

EDITORIAL

Societal factors and pregnancy outcome



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Since 1970 much more is being understood regarding the importance of antenatal care. Improvements in maternal-fetal outcome have been a triumph of the bio-medical approach in the detection and treatment of disease. Improvement in iron replacement therapy during pregnancy, use of ultrasound, improvement in early screening to rule out chromosomal abnormalities are now included in antenatal care. Fetal monitoring is now routinely done in hospitals though much remains desired to be done in Primary Health Centres. Despite efforts to improve birth outcome, preterm birth and low birth weight remain major public health concerns with rates of both increasing over the last few decades. Preterm infants have higher perinatal morbidity and mortality and costs of hospitalization for these are increasing all over the world. It is now increasingly acknowledged that social factors play a significant role in pregnancy outcome, mostly preterm birth, low birth rate and spontaneous abortion, alteration in development of fetus and long term health of offspring.

Recognition of the importance and impact of societal factors has occurred during a time when increasing number of women have joined or remained in the workforce during pregnancy in our part of the world. They continue to perform strenuous work at home/field. Although much has been understood about the effect of work on pregnancy outcome, much is still unknown about risk related to stress. As we continue to improve on maternal and neonatal care, which will mitigate bio-medical research further, societal factors will likely account for even greater proportion of the residual risk for abnormal pregnancy outcome.

ACOG defines psychosocial issues as non-biomedical factors that affect mental and physical well being. These include modifiable issues such as smoking, alcohol and

drug abuse as well as non-modifiable ones like poverty and socio-economic status. All these are increasingly playing a significant role in pregnancy outcome. Much has been studied about the effect of nutrition before and during pregnancy but in the western world, the relationship between nutrition and pregnancy is receiving renewed attention particularly as obesity reaches epidemic levels, although in Nepal and South-east Asia, malnutrition remains the major issue. Societal factors can be thought of as psychosocial stresses and stresses of socio-economic origin, though a very thin line divides them and they overlap. On the basis of current understanding of stress biology, it is likely that a range of psychosocial stresses (from individual level to community level) may affect the function of feto-placental unit resulting in risk of preterm birth and low birth weight.

Chronic stresses may emerge due to coping with the death of a loved one or dealing with financial and emotional strain- the risk of preterm birth varies according to the severity of anxiety. The various stresses in pregnancy could be life events like significant loss of loved ones, maternal ill health leading to anxiety, emotional disorders, work related, whether household or office, racism / discrimination, daily hassles and the anxiety to cope with them, lack of social support, chronic stresses including financial strain due to poverty and emotional stresses, poor nutrition, tobacco, alcohol and drug abuse, pregnancy specific stress including desire to have a male child and pregnancy desirability.

Each or all of these may contribute to adverse pregnancy outcome. Usually, neuroendocrine systems respond to acute stress and allow the individual to adapt and react to change of environment. When the

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stress is chronic, which is more in our part of the world, (e.g. poverty, early marriage, illiteracy, high parity, distance of health facility from residence) the stress response adoptive system may fail and even cause disease (e.g. anemia, gestational hypertension). It is hypothesized that when the feto-placental unit is exposed to excessive stresses, this neuroendocrine response may be triggered, resulting in maternal endocrine changes leading to accelerated fetal maturation, preterm birth and low birth weight.

It is estimated that 10-20% of clinically recognized pregnancies result in spontaneous abortions. Social factors like use of toxicants, occupational hazards and age have been associated with spontaneous abortions. In most cases smoking and cocaine have resulted in spontaneous abortion. Carbon monoxide and cyanide from cigarette smoke bind with and deplete Hb and B12 which are necessary for fetal growth and development. One more study has shown smoking reduces progesterone which is essential for maintenance of pregnancy. Research has shown that passive smoking i.e. environmental smoke is equally responsible for spontaneous abortion. Also alcohol intake during early pregnancy can lead to spontaneous abortion. Other studies have shown that women between 25-32 years have lower risk of spontaneous abortion than women >35 years in age. The reason for this is not clear but could be difficulty of older women to adapt to increased haemodynamic demands during pregnancy.

Abnormalities in chromosomes lead to aberrant genetic signals, resulting in malformation of various structures critical for the development of the fetus such as placenta, blood vessels or amniotic fluid. These chromosomal abnormalities are associated with certain societal factors e.g. toxicant exposure is associated with spontaneous abortion. Toxicants are nicotine, caffeine, cocaine, carbon monoxide or alcohol.

The reasons for the increase in preterm birth are still unknown. The reasons for death in preterm birth could be asphyxia-23%, chromosomal defects-80%, environmental toxins-07%. Various epidemiologic studies have shown that apart from aforementioned factors leading cause of preterm birth is infection due to unhygienic conditions during pregnancy. Infections are usually prevalent in women residing in low socio-economic conditions. Bacterial vaginosis has been extensively studied in relation to preterm birth. Its prevalence is about 40%, with a significant amount in unmarried, uneducated and low socio-economic strata women all over the world. In developing countries, socio-economic strata is a complex term generally used to define social inequality and is usually measured by income/education. It also includes marital status,

nutrition and unwanted pregnancy. Women belonging to these strata in developing countries enter antenatal care late due to lack of information and in the western world lack of health insurance. All this leads to stress and psychological reactions which can shorten gestation.

Awareness of potentially devastating effects of toxicants on fetal development significantly increased in the 1960's when effect of Thalidomide on limb development was first discovered. However, we know that 3% of developmental defects are attributed to chemical exposure and 25% are due to combination of environmental factors. Pregnant women can be exposed to polyaromatic hydrocarbons, heavy metals, pesticides and endocrine disrupting chemicals in the work place and home, throughout pregnancy. Polyaromatic hydrocarbons are air pollutants that are generated through combustion of diesel and gasoline, coal and smoking. Polyaromatic hydrocarbons cause DNA damage, fetal growth reduction, IUGR, fetal death, premature birth, reduction in birth weight, length and head circumference. In a recent study by Chio et al, parental polyaromatic hydrocarbons exposure was associated with reduced birth weight in new born, even after the mother had stopped smoking. Air pollutants like nitrous oxide, SO₂ and CO gases could result in preterm birth, if levels are high. In a study conducted in Los Angeles on women from low socio-economic strata living near traffic signals, it was found that traffic related air pollution was associated with preterm birth.

There is growing incidence indicating that developing fetuses and infants are more sensitive to pesticides than are adults. Many pesticides like organophosphates, pyrethroids, organochlorines and carbamates are developmental neurotoxicants. Parental exposure to heavy metals like mercury and lead may be associated with adverse effects in fetal development. WHO has estimated that 98% of lead and 40% of mercury acquisition by humans was from drinking water and/or food consumption. Fish may be a potential source of the pollutant methyl mercury which is absorbed by people who eat such fish. Placenta does not protect fetus from lead and mercury. Fetus can have neural tube defect if the mother has > 10mcg/L of lead. Child can also have low birth weight. High levels of parental methyl mercury exposure can cause cerebral palsy, mental retardation, low birth weight and early sensori-motor dysfunction.

Given the evidence that maternal psychosocial stresses can contribute to poor pregnancy outcome, the means by which these stresses can be assessed are of particular relevance to clinicians. For the last few years considerable work is being done to evolve instruments

for the assessment of psychosocial stress. The agreement is evident by the overwhelming use of particular tools, or subsets thereof, by researchers in the field. Those measurements that have demonstrated staying power due to sustained reliability and validity over the years screen for the following potentially problematic stress variables: life events, anxiety, depression, perceived stress, racism, self esteem, work and household strain and social support. Additionally, more recent literature suggests that future assessments should also include pregnancy specific stress and pregnancy desirability. Many instruments have yielded significant findings. To familiarize clinicians with such instruments will take some time and motivation. I will elaborate on some of these.

Life Events Inventory was initially developed by Cochrane and Robertson. This self administered tool is used to assess “acute stress” in personal, interpersonal, social, financial and work related areas that are not everyday occurrences. This inventory has served as a springboard from which several other life event inventories have been adopted. State-Trait Anxiety Inventory was developed by Spielberger *et al* to assess level of anxiety. The tool comprises items related to how the respondent “typically feels”. Respondents are presented with a list of adjectives and asked to describe the rate of their feelings, such as nervousness, fright and tension (on a 4-point Likert scale) in the last few days of pregnancy. Edinburgh Postnatal Depression Scale was developed in 1987 by Cox *et al*. This screening tool is unique in that it is specifically to screen postpartum depression. The Centre for Epidemiologic Studies Depression Scale is a short (20 items) self reporting scale that was designed to assess depression in general population by asking respondents to indicate their feeling during pregnancy. Despite the plethora of instruments available for measurement of psychosocial stress, there is no single instrument that incorporates what we believe to be all of the clinical components needed for adequate screening of maternal stress.

Recently ACOG published its version of a thorough assessment for psychosocial risk during pregnancy. This nine item screening tool addresses relevant issues like barrier to health care, unstable housing, intimate partner violence, substances used, unintended pregnancy, and perceived stress. This does not include stress of significant life events, work related stress and

presence/absence of social support. There is evidence that women screened for psychosocial stresses at least once each trimester are half as likely to have low birth weight and preterm infants as women not screened as such.

Data from previous studies indicate that there may be a strong association between adverse pregnancy outcomes and several societal factors. To help prevent adverse pregnancy outcomes, there are a number of strategies that can be implemented to improve the health of the fetus and the mother. One such strategy includes making information about potential risk factors for adverse pregnancy outcomes available to pregnant women and their partners. It is important to make prenatal healthcare available to all pregnant women, especially those of low socio-economic status. It may also be important to monitor and reduce exposure to environmental toxicants that have been associated with adverse pregnancy outcomes and sanitary conditions in and near the house. Educating mothers on lifestyle factors that are associated with spontaneous abortion and preterm birth, or developmental abnormalities may encourage them to use extra care during pregnancy and infancy.

Greater attention to women’s health across the life course would not only improve birth outcomes, but would also promote intergenerational health and have positive effect on the broader health of families and communities. Health workers in health outposts should realize the importance of societal factors and their association with adverse pregnancy outcome and conduct screening for psychosocial issues at least once each trimester.

Finally, relatively little is known about risk factors for adverse outcomes and their mechanisms of action. Therefore, further studies are needed to fully understand these so that clinicians can help patients take preventive measures or investigators can develop treatments for the outcomes associated with these. Much remains desired regarding the instruments for screening of psychosocial stresses, especially for those which can be successfully used for the large illiterate populace of developing countries like ours. Major research public health policy initiatives, beyond the view of individual clinicians, will need to be implemented to effect this transition of a life course perspective on pregnancy and its adverse outcome.