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Maternal anxiety about prenatal screening for group B streptococcus disease and impact of positive colonization results

P.J. Cheng *, S.W. Shaw, P.Y. Lin, S.Y. Huang, Y.K. Soong

Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, Taipei, Taiwan, ROC

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Abstract

Objective: Universal screening for colonization by group B streptococcus (GBS) is the recommended strategy to reduce incidence of colonization in newborns and prevent neonatal GBS-related disease. This study was designed to assess maternal anxiety levels about prenatal screening and psychological impact of positive colonization test results.
Methods: A total of 71 women who screened positively for GBS colonization and 112 screen-negative women (controls) were recruited. Anxiety levels were measured by the Spielberger State Trait-anxiety Inventory just before the GBS screening test, 1-week after testing, and 1-week after delivery. After delivery of their infants, all participants were asked to respond with a Likert scale line about attitudes toward being tested for GBS colonization.
Results: Women with GBS colonization reported significantly greater psychological distress on state-anxiety scores after the full report was received. The trait- and state-anxiety scores before GBS screen testing and after delivery did not differ between the groups. Both groups of women were strongly positive about being screened for GBS in the current pregnancy and in future pregnancies.
Conclusion: Women with GBS colonization did not have a sustained increase in anxiety; therefore, clinician concerns about causing maternal anxiety should not be an impediment to test for GBS.

Keywords: Group B streptococcus; Prenatal screening; Anxiety

1. Introduction

Infection by *Streptococcus agalactiae* (group B streptococci [GBS]) is still a common cause of neonatal diseases such as pneumonia, septicemia, and meningitis [1–3]. It is generally accepted that bacterial colonization of the fetus during passage through the vagina is the main cause of early-onset infections (those among neonates aged less than 7 days). Universal screening for GBS colonization at 35–37 weeks' gestation followed by selective intrapartum chemoprophylaxis (IPC) for all affected women is the strategy currently recommended to reduce incidence of colonization in neonates and prevent early-onset GBS-related diseases [4–6].

Although prenatal screening protocols for GBS are common in Taiwan, little is known of women's perceptions of this screening or the condition of bacterial colonization itself. The aims of this prospective longitudinal study were to assess maternal anxiety levels about prenatal screening for GBS, as well as the psychological impact of positive colonization test results.

2. Methods

Since 2003, the Chang Gung Memorial Hospital in Linkou, Taiwan has offered routine screening for GBS colonization to all pregnant women. Prenatal GBS screening culture is performed between 35 and 37 weeks of gestation under the guidelines published by the Centers for Disease

* Corresponding author at: Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, 5, Fu-Shin Street, Kwei-Shan, Tao-Yuan, 333, Taiwan, ROC. Tel.: +886 3 328 1200x8258; fax: +886 3 328 8252.
E-mail address: pjcheng@cgmh.org.tw (P.J. Cheng).

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Control and Prevention (CDC, USA) [7] and the American College of Obstetricians and Gynecologists (ACOG) in 2002 [8]. Vaginal and rectal swab specimens from each woman are collected separately, with both swabs placed into the same container with Amies medium (Copan, Italy) to be cultured within 36 h in non-enrichment and in selective medium for 48 h at 36 ± 1 °C. Mueller Hinton agar (Oxoid, Unipath) supplemented with 5% defibrinated sheep blood is employed for antimicrobial susceptibility testing. Minimum inhibitory concentrations of penicillin, ampicillin, cefotaxime, tetracycline, erythromycin, and clindamycin are evaluated according to the National Committee for Clinical Laboratory Standards (NCCLS) guidelines [9]. The full screening test report is available to clinicians within 72 h; pregnant women are informed of the GBS colonization and antimicrobial susceptibility testing results during a routine clinic appointment 1 week later. At the time of labor or rupture of membranes, intrapartum chemoprophylaxis is given to all pregnant women identified as GBS carriers. For intrapartum chemoprophylaxis, the specific regimen for each colonized woman is chosen according to history of penicillin allergy, report of antimicrobial susceptibility testing, and result of antimicrobial challenge test.

This study was performed between May 2003 and April 2004. Women who could read and write Chinese sufficiently well to respond to written self-report questionnaires and who agreed to participate in this study were recruited. Based on prenatal GBS testing results, participants were divided into two groups. Those who had GBS colonization formed the study group; the control group consisted of women without GBS colonization. Exclusion criteria were the following: (1) clinical GBS bacterial infection during the current pregnancy, (2) previous delivery of an infant with early-onset GBS disease, (3) unknown culture results at the time of delivery, (4) delivery at <37 weeks' gestation, (5) delivery with duration of membrane rupture ≧18 h, (6) presence of intrapartum temperature ≧100.4 °F [≧38.0 °C], or (7) planned cesarean delivery performed in the absence of labor or membrane rupture.

Anxiety levels in all participants were measured using the Spielberger State Trait-anxiety Inventory (STAI) [10]. The STAI comprises two self-report scales for measuring two distinct anxiety concepts, state-anxiety and trait-anxiety. Both scales contain 20 statements that ask the respondent to describe how she feels at a particular moment in time (state-anxiety) or how she generally feels (trait-anxiety). State anxiety is conceptualized as a transitory emotional state, whereas trait-anxiety refers to relatively static individual differences in proneness to anxiety. The STAI used in this study had been translated from English into a Taiwan Chinese version. The test-retest reliability for the Taiwan Chinese version of STAI has been established as 0.74 for state anxiety and 0.76 for trait-anxiety. Cronbach's alpha was 0.90 for state anxiety and 0.86 for trait-anxiety. Each item in the STAI was scored on a scale of one to four. Total scores obtained on the state- and trait-anxiety scales ranged from 20 to 80. Variation in score indicates significant differences in level of anxiety. All women were asked to answer both the trait-anxiety questionnaire and the state-anxiety questionnaire on three occasions: (1) before GBS screening, (2) 1 week after screening when the full test report was given, and (3) 1 week after delivery. After delivery, study-group participants were asked to respond along a Likert scale line about their attitudes toward being tested for GBS colonization with six questions: (1) "How did you feel when you were first told you had GBS colonization?" (2) "How do you feel now?" (3) "Are you glad you had a test for GBS colonization?" (4) "Do you wish you had never had a test for GBS colonization?" (5) "Do you want to be tested for GBS colonization if you have another child?" and (6) "Do you think having GBS colonization in this pregnancy might influence your decision whether or not to have more children?" Women in the control group were not asked questions 1, 2, and 6.

Demographic data including each woman's age, marital status, parity, education, occupation, and total family income were recorded. Information on whether the current pregnancy was planned or unplanned and whether there was any previous infant who developed early-onset GBS disease was also recorded. The research protocol was approved by the Chang Gung Memorial Hospital Research and Ethic Committee prior to implementation. The SPSS 11.0 statistical package (SPSS Inc., Chicago, IL, USA) was used for all statistical analysis. Analysis of variation (ANOVA), Mann–Whitney *U*-test, Student's *t*-test, and X^2-test were used as appropriate for comparisons between the two groups. The criterion for statistical significance was set at $P < 0.05$.

3. Results

Over the 12-month study period, a total of 762 women received prenatal GBS screening and completed the STAI. Of these 762 women, 85 women with positive GBS colonization were eligible for the study and 71 agreed to participate and completed the study questionnaires. The control group consisted of 112 randomly selected, age-matched, screen-negative women who agreed to participate and completed the study questionnaires on the three specific occasions.

There were no significant differences between groups with respect to age, marital status, parity, education, occupation, or total family income. Table 1 shows the anxiety scores for women in both the GBS colonization and control groups. The trait- and state-anxiety scores before GBS screening did not differ between groups. Women with GBS colonization reported significantly greater psychological distress on the state-anxiety scores after the full report had been given. However, by the third time the questionnaire was completed (e.g., postpartum), trait- and state-anxiety scores did not differ between groups.

Table 1
Anxiety status scores for women with GBS colonization and control subjects

	Women with GBS colonization ($n = 71$)	Control subjects ($n = 112$)	P^*
Trait-anxiety (STAI)			
Before GBS screen testing	39.0 (10.0)	42.0 (8.25)	0.61
After full report given	43.0 (5.0)	41.5 (6.25)	0.72
Postpartum	40.0 (5.75)	39.0 (6.0)	0.81
State-anxiety (STAI)			
Before GBS screen testing	39.0 (6.0)	41.5 (6.5)	0.41
After full report given	45.0 (9.0)	37.5 (6.25)	0.007
Postpartum	38.0 (5.25)	37.0 (6.5)	0.45

All the scores are expressed as median (interguartile).
* Mann–Whitney *U*-test.

Table 2
Responses on a 0–100 Likert scale re. feelings about prenatal GBS screening for all study participants

	Women with GBS colonization ($n = 71$)	Control subjects ($n = 112$)	F	P
Are you glad you had a test for GBS? (0 = no, 100 = yes)	92.6 ± 19.5	93.9 ± 12.7	0.03	0.78
Do you wish you never had a test for GBS? (0 = no, 100 = yes)	8.7 ± 23.6	4.9 ± 10.1	1.09	0.24
Do you want to be tested for GBS if you have another pregnancy? (0 = no, 100 = yes)	93.9 ± 16.1	94.1 ± 8.6	0.19	0.66

Data are means ± S.D.

A summary of patients' attitudes toward prenatal testing for GBS is shown in Table 2. Using ANOVA, no significant differences were detected between women with GBS colonization and control subjects in the postpartum period. Both groups of women were strongly positive about being screened for GBS in the current pregnancy and in any future pregnancies. When women who had screened positive were asked how they felt after being informed of the screening result, responses were diverse. On a 0–100 Likert scale, the mean response was 61.3 (standard deviation [S.D.] 27.9, range 0–100) when women were first told they had GBS colonization. However, the score had decreased significantly ($P = 0.000$) to 22.7 (S.D. 19.8, range 0–79) 1 week after delivery. The presence of GBS colonization in the current pregnancy did not seem to be an impediment to consideration of future pregnancies. When subjects were asked the question "Do you think having GBS colonization in this pregnancy might influence your decision whether or not to have more children? the response was 9.1 (S.D. 14.4) in the postpartum period.

4. Discussion

There have been tremendous advances in prenatal screening and diagnosis over the past decade. As a result, research attention on women's psychological responses regarding screening in general is increasing. Such reports have mostly focused on women's reaction to antenatal genetic screening, primarily tests predicting fetal abnormalities such as first-trimester ultrasound nuchal translucency measurement [11,12] and mid-trimester maternal serum marker screening [13,14]. This type of screening identifies a risk of chromosomal abnormalities in the fetus. Women who are assigned a risk above an arbitrary cut-off level are designated screen-positive. They are then offered invasive, definitive testing procedures for the diagnosis of fetal conditions such as Down syndrome. According to the literature, these screen-positive women exhibit great anxiety [15,16]. This response may occur because women have not anticipated themselves to be at increased risk, or they may have erroneously interpreted the meaning of a positive screen. Although adequate counseling has been shown to reduce the anxiety level of women screened for such fetal defects, the effect in anxiey reduction will not be as great as when the final result turns out to be normal [17].

GBS colonization testing is a different model for prenatal screening, yet there has been no specific research exploring links among the experience of prenatal testing, receipt of positive results, and maternal anxiety level. In our study area, all pregnant women planning to deliver vaginally are screened for GBS colonization with vaginal and rectal swabs at 35–37 weeks' gestation. At the time of labor or rupture of membranes, intrapartum chemoprophylaxis is given to all pregnant women identified as GBS carriers. Little is known about the psychological perceptions of undergoing such screening and receiving colonization results. Anxiety levels in all participants were measured by the STAI. The STAI is

designed to differentiate between the temporary condition of ''state anxiety'' and the more general and long-standing quality of ''trait-anxiety'', which has been extensively used and validated in clinical situations. The state anxiety scale evaluates feelings of apprehension, tension, nervousness, and worry, which increase in response to physical danger and psychological stress. As demonstrated in our present study, women in whom GBS colonization was confirmed recalled a high level of worry at the time they received the test result. This anxiety had reduced significantly in the postpartum period. Both women with GBS colonization and control subjects remained very positive about having been tested for GBS and about the need for testing in future pregnancies. Compared with control subjects, women with GBS colonization revealed a higher state-anxiety score, but the trait-anxiety score was not significantly different when the full test report was released (Table 1). This indicates that their anxiety was reactive rather than intrinsic. In the postpartum period, there were no significant differences in any of the scores.

Our study showed that women with GBS colonization were worried and anxious at the time of a positive diagnosis, a phenomenon similar to that seen with prenatal genetic screening despite the basically different screening methods involved. One possible explanation for this phenomenon is related to the patient's knowledge level about the screening. Knowledge was demonstrably poor in women undergoing Down's syndrome screening, and researchers have speculated that the paucity of information regarding the screen was causing anxiety [11–13,15,18]. For women's perceptions of GBS screening and the disease itself, a quantitative study that focused on group interview data showed that women's understanding of the bacterium and its associated screening continued to be generally poor, largely because it had either never been mentioned to the patient or had only been cursorily described [19]. In our study, women with positive GBS colonization were specially counseled for its relatively harmless maternal effects and for receiving intrapartum chemoprophylaxis to benefit the fetus. In the postpartum period, we were unable to demonstrate any increased level of anxiety among women who had required intrapartum antibiotic therapy. It is very likely that receiving appropriate medical advice and a treatment plan quickly dissipated any anxiety and distress felt on receipt of the positive colonization report. These should be explored by further studies.

Other approaches to the problem of GBS colonization, among them, implementing GBS screening for both high-risk and low-risk pregnant women and providing assuring antenatal care before delivery, might also contribute to lack of postpartum anxiety. In the current study, all women, rather than women with selected risk factors, were offered a test for GBS. Consequently, the anxiety about being listed in a high-risk group was avoided. In addition, women with GBS colonization were followed at approximately 1-week intervals during pregnancy and were well informed about what would happen in the intrapartum and postpartum periods.

To the best of our knowledge, our study is the first prospective longitudinal study of anxiety for pregnant women screened for and diagnosed with GBS infection. Their anxiety level was assessed separately when first told about the screening, after the result was disclosed, and finally, in the postpartum period. Some women with GBS colonization had reactive anxiety at the time of diagnosis that had settled by the postpartum period (Table 1). In the postpartum period, no differences could be demonstrated between women diagnosed and treated with GBS and control subjects.

The potential for causing maternal psychological stress by complicated testing in pregnancy has always been a concern for clinicians concerned with maternal welfare. The beneficial effects for fetuses of treatment for GBS colonization have been well established. In this study, we imagine that anxious feelings for the health of their unborn babies experienced in women positive for GBS became a positive supplementary support that helped to get them through the antenatal follow-ups and delivery of their infants. These women did not have any sustained increase in anxiety. Moreover, according to our study, among all women screened for GBS, those with positive and negative results alike, there was great approval for the test and the desire to have screening for their next pregnancy. Screening for GBS during pregnancy is done for the fetus's benefit and concerns about causing anxiety in mothers should not be a deterrent to testing.

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