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Original Research Article

UNIVERSAL SCREENING OF ANTENATAL WOMEN FOR GROUP B STREPTOCOCCI AND ITS OUTCOME

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Abstract

Background: Universal screening of antenatal women for group b streptococci and its outcome. **Materials and Methods:** This analytical Study was done in the department of Obstetrics & Gynaecology Institute of Social Obstetrics and Government Kasturba Gandhi Hospital for Women and Children, Chennai from January 2014 to October 2016. 300 primi gravid women of 35 – 37 weeks of gestation were recruited for the study, based on the inclusion and exclusion criteria. The study was approved by the hospital ethical committee. A detailed history was taken in all the women recruited for study. The 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 basic investigations were done in all women. **Results:** 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. The prevalence rate of Group B streptococci in asymptomatic primi gravid was found to be 15.66%. 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. 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. There was no statistical significance between the GBS status of mother and neonatal mortality when compared among the two groups. It is found that there is a significant association between group B streptococcal positivity and maternal morbidity. (p value 0.00). **Conclusions:** We concluded that GBS screening importance 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.

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.[1] 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. Epidemiological studies in India have shown maternal colonization rates ranging from 12 -18%. Reported perinatal transmission rates in the newborn

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ranges from 53 to 56%. However the incidence ofinvasive 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.[2]

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.[3] Group B streptococcus can cause significant morbidity in pregnant women. The manifestations include Chorioamnionitis, Endometritis, Cystitis, Pyelonephritis, Febrile bacteremia, Postpartum endometritis, following caesarean delivery, Prolonged labour, Premature rupture of membranes (PROM) and Preterm delivery.[4] 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. Because group B infection can cross the intact amniotic membranes, a caesarean delivery does not prevent mother to child transmission of the infection.[5] 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.

MATERIALS AND METHODS

This analytical Study was done in the department of Obstetrics & Gynaecology Institute of Social Obstetrics and GovernmentKasturba Gandhi Hospital for Women and Children, Chennai from January 2014 to October 2016. 300 primi gravid women of 35 – 37 weeks of gestation were recruited for the study, based on the inclusion and exclusion criteria. The study was approved by the hospital ethical committee. A detailed history was taken in all the women recruited for study. The 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 basic investigations were done in all women.

Inclusion Criteria

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

Exclusion Criteria

- All multigravida
- Primi gravid with less than 35 weeks of gestation.
- Non cephalic presentation
- Multiple pregnancy
- All high risk pregnancies
- Patients with uterine anomalies

Methodology

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

One minute and five minute APGAR of all the babies were recorded, Birth weight, Neonatal admissions, Duration of stay in Neonatal Intensive care unit (NICU) and Neonatal mortality were observed. 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 criterion for accessing maternal morbidity.

Statistical Analysis

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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.

RESULTS

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

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

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. [Table 1]

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). [Table 2]

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. 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. [Table 3]

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)). 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). [Table 4]

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. 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). [Table 5]

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. [Table 6]

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. [Table 7]

All the low APGAR babies and very low birth weight babies in both the category were admitted. [Table 8]

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,

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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). [Table [9]

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. [Table 10]

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). [Table 11]

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. [Table 12]

Table 1: Age and Socio Economic Status of the participants

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		
Socio Economic Status						
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		
III	3	6.38	19	7.51		

Table 2: 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			

Table 3: 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			

Table 4: 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			

Table 5: 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		
		APGAR score at 5 minutes							
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		

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Table 6: 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	

Table 7: 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			

Table 8: 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

Table 9: Number of NICU days for the baby

GBS	N	Number of NICU days for the baby						X value	p- value
		< = 5		6 – 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		

Table 10: 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		

Table 11: 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			

Table 12: Extended Number of Hospital days for the mother

GBS	N	Number of NICU days for the baby						X^2 value	p- value
		< = 5		6 – 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		

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 13) among the pregnant women was analyzed it was found that the rate of colonization differ worldwide between 12- 24%. In India the rate of colonization varies between 14 – 18%.

Table 13: The rate of GBS colonization

Name of the Study	GBS Prevalence Rate
Regan JA, Klebanoff et al[6]	21%
McDonald, Vigneshwaran R, O'Loughlin[7]	13.20%
ChauS, Arul Kumaran et al[8]	14.10%
CHS Chan, KM Wan, WH Lee[9]	24%
Manuel et al[10]	14.60%
Lucto M et al[11]	12%
Tim SF, Lyon DT, Chung KH[12]	7.40%
Zalenik DF et al[13]	14%

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McDuffe RS Jr, Mc Nabbs[14]	18%
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%.

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%. Regan JA, Chau S et al,[6] (18%), McDonald et al,[7] (18.70%), CHS Chan et al,[8] (20%), Manuel et al (35%) and McDuffe et al,[14] (13%) and Koshelena et al,[15] (15%)were also found similar results.

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.

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. Geralds CJ et al16 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 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. McDuffe RS et al,[14] (33%) and Hastings MJ et al,[17] (20%) were found the incidence of prolonged labour, was more common in patients who are colonized with GBS, than when compared to patients who were non-colonized.

After delivery the APGAR scores of all the babies born to the women under study were analyzed, Gerards CJ et al,[16] 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. Similarly, when 5 minute APGAR scores were tabulated it was found 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. There was consistent correlation between low APGAR scores and GBS positive status, in the above reference studies and in the presence study. The others authors were found low birth rate were Regan JA et al,[6] (20.6%), Gerards CJ et al,[16] (30.1%).

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. 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%). Similar study were also found by others authors.[12-15]

Our study had a higher rate 8.51% of NICU admission. Regan JA et al,[6] (26%) and CHS Chan et al9 (13%) were also found similar results. 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. This low percentage of neonatal mortality 2.12% may be due to many factors such as small sample size, healthy mothers under study improved neonatal care in the institution etc., Koshelena et al,[15] were found 12.6% neonatal mortality. 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.

CONCLUSION

We concluded that GBS screening importance 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.

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