are invariably encapsulated and belong to one of the nine recognized capsular serotypes.

The nine capsular types are composed of glucose, galactose, N-acetyl glucosamine, N- acetyl muraminic acid. Serotype specificity is recognized, by differing arrangements of one of the nine capsular serotypes. The polysaccharide capsule antigen is designated by Ia and b, II,III, IV, V, VI, VII and VIII. The protein antigen is designated by the single letter c.

Group B streptococcus produces a variety of potential virulence determinants. these include

1. Beta hemolysin
2. C5 a peptidase
3. Lipotechoic acid
4. Cell surface protein
5. Hyaluronic acid lyase
6. Cell surface penicillin binding protein.

Group B streptococcus colonization and transmission:

The gastro intestinal tract serves as a natural reservoir for group B streptococcus and is the chief source of vaginal colonization. Vaginal colonization is unusual in childhood, but becomes more common in the adolescence. Approximately 10-30 percent of pregnant women are colonized with the organism in vagina and rectum. Intra partum transmission occurs via ascending spread from the colonization.

Clinical Spectrum

Material Infections:

Group B streptococcus can cause significant morbidity in pregnant women. The manifestations include

1. Chorio amnionitis
2. Endometritis
3. Cystitis
4. Pyelonephritis
5. Febrile bacteremia
6. Post partum endometritis, following caesarean delivery.
7. Prolonged labour
8. Premature rupture of membranes (PROM)
9. Preterm delivery.

Less commonly it is associated with

1. Post partum fever
2. Wound infections
3. Pelvic abscess
4. Septic pelvic thrombophlebitis
5. Osteomyelitis

Neonatal Infections:

In the newborn, group B streptococcal infection can manifest as two different diseases depending on the time from delivery at which symptoms manifest.

Neonatal manifestations of group B streptococcal disease		
	Early onset disease	Late onset disease

Onset	First week of life (usually within the first 24 hrs)	After one week to 3 months of age.
Clinical presentation	Respiratory distress Pneumonia, Sepsis	Sepsis, Meningitis Osteoarthritis
Incidence of Prematurity	Increased	No change
Maternal obstetrical complications	Frequent (70%)	Uncommon
Transmission	Vertical: acquired in utero or intrapartum	Usually horizontal transmission: can also be intrapartum.
Predominat scrotypes	Ia, III, V	Ia, III, V
Mortality (%)	10 -15	2-6

Screening and Detection of Group B streptococcus colonization

In 1996, the Centre for Disease Control and Prevention (CDC) published consensus guidelines recommending two methods of perinatal group B streptococcal disease prevention.

The screening based approach which recommends obtaining vaginal and rectal cultures at 35 -37 weeks of gestation, and giving intra partum antibiotic prophylaxis to women with positive cultures.

The risk based approach, which recommends administering intra partum antibiotic prophylaxis to women with risk factors, when they go into labour.

In 2002 further study on the above two methodologies indicated that, routine screening for the infection would prevent approximately 50% more new born infections, than would a risk based approach. This study along with other data, led to the revised guidelines formulated by the CDC.

The CDC revised guidelines August 2002 recommends screening all pregnant women at 35 -37 weeks of gestation, with the vaginal and rectal swab for group B streptococcal culture. Swabbing both the vagina and rectum through the anal sphincter increases the yield substantially, compared with sampling the cervix or sampling the vagina alone without swabbing the rectum. Because vaginal and rectal swabs are likely to yield diverse bacteria, one of the selective enriched broth is recommended to maximize the isolation of group B streptococci and avoid growth of other organisms.

The key changes in CDC 2010 guidelines

1.Expanded recommendations on laboratory methods for identification of GBS

2.clarification of the colony count threshold required for reporting GBS detected in urine of pregnant women.

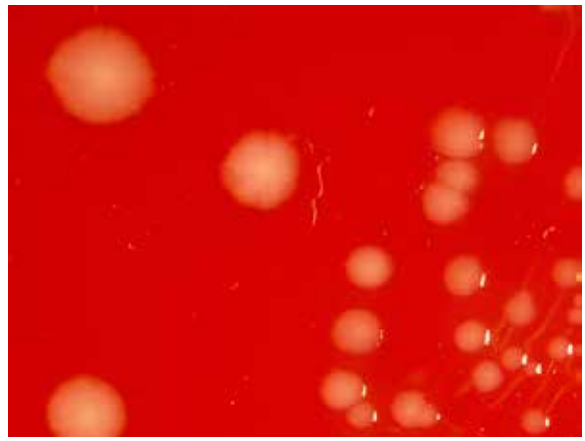
3.updated algorithms for GBS screening and intrapartum chemoprophylaxis for women with preterm labour or preterm premature rupture of membranes.

4.revised algorithms for management of newborns with respect to risk of early onset GBS disease.

5.change in the recommended dose of pencillin G for chemoprophylaxis.

Universal screening at 35-37 weeks gestation for maternal GBS colinization and the use of intrapartum antibiotic prophylaxis has resulted in substantial reduction in the burden of early onset GBS disease among newborns.

CLOSE VIEW OF GBS COLONY



Method for culturing group B streptococci in pregnant women

Center for Disease Control (CDC) guidelines

Without using a speculum, sweep a single swab over the skin from the vaginal introitus to the anus. Place the swab in a suitable transport medium such as Amies medium. The swab can remain in the medium for up to four days.

Inoculate in one of the following selective broth media

- Todd – Hewitt broth supplemented with nalidixic acid 15 micro gm per ml and either colistin 10 micro gm per ml or gentamicin 8 micro gm per ml or Commercially available culture medium such as SBM or Lim broth.
- Incubate the culture for 18-24 hours.
- Subculture the both culture to sheep – blood agar plate and incubate for 18-24 hours.
- Inspect and identify organism suggestive of group B streptococci.
- For definitive identification use group B streptococcal antigen detection methods.
- For presumptive identification use the Christie, Atkins and Munch Peterson (CAMP) test.

Guidelines for intrapatrum antibiotic prophylaxis to prevent perinatal GBS disease under a universal prenatal screening strategy based on combined vaginal and rectal cultures collected at 35 -37 weeks gestation from all pregnant women (CDC guidelines).

CAMP TEST

Indications for Intrapartum prophylaxis:

- Previous infant with invasive GBS disease.
- GBS bacteriuria during current pregnancy.
- Positive GBS screening culture during current pregnancy (unless a planned caesarean delivery, in the absence of labour or amniotic membrane rupture, is performed)
- Unknown GBS status (culture not done, incomplete, or results unknown) and any of the following.

1. Delivery at < 37 weeks gestation.
2. Amniotic membrane rupture > 18 hours.
3. Intrapartum temperature > 100.4 F (> 38.0C)

Intrapartum prophylaxis not indicated in

1. Previous pregnancy with a positive GBS screening culture (unless a culture was also positive during the current pregnancy)
2. Planned caesarean delivery performed in the absence of labour, or membrane rupture (regardless of maternal GBS culture status)
3. When vaginal and rectal GBS screening culture are negative in late gestation during the current pregnancy, regardless of intrapartum risk factors.

Recommended regimen:

Penicillin G, 5 million units IV initial dose, then 2.5 million units IV every 4 hours until delivery.

Alternative regimen:

Ampicillin, 2 g IV initial dose, then g IV every 4 hours until delivery

If allergic to penicillin	
Patients not at high risk for anaphylaxis.	Cefazolin, 2 g IV initial dose, then 1 g IV every 8 hours until delivery.
Patients at high risk for anaphylaxis. a) GBS susceptible to clindamycin and erythromycin.	Clindamycin, 900 mg IV every 8 hours until delivery.
	OR Erythromycin, 500 mg IV every 6 hours until delivery.
b) GBS resistant to clindamycin or erythromycin or susceptibility unknown.	Vancomycin, I g IV every 12 hours until delivery.

Clinical challenges

Group B streptococci bacteriuria during pregnancy

The presence of bacteriuria in any concentration in pregnant women is a market for heavy genital tract infection. Therefore any women with any quantity of group B bacteriuria during pregnancy should receive intrapartum chemoprophylaxis. Vaginal and rectal screening at 37 -38 weeks is not necessary for these women. Women with such bacteriuria or urinary tract infections with group B streptococci should receive appropriate treatment at the time of diagnosis as well as intrapartum prophylaxis.

Planned caesarean delivery

Because group B infection can cross the intact amniotic membranes, a caesarean delivery does not prevent mother to child transmission of the infection.

Threatened preterm delivery

Because preterm delivery is an important risk factor for early onset group B streptococcal disease, and because timing of delivery can be difficult to assess, management of intrapartum prophylaxis for women with threatened preterm delivery can be challenging.

Suggested Group B Streptococci Prophylaxis for women with Threatened Preterm Delivery

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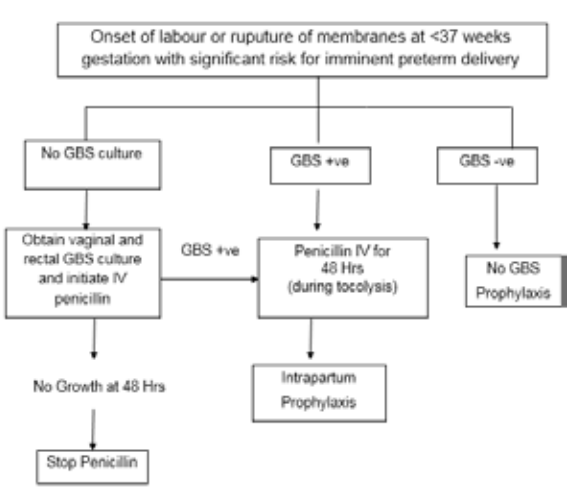

Adverse Effects and Unintended Consequences of Chemoprophylaxis

Potential adverse or unintended effects of GBS prevention efforts that have raise concern include allergic or anaphylactic reactions to agents used for intrapartum antibiotic prophylaxis, emergence of GBS strains resistant to standard therapies, and increasing incidence of serious neonatal infections caused by pathogens other than GBS, including antimicrobial resistant strains. Because of the increasing emergence of bacterial resistance to antimicrobial agents in nosocomial and community settings, assessment of the impact and continued effectiveness of interventions based on antimicrobial prophylaxis is critical.

Future prevention technology

Rapid tests to detect group B streptococcal colonization

Rapid tests for detection of GBS colonization at the time of labour or rupture of amniotic membranes might obviate the need for prenatal culture based screening, provided their sensitivity and specificity are comparable to culture in selective broth media, and they yield results rapidly enough to permit administration or adequate intrapartum antibiotic prophylaxis, to women detected as carriers.

Currently available rapid tests, detect GBS antigen from swab specimens. These tests are insufficiently sensitive to detect light colonization and therefore are not adequate enough to replace culture base screening method.

On going trials in other parts of the world involve a new fluorogenic polymerase chain reaction assay. This assay is found to be 97% sensitive and 100% specific when compared to the rectal and vaginal cultures. Further the test results from this assay are available within 45 minutes of specimen collection.

Further studies are needed to determine whether this type of test can be adapted for use outside the research setting. If appropriate techniques for rapid detection of GBS become commercially available, they may be integrated into the currently recommended screening strategy.

Vaccines to prevent GBS disease

Serotype specific antibodies to GBS capsular polysaccharide, although rare in population of unvaccinated women, have been shown to protect against the disease" These vaccines in the initial trails are found to be well tolerated and immunogenic.

The challenges faced with vaccination implementation are,

1. Large and appropriate sample size is necessary to demonstrate vaccine efficacy.
2. Duration of protection offered by the vaccine is currently unknown.
3. Shifts in the GBS serotypes responsible for infection over time.

Hence until a safe, effective, and economical vaccine achieves licensure, it is very much important to continue current recommendations of screening and treatment.

REVIEW OF LITERATURE

Puerperal sepsis has been described for centuries and ancient Indian texts in 1500 B.C have recorded that good hygiene lead to a reduction in the perinatal disease.

In 1879 Louis Pasteur identified streptococcus as a causative organism for puerperal sepsis.

Since the early 1930's when Rebecca Lancefield reported her grouping system for hemolytic streptococci, group streptococcus (streptococcus pyogenes) was wildly acknowledged as the major pathogen associated with puerperal sepsis.

Group B streptococcus was initially thought to be a commensal, until 1937 when Fry reported several cases of group B streptococcus associated puerperal fever with three deaths.

During the 1970's and 1980's group B streptococci emerged as a significant neonatal and maternal pathogen in the United States and Western Europe with reported mortality rates of 15 to 50 percent.

In the early 1980's clinical trials demonstrated that administering antibiotics during labour to women at risk of transmitting the group B streptococcal infections to newborns could prevent invasive disease in the first week of life.

In 1981 in a prospective study of colonization with group B streptococci among 6706 parturients, Regan JA, Chan.S.James LS found an increased incidence of premature rupture of membranes and preterm delivery in patients colonized with GBS. Premature rupture of membranes occurred in 8.1% of the non-colonized population and 15.3% of the colonized population. Preterm delivery occurred in 1.8% of the non colonized population and among 5.4% of the colonized women.

McDonald, Vigneshwaran R, O'Loughlin JA, did a prospective study with vaginal swabs obtained from 692 women at 35-36 weeks of gestation. GBS was detected in 91(13.2% of the women). The rate of preterm labour, less than 37 weeks was significantly higher in GBS positive women than in GBS negative women (18.7% Vs 5.5%). This association remained significant even when patients with other recognized factors predisposing to preterm labour were excluded (11.5% Vs 3.9%)

The rate of premature rupture of membranes was also significantly higher in the GBS positive women (9.9% Vs 2.7%) and remained higher when patients with other recognized risk factors were excluded (6.1% Vs 1.8%). The results unequivocally showed that the pregnant women who were vaginal carriers of GBS have a significantly increased risk of premature rupture of membranes and preterm labour.

Regan JA, Klebanoff MA, Nugent RP et al studied the association of cervico vaginal colonization of group B streptococci with pregnancy and neonatal outcome. Genital tract cultures were taken at 35 to 37 weeks. The colonization rates were found to be 21%. There was 1.5 times increased risk of delivering a preterm (14.7%) and low birth weight infant (20.6%) in GBS positive women when compared to GBS negative women. Neonatal sepsis occurred in 2.6 per 1000 live births in women with GBS colonization and 0.4 per thousand live births in women without GBS colonization.

In a study involving 326 antenatal women, Chau.S.Arul kumaran . S observed the group B streptococci colonization in 14.1% of pregnant women. All the patients were screened after 32 weeks of gestation. They further concluded that, antenatal screening for GBS carrier status prior to 32 weeks of gestation might not identify women at high risk of preterm labour or premature rupture of membranes.

Liang ST, Law SP, Fok TF reported carriage of GBS after 34 weeks of gestation to be 19% . Incidence of GBS infection in neonates was found to be 1.6 per thousand livebirths.

CHS Chan, KM wan, WH Lee, in a prospective study involving 986 antenatal women found that the maternal carriage rate of GBS was 24%. The incidence of premature rupture of membranes in GBS Positive patients was found to be 14.2% and the incidence of preterm labour was found to be 20%. These rates were significantly higher when compared to women who were not colonized with GBS.

The incidence of GBS related sepsis was found to be 1.3 per 1000 live births. The rate of neonatal admission n the GBS positive group was 67% which was significantly higher when compared, to the women with GBS negative status.

Manuel et al in a study involving antenatal Spanish women found that the maternal carriage rate of GBS to be 14.6%. The incidence of preterm labour was 35% in the GBS positive women and 7% in GBS negative women. The association of GBS positive status with preterm labour was significant.

Lucto M. Sanches MJ et al did a universal ante partum vaginal culture of all the antenatal patients after 34 weeks of gestations and found that the rate of maternal GBS colonization to be 12%.

Tim Sf, Lyon BJ, Chung KH reported that the genital carriage of GBS is 7.4% in Chinese population.

Zalenik DF et al did a prospective study in 695 antenatal women and stated that the rate of group B streptococcal colonization in Asian women to be 14%.

Mc Duffe RS Jr. Mc Babb.F, Fryer GE et al did a prospective study in antenatal women at 32 weeks of gestation. 18% of the patients were found to be colonized with GBS an there was an increased incidence of preterm labour (13%) premature rupture or membrane (13%) prolonged labour more than 12 hours (33%) and chorio amnionitis (9%) when compared to GBS negative patients.

Boyer KM studied the perinatal effects of GBS colonization. The incidence of GBS sepsis was found to be 1.8 per 1000 live births and the case fatality ratio due to group B streptococcus was found to be 10 to 20%.

Mariijane A, Krohn et al studied the maternal peripartum complications associate with vaginal group B streptococcal colonization. The incidence of intra amniotic infection in colonized women was found to be 2.2%. The incidence of post partum endometritis was seen in 2% of the patients. The percentage of patients in the study group colonized with GBS was found to be 21.6%

Katz VL et al studied the maternal colonization of GBS and found to be varying from 15 to 30% among various racial groups. Further the rate of invasive infection in newborn was found to be 1-3% per 1000 live births.

Kosheleva et al studied the effect of maternal colonization on pregnancy outcome and reported the incidence of preterm labour in GBS positive women as 21.7% and the incidence of PROM as 13.7%. Further the perinatal mortality of babies born to GBS positive mothers was found to be 12.6%.

Gerards CJ, Hoog, Korslange JA et al studied the influence of group B streptococcal carrier state, on pregnancy outcome and found that the race and age group have no specific implication with regard to GBS colonization. The percentage of low birth weight babies (<2.5 Kg) was found to be 30% and these rates were significantly higher when compared to that of women in the negative group. The transmission frequency of GBS infection to neonates was found to be 46%.

Campel et al did a cross sectional study in antenatal women and found a GBS carrier rate of 22%. The rate of neonatal sepsis was found to be 1.4 per 1000 live births. The neonatal mortality in GBS positive group was found to be 10.6%

Matorras R, Garcia Percea A et al studied the effect of maternal colonization by group B streptococci in 1050 pregnant women. They found that there is an increased incidence of premature rupture of membranes (26.4%) in patients colonized with GBS as against non-colonized (7.8%). The prevalence of low birth weight babies less than 2.5Kg. (25.4%) was found to be significant in patients with GBS, when compared to non-colonized patients.

Garland SM, Kelly N, Ugoni AM concluded in a study at royal Women's hospital that the prevalence of group B streptococci among pregnant women was 12.9%.

Badri MS et al did a cross sectional study to detect the rate of maternal colonization and found to be 20.5%.

Feikin DR, Thorsen P, Zvwickis conducted a study to assess the association between colonization with group B Streptococci during pregnancy and preterm delivery in Danish women. They found that, more women with preterm delivery (12/84 = 14%) were colonized with group B streptococci, than women with term deliveries (22/300 = 7%). Group B streptococcal colonization at less than 24 weeks, was not significantly associated with preterm delivery.

Regan and associates while analyzing data from Vaginal Infections and Prematurity (VIP) study, suggested that the colonization with group B Streptococci is associated with preterm, premature rupture of membranes, neonatal death from sepsis and risk of postpartum endometritis, suggesting that both pregnancy and neonatal outcomes are affected with the infection.

Hastings MJ, Easmon CS, Neill J observed that vaginal colonization of pregnancy was not related to age, parity or blood group. They also stated htat vaginal group B Streptococcal colonization was significantly associated with intrapartum pyrexia and prolonged labour (20%) when compared to negative women".

Joshi AK, Chen CI, Turnell RW stated that higher rates of preterm delivery (15.6%) and of low birth weight (26.4%) was noted among the babies of colonized women than among the babies of all women admitted for labour and delivery.

Towers Craig V, Lewis David F observed that prevalence of Group B Streptococci to pregnant women is 13% when admitted for delivery.

Dalal S, Lahiri A, Parel CC in a study regarding the carriage rate of group B Streptococci, involving 507 pregnant Indian women, reported that 12% of the women had group B Streptococci isolated from the throat and vagina, 10% had positive cultures from the vaginal sample alone.

Chaudhary U, Sabherwal U stated the carrier rate among pregnant women in India to be 16%.

Mani V, Jadhav M estimated the incidence of neonatal group B streptococcal infection in India by calculating from the Indian epidemiological data. They reported the maternal and infant Group B Streptococcal colonization rates to be 14% and 50% respectively.

AIM OF THE STUDY

1. To study the prevalence of group B Streptococcal infection at 35 -37 weeks of gestation, in normal asymptomatic primi gravid, attending antenatal clinic in a level three tertiary care institution.
2. The evaluate and compare the incidence of preterm labour, premature rupture of membranes and puerperal morbidity in group B streptococcal colonized and non-colonized women.
3. To study and compare, the effect of colonization on the mode of termination of the pregnancy, in group B streptococci positive and negative women.
4. To evaluate the fetal outcome and morbidity in colonized and non colonized mothers in the form of Neonatal Intensive care Unit (NICU) admissions, duration of stay and incidence of neonatal mortality.

SUBJECTS AND METHODS

All primi gravid women of 35 – 37 weeks of gestation attending the antenatal clinic of Institute of social obstetrics and Governent Kasturba Gandhi Hospital for women and children, Triplicane, Chennai were recruited for the study, based on the inclusion and exclusion criteria. The study was approved by the hospital ethical committee.

Methodology

Study Design : Analytical Study

Place of Study : Institute of Social Obstetrics and Government, Kasturba Gandhi Hospital for Women and Children, Chennai – 600005.

Duration of Study : January 2014 to October 2016.

Inclusion Criteria :

1. Primi with singleton gestation at 35 – 37 weeks of gestation.
2. Cephalic presentation
3. No history of sepsis or any other infection in the antenatal period.
4. No other medical or surgical complications.
5. Not on any long term therapy.

Exclusion Criteria:

1. All multigravida
2. Primi gravid with less than 35 weeks of gestation.
3. Non cephalic presentation
4. Multiple pregnancy
5. All high risk pregnancies
6. Patients with uterine anomalies
7. Associated medical and surgical illness complicating pregnancy.
8. Past history of sepsis in the antenatal period
9. Patients on any long term therapy.

Sample size: - 300 women based on the inclusion and exclusion criteria.

A detailed history was taken in all the women recruited for study. The following basic investigations were done in all women.

- Height
- Weight
- Body mass index
- Blood pressure, pulse rate
- Cardiovascular and respiratory examination
- Obstetric examination
- Urine albumin and sugar
- Complete hemogram
- Blood sugar, urea
- HbsAg
- HIV after getting consent
- Swab for GBS
- Smear for TV, Moniliasis
- Ultrasound examination for gestational age, anomalies, cervical length, Internal os diameter.

Method of Swab Collection: (according to CDC guidelines August 2009)

1. Without using a speculum a single seep of the sterile swab over the skin from the vaginal introitus to the anus was taken.
2. The swab was immediately placed in Amies transport medium.
3. Then the swab was inoculated in Todd – Hewitt broth supplemented with nalidixie acid 15 microgram/ml and gentamicin 8 microgram/ml.
4. The culture was incubated at 37 C in 5-10% carbon dioxide for 18 to 24hrs.
5. Then the broth was sub cultured on tryptone soya agar enriched with 5% defibrinated sheep's blood at 37 C in 5-10% carbon dioxide for 18 to 24 hrs.
6. Group B Streptococci and identified using CAMP (Christie, Atkins and Munch – Petersen) test.

Composition of culture media

Amies transport media:

Charcoal, sodium chloride, phosphate buffer, potassium chloride, sodium thioglycollate, calcium chloride, magnesium chloride, agar.

Todd – Hewitt broth:

Meat infusion, tryptone, glucose, sodium bicarbonate, sodium chloride, di sodium phosphate.

According to the group B Streptococcus swab status whether positive or negative, the patients were followed up for the rest of the antenatal period and observed for the following parameters.

Preterm labour – onset of labour prior to 37 completed weeks of gestation was taken as positive criteria for preterm labour.

Premature rupture of membranes – the rupture of membranes prior to the onset of labour is taken as the criteria.

All the deliveries were monitored with partogram.

Mode of Onset of Labor whether Spontaneous or Induced were recorded.

Mode of Delivery:

The patients were followed up and the type of delivery noted.

Prolonged Labour:

Labour was considered prolonged when it grossly exceeded the average duration of labour for the first and second stage, based on the partograph (6hrs for first stage and two hrs for second stage).

Neonatal Follow up:

1. One minute and five minute APGAR of all the babies were recorded.
2. Birth weight
3. Neonatal admissions.
4. Duration of stay in Neonatal Intensive care unit (NICU).
5. Neonatal mortality.
6. Maternal Morbidity:

Maternal morbidity was assessed in terms of number of days of extended stay in the hospital. In our hospital the routine number of hospital days for patients delivered by labour natural is 3 days, by instrumental vaginal deliveries is 5 days and by LSCS is 7 days. Any patient requiring more than the above mentioned number of days according to the mode of delivery is taken, as an indirect criteria for accessing maternal morbidity.

Statistical Methodology:

All the assessed parameters were studied for all the 300 women and the data was analyzed using chi square test. The significant parameters were further studied using univariate analysis and the odds ratio and the confidence limits were arrived. A "p"value of < 0.05 was taken as statistically significant.

OBSERVATIONS

The total no of subjects screened were 300 out of which 47 patients were found to be positive for group B streptococcus and 253 patients were found to be negative for the culture.

Table1 : GBS Prevalence

GBS POSITIVE	GBS NEGATIVE	TOTAL
47 (15.66%)	253 (84.33%)	300

The prevalence rate of Group B streptococci in asymptomatic primi gravid was found to be 15.66%.

Figure 1 : GBS Prevalence

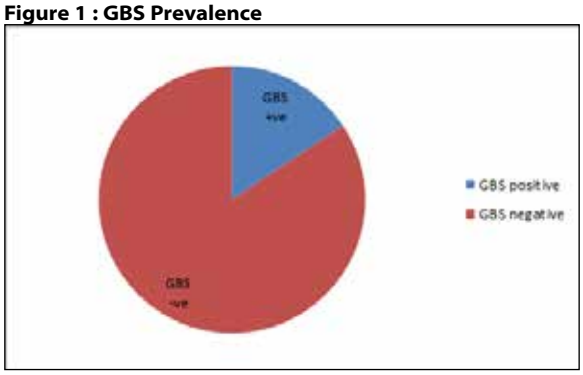

Figure 2 : Age Distribution

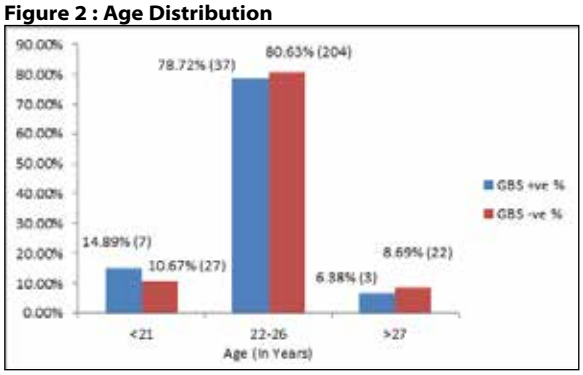

Table 2: Age in Years

Age (in years)	GBS +ve		GBS - ve		X^2 value	p- value
	N = 47	%	N = 253	%		
< 21	7	14.89	27	10.67	0.90	0.64
21 -26	37	78.72	204	80.63		
>27	3	6.38	22	8.69		

There was no correlation between age of the women and presence or absence of GBS infection.

Figure 3 : Socio Economic Status

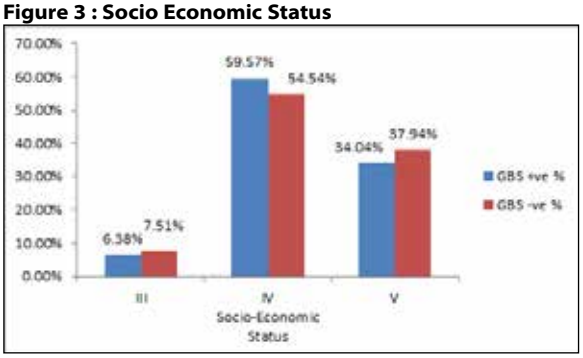

Table: 3 Socio Economic Status

Socio Economic Status	GBS +ve		GBS - ve		X^2 value	p- value
	N = 47	%	N = 253	%		
III	3	6.38	19	7.51	0.41	0.81
IV	28	59.57	138	54.54		
V	16	34.04	96	37.94		

Our hospital essentially caters to the women from the low socio economic group, population below the poverty line.

The incidence of group B streptococci was found to almost equal in each of the socio economic class when compared between the GBS positive and negative group.

However with the available data, the colonization does not seem to affect any particular socio economic class group.

Figure 4 : Preterm Labour

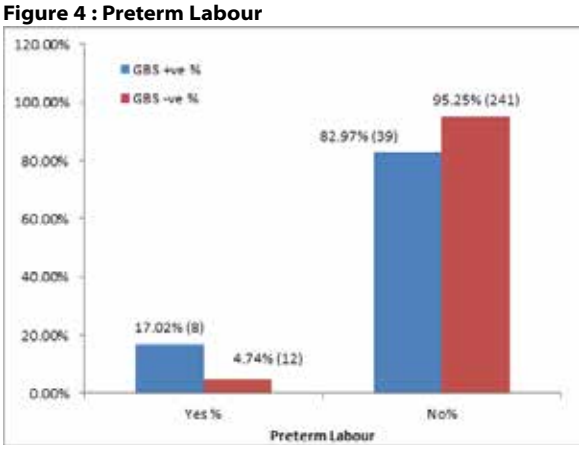

Table 4: Preterm Labour

GBS	N	Preterm Labour				X2 value	p- value	O.R (95% C.I.)
		Yes		No				
		N	%	N	%			
Positive	47	8	17.02	39	82.97	9.6	0.002	4.1 (1.4, 11.7)
Negative	253	12	4.74	241	95.25			

It was observed that 8 (17.02%) patients who were colonized with the organism went in for preterm labour whereas 12 (4.74%) patients who were not colonized developed preterm labour.

The association between preterm labour and GBS positivity was found to be statistically significant – p value of 0.002 (O.R -4.1 (1.4, 11.7))

Figure 5 : Premature Rupture of Membrances

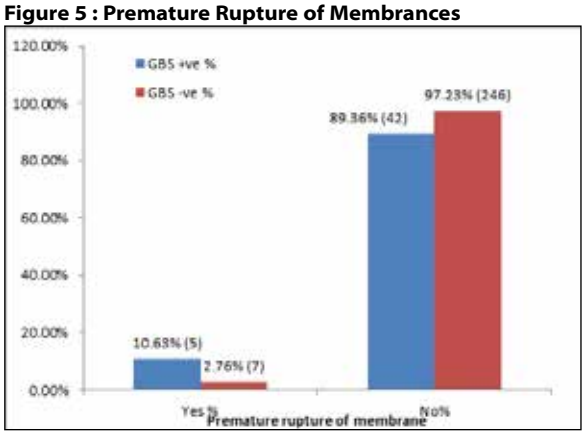

Table 5: Premature rupture of membranes

GBS	N	Premature rupture of membranes				X2value	p-value	O.R (95% C.I.)
		Yes		No				
		N	%	N	%			
Positive	47	5	10.63	42	89.36	6.4	0.01	4.1 (1.1, 15.2)
Negative	253	7	2.76	246	97.23			

The number of patients who developed premature rupture of membranes, was found to be 5 (10.63%) and 7 (2.76%) in group B streptococcal positive and negative women respectively.

The association of premature rupture of membranes with streptococcus colonization was found to be statistically significant, with the positive patients having 4.1 times increased chances of developing premature rupture of membranes.

Figure 6 : Mode of onset of Labour

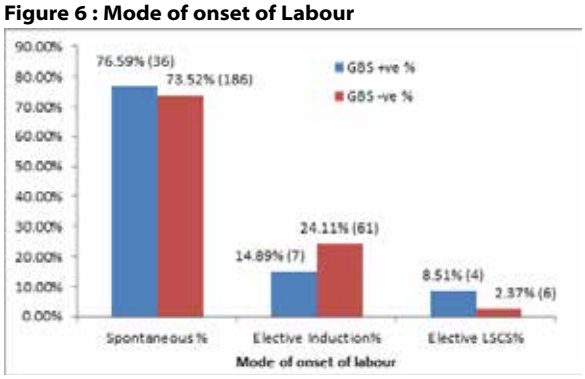

Table 6:Mode of onset of labour

GBS	N	Mode of onset of labour						X2value	p-value
		Spontaneous		Elective Induction		Elective LSCS			
		N	%	N	%	N	%		
Positive	47	36	76.59	7	14.89	4	8.51	6.0	0.05
Negative	253	186	73.52	61	24.11	6	2.37		

- The mode of onset of labour in both group B streptococcal positive and negative women was compared.
- 36 Patients (76.59%) in the positive group and 186 (73.52%) in the negative group went in for spontaneous labour.
- 4 (8.51%) patients in the positive group and 6(2.37%) in the negative group underwent elective LSCS for non obstetric indications.
- 7 (14.89%) in the positive group and 61 (24.11%) in the negative group were induced electively. The percentage of patients who went in for spontaneous labour was slightly more in the positive group than in the negative group. However this association was statistically insignificant.

Figure 7 : Increased Duration of Labour

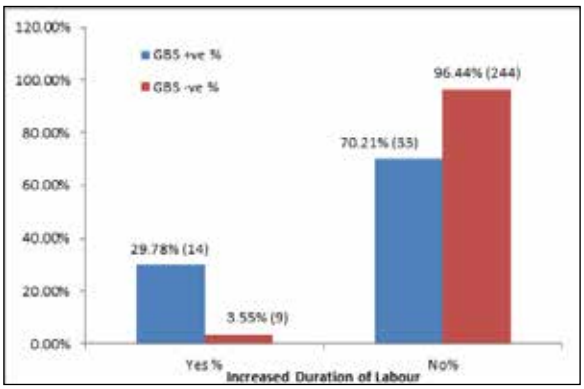

Table 7: Increased duration of Labour

GBS	N	Prolonged Labour				X2value	p-value	O.R (95% C.I.)
		Yes		No				
		N	%	N	%			
Positive	47	14	29.78	33	70.21	38.5	0.00	11.5 (4.3, 31.6)
Negative	253	9	3.55	244	96.44			

The percentage of patients who went in for prolonged labour was 29.78% (14/47) in the positive group and 3.55% (9/253) in the negative group.

The association of increased duration of labour with group B streptococcal colonization was found to be statistically significant with p value of 0.00 (O.R 11.5 (4.3,31.6))

Figure 8 : Mode of Delivery

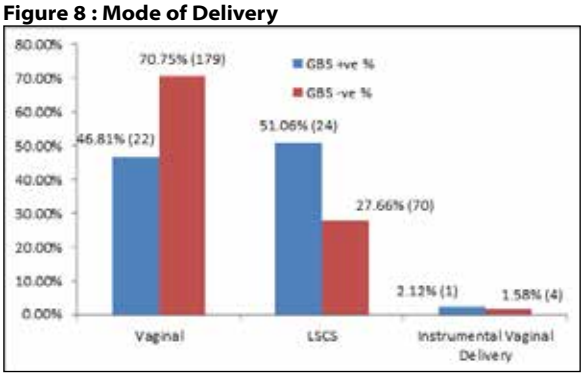

Table: 8 Mode of Delivery

Mode of Delivery	GBS +ve		GBS - ve		X2 value	p- value	O.R. (95% C.I)
	N = 47	%	N = 253	%			
Vaginal	22	46.81	179	70.75	10.4	0.006	1.0 (Reference)
LSCS	24	51.06	70	27.66			2.8(1.5, 5.3)
Instrumental vaginal deliveries	1	2.12	4	1.58			2.0 (0.2, 19.0)

The mode of delivery in all the three hundred patients was followed up.

The incidence of LSCS in GBS positive patients was found to be 51.06% and that in the GBS negative group was found to be 27.66%.

It was found that LSCS delivery is more common in group B streptococcal positive patients than in negative patients with p value of 0.006 (O.R.2.8 (1.5,5.3)

Figure 9 : APGAR Score at one Minute

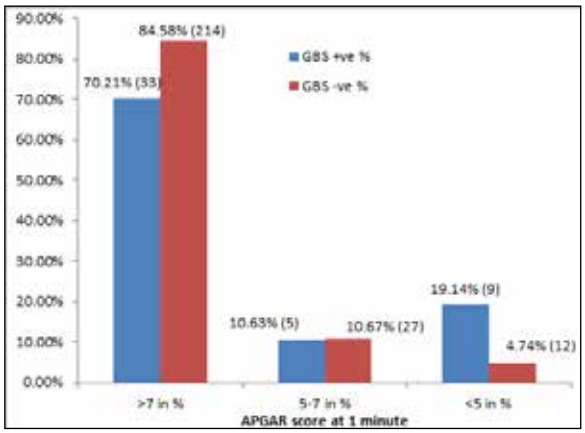

Table 9: APGAR score at 1 minute

GBS	N	APGAR score at 1 minute						X2 value	p- value
		>7		5 – 7		< 5			
		N	%	N	%	N	%		
Positive	47	33	70.21	5	10.63	9	19.14	1.87	0.002 O.R.2.3 (1.1, 5.0)
Negative	253	214	84.58	27	10.67	12	4.74		

The APGAR score of all the babies born to the study group was observed and it was found that the babies born to Group B streptococcal colonized mothers were having low APGAR score than when compared with that of the positive group.

It was found that in Group B streptococcus positive patients 14 (29.7%) of the infants had APGAR scores less than 7 and in Group B negative patients there were 39 (15.4%) of them. The association of such low APGAR scores was found to be statistically significant.

Figure 10 : APGAR Score at 5 Minute

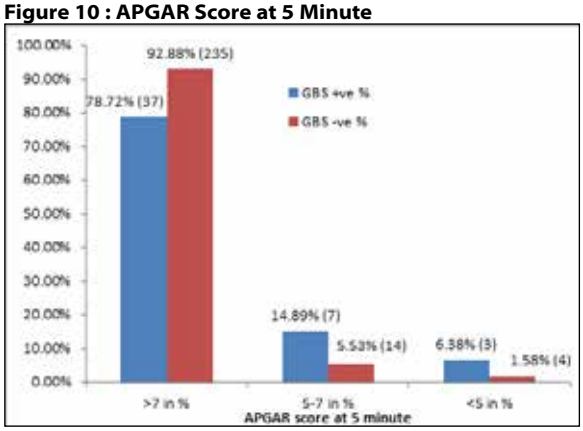

Table 10 : APGAR score at 5 minutes

GBS	N	APGAR score at 5 minutes						X2value	p- value
		>7		5 – 7		< 5			
		N	%	N	%	N	%		
Positive	47	37	78.72	7	14.89	3	6.38	9.7	0.008 O.R.2.3 (0.9, 5.4)
Negative	253	235	92.88	14	5.53	4	1.58		

In the same way as one minute APGAR score, the five minutes APGAR score was compared in both Group B streptococci positive and negative patients. Scores of less than 5 was seen in 3 in the positive group and 4 in the negative group.

The APGAR score of less than 7 was seen in 10 (21.2%) of the Group B streptococcal positive patients and in 18 (7.11%) of the negative patients. The association of low five minute APGAR scores with positive patients was found to be statistically significant. (p value 0.008)

Figure 11 : Birth Weight

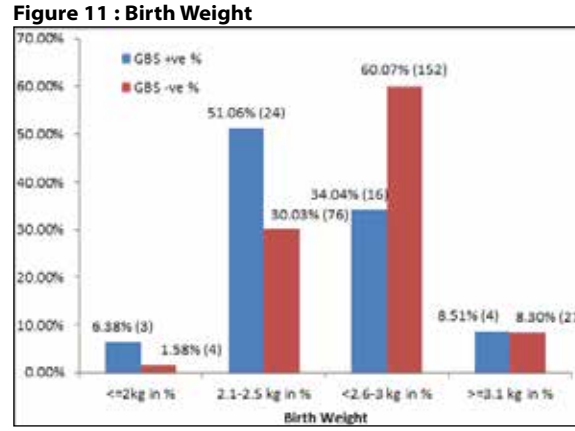

Table 11: Birth weight

GBS	N	Birth Weight								p- value
		<2 Kg.		2.1 – 2.5 Kg.		2.6 – 3 Kg.		> = 3.1 Kg.		
		N	%	N	%	N	%	N	%	
Positive	47	3	6.38	24	51.06	16	34.04	4	8.51	0.003
Negative	253	4	1.54	76	30.03	152	60.07	21	8.30	

X Value – 13.9 p value 0.003

O.R. – 2.9 (1.5, 5.8)

The birth weight of the newborns born to the patients in the study group was divided into above categories.

It was found that 51.06% of the babies born to the mothers in the positive group were having birth weight between 2.1 – 2.5 Kg, where as 60.7% of the newborns in the negative group were having birth weights in the range of 2.6 – 3 Kg.

Figure 12 : Neonatal Admission

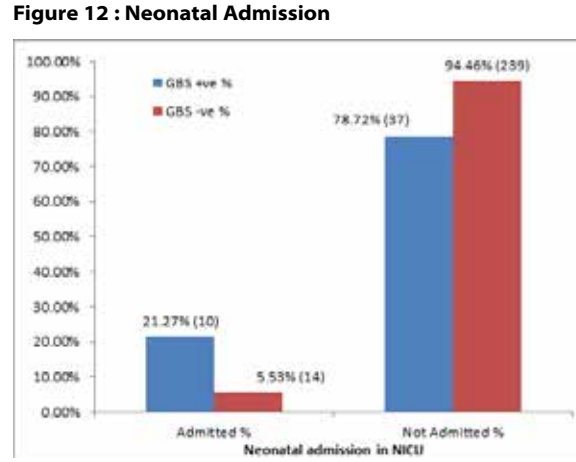

Table 12 : Neonatal admission

GBS	N	Neonatal admission				X value	p- value	O.R (95% C.I.)
		Admitted		Not Admitted				
		N	%	N	%			
Positive	47	10	21.27	37	78.72	13.3	0.0003	4.6 (1.8, 12.1)
Negative	253	14	5.53	239	94.46			

The number of babies admitted in the intensive care unit in the group B streptococcal positive group were 10 (21.27%) and in negative group were 14(5.53%).

There was significant association between, positive patients and the need for neonatal admission.

Figure 13 : Indications for Neonatal Admission

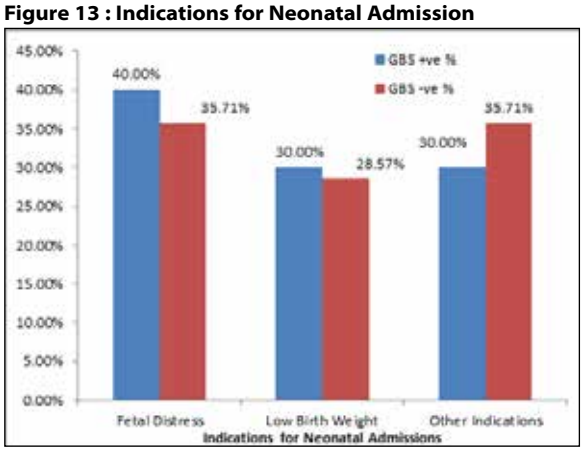

Table 13 : Indications for neonatal admission

Reason	GBS positive N = 10 babies	GBS Negative N = 14 babies
Fetal distress	4	5
Low Birth weight	3	4
Other indications	3	5

All the low APGAR babies and very low birth weight babies in both the category were admitted.

Figure 14 : Number of NICU days of the Baby

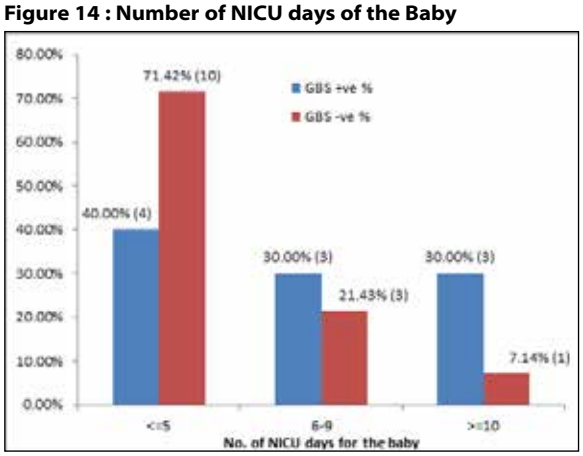

Table 14: Number of NICU days for the baby

GBS	N	Number of NICU days for the baby						X value	p-value
		< = 5		– 9		>= 10			
		N	%	N	%	N	%		
Positive	10	4	40	3	30	3	30	2.99	0.22
Negative	14	10	71.42	3	21.43	1	7.14		

In the positive group 4 babies with fetal distress required admission for less than 5 days. 3 babies with low birth weight required admission for more than 10 days. The rest of the 3 babies, admitted for other reason for more than 10 days. The rest of the 3 babies, admitted for other reason required NICU days ranging from 6-9 days.

In the negative group, three babies admitted for low birth weights required NICU stay between 6-9 days, one low birth weight baby was admitted for more than 10 days. The rest of the 10 babies in the negative group, admitted for fetal distress and for other reasons, required less than 5 days of NICU stay.

The number of NICU days required were found to be more in the case of positive patient when compared to that of the negative patients.

However this was statistically found to be insignificant.

Out of the total number of babies under the study four (4/47) babies in the positive group developed signs and symptoms of neonatal sepsis, with two (2/253) babies in the negative group developed signs and symptoms of neonatal sepsis.

However this was statistically found to be insignificant.

Out of the total number of babies under the study four (4/47) babies in the positive group developed signs and symptoms of neonatal sepsis, with two (2/253) babies in the negative group developed signs and symptoms of neonatal sepsis.

The association of neonatal sepsis with GBS positivity was not significant when compared to GBS negativity (p-0.15). The rate of negative group was found to be 0.79% (2/253)

Figure 15 : Neonatal Mortality

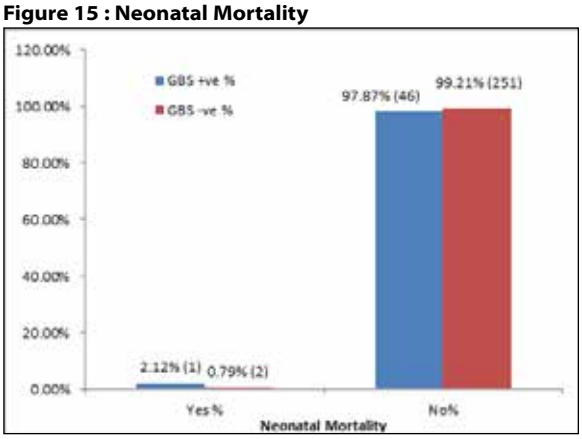

Table 15 : Neonatal admission

GBS	N	Neonatal admission				X value	p- value
		Yes		No			
		N	%	N	%		
Positive	47	1	2.12	46	97.87	0.7	0.4
Negative	253	2	0.79	251	99.21		

Out of the 47 babies in the positive group one baby died of sepsis due to streptococcal bacteremia and there were two deaths in the negative group which were due to causes other than sepsis. There was no statistical significance between the GBS status of mother and neonatal mortality when compared among the two groups.

Figure 16 : Maternal Morbidity

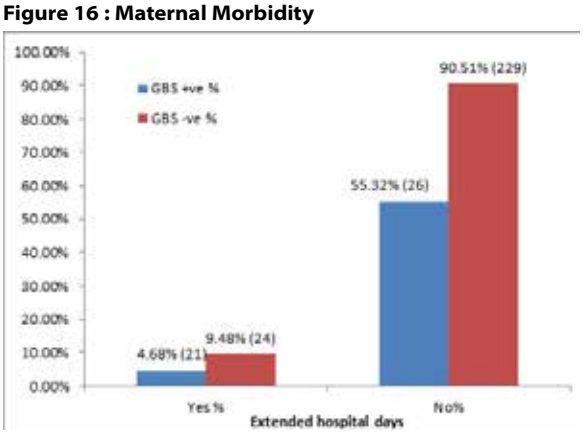

Table 16 : Maternal Morbidity

GBS	N	Extended Hospital Days				X2 value	p- value	O.R (95% C.I.)
		Yes		No				
		N	%	N	%			
Positive	47	21	44.68	26	55.32	38.5	0.00	7.7 (3.6, 16.7)
Negative	253	24	9.48	229	90.51			

The maternal morbidity was measured in terms of extended number of hospital stay days required, excluding the compulsory days of admission due to neonatal admissions.

It was found that 21(44.68%) of the positive patients stayed in the hospital for a longer period of time as against 24 (9.48) patients in the negative group.

It is found that there is a significant association between group B streptococcal positivity and maternal morbidity. (p value 0.00)

Figure 17 : Extended number of Hospital Days for the Mother

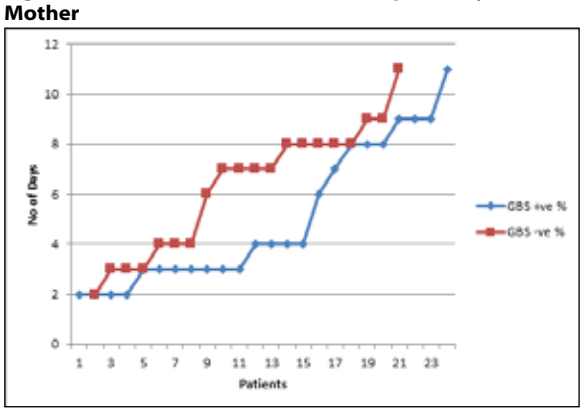

Table 17: Extended Number of Hospital days for the mother

GBS	N	Number of NICU days for the baby						X^2 value	p-value
		< = 5		– 9		>= 10			
		N	%	N	%	N	%		
Positive	21	8	38.09	12	57.14	1	4.76	2.7	0.25
Negative	24	15	62.5	8	33.33	1	4.16		

When computed in terms of the actual number of days it was found that 61.9% of the patients in the positive group required more than 5 days for recovery whereas only 37.49% of the patients in the negative group required more than 5 days for recovery.

DISCUSSION

This study on the influence of GBS infection on the various aspects of pregnancy, labour, fetal outcome was conducted at the Institute of Social Obstetrics and Government Kasturba Gandhi Hospital For Women and Children between January 2014 and october 2016, in 300 asymptomatic antenatal women attending the antenatal clinic.

When the rate of GBS colonization (Table 1) among the pregnant women was analyzed it was found that the rate of colonization differ world wide between 12- 24%. In India the rate of colonization varies between 14 – 18%.

Name of the Study	GBS Prevalence Rate
Regan JA, Klebanoff et al	21%
McDonald, Vigneshwaran R, O'Loughlin	13.20%
ChauS, Arul Kumaran et al	14.10%
Liang ST, Lau SP, Fok TF	19%
CHS Chan, KM Wan, WH Lee	24%
Manuel et al	14.60%
Lucto M et al	12%
Tim SF, Lyon DT, Chung KH	7.40%
Zalenik DF et al	14%
McDuffe RS Jr, Mc Nabbs	18%
Mariijane, Drohn et al	21.60%
Katz et al	15-30%
Campdel et al	22%
Garland SM, Kelly N	12.90%
Badri MS et al	20.50%
Towers Creig V, Lewis David	13%
Dalal S Lahiri	10%
Mani V.Jadhav	14%
Choudary et al	16%
Present study	15.66%

The prevalence of group B streptococci in the present study is comparable to that of studies mentioned above. It is to be noted that, the prevalence of group B streptococci in most of the studies is around 14%, except in 3 – 4 studies where it is around 20%. Hence the global incidence cab be taken as 14%

In the table 2, the prevalence of group B streptococci towards the age group < 21, 22-26, >27 years were analyzed. It was found that there was no correlation, between the presence of GBS infection and the age group.

Similarly in table 3, the prevalence of GBS positivity in a particular socio economic group was analyzed, though there were no patients in class 1 and class 2 socio economic statuses included in the study, there was no significant correlation between the class 3, class 4 and class 5 socio economic patients and GBS colonization.

The same observation was observed in a few other studies also.

Gerards CJ, Lab BP, Hoog found no correlation between age and GBS colonization. Hastings MJ, Easmons CS, Neill J could not ascertain any correlation between age, blood group and GBS colonization.

The incidence of preterm labour in GBS Positive women was analyzed as in table 4.

Name of the Study	Percentage of preterm labour in GBS +ve women
Regan JA, Chau S et al	18.00%
McDonald, Vigneshwaran R, O'Loughlin	18.70%
Regan JA, Klebanoff, Nugent	14.70%
CHS Chan, KM Wan, WH Lee	20.00%
Manuel et al	35.00%
McDuffe RS Jr, Mc Nabbs	13.00%
Koshelena et al	21.70%
Matorass R, Garecca Percea	28.20%
Feikin DR, Thorsen P et al	14.00%
Joshi, Chen et al	15.60%
Present study	17.02%

In all the above reference studies and the present study, the association of GBS positivity and preterm labour was found to be significant.

The prevalence of preterm labour in GBS positive patients in the present study was found to be 17.02% and in GBS negative patients it was found to be 4.74%

In this study the association of preterm labour, with GBS colonization was found to be statistically significant.

The incidence of preterm labour was found to be four times more common in patients colonized with GBS, than when compared to patients who were non- colonized.

The incidence of premature rupture of membranes (PROM) prior to the onset of labour was further analyzed as per table 5

Name of the Study	Percentage of PROM in GBS +ve Patients
Regan JA, Chau S, James	8.10%
McDonald, Vigneshwaran R, O'Loughlin	9.90%
CHS Chan, KM Wan, WH Lee	14.20%
McDuffe RS Jr, Mc Nabbs	13.00%
Koshelena et al	13.70%
Present study	10.63%

In all the above studies, including the present study the rate of premature rupture of membranes in GBS positive women was found to be significant, when compared to GBS negative women, when the results were statistically analyzed. In the present study it was further found, that PROM was four times more common in GBS Positive women, when compared to GBS negative women.

After the above parameters the mode of onset of labour among the 300 study population were analyzed (table 6)

Geralds CJ, Lab BP studied the effect of streptococcus carrier state on the mode of onset of labour, and stated though a considerable percentage of patients with GBS colonization went in for spontaneous labour including preterm, premature rupture of membranes, there was no statistical correlation between the mode of onset of labour and GBS positive status.

The same was observed in our study (table 6) where 36 (76.59%) GBS positive women went in for spontaneous labour and 186 (73.52%) GBS negative women went in for spontaneous labour. There was no specific statistically significant correlation, between GBS positive status and mode of onset of labour.

In table 7, the incidence of prolonged first & second stages of labour in GBS positive and GBS negative women were analyzed.

Name of the Study	Percentage of Prolonged labour in GBS +ve Patients
McDuffe RS Jr, Mc Nabbs	33%
Hastings MJ, Easmon CS, Neill J	20%
Present study	32.55%

In all the above studies the incidence of prolonged labour, was found to be more common in patients who are colonized with GBS, than when compared to patients who were non-colonized.

The mode of delivery in study group was further analyzed as per table 8.

The rate of operative deliveries were found to be more common in patients, who were streptococcus positive than compared to streptococcus negative patients. (51.06% in positive Vs 27.66% in negative women) This association between operative deliveries and GBS positive status was found to be statistically significant (p value 0.006)

Caesarean section in the GBS positive group were more commonly seen in those women who had increased duration of labour (8/14), and those who underwent elective induction (5/7). The rest of the caesarean (7/24) excluding the elective sections (4/24) were due do obstetric indications, developed during the process of labour.

Name of the Study	Percentage of Operative Deliveries
Katz et al	42.4%
Liang ST, Lab BP, Fok TF	49.2%
Present study	51.06%

After delivery the APGAR scores of all the babies born to the women under study were analyzed, Gerards CJ, Lab BP, Hoog, Kamp Korstange JA in a study reported low APGAR score in GBS positive women when compared to GBS negative women (<5APGAR:10.2%)

The same was observed in our study with APGAR score at 1 minute of less than 5 was seen in 9 babies (19.14%) of GBS positive women and 12 babies (4.74%) in GBS negative women (table 9)

Similarly when 5 minute APGAR scores were tabulated it was found (table 10) that APGAR scored of less than five was seen in 3 babies, (6.38%) in GBS positive group and in 4(1.58%) babies in the GBS negative groups.

Similar observations were reported by the following studies.

Name of the Study	<5 APGAR at 5 minutes
CHS Chan, KM Wan, WH Lee	10%
Gerards CJ, Lab BP, Hoog, Kamp Korstange JA	8.4%
Present study	6.38%

There was consistent correlation between low APGAR scores and GBS positive status, in the above reference studies and in the presence study.

Following APGAR scores, the birth weight of all the babies born to the women under the study group were analyzed (Table 11)

Name of the Study	Percentage of Low birth weight babies
Regan JA, Klebanoff, Nugent	20.6%
Gerards CJ, Hoog, et al	30.1%
Matorras, Garecea Percea eta al	25.4%
Present study	57.44%

The increased incidence of low birth weight in our study may not be entirely attributed to GBS infection. Other factors such as genetic predisposition, antenatal nutritional status, maternal configurations, might have played a role in these babies being born as low birth weight infants. However, in all the studies mentioned above including the present study the incidence of low birth weight infants, was found to be statistically significant, when compared to that of GBS negative women.

Further the neonatal admission requirements and the number of NICU days required were analyzed as per tables 12, 13 & 14.

Name of the Study	Percentage of GBS Infants admitted
Chan CHS, KM Wan, WH Lee	12%
Gerards CJ, Lab BP	19.5%
Bayer KM	10 - 20%
Present study	21.27%

The varying rates of admission could be attributed to the various methods of standard operative protocols followed by each institution. The rate of neonatal admissions in GBS positive women (21.27%) was found to be statistically significant when compared to that of negative women (5.53%).

Our study had a higher rate of NICU admission. This could be due to the hospital policy of admitting babies with even mild distress. Moreover the three low birth weight babies in our study required extended duration of NICU stay.

The neonatal morbidity and mortality with group B streptococci were further analyzed. (Table 14 &15)

Name of the Study	Neonatal sepsis
Regan JA, Klebranoff	26%
Liang, Lan SP, Fok TF	16%
CHS Chan, KM Wan, WH Lee	13%
Boyer KM	18%
Katz et al	10 - 30%
Campbel et al	14%
Present study	8.51%

The reason for the low incidence of sepsis can be attributed to the small sample size of the study. This could be also partially attributed to the improved tertiary, neonatal care available at our hospital. Further in our study when the rate of sepsis in infants born to GBS positive women (4/10 admissions) and GBS negative women (2/14 admission) were compared, the association between GBS positive status and sepsis rates were not significant. This may be due to the reason that this study was essentially a screening study and the patients under the study group were healthy asymptomatic individuals.

In the same way the fetal mortality due to sepsis and other reasons were analyzed (Table 15). There was one death among infants in GBS positive women due to sepsis, and two deaths in infants in the GBS negative group due to causes, other than sepsis. The association of GBS sepsis related mortality between GBS positive women and GBS negative women was not found to be statistically significant.

Name of the Study	Fetal mortality
Bayer KM et al	10 - 12%
Koshelena et al	12.6%
Campbel et al	10.6%
Present study	2.12%

This low percentage of neonatal mortality may be due to many factors such as small sample size, healthy mothers under study improved neonatal care in the institution etc.,

Following fetal parameters, maternal morbidity was analyzed by way of extended number of hospital days required before discharge of the mother, excluding the days arising out of compulsory stay due to neonatal admissions. The reasons were mostly due to sub involution of the uterus, post partum pyrexia, urinary tract infections, wound infections at the caesarean site and episiotomy wounds etc.

Name of the Study	Maternal morbidity
Mc Duffee RS Jr, Mc Nabbs	35.6%
Hastings et al	20%
Present study	44.68%

The high rate of maternal morbidity could be due to many reasons such as increased incidence of preterm labour, PROM, prolonged labour, increased incidence of operative deliveries etc.

This increased rate could also be attributed to the prepregnant condition of the women, wherein most of them were undernourished because of their low socio economic status.

However maternal morbidity when compared between GBS positive and negative patients (44.68% vs 9.48%) was found to be significantly higher. Also the association of maternal morbidity with GBS positive status remained statistically significant.

There was no maternal mortality in the study group of both the categories.

SUMMARY

- The prevalence of group B streptococcal colonization in asymptomatic prim in the study population was 15.66%
- The maternal colonization with group B streptococci was not related to age, and socio economic status of the patients.
- There was an increased incidence of preterm labour (17.02%) and premature rupture of membranes (10.63%) in patients colonized with group B streptococci, when compared to those who were not colonized.
- There was an increased incidence of prolonged labour (29.78%) among the positive group when compared to the negative group (3.55%)
- There was an increased incidence of low APGAR scores among babies born to positive women than when compared to negative women.
- There was an increased incidence of operative deliveries among GBS colonized women (51.06%) than when compared to GBS negative women (27.66%).
- There was statistically significant, increased rate of neonatal admissions (21.27%) and increased number of NICU days required by the babies born to GBS positive mothers than in the negative group.
- The incidence of sepsis in GBS positive mothers was 8.51%. However when analysed statistically the association between GBS positive status and the rate of sepsis in GBS positive mothers, was insignificant when compared to GBS negative mothers.
- The mortality rate of the neonates in the GBS positive group was 2.3%. This low rate could be due to the improved neonatal care available at our institution.
- There was significant maternal morbidity (analyzed in terms of extended number of hospital days required) in GBS positive group (44.68%), when compared to GBS negative group.
- There was no maternal mortality in both groups.
- From the above statements it could be inferred that the screening of all the pregnant women at 37 -38 weeks of gestation, serves to be an important factor in reducing the incidence of preterm labour, premature rupture of membranes, and hence decrease the probability of low birth weight, low APGAR scores, and hence subsequent morbidity and mortality of both the mother and the newborn.

CONCLUSION

1. The prevalence of Group B streptococcus infection at 35 -37 weeks of gestation in normal, asymptomatic primi attending the routine antenatal clinic in a level three tertiary care institution is 15.66%.
2. The incidence of preterm labour in GBS colonized women is 17.02%, and in non colonized women is 4.74%. There is statistically significant increased risk of preterm labour in GBS positive women.
3. The incidence of premature rupture of membranes in colonized women is 10.63% and in non colonized women in 2.76%. The association of premature rupture of membranes and GBS positive status is statistically significant.
4. The puerperal morbidity in GBS positive women is 44.68% and in negative women is 9.48% There is significant increased puerperal morbidity in GBS positive women.
5. There is statistically increased incidence of operative deliveries (51.06%) in GBS positive women, when compared to negative women (27.66%).
6. There is statistically significant increase in neonatal morbidity in the form of increased neonatal admissions in GBS positive women (21.27%) when compared to GBS negative women. (5.53%). The number of days of NICU stay of the neonates was not significant in GBS positive women when compared to GBS negative women.
7. The neonatal mortality rates were not significant (1/47 babies) in babies born to GBS positive patients when compared to GBS negative patients (2/253 babies).
8. All the above conclusions, point out the importance of GBS screening during the antenatal period and the need to include it in the screening protocol of our health systems in the present era of evidence based medicine.

ANNEXURE
PROFORMA

Name	
Age	
Socio Economic Status	
Gestational age as per last menstrual period	
Obstetric examination	
Investigation	
Preterm labour	Yes/No
Prematute rupture of membranes	Yes/No
Mode of onset of labour	spontaneous/induced
Prolonged labour	yes/ No
Mode of delivery	normal vaginal/IVD/LSCS

APGAR Score	
One minute	
Five minutes	
Birth weight	
Neonatal admission	Yes/ No.
Neonatal morbidity	sepsis, pneumonia, severe respiratory distress, LBW/ others.
Number of NICU days of admission	
Neonatal mortality	sepsis/ others
Maternal morbidity	Yes/No
Extended number of hospital days.	
Maternal mortality	Yes/No.

Key: CTG cardio tocogram, IVD – instrumental vaginal deliveries LSCS – Lower segment caesarean section, NICU – Neonatal intensive care unit, LBW, low birth weight.

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