

Does Group B Streptococcal Infection Contribute Significantly to Neonatal Sepsis in Antigua and Barbuda?

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ABSTRACT

Group B streptococcus is the most common cause of neonatal sepsis in the United States of America (USA). This study was undertaken to determine the contribution of group B streptococcus to neonatal septicaemia in Antigua and Barbuda. From 1994 to 2002, there were about 12 000 births, with 2500 Special Care Nursery admissions, 1100 (44%) with potential neonatal septicaemia. Blood cultures were done in 433/1100 (39%) and cerebrospinal fluid cultures in 52/1100 (5%). Positive cultures were seen in 41/433 (9.5%) with group B streptococcus in 1/41 (2.4%), streptococcus "species" in 3/41 (7.4%) and positive cerebrospinal fluid cultures were seen in 2/52 (one group B streptococcus) giving 5 per 12 000 or 0.4 cases per 1000 babies. Vaginal cultures from 1994 to 2002 revealed group B streptococcus in 14/163 (8.6%) of positive bacterial cultures. A sample of pregnant women from a private office had positive culture for group B streptococcus in 2/120 (1.7%). The prevalence rate of carriage (15 to 40%) and infection (1.7 to 4 per 1000 babies) was much higher in the USA in the same period. Universal screening of mothers for group B streptococcus may not be as necessary or cost-effective in Antigua and Barbuda.

¿Contribuye Significativamente la Infección Estreptocócica del Grupo B a la Sepsis Neonatal en Antigua y Barbuda?

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RESUMEN

Los estreptococos del grupo B son la causa más común de sepsis neonatal en los Estados Unidos (EE.UU.). Este estudio se llevó a cabo con el propósito de determinar en que medida los estreptococos del grupo B contribuyen a la septicemia neonatal en Antigua y Barbuda. Desde el año 1994 hasta el 2002, hubo alrededor de 12000 nacimientos, con 2500 ingresos a la Guardería de Cuidados Especiales, 1100 (44%) con septicemia neonatal potencial. Se realizaron cultivos de sangre en 433/1100 (39%) y cultivos del líquido cefalorraquídeo (cerebroespinal) en 52/1100 (5%). Se observaron cultivos positivos en 41/433 (9.5%) con estreptococos B en 1/41 (2.4%), "especies" de estreptococos en 3/41 (7.4%), y se observaron cultivos cefalorraquídeos positivos en 2/52 (1 de estreptococos del grupo B), para 5 por 12 000 ó 0.4 casos por 1000 recién nacidos. Los cultivos vaginales desde el año 1994 al 2002 revelaron estreptococos del grupo B en 14/163 (8.6%) de los cultivos bacterianos positivos. Una muestra de mujeres embarazadas – provenientes de una oficina privada – tuvo un cultivo positivo para estreptococos del grupo B en 2/120 (1.7%). La tasa de prevalencia de portación (15 a 40%) e infección (1.7 a 4 por 1000 recién nacidos) fue mucho más alta en los EE.UU. en el mismo período. El pesquiasaje universal de madres en relación con el estreptococo de grupo B puede no ser tan necesario o costo-efectivo en Antigua y Barbuda.

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INTRODUCTION

Group B streptococcus is an important cause of perinatal morbidity and mortality in the United States of America (USA) and other developed countries (1, 2). Prior to 1990, in the USA, this organism was the most frequent cause of neonatal septicaemia and meningitis (1–4), causing up to 55% of early neonatal sepsis (4) with case fatality rate of 20% (5). In

that era, 15 to 40% of women were colonized in the vaginal or rectal areas and vertical transmission accounted for about 1 to 4 cases of neonatal septicaemia per 1000 babies born in the USA (5, 6). About 40 to 70% of newborns of mothers carrying group B streptococcus become carriers themselves compared with 3 to 12% of babies born to non-carrier mothers (5). In 1996, the Centers for Disease Control in the USA published guidelines for the use of antibiotics in high risk mothers (1) and in 2002, extended this to pregnant women having vaginal or rectal cultures positive for group B streptococcus at 35 to 37 weeks gestation (6). Little information is available on the prevalence of group B streptococcus in the Caribbean. A recent report from the University Hospital of the West Indies, Kingston, Jamaica, suggests a lower rate for group B streptococcal infection in newborns than in the USA (7). The present study was undertaken to assess the prevalence of neonatal infection with group B streptococcus and the need for widespread prenatal screening in Antigua and Barbuda.

SUBJECTS AND METHODS

A retrospective review of records at Holberton Hospital in Antigua was undertaken. Holberton Hospital is the only full service hospital in Antigua and Barbuda, handling about 90% of the deliveries and having the only neonatal care facility. Holberton Hospital serves a population of 70 000, 90% Afro-Caribbean; the mean income is US\$5000 with 70% from tourism at the time of observation.

Data recorded included the number of live births in Antigua and Barbuda, the number of babies admitted to the Special Care Nursery and the number of babies with clinical conditions in which neonatal sepsis was a possibility from Special Care Nursery records. The number of blood and cerebrospinal fluid culture results were obtained from the Pathology Department and the Infection Control Committee. Results of conjunctival and umbilical cultures were also recorded. The number and results of vaginal cultures from the Pathology Department were recorded. The records of obstetricians in private practice who were performing surveillance cultures were reviewed.

RESULTS

From January 1994 to June 2002, there were about 12 000 babies born in Antigua and Barbuda. Of these, 2500 babies (21%) were admitted to Special Care Nursery. Conditions associated with neonatal septicaemia were present in 1100 of 2500 (44%) of babies. These conditions included prematurity (13% of babies admitted), prolonged rupture of membranes (7%), respiratory distress (10%) and other problems suggesting sepsis such as fever, lethargy and poor feeding (14%).

Culture results were available from January 1994 to June 2002. Blood cultures were obtained in 433 of 1100 babies (39.4%) suspected of sepsis during that time,

depending on equipment availability. Blood cultures were positive in 41 of 433 cases (9.5%). Gram positive organisms accounted for 20 of 41 cultures (48.7%) with coagulase negative staphylococcus accounting for 13 of 41 (31.7%). Gram negative organisms accounted for 20 of 41 cultures (48.7%) with *Klebsiella* species accounting for 9 of 41 (22.0%) and *Escherichia coli* accounting for 4 of 41 (9.7%). There was one culture positive for *Candida* species (2.4%). Group B streptococcus accounted for 1 of 41 (2.4%) cases of sepsis with another 3 cases of streptococcus "species" (7.3%) found.

A total of 52 of 895 babies (5.8%) had cerebrospinal fluid cultures performed based on equipment availability. There were 2 of 52 positives (3.9%) with one being Group B streptococcus. A total of 69 conjunctival cultures were sent, 59 (86%) positive. One of 59 (1.7%) was positive for group B streptococcus. There were 33 umbilical cultures sent with 31 of 33 (94%) positive with none identified as group B streptococcus and 2 of 31 (6.5%) identified as streptococcal "species". Adding the one cerebrospinal fluid culture result to the four blood cultures specimens positive for group B streptococcus would give a prevalence of 0.4 per 1000 babies born during that period.

There was a total of 516 vaginal cultures done at Holberton Hospital, with 163 of 516 (31.6%) reporting bacterial culture results. Of these, 14 of 163 (8.6%) were positive for group B streptococcus. One obstetrician reported having performed vaginal cultures at 35 to 37 weeks gestation in pregnant women as per recommended guidelines. There were 120 vaginal cultures performed with 2 of 120 (1.7%) positive for group B streptococcus.

DISCUSSION

Prior to the introduction of antibiotic treatment to prevent the vertical spread of group B streptococcus from mother to baby, group B streptococcus accounted for 31 to 54% of cases of neonatal septicaemia (4, 8, 9) and affected 1.7 to 4 babies per 1000 born (1, 3, 8, 9) with a case fatality rate of 5 to 20% (1). Following the introduction of antibiotic treatment for high risk mothers (a previous baby having group B streptococcal disease, group B streptococcal bacteriuria, duration of ruptured membranes over 18 hours or delivery at less than 37 weeks gestation), the prevalence fell from 1.7 to 0.6 per 1000 babies, a 65% decrease (10). Routine screening with treatment of mothers carrying Group B streptococcus may lower the risk of group B streptococcal disease from 0.5 per 1000 to 0.44 per 1000 compared with treating only high risk mothers (11). In a recent report from the USA in the era of maternal screening, 0.37 in 1000 live born babies were identified with early onset group B streptococcus infection (12).

This study from Antigua and Barbuda suggests that the burden of neonatal septicaemia due to group B streptococcus may be less than that reported in developed countries. The

prevalence of 5 (4 blood, 1 CSF) per 12 000 babies in Antigua and Barbuda, 0.4 per 1000 is very low. The percentage of group B streptococcus positive cultures, 5 per 43 (11.6%) for blood and CSF, compares with 31 to 51% before antibiotic prophylaxis in the USA. In neonates in Jamaica, group B streptococcus accounted for 12% of septicaemia (13). The low prevalence of group B streptococcus on vaginal cultures in Antigua and Barbuda of 1.7% to 8.6% compared with 15 to 40% in the USA and would suggest a much lower carriage rate in women in Antigua and Barbuda. In Kingston, Jamaica, the prevalence of early group B streptococcal infection in newborns was 0.66 per 1000 from 1991 to 2000 (7) suggesting that this may be a regional phenomenon. In Guyana, group B streptococcus was an infrequent cause of neonatal sepsis (14). In Kenya, group B streptococcal bacteraemia was identified in the first 28 days in 0.66 per 1000 live births (15) suggesting that this may be a more widespread phenomenon.

Late onset neonatal sepsis (after 72 hours of life) from group B streptococcus was not recognized in Antigua and Barbuda but accounted for 28% of infections in Jamaica (7) and 20% of cases in the USA (11). Even following the use of antibiotic prophylaxis in the USA, group B streptococcus accounted for 40 to 45% of cases of neonatal sepsis (16, 17). The cost of prophylactic antibiotics has also included an increase in resistance of *Escherichia coli* to ampicillin (16, 17). Although group B streptococcal disease became less frequent (5.9 to 1.7 per 1000) following antibiotic prophylaxis in very low birth weight babies, *Escherichia coli* infections have increased (3.2 to 6.8 per 1000) comparing 1988 to 2000 (18).

The current recommendation from the Centers for Disease Control in the USA is that all pregnant women have vaginal and rectal culture at 35 to 37 weeks gestation, and if positive, should receive intrapartum penicillin G 5 million units intravenously then 2.5 million units every 4 hours or ampicillin 2 grams intravenously then 1 gram every 4 hours (6). Women with risk factors should be treated regardless of culture results, and those undergoing Caesarean section need not be treated (6). In Jamaica, the majority of mothers having infected babies had risk factors including fever (21%), preterm rupture of membranes (39%) and rupture of membranes for over 12 hours (43%) (7).

This study suggests that in Antigua and Barbuda and perhaps elsewhere in the Caribbean region, the prevalence of Group B streptococcal disease is already lower than that following prophylactic antibiotic use in the USA. Recent reports from Germany (0.47 per 1000) and the United Kingdom (0.55 per 1000) also suggest lower rates than the USA (19, 20) in the absence of wide-spread screening. The low prevalence of vaginal carriage would suggest that routine screening of pregnant women in Antigua and Barbuda may not be as cost effective an intervention as it has been in the USA. Country-specific prevention guidelines are needed

concerning screening of pregnant women for group B streptococcus (19, 20).

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