Low Birth Weight In Asia: An Ethnic, Socioeconomic and Clinical Enigma

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Introduction

Low birth weight, remains an enigma in developing countries which struggle with high perinatal mortality rates. (Tamby Raja 1985). Ethnic differences in birth weight have been highlighted as a major contributor to high still birth rates. It is fundamental to consider differences in growth and maturation when, seeking to provide antenatal care and safe delivery in different ethnic groups. (Tamby Raja and Papiernik 1989).

Social rather than genetic factors have been considered to be the chief contributors to low birth weight, among both term and preterm infants, and the associated increase in infant mortality. Vital statistics show a decrease in low birth weight among babies born to poor women, regardless of race, as their socioeconomic status improves. The remaining confounding factor, however is the fact that African — American women with the same socioeconomic status as white women have twice as high a risk of giving birth to an infant weighing less than 2500g and three times as high a risk of delivering a very - low-weight infant as do the Indian women in Singapore (Tamby Raja (1997). Preliminary evidence shows that there are intergenerational effects on birth outcome. In the past, virtually all studies of the effect of socioeconomic status on perinatal outcome have been cross-sectional; how long a family has its current social position has not been evaluated. Rapid socioeconomic progress in multiracial Singapore has made us study social and racial factors in pregnancy outcome.

Socioeconomic factors and race

To look for a genetic cause of the difference in birth weight between the races has to wait until the sociocultural questions have been answered. This has been done in Singapore and France. (Tamby Raja and Papiernik (1994). Race very often serves as a proxy for poverty. The importance of "nonmedical" barriers to a good health care outcome has not been fully appreciated by the medical profession. Sociologists recognize attitudinal and organizational barriers to healthcare. Attitudinal barriers are those that prevent individual persons from becoming motivated to seek the much needed health services. Organizational barriers, in contrast, prevent motivated persons from obtaining the services they know they need. Examples of attitudinal barriers are cultural isolation, fatalism, customs, superstition and fear. Examples of organizational barriers are lack of health insurance, lack of transportation, poor access to health care providers, a paucity of health care facilities and the like. It is known that these barriers are greatest in minority communities and are being overcome in Asia.

Birth weight does not always correlate with maturity and survival. Socioeconomic conditions have often been thought to be a major cause of prematurity in the developing world. Our studies indicate that genetic factors interact with nutrition in determining the duration of gestation. The mortality of these infants can only be decreased by improved antenatal monitoring and adequate neonatal care in vulnerable races.

Birth weight gestation and mortality

Birth weight has been thought to be a major determinant of infant survival. Studies from Singapore have shown that, in the low birth weight group, the Malays and Indians have double the stillbirth rate compared to their Chinese sisters (9.9,9.7 and 5.1 per thousand, respectively) whereas the neonatal mortality rates for all three races with low birth weight are similar (Papiernik and Cohen, 1986). This suggests earlier maturation in races like the Indians. The duration of gestation in weeks (38.8 and 39.1) for Indians and Malays was significantly less for the Chinese (39.1). Similar differences were noted by Papiernik and colleagues between the Africans, Caribbeans and Europeans in Paris. (Ferguson and Myers (1990). Growth in utero is distinct from early maturation. Obstetricians have been blindly looking at centiles of growth to diagnose growth retardation without using customized growth charts for monitoring different ethnic groups. The factors which influence and control intrauterine growth are complex. Different races have different rates of intrauterine growth. The effect of race on the relationship between fetal death and altered fetal growth has been studied by Ferguson and Myers, (1990). Black fetuses were more sensitive than white fetuses to factors that adversely affect growth. Race- neutral data in clinical practice are a poor predictor of stillbirth.

Measurement of fetal growth

With the use of ultrasound, the well-known non-pathological variables appear to have been forgotten. These include maternal height and weight and birth weight. We have highlighted major differences in fetal growth in the populations of Asia. Studies from Nottingham have used software to extrapolate growth patterns for different ethnic groups. Using longitudinal studies, Gardosi et al, (1995) have demonstrated differences in the growth pattern of these groups when compared to the growth curve from the general population. Using a database of 38 114 singleton pregnancies and stepwise multiple regression analysis and coefficient for the variables, a software program has been developed which will be of benefit to multiracial societies (Mongelli and Gardosi, (1995). For most Asian countries, the lack of basic understanding of their small babies and the use of nomograms developed in the West have been a pitfall for monitoring and delivery. Most of these charts use cross — sectional rather than longitudinal data. Mongelli and Gardosi, (1995) from Nottingham have found lower fetal weights in the IndoPakistani groups compared t Europeans(Gardosi et al, 1995). The study also show... that maternal characteristics which are known to affect birth weight are also associated with corresponding differences in ultrasound estimation of fetal weight. We have recently described pitfalls in screening for fetal growth restriction ultrasound is monitoring of fetal growth at 2 weeks intervals is associated with false positive rates in excess of 10%, increasing much higher in the third trimester (Mongelli and Tamby Raja (1998).

Racial differences in maturity

It is realised that, in some ethnic groups, the higher stillbirth rates and perinatal mortality may be related different intrauterine maturation patterns, causing a p term or rather 'post-mature' state in utero. Our prelimi investigations suggest ethnic predilection to early maturity and this may predispose to a vulnerability to even mild asphyxial insults. Our observations reveal that fetal distress and meconium release may develop in these racial groups (black and Indians) before 40 weeks. The clinical importance for the obstetrician may be that we should increase antenatal surveillance in these groups. The higher stillbirth rate and perinatal mortality may be related to different intrauterine maturation patterns leading to a pc term (post — mature state) before the accepted stan of 40 weeks. In addition to monitoring fetal growth, w must consider amniotic fluid volume and Doppler velocimetry.

What has been accepted as the norm will have to be modified in different races. Preliminary studies from Malaysia and Singapore show growth patterns for different ethnic groups. There is a deficiency of knowledge on human fetal growth in different ethnic groups. Genetic

factors seem to overwhelm those of social and medical origin. In Singapore, it would seem that there are ethnic groups like the Malays in whom preterm birth is the major problem, while in Indians evidence is accumulating that the velocity of growth is different and in the vast majority of cases, low birth weight is due to abnormal growth and shortened gestation. Familial evidence of preterm delivery is documented by Porter et al, 1997. Strong evidence is accumulating from the work of Challis and Gibb (1996) that the endocrine pathways (corticotropin releasing hormone and prostaglandin synthase – –2 mRNA and 15 hydroxy prostagladin dehydrogenase) in parturition are genetically activated. Further research is clearly needed to understand how environmental factors modulate genetic factors in initiating the onset of labor (Challis and Gibb, 1997).

Conclusion

Although the incidence of low birth weight decreases and the number of risk factors declines, the improvement is faster among Europeans and Chinese resulting in a wider birth weight gap in infants of low-risk women. This has led some of us to believe that genetic factors associated with race influence birth weight. In the 1967 National Collaborative Perinatal Project, only 1 percent of the total variance in the birth weight among 18,000 infants was accounted for by socioeconomic variable, leading the authors to conclude that race behaves as a real biological variable in its effect on birth weight. (David and Collins 1997) This effect of race is presumably genetic. The assumption that blacks differ genetically from white women or Chinese from Indian women in their ability to bear normal or large infants persists in our recent studies of fetal growth.

It would seem that there are ethnic groups like the Indians and Africans in whom intrauterine maturation and the velocity of growth is different. In the vast majority of cases low birth weight is due to abnormal growth and shortened gestation. The mortalilty of the Indian baby is not confined to the perinatal period. Indians are well known to have a higher predilection to ishaemic heart disease. David Barker et al (1989) have shown a remarkable correlation between weight at birth and the probability of such death to be inversely related. Perinatal and adult medicine are closely related and such mortality can be at last understood by experimental science. The first prospective study on ethinicity, fetal growth and gestation in South-East Asia has been conducted and will provide clinicians the necessary normograms for improved perinatal care.

The perinatal period is critical in determining the health of children and adults. Prospective studies are needed to provide better insight into ethnic differences in length of gestation, growth, intrauterine nutrition and survival in different racial groups. Barker et al (1989) have shown the correlation between weight at birth and probability of death from hypertension and diabetes. Metabolic studies from cordocentesis in utero of growth – resisted fetuses provide data that reduced glucose supply is the main reason for reduced growth with elevated fetal glycine/valine ratio and hypertriglyceridemia. (Economides and Nicolaides 1989). At birth, the lipids which are high coronary risk factors such as LDL cholesterol and apolipoprotein B were highest among Indians and lowest among Chinese, while the protective risk factors HDL and apolipoprotein A-1 were lowest in Indians. (Low et al 1996). Blood levels of lipids at birth show a remarkable correlation to risk of propensity of death from hypertensions and ischemic heart disease in adult life. Perinatal and adult medicine are closely related and such mortality can at last be understood by experimental science.

Morbidity in LBW has not been addressed in developing countries. Neurological handicap is present in a third of VLBW survivors. Important issues include the provision of followup for these infants. Lucas et al(1998) have highlighted that preterm infants are also vulnerable to suboptional early nutrition and notably language based skills at 8 years of age. The problem requires not only medical but also social, societal and Government concerns to prevent handicapped individuals further depleting the resources of poor Asian countries.

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