CHAPTER-II

REVIEW OF RELATED LITERATURE

The review of literature is instrumental in the selection of the topic, formation of hypothesis and deductive reasoning leading to the problem. It helps to get a clear idea and more knowledge which supports the finding with regard to the problem under study.

The review of literature is instrumental in the formation of hypotheses and to get a full picture of what done with regard to the problem under study. Such a review brings about a deep and clear perspective of the overall field. Now a day the educational program of any type is characterized by reforms and innovative ideas. It seems to be necessary one to formulate such a reviews of various scholars works. This can bring out a deep insight and clear perspective of the overall field in such reviews. Such collected reviews have been presented in logical order, in order of importance and in sequence of merit. This chapter is a step to get full picture of what has been done and said with regard to the problem under study. The review of literature is given as follows.

2.1. STUDIES ON PREGNANCY

2.1.1. Pregnancy

Giovanni Previti et al (2014, December) conducted the "study on Neurodevelopmental outcome for offspring of women treated for antenatal depression; a systematic review". They did the systematic review of the literature to identify studies on different kinds of treatment for antenatal depression (antidepressants and alternative therapies) and their effects on infants neurodevelopment. A total of 22 papers were selected, nineteen papers studied the effects of antidepressant drugs, one on docosahexanoic acid (DHA)(Fish oil capsule) and two on massage therapy. Comparisons between newborns exposed to antidepressants in utero with those not exposed showed significant differences in a wide range of neurobehavioral outcomes. Two studies found a slight delay in psychomotor development. Alternative therapies may have some benefits on

neurodevelopmental outcomes. They have suggested that antidepressant treatment may be associated with some neurodevelopmental changes, they have also mentioned that some of these changes, they may also due to depression by itself.

2.1.2. Depression And Anxiety During Pregnancy-Antidepressants

Giovanni Previti (2014, December) found that infants exposed to drugs displayed more tremors, agitation, irritability, spasms and hyper or hypo tonia than infants of healthy women. These symptoms have been referred to as "neonatal adaptation syndrome" (Grigoriaclis et al, 2013). Those studies have presented the wider range of motor and behavioral symptoms, all the studies have used standaedized tests of neurodevelopmental outcomes administered by trained staff, as opposed to questionnaire or clinical notes.

2.1.3. Anxiety Measure During Pregnancy-SSRI

In a recent study, smith et al. (2013) compared neurobehavioral outcomes between neonates who were born to euthymic women who either took or did not take an Selectice Serotonin Reuptake Inhibitor (SSRI) during the last trimester of pregnancy. The study found significant differences on motor cluster scores on the Neonatal Behavioral Assessment Scale (NBAS). Exposed infants had lower scores than unexposed, specifically on the pull-to-sit item on the motor cluster, which measures traction, head control and neck muscle strength. The significant differences on motor cluster became marginal ($p=0.05$) after adjustment for gestational age.

2.1.4. Stress And Depression During Pregnancy-SSRI-NNNS

Salisbury et al. (2011) found lower scores on quality of movement, such as hypertonic reflexes, startles, tremors, back-arching and a greater number of the central nervous system stress signs, in infants exposed to Selective Serotonin Reuptake Inhibitor (SSRI), compared with those exposed to untreated depression or to infants of healthy women. These differences were not related to depression severity or timing or length of SSRI exposure. Newborns exposed to depression had the highest quality of movement scores but significantly lower scores on attention items compared to the other two groups.

2.1.5. Pregnancy -NNNS

Lester and Tronick (2004), The Neonate Networking Neurodevelopmental Scale (NNNS) test assesses the following; neurological functions, as active and passive tone, reflexes and central nervous system integrity; behavioral items including state, sensory and interactive response; stress and abstinence items

2.2. STUDIES ON YOGIC PRACTICES

2.2.1. Yogic Practices For Anxiety During Pregnancy

Hong Gong et al. (2015) in his study on "Yoga for prenatal depression and anxiety; a systematic review and meta-analysis' stated that prenatal depression and anxiety can negatively affect the physical and mental health of both mother and fetus. He aimed to determine the effectiveness of yoga as an intervention in the management of prenatal depression and anxiety. Six randomized control trials were identified in the systematic search. The sample consisted of 375 pregnant women, with their age group between 20 and 40 years. The diagnoses of depression were determined by their scores on structures clinical interview for DSM-IV, and the centre for epidemiological studies depression scale. When compared with comparison groups (standard prenatal care, standard antenatal exercises, social support etc.) the level of depression statistically significantly reduced in yoga groups. (Standardized mean difference (SMD), -0.59; 95% confidence interval (CI)-0.94 to 0.25; p=0.007). One subgroup analysis revealed that both the levels of depressive symptoms in prenatally depressed women (SMD, -0.46; CI, -0.90 to -0.03; p=0.04) and non depressed women (SMD. -0.87; CI, -1.22 to -0.52; p<0.00001) were statistically significantly lower in yoga group than that in control group. There were two kinds of yoga; the physical-exercise-based yoga and integrated yoga, which, besides physical exercise, included pranayama, meditation or deep relaxation. Other subgroup analysis was conducted to estimate effects of the two kinds of yoga on prenatal depression. The results shows that the level of depression was significantly decreased in the integrated yoga group (SMD, -0.79; ci, -1.07 TO -0.51; P<0.00001) but not significantly reduced in physical-exercise-based yoga group (SMD,-0.41; CI,-1.01 to -0.18;

p=0.17). They have concluded that, prenatal yoga intervention in pregnant women may be effective in partly reducing depressive symptoms.

2.2.2. Mindful Meditation To Reduce Perceived Stress

Muthukrishnan (2016), conducted the study on Indian pregnant women at 12 weeks of gestation. Subjects were randomized into two groups, experimental group treated with mindfulness meditation and control group underwent regular anti-natal care. The effects of mindfulness meditation on perceived stress scores and cardiac sympathetic and parasympathetic functions were assessed before and after the administration of testing procedures. The results suggests that there was a significant reduction in perceived stress scores and significant increase in heart rate variability in the experimental group ($p<0.05$), which shows that, mindfulness meditation is a powerful tool to regulate the sympathetic nervous system, there by reduces the perceived stress in pregnant women.

2.2.3. Massage Therpy To Overcome Anxiety In Pregnancy

Field et al. (2011). Widely studied the effects of depression on the health of women and babies during pregnancy and the benefits of massage therapy for pregnant women. (FIELD 2011; Field et al. 2006, 1999). In two randomized clinical trials (Field 2004,2009), they assessed the effects of massage therapy. The Neurobehavioral Assessment Scale (NBAS) was used to examine the neurobehavioral development of infants in both studies. The massage therapy was carried out over two sessions of 20 minutes per week during the second and third trimester of pregnancy. The massage was performed by “significant others” of the women who were then trained by massage therapists. In the 2004 study, newborn born to mothers in the massage therapy group had better performance on the NBAS with significant better scores than the control group on the habituation, range of state, autonomic stability, withdrawal scales, depressed Scale and motor maturity Scale. In the study conducted in 2009, the newborns of the massage group performed significantly better on the NBAS on habituation, orientation, motor and depression score items. In addition, they had lower cortisol levels that could be related to the lower cortisol level of massage therapy mothers. These in turn

associated with fewer incidences of low birth weight and pre-maturities in both studies.

2.3. STUDIES ON MODIFIED DIET DURING PREGNANCY

2.3.1. Comparing High Fat And Low Carb Diet

Leena Hilakivi-clarke (2017) suggests that, high-fat diet during pregnancy may increase the risk of breast cancer in up to three generations of offspring. He has found in his earlier studies that mice that eat a high fat diet when they were pregnant have “daughters” that are at excess risk of cancer. In his new study he found that, if pregnant mice were switched to a high fat diet during their second trimester, when the germ line mediating genetic information from one generation to another forms in the fetus, an increase in breast cancer risk also seen in ”great granddaughters”. A gene screen revealed a number of genetic changes in the first and third high-fat mice generations, including several genes linked in women to increased breast cancer risk, increase resistance to cancer treatment, poor cancer prognosis and impaired anti-cancer immunity. The researchers also found three times as many genetic changes in third generation than first generation mammary tissue between high-fat diet pregnancy and the control group’s offspring. The amount of fat fed to the experimental mice matched to human beings daily intake. In his study both the control mice and the mice fed with high levels of corn oil ate the same amount of calories and they weighted the same. Experimental mice got 40% of their energy from fat, where as the control mice got normal diet with 18% of their energy from fat. Pregnant mice in the experimental group ate the high-fat-diet started at gestation day 10, the time when a daughter’s ovarian eggs begin to develop. This corresponds to women’s second trimester of pregnancy. By comparison, eating a high-fat diet before and during pregnancy increases breast cancer risk in the subsequent two generations, but does not cause inheritable changes in the germ cells. It is believed that environmental and life-style factors such as diet, plays a critical role in increasing human breast cancer risk, and so they have used animal models to reveal the biological mechanisms responsible for the increase in risk in women and their female progency. Ahigh-fat diet linked to excess inflammation and a number of epidemiological studies have made the connection between inflammation and risk of cancer.

2.3.2. Vitamin B12 Deficiency Associated With Low Birth Weight

Tormod Rogne Myrte (2017) found that vitamin B12 deficiency in pregnancy is prevalent and has been associated with both lower birth weight (birth weight <2,500 g) and preterm birth 9length of gestation <37 weeks). In his systematic review and meta-analysis of individual participant's data, evaluated 22 eligible studies were found (11,993 observations), 18 studies were included (11,216 observations). There was no linear correlation between maternal vitamin B12 deficiency and birth weight. But it was strongly associated with (<148 pmol/l) higher risk of low birth weight in newborns (adjusted risk ratio =1.15, 95% confidence interval (CI); 1.01,1.31). There was a linear association between maternal levels of B12 and preterm birth (per each 1- SD increase in B12, adjusted risk ratio = 0.89, 95% CI; 0.82, 0.97). Hence B12 deficiency was associated with a higher risk of preterm birth (adjusted risk ratio = 1.21, 95% CI; 0.99, 1.49). This finding supports the need for randomized controlled trails of vitamin B12 supplementation in pregnancy.

2.3.3. Low Glycemic Index Diet And High Fiber Diet Have Same Impact

Tania P. Markovic et al (2016) in her study on gestational diabetes mellitus suggests that dietary interventions can improve pregnancy outcomes in women with gestational diabetes mellitus(GDM). They compared the effect of low-glycemic index with conventional high-fiber diet (HF) on pregnancy outcomes, birth weight Z scores and maternal metabolic profile in women at high risk of GDM. 139 pregnant women,(mean (SD) age 34.7 (0.4) years and pre-pregnancy BMI 25.2 (0.5) Kg/m2) were randomly assigned to a low (GI) (LGI) DIET (N=72, target GI-50) or high fiber, moderate – GI (HF) diet (n=67; target GI-60) at 14-20 weeks of gestation. Diet was assessed by 3-day food records and infant body composition by air-displacement plethysmography and pregnancy outcomes were assessed from medical records. The LGI group achieved a lower GI than the HF group (mean (SD) 50 (5)vs.58 (5); p<0.001). There were no differences in glycosylated hemoglobin, fructosamine or lipids at 36 weeks or differences in birth weight (LGI 3.4 (0.4) Kg Vs HF3.4 90.5) Kg; p=0.514), birth weight Zscore (LGI 0.31 (0.90) Vs HF 0.24 (1.07); p=0.697), ponderal index (LGI 2.71 (0.22)Vs HF 2.69 (0.23)Kg/M3p=0.672), birth weight centile (LGI 46.3(25.4 VsHF

41.8(25.6);P=0.330), percentage of fat mass (LGI 10(4) Vs HF 10(4); p=0.789) or incidence of gestational diabetes mellitus. They suggest that intensively moniteres women at risk for GDM a loe glycemic index diet and a healthy diet produce similar pregnancy outcomes.

2.3.4.Maternal Vegetarian Diet Associated With Hypospadias (Mal-Farmation Of Ureter)

Soumyodhriti Ghosh et al. Found a correlation between maternal age and diet during pregnancy with the prevalence of hypospadias. The mothers of patients presenting with hypospadias were allotted structured self-completed questionnaires. Obstetric history, dietary patterns and life-style information during pregnancy was obtained. The mother of patients presenting with hypospadias who had been on a vegetarian diet had an increases incidence of babies presenting with hypospadias. Diet during gestation play a role in the etiology of hypospadias.

2.3.5. Non-Vegetarian Diet Associated With Inflammatory Markers

Laufey Hrolfsdottir et al (2016) conducted a cross-sectional analysis of 671 pregnant women, their diet was assessed in gestational age 30 and 37. Gestational weight gain (GWG) was assessed during this period. Inflammatory markers, high sensitive C-reactive protein (hsCRP), serum amyloid A(SAA), Interleukin (IL)-6, IL-8,IL-1 beta and tumor necrosis factor-alpha were assessed. After adjusting for age, pre-pregnancy BMI, parity, smoking status and education, each 1Kg increase in GWG was associated with 3% (95% CI; 1-5) higher hsCRP and 3% (95%CI; 1-4) higher SAA concentration, which corresponded to -18% to 25% increase in these biomarkers among those with excessive weight gain. GWG was inversely associated with IL-8, while no associations were found for the other inflammatory markers, with respect to diet, women in the highest compared with lowest quantile of protein intake had 26% (95% CI; 3-54) higher hsCRP concentrations. This increase appeared to be driven by intake of animal protein. A similar pattern was observed for SAA. They have concluded that, excessive GWG, as well as high intake of animal protein, was associated with higher concentration of inflammatory factors.

2.3.6. Maternal Nutrition Body Composition Influences Fetal Demand

Size at birth reflects the product of the fetus's trajectory of growth, set at an early stage in development, and the materno-placental capacity to supply sufficient nutrients to maintain that trajectory. Failure of the materno-placental supply line to satisfy fetal nutrient requirements results in a range of fetal adaptations and developmental changes. In Western communities, randomized controlled trials of maternal-macronutrien supplementation have had relatively small effects on birth weight (Kramer MS 1993). These have led to the view that regulatory mechanisms in the maternal and placental systems act to ensure that human fetal growth and development is little influenced by normal variations in maternal nutrient intake, and that there is a simple relationship between a woman's body composition and the growth of her fetus. Recent experimental studies in animals and observational data in humans challenge these concepts (Barker DJP 1998). These suggest that a mother's own fetal growth and her dietary intakes and body composition can exert major effects on the balance between the fetal demand for nutrients and the materno-placental capacity to meet that demand.

2.3.7. Maternal Dietary Balance And Body Composition

Indications that the balance of macronutrients in the mother's diet can have important short and long-term effects on the offspring has come from experimental studies in pregnant rats. These have found that maternal diets with a low ratio of protein to carbohydrate and fat alter fetal and placental growth, and result in lifelong elevation of blood pressure in the offspring (Langley-Evans SC 1994). A follow-up study of 40 year old men and women in Aberdeen, UK suggested that alterations in the maternal macronutrient balance during pregnancy could have similar adverse effects on the offspring (Campbell DM 1996), the relations with maternal diet were, however, complex and studies to replicate them are in progress. Among women with low intakes of animal protein, a higher carbohydrate intake was associated with a higher adult blood pressure in the offspring; among those with high animal protein intakes, a lower carbohydrate intake was associated with higher blood pressure. These increases in blood pressure were associated with decreased placental size, (Campbell DM 1996). Support for the thesis that

alterations in fetal and placental development may result from a low ratio of animal protein to carbohydrate comes from observational studies of maternal nutrition in pregnancy (Godfery K1996). Support for adverse effects of a high ratio of animal protein to carbohydrate comes from a review of 16 trials of protein supplementation showing that supplements with a high protein density were consistently associated with lower birth weight (Rush D 1989)

A prospective observational study conducted to assess how nutrient intakes of mothers in early and late pregnancy influence placental and fetal growth and concluded that mother who had high carbohydrate intakes in early pregnancy had babies with lower placental and birth weights. Low maternal intakes of dairy and meat protein in late pregnancy were also associated with lower placental and birth weight (K Godfrey 1996). In contrast in a prospective cohort study they stated that, milk intake in pregnancy was associated with higher birth weight for gestational age, lower risk of small for gestational age (SGA), and higher risk of large for gestational age (LGA), (Sjurdur F Olsen 2007). However, the result from another prospective cohort study, indicated that a diet in pregnancy, based on red and processed meat and high fat dairy, was associated with increased risk for SGA (V K Knudsen 2008).

Evidence that maternal body composition has important effects on the offspring have come from studies showing that extremes of body composition in pregnancy are associated with adverse long-term outcomes in the offspring. Follow-up of a group of Jamaican children showed that those whose mothers had thin skin fold thicknesses and a low weight gain in pregnancy had higher blood pressure at the age of 11 years (Godfery KM 1994). Studies in India have found that a low maternal weight in pregnancy is associated with an increased risk of coronary heart disease in the offspring in adult life (Stein CE 1996).

2.3.8. Importance Of Essential Fatty Acids For Neural Membrane And Retina Formation Of Fetus

An adequate amount of dietary fat is essential for health, particularly for pregnancy and lactation. Essential fatty acids play a major role during pregnancy. They provide the precursors for prostaglandins and leucotrienes and are present mainly in highly specialised membranes (retina and synapses). The consumption of essential fatty acids is deemed important for normal growth and development in infants. The interest in essential fatty acids in relation to pregnancy stems from both epidemiological observations (Oslen SF 1991,Harper V 1991,Oslen SF 1989, Oslen SF 1990, Oslen SF 1993, AI MD 2000,Oslen SF 2006) and intervention studies (Oslen SF & Secher NJ 1990,Oslen SF 1992). They showed longer gestation, larger babies and, in some cases, reduced numbers of pregnancy complications such as intra-uterine growth retardation, pregnancy-induced hypertension and pre-delivery in association with higher marine fatty acid (long-chain PUFA or n-3 fatty acids), fish or fish oil intake.

Several mechanisms have been suggested for explaining these associations. The first one is a delayed spontaneous delivery, resulting from altered balance between the prostaglandins involved in the initiation of the labour (Hansen HS 1988, Oslen SF 1986). The second one is an increased fetal growth rate, resulting from improve placental blood flow due to a lowered thromboxane: prostacyclin ratio (Andersen HJ 1989) and blood viscosity (Oslen SF 1990). Moreover, marine fat could reduce the risk of preterm delivery (Oslen SF 2000, Oslen SF 2002) and of intrauterine growth retardation (Rogers I 2004).

(Oslen SF 1995) could not detect any association between the length of gestation, birth weight and length on one hand and on the other hand the intake of n-3 fatty acids in the second trimester of pregnancy, whether the intake was quantified by a validated questionnaire or biochemical measurements. More importantly, another randomized controlled trial in pregnant women failed to detect effects of n-3 and n-6 fatty acid supplementation on gestational length, birth weight and length, head circumference or placental weight (Helland IB 2001). Nevertheless, several studies in both animals and human subjects have shown that deficiency of dietary n-3 PUFA is associated with biochemical changes in the brain and with disturbances in vision and other neurological parameters (Mc Cann Jc 2005). The most vulnerable period of neural development is during embryonic and fetal growth. Essential fatty acids, especially DHA, are required for fetal brain, nervous system and retinal growth in late pregnancy. The maternal plasma concentration of individual fatty acids, and hence the composition of the maternal diet, may have large effects on long-chain PUFA delivery to the foetus (Peggy Drouillet 2009).

2.3.9. Maternal milk consumption during pregnancy and infant birth weight

In many cultures, milk is an important source of energy for both the pregnant woman and the foetus. Non-randomized and randomized trials alike suggest that protein/energy supplementation may affect birth weight and reduce the risk of IUGR (Prentice AM 1983, Prentice AM 1987,de Onis M 1998). Data from Great Britain indicate that low intake of dairy proteins affects placental growth (Godfrey K 1996). However, birth weight *per se* may be more closely related to meat protein intake than to the intake of dairy protein (Godfrey K 1996). In a study in Wales, mothers who had received milk tokens gave birth to infants with a slightly higher birth weight than controls (statistical significance not reported), (Elwood PC 1981). Milk is also an important source of calcium. One hundred milliliters of milk, Swedish milk, Arla Ltd., 3% fat (Arlaforum SE)) supplies the pregnant woman about 13% of the recommended daily intake of calcium (Nordic council of Ministers 1996). Calcium may be involved in foetal growth, although the results of active calcium supplementation with respect to birth weight have hitherto been inconsistent. In a placebo-controlled study of

calcium supplementation, supplemented infants were 189 g heavier than controls (p = 0.06) and less seldom had LBW (p = 0.03), (Nillary 1990. Koo WW 1999), who focused on foetal bone mineral content, reported a similar increase in birth weight among infants of supplemented women (3183 vs 3062 g), although the difference was not statistically significant.

2.3.10. Association Of Calcium Intake And Birth Weight Of The Babies

Milk is not a balanced protein/energy supplement but rather a high protein supplement. One of the few trials with high protein supplementation during pregnancy indicated a beneficial effect on maternal weight gain, but a more complex effect on intrauterine growth (Rush D 1980). In the Rush D 1980 study, mean infant birth weight was lower in supplemented women giving birth prematurely, while the opposite was seen in infants born after 37 wk (non-significant differences). It may be that milk, although providing more than 25% of the total energy in dairy protein, mediates a specific effect on foetal and placental growth (Godfery K 1996, Godfrey KM 1997). In the study by Godfrey K 1996, no association was seen between intake of dairy protein and birth weight.

2.3.11. Importance Of Calcium Intake During Pregnancy

The effect of calcium intake in pregnancy is less certain because there have been few studies of it. Pregnancy-associated alterations in calcium and bone metabolism, it is evident that even in women with very high calcium intakes, and calcium supplements appear to have little effect (Cross NA, 1995, King JC 1992). In addition, the changes in calcium absorption that occur during pregnancy suggest that the physiologic adjustments are likely to cover the increased requirements of the mother without a need for her to increase her calcium intake. However, there is some evidence that mothers with a customarily low calcium intake may benefit from higher calcium intakes during pregnancy. These include the observation that the bone mineral contents of neonates born to Indian women from poor social class backgrounds would be higher if the mothers had received a calcium supplement during pregnancy (Raman L 1978), and that breast-milk calcium concentration, and hence the calcium intake of the breast-fed infant, may be influenced by maternal calcium intake during the preceding pregnancy (Prentice A 1994).

Three studies conducted in pregnant women in Gambia, in Malawi and Nigeria assessed the calcium intake by weighing the food (Nyambose J 2002, Persson V 2001, Oguntona CR.2002).

2.3.12. Intake Of Micronutrients Improve The Birth Weight Of The Baby

In a recent prospective study conducted in India in underweight women, increased infant birth weight was strongly associated with consumption of foods rich in micronutrients (vitamins A and C, folacin, calcium and iron) whereas energy and protein intakes were not associated with birth size (Rao,S.2001). Women who consumed green leafy vegetables, fruits or milk products 3–4 times/wk compared with women who consumed these foods,1 time/wk had infants with a significantly higher mean birth weight (green leafy vegetables: 2742 vs. 2601 g, fruits: 2721 vs. 2598 g, milk products: 2704 vs. 2618 g). Because the mean birth weight in this study was low, an increase in birth weight of 139, 122 and 86 g with increased consumption of micronutrient-rich green leafy vegetables, fruits and milk products, respectively, is of biological significance. Thus, in undernourished women with low pre-pregnancy BMI, a lack of association of birth weight with energy and protein intakes but a strong association with micronutrient intakes suggests that micronutrients may be one of the limiting factors for fetal growth.

2.3.13. Fruit and vegetable intake during pregnancy

Fruit and vegetable intake has frequently been inversely related to the risk of chronic diseases (World Health Organization 2004) Nutrition and diet for healthy lifestyles in Europe 2001 (Hu FB 2002). Fruit and vegetables are important sources of antioxidant nutrients and consumption has been positively correlated with serum vitamin C and carotenoids (Zino S. 1997, Ness AR 1999, Palli D, 1999).

Vitamin C and b-carotene are known to be powerful antioxidant nutrients. Via their antioxidant functions of protecting organisms against free radical damage, vitamin C and β- carotene may play a crucial role. The authors reported a

low intake of calcium in Gambia (404 mg/d) which was explained by the diet being based on cereals, groundnuts and leaves which are very low in calcium (Nyambose J, 2002). In Malawi the mean intake of calcium was 813mg/d in the 2nd trimester and 640 mg/d in the 3rd trimester. This difference was explained by the seasonal influence: pregnant women used to eat more during prepares and harvest (Persson V, 2001).

In a study in Nigeria measuring the calcium intake in adolescents, the median intake was 659.1mg/d (Oguntona CR 2002). In Asia, the studies showed the lowest calcium intake. In India (Mohapatra P 1990) calcium intake was the lowest amongst all the studies (250 mg/d). The explanation could be that the participants were rural workers who based theirs meals on grains and vegetables and also described that these women ate only after everybody at home had eaten their share. Whereas included in another study where intake averaged 500 mg/d (Marya RK 1987).

In Indonesian women (Prentice A 1993) the intake of calcium was 316 mg/d with very low variation between trimesters of pregnancy. In Brazil (Lopez-Jaramillo P 1989) the authors of these cross sectional study obtained a median intake of calcium in pregnant women of 500mg/d. In Ecuador there were great differences. In the first study (Lopez-Jaramillo P 1989) in 1989 the authors extracted data from another survey conducted in that country without mentioning the method used to measure the intake. The results were lower (mean of 292mg/d) than in the last study (Lopez-Jaramillo P 1997) which measured calcium intake by 24h-recall in an adolescent population and obtained a mean of 605mg/d in the placebo group and 628 mg/d in the supplemented group.

The majority of trials supplementing pregnant women have been conducted with the aim of reducing hypertensive disorders in pregnancy (Carroli G 1994). With the exception of one recent study (Levine RJ, 1997) RCTs (randomized control trials) have shown beneficial effect of calcium supplementation (at least 1 g daily) on the incidence of high blood pressure, particularly among women with low dietary calcium intakes and those at high risk of gestational hypertention. There is weak evidence to support an effect of calcium supplementation on fetal growth (de Onis M 1998). Follow up of calcium supplemented pregnancies (2 g daily) recently showed the 7-year old offspring to have reduced levels of blood

pressure (BelizaÂn JM 1997). It is not known whether there are benefits of lower levels of calcium supplementation.

2.4. STUDIES ON PHYSIOLOGICAL VARIABLES

2.4.1. BODY MASS INDEX

2.4.1.1. Influence Of Diet On Body Mass Index

Cynthia H. Chuang (2014, February 26)"Attitude during pregnancy affects weight gain" Cynthia Chuang studied the attitudes and habits of women who gained appropriate weight and those who exceeded guidelines. Researchers interviewed 29 post-partum women who were overweight or obese before pregnancy of these 11 met the appropriate guidelines and 18 exceeded the recommended weight gain. Participants in the study were asked about their diet habits, experience with morning sickness and physical activity habits during pregnancy. Those who gained appropriate amount of weight stuck to a meal plan and chose foods carefully, monitored their calories intake and exercised as much or more than they had before pregnancy. Women who gained excessive weight described the experience as "eating for two", fewer goals, exercised less than usual during pregnancy. Had less healthy food choice and ate more as a result of cravings. Too much weight gain during pregnancy can lead to post-partum and long term weight gain and obesity. It can also cause premature birth and other unfavorable events. "women who closely monitor their weight gain during pregnancy can prevent future complications".

The epidemics of obesity during pregnancy will have an alarming effect in high-risk pregnancies. According to the American college of obstetricians and gynecologist, all pregnant women should follow the healthy diet, and focus on at least half an hour of physical activity per day during pregnancy. The management of maternal obesity should start before conception, during pregnancy and after delivery (Dr. Catalano, 2016).

2.4.1.2. Gestational Obesity Associated With Diabetes And Hypertension

Dr.Trine Moholdt (2016 July,26), Suggests that exercise cuts gestational diabetes in obese pregnant women, in Norwegian University of science and technology. The study comprised of 91 obese pregnant women, in their child bearing age, they were randomly divided into exercise group and control group. Subjects in the exercise group attended three days a week of 60 minutes exercise program, throughout the course of pregnancy. The training includes 25 minutes of strength training and 35 minutes of moderate intensity treadmill walking. The control group was given standard prenatal care. In the research outcome, only two in exercise group and nine in the control group developed gestational diabetes. Women who took part in experimental group, had lower blood pressure towards the end of their pregnancy.

2.4.1.3. Gestational Obesity Influence The Sleep

Sirimon Reutrakul (2013,August 20) in her study on "Gestational Diabetes tied to seven-fold increase in sleep apnea risk, found that, women diagnosed with gestational diabetes are nearly seven times more likely to have obstructive sleep apnea than other pregnant women. Sirimon Routrakul, conducted the research at Ruch University medical centre in Chicago. Nearly 75 percent of the participants in their study who had gestational diabetes also suffered from obstructive sleep apnea. In a series of observational case control studies, researcher monitored 45 women for sleep apnea and other sleep disruptions. The research examined sleep health in 15 pregnant women who had gestational diabetes, 15 pregnant women who did not had the condition and 15 women who were not pregnant and did not had diabetes. The study found a strong association between obstructive sleep apnea and gestational diabetes in this group of mostly overweight or obese women. Based on the findings, women who had gestational diabetes should be considered for evaluation for obstructive sleep apnea, especially if other risk factors such as hypertension or obesity are present, and women already diagnosed with sleep apnea should be monitored for signs of gestational diabetes during pregnancy.

2.4.1.4. Low Body Mass Index Cause Maternal Complications

A large number of women in many parts of the world enter pregnancy at suboptimal weight and/or height. An analysis of studies in 20 countries (Kelly et

al., 1996) showed that in ten countries many women had pre-pregnancy weights of < 50 kg and heights of < 150 cm. These cut-off points were associated with increased risks of maternal complications. In addition, weight below 45 kg or height below 148 cm was associated with poor foetal outcomes. The linear relationship between gestational weight gain and birth weight is influenced by maternal pre-pregnancy BMI, such that women with a BMI < 18.5 must gain more weight than those with a normal BMI in order to have babies with adequate birth weight. It is then particularly important that underweight women increase their energy intake to gain the prescribed 10 to 14 kg during pregnancy; depending on their height (e.g. taller women should strive for a weight gain of 14 kg). Gestational weight gains as high as 18 kg have been suggested for undernourished women (Institute of Medicine/Food and Nutrition Board, 1992).

2.4.1.5. Recommended Gestational Weight Gain

Women with a pre-pregnancy BMI > 25 tend to have babies with high birth weights, even when the women have relatively low gestational weight gains (Institute of Medicine/Food and Nutrition Board, 1992; Shapiro, Sutija and Bush, 2000). As this may lead to problems during delivery, it is likely that such women will be better off gaining weight at, or somewhat below, the lower limit of the 10 to 14 kg range recommended for women with normal BMI. It has been suggested that weight gain should be as low as 7 kg for women who enter pregnancy with BMI > 26 (Institute of Medicine/Food and Nutrition Board, 1992).

The WHO Collaborative Study on Maternal Anthropometry and Pregnancy Outcomes showed that birth weights between 3.1 and 3.6 kg, with a mean of 3.3 kg, were associated with the optimal ratio of good foetal and maternal outcomes (WHO, 1995a, Kelly et al., 1996). The range of maternal gestational weight gains associated with such birth weights was between 10 and 14 kg, with a mean of 12 kg. This is in agreement with earlier estimates that healthy women in developing countries, who eat in accordance with appetite, gain 10 to 12 kg (Institute of Medicine 1992). An analysis of gestational weight gains associated with optimal outcomes and full-term delivery of 3-to 4-kg infants in the United States gave a similar although somewhat higher range (11.5 to 16.0 kg) for women with pre-pregnancy BMI between 19.8 and 26.0 (Institute of Medicine/Food and Nutrition

Board, 1990; Abrams, Altman and Pickett, 2000).

This consultation endorsed the WHO recommendation that healthy, well-nourished women should gain 10 to 14 kg during pregnancy, with an average of 12 kg, in order to increase the probability of delivering full-term infants with an average birth weight of 3.3 kg, and to reduce the risk of foetal and maternal complications.

2.4.1.6. Gestational Obesity Leads To Preterm Baby

In developed countries an interaction between pre-pregnancy weight and weight gain during pregnancy has been reported: underweight women with weight gain in excess of 12 kg and overweight women with weight gains limited to 6–11 kg tend to have the best pregnancy outcome (Abrams, B.1995. Spinillo, A.1998) reported a pre-pregnancy BMI < 19.5 and a second and third trimester weight gain <0.37 kg/wk to be associated with a significantly increased risk of spontaneous preterm delivery.

Considerable evidence suggests a role for micronutrients in pregnancy outcomes, (Seshadri, S.2001, Bendich, A. 2001). Even in a developed country like the United States, a substantial proportion of women of childbearing age consume diets that provide less than the recommended amounts of micronutrients, particularly, zinc, folate, calcium and iron (Scholl, T.O.1997, Block, G. 1993). In South Asia, iron deficiency anemia affects 50% or more of pregnant women. The prevalence of folic acid deficiency may be up to 30–50% and zinc deficiency is likely to be widespread (Seshadri, S.2001). However, nutrition intervention studies have not provided unequivocal evidence of an association between micronutrient intakes and pregnancy outcomes such as birth weight, IUGR, preterm delivery and pregnancy-induced hypertension (Onis, M.1998, Ramakrishnam, U. 1999).

2.4.2. STUDIES ON BLOOD PRESSURE

2.4.2.1. Yogic Practices Reduce The Gestational Hypertension,Preterm Birth, Birth Weight And IUGR

Shanmanthakamani Narendran et al. (2005) investigated the "Efficacy of yoga on pregnancy outcome". Three hundred and thirty five (335) women attended the antenatal clinic at Gunasheela surgical and maternity hospital in Bangalore, India, were enrolled between 18 and 20 weeks of pregnancy in a prospective matched, observational study; 169 women took part in the yoga group and 166 women were there in the control group. They were matched for age, parity, body weight and Doppler velocimetry scores of umbilical and uterine arteries. Yoga practices, including physical postures, breathing and meditation were practiced by the yoga group one hour daily, from the date of entry into the study until delivery. The control group walked 30 minutes twice a day (standard obstetric advice) during the study period. Birth weight of the fetus and gestational age at delivery were measured. The number old babies with birth weight >2500 grams were significantly higher ($p<0.01$) in the yoga group. Preterm labor was significantly lower ($p<0.006$) in the yoga group. Complications such as isolated intrauterine growth retardation (IUGR) ($P<0.003$) and pregnancy induced hypertension (PIH) with associated (IUGR) ($p<0.025$) were also significantly lower in the yoga group. There were no significant adverse effects noted in the yoga group. They have concluded that, an integrated approach to yoga during pregnancy is safe. It improves birth weight, decreases pre-term labor, decreases IUGR either in isolation or associated with PIH, with no increased complications.

2.5. STUDIES ON BIO-CHEMICAL VARIABLES

2.5.1. STUDIES ON BLOOD SUGAR LEVEL

Cuilin Zhang (2016) In his study on "Depression in early pregnancy linked to gestational diabetes" analyzed pregnancy records from the (NICHD) National Institute of Child Health and Human Development, Fetal growth studies, singleton cohort, they have tracked the progress of thousands of pregnancies, to understand the patterns of fetal growth. The study enrolled 2334 non-obese and 468 obese women in weeks 8 to 13 of pregnancy. The women responded to questionnaires on symptoms of depression, when they enrolled in the study, again between the 16th

and 22nd week of pregnancy, and then six weeks after giving birth. The researchers also reviewed the women's records to identify who had developed gestational diabetes." persistent depression from the first to second trimester set women at even greater risk for gestational diabetes". Women who had the highest scores for depression in the first and second trimester about 17 percent had nearly triple the risk for gestational diabetes when compared to women who had lower depression scores.

The researchers also found a higher risk for post partum depression among the women who had gestational diabetes; nearly 15 percent experienced depressive symptoms after birth which was more than four times that of women who had not had gestational diabetes. The researcher added that, the depression is associated with impaired glucose metabolism that may lead to higher blood glucose levels. Similarly high blood sugar levels may lead to inflammatory, hormonal and other changes that could lead to symptoms of depression.

2.5.2. Anxiety During Pregnancy Leads To Gestational Diabetes

Mary Byrn, Sue Penckofer (2015) suggests that, in her study on "The Antenatal Depression, A history of depression may put women at risk for developing diabetes during pregnancy, according to research published in the latest issue of the Journal of obstetric, Gynecologic and Neonatal Nursing by researchers from Loyola University Chicago Marcella Niehoff school of Nursing (MNSON). This study also pointed to how common depression is during pregnancy and the need for screening and education. Loyola researchers used the Edinburgh postnatal depression scale to measure symptoms of depression in 135 pregnant women attended routine prenatal care visits. Sixty five study participants had gestational diabetes. These women were 3.79 times more likely to have history of depression than women without gestational diabetes. In addition 20 percent of women with gestational diabetes and 13 percent of women without gestational diabetes had significant symptoms of depression. Anxiety and perceived stress were significant predictive factors of depression for both groups.

2.5.3. Geatational Obesity Leads To Gestational Diabetes

Boyd Metzger (2012, April 11) “New pregnancy risk for babies and moms; overweight moms with moderately high blood glucose raise health risk”. Pregnant women who were overweight with moderately elevated blood sugar were at a higher risk of bad pregnancy outcomes than previously known. The researcher included 23,316 women from nine counties. The study found when the mothers were obese and had gestational diabetes, the babies weigh 340 grams more than babies of mothers were overweight (not obese) with above average blood sugar levels, the babies weigh 214 grams more. Mothers of normal weight but with gestational diabetes had babies who weigh 164 grams more. And obese mothers with normal glucose levels had babies with an increased weight of 174 grams. A pregnant women’s higher blood sugar level and weight also can lead to higher insulin and lower blood sugar level in a newborn. This in turn causes the obesity and diabetes as early as in childhood.

2.5.4. Lifestyle Modification And Nutritional Adaptation To Manage Gestational Diabetes

Thomas et al (1993) suggests that gestational diabetes mellitus would be an important risk factor for adverse perinatal outcomes, including long term complications such as obesity and glucose intolerance in offspring. Most of the GDM mothers were associated with gestational hypertension or preeclampsia. Diagnosing and treating these conditions plays a crucial role in the management of long term complications. Nutritional consultation, insulin, glyburide and metformin could be the possible treatment options. Screening women for diabetes risk and HbA1c before they plan for pregnancy would be effective in delaying or preventing future complications. Life-style modification could be an effective treatment option. There are some evidence to prove that, breastfeeding may reduce the chances of obesity in children.

2.5.5. Risk Of Gestational Diabetes At Different Trimester

Amit D.Sonagra et al (2014) conducted the study on risk of Gestational diabetes with insulin resistance at different trimester of pregnancy. There were four groups, pregnant women of 1st, 2nd and 3rd trimester served as experimental groups I,II and III respectively (n=20), and healthy non-pregnant women kept as

control group (n=30). Fasting plasma glucose (FPG) and fasting serum insulin (FSI) were measured, and IR indices such as fasting glucose to insulin ratio (FGIR)and Quantitative Insulin Sensitivity Check Index (QUICKI) log FSI and log HOMAI-IR were calculated. To analyse the data student's t-test and one way Analysis of variance were used. The mean FSI, log FSI and log HOMA 1-IR were significantly higher in 2nd and 3rd trimester while QUICKI was significantly lower in 2nd and 3rd trimesters of pregnancy when compared with controls. Mean FGIR was found to be significantly lower in 3rd trimester when compared with control group. As pregnancy advances, IR increases, associated with poor maternal and fetal outcome. Screening of all pregnancy for IR and early intervention may help to reduce the associated complications.

2.6. STUDIES ON LIPID PROFILE (TRIGLYCERIDES, HIGH DENSITY LIPOPROTEIN & LOE DENSITY LIPOPROTEIN)

2.6.1. Evaluation Of Lipid Profile In 2nd And 3rd Trimester

Raghuram Pusukuru et al (2016) conducted study on evaluation of lipid profile in the second and third trimester of pregnancy, at Mahatma Gandhi Mission Hospital, Navi Mumbai, India. The study period was from October 2012 to October 2014. 200 subjects took part in the study. They found that, the mean cholesterol in the 2nd and 3rd trimester were 214.6+18.16 mg/dl and 241.65+20.44 mg/dl respectively. The mean triglycerides level in 2nd and 3rd trimester was 188.68+20.88 mg/dl and 216.782+0.09 mg/dl respectively. High density lipoprotein was 49.13+6.15 mg/dl and 43.07+4.34 mg/dl respectively. The low density lipoprotein was 92.41+18.94 and 137.82+13.45 mg/dl. This indicates that triglycerides and low density lipoprotein increases in both 2nd and 3rd trimester, and the increase is more in 3rd compared to 2nd trimester. High density lipoprotein is reduced in 3rd trimester compared to 2nd trimester.

2.7. STUDIES ON BLOOD URIC ACID LEVEL

2.7.1. Increased Serum Uric Acid Level With Gestational Hypertension

Pramanik et al (2014), conducted the study on pre-eclampsia with increased uric acid level as a biochemical indicator in Nepal medical college teaching hospital from June 2012 to June 2013. Pregnant women with pre-eclamptic condition served as experimental group and normal healthy pregnant women of similar age group served as control group. Evaluation of their blood pressure and serum uric acid levelshows that significantly high blood pressure (sbp 129.42± 12.35 vs 109.00± 7.93 mmhg; Dbp 96.85± 8.32 vs 72.5± 7.10 mmhg) and serum uric acid level (6.27± 1.37 vs 4.27± 0.61 mg/dl) in patients with pre-eclampsia compared to healthy pregnant women.

2.8. STUDIES ON PSYCHOLOGICAL VARIABLES

2.8.1. STUDIES ON PERCEIVED STRESS DURING PREGNANCY

2.8.1.1. Reduction In Stress And Heart Rate Variabilities

Maharana Satyapriya et al. (2009, March) conducted the study to find out the effect of integrated yoga practice and guided yogic relaxation on both perceived stress and measured autonomic response in healthy pregnant women. They recruited 122 healthy women between 18th and 20th week of pregnancy at prenatal clinics in Bangalore, India, were randomized to practicing yoga and deep relaxation or standard prenatal exercise one hour daily. The results for the study were evaluated by repeated measures analysis of variance. In their findings perceived stress decreased by 31.57% in the yoga group and increased by 6.60% in the control group ($p=0.001$), during a guided relaxation period in the yoga group, compared with values obtained before a practice session, the high-frequency band of the heart rate variability spectrum (parasympathetic) increased by 64% in the 20th week and by 150% in the 36th week, and both the lo-frequency band (sympathetic), and the low-frequency to high-frequency ratio were concomitantly reduced ($p<0.001$ between the two groups). The low-frequency band remained decreased after deep relaxation in the 36th week in the yoga group. Hence yoga reduces perceived stress and improves adaptive autonomic response to stress in healthy pregnant women.

2.8.1.2. Maternal Stress Leads To Preterm Birth Of Babies

Pathik D. Wadhwa (2011) suggests that, preterm birth was considered to be the most significant issue in maternal-child health. Recent studies proved that the maternal stress and the underlying pathophysiological mechanism could be the possible causative factors for this problem. This study focus on key issues and under what circumstances and which stage of gestation would be vulnerable to the potential detrimental effect of maternal stress and subject's biological (maternal-placental-fetal endocrine, immune, vascular and genetic) mechanisms.

2.8.1.3.Reversing Homeostatic Mechanism With Meditation (Non-Pregnant)

Ravinder Jerath et al. (2015, June) found in his recent publications, the inter-relationship between respiration and emotions and the influence of respiration on autonomic changes, and subsequent widespread membrane potential changes resulting from changes in homeostasis. They have hypothesized that reversing homeostatic alterations with meditation and breathing techniques rather than targeting neurotransmitters with medication may be a superior method to address the whole body changes that occur in stress, anxiety and depression. They have proved that, the detrimental effects of stress, negative emotions and sympathetic dominance of the autonomic nervous system have been counter acted by different forms of meditation, relaxation and breathing techniques. They proposed that, these breathing techniques could be used as first-line and supplemental treatments for stress, anxiety, depression and some emotional disorders.

2.8.2. STUDIES ON ANXIETY

2.8.2.1. Yogic Practices For Anxiety

Kyle Davis et al. (2015, June 5) conducted the study on "A randomized controlled trial of yoga for pregnant women with symptoms of depression and anxiety". They have randomly assigned 46 pregnant women with symptoms of depression and anxiety to an 8 week yoga intervention or treatment-as-usual (TAU) to examine the feasibility and preliminary outcomes. They found that, participants in both conditions reported significant improvement in symptoms of depression and

anxiety over time; and yoga was associated with significantly greater reduction in negative affects as compared to TAU (p=0.53,SE=0.20,p=0.011). They found that prenatal yoga was found to be a feasible and acceptable intervention and was associated with reduction in symptoms of anxiety and depression

2.8.2.2. Mind Body Therapy To Reduce Depression And Anxiety

Patricia Kinser (2014, November) conducted a study on, 'The experience of stress and depression in pregnant, urban, African-American Adolescents and their perception of yoga as a management strategy. They have conducted community-based, qualitative study using non-therapeutic focus groups to allow for exploration of attitudes, concerns, beliefs and values regarding stress and depression in pregnancy and non pharmacological management approaches, such as mind-body therapies and other prenatal activities. They took the sample of 17 (n=17) pregnant, African-American, low-income adolescents, resided in large urban area in the United states. The main aim of the study is to find out the stress and depression level in their daily life, group based activities to interact and helping them to focus on their needs and suggesting yoga is a best technique to over come this issues. They have concluded that pregnant, Urban, adolescents were highly stressed. They interpret symptoms of stress and depression. They desire to take part in group-based interactive activities; they were interested in yoga classes to overcome this issues and to buildup relationship among themselves. Researchers and health care providers should focus on these issues when they design prevention and intervention strategies.

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2.8.2.3. Anxiety During Pregnancy Affects Gross Motor Skill Of Fetus

Hanley et al. (20140; Casper et al. (2011); Mortenson et al. (2003); Casper et al. (2003) found significant negative associations between treatments with antidepressants and psychomotor development scores on the Bayley Scale (Bayley 1993) and on Boel test (Junker et al. 1982). In a recent study, Henley et al. (2013) studied the effects of exposure to SSRI (Selective Serotonin Reuptake Inhibitor) on 10-month-old babies whose mothers took antidepressants throughout the pregnancy. They found that infants who were exposed to drugs in the antenatal

period scored significantly lower on the gross motor, socio-emotional, and adaptive behavior items compared with those not exposed.

2.8.2.4. Anxiety And Depression Influence The Psychomotor Development Index

Casper et al. conducted two studies (2003,2011) to evaluate the effects of ante-natal exposure to antidepressants on children born to depressed mothers. In the first study, they found significant lower scores for the psychomotor development Index and motor quality factor of the Bayley Behavioural Rating Scale. (Test child's behavior) in the group exposed to antidepressants compared with unexposed children.

2.8.2.5. Depression- And Anxiety Leads To Physiological Symptoms

Oberlander et al. (2004) found a higher incidence of poor neonatal adaptation syndrome at birth in newborns exposed to SSRI alone in combination with benzodiazepine, especially those who were exposed to the combination of paroxetine and clonazepam within the entire exposed group, 30% of newborns, compared with 9% of control group, showed symptoms of mild respiratory distress, hypotonia,jittery, tremors and hypertonia, cardiac arrhythmia, bradycardia, and hypoglycemia. (after 48 hours, symptoms had disappeared in all babies).

2.8.2.6. Anti-Natal Anxiety Causes Behavior Syndrome

A recent study by Jorelan et al. (2008) and a review by Moses-Kolko et al. (2005) where poor neonatal adaptation syndrome, including SSRI withdrawal, SSRI toxicity, Serotonin syndrome, and serotonergic excess, serotonergic CNS adverse effects, neonatal behavioral syndrome, affects 25-30% of newborns whose mothers took SSRI antidepressants during pregnancy, with an overall risk ratio of 3.0 (95% CI 2.0-4.4)

2.8.2.7.Anxiety During Pregnancy Reduces IQ Level Of Fetus

Nulman et al. (2012) compared the IQ of children exposed to antidepressants during pregnancy with the IQ of children of mothers with

untreated depression and the children of healthy mothers. They found that children exposed to venlafaxin or SSRI had a significantly lower scores in the full-scale IQ test, in the verbal IQ scale, and in the performance IQ scale of the WPPSI compared to the control group.

2.8.2.8. Developmental Delay In Fetus Associated With Anxiety During Pregnancy

T. Deave et al. (2008, June 28)"The impact of maternal depression in pregnancy on early child development" done a prospective cohort study, Avon longitudinal study of parents and children in Southwest England. They took the sample of 9244 pregnant women and their children with delivery dates between April 1991 to December 1992. They have collected the data antenatally at 18th and 32nd weeks of gestation and at 8 weeks and 8 months post-natally, through postal questionnaires, including a self-report measure of depression (Edinburgh Postnatal Depression Scale-EPDS). They have assessed child's development at 18 months using a modified Denver Developmental Screening test (modified DDST). They found that, applying the standard 12/13 cutoff, 1565 (14%) women were depressed antenatally, but not at either time-point postnatally. Employing the modified DDST, 893 (9%) children were developmentally delayed at 18 months of age. Persistent depression (EPDS>10 at both time-points) is associated with developmental delay (adjusted or 1.34, 95% CI, 1.11-1.62) Applying the 12/13 and 14/15 cutoffs gave similar results. They have concluded that the effects on child development attributed to postpartum depression were caused in part by depressive symptoms during pregnancy.