

A review on effect of nutrient on anxiety and depression during pregnancy and its management by foods

Ranajit Kumar Khalua^{1*}, Souvik Tewari² and Rita Mondal³

^{1*} Dept. of Zoology, Narajole Raj College, Paschim Medinipur, West Bengal, India.

² PhD scholar in Food science and Technology, Dept. of Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Allahabad, Uttar Pradesh, India.

³ Dept. of physiology, Narajole Raj College, Paschim Medinipur, West Bengal, India.

Abstract

Anxiety and depression represent a global problem, affecting a large number of people worldwide. Anxiety and depression are most common problems during pregnancy due to different type of factor. Nutritional factor is most common among them. Few people are aware of the connection between nutrition and depression while they easily understand the connection between nutritional deficiencies and physical illness, but Nutrition can play a key role in the onset as well as severity and duration of depression during pregnancy. The most common nutritional deficiencies seen in patients with mental disorders are of omega-3 fatty acids, B vitamins, minerals, and amino acids that are precursors to neurotransmitters in depressed patients. Daily consumption of dietary supplements of omega-3 fatty acid that contain 1.5-2 g of EPA has been shown to stimulate mood elevation. Consumption of diets low in carbohydrate tends to precipitate depression, since the production of brain chemicals serotonin and tryptophan that promote the feeling of well-being, is triggered by carbohydrate rich foods. Protein intake and in turn the individual amino acids can affect the brain functioning and mental health. Many of the neurotransmitters in the brain are made from amino acids. The neurotransmitter dopamine is made from the amino acid tyrosine and the neurotransmitter serotonin is made from the tryptophan. If there is a lack of any of these two amino acids, there will not be enough synthesis of the respective neurotransmitters, which is associated with low mood and aggression in the patients.

Keywords: Anxiety, depression, pregnancy, nutritional factor and foods

1. Introduction

Pregnancy is a period in which psychological problems are present, increasing the risk of emotional suffering and psychiatric morbidity (anxiety and depression) in this stage of a woman's life. Anxiety is a normal and often healthy emotion, it is usually a term for a group of mental health disorder and Depression is a disorder associated with major symptoms such as increased sadness and anxiety, loss of appetite, depressed mood, and a loss of interest in pleasurable activities during pregnancy. During pregnancy the chances of anxiety is high. There are so many factors mainly the mothers are worried about the condition of the child. The tremendous pressure on them about the normal and healthy child birth, the preference of male child etc. The food plays an important factor as the in depth study in the different villages showed that the minimum requirement of food during pregnancy was not met. And the babies were grown in the foetus in the expanse of maternal nutrient store. When anxiety or depression occurs during pregnancy it is referred to as antenatal anxiety or antenatal depression. Up to 1 in 10 women and 1 in 20 men experience antenatal depression¹. Anxiety is just as common, and many parents experience anxiety and depression at the same time. It is normal to experience a degree of anxiety and 'ups and downs' when expecting a baby. However, some people develop a more pronounced anxiety or lower mood (depression) which affects their daily life and functioning. High levels of anxiety, during pregnancy, have adverse effect on mother and baby. Anxiety, in early pregnancy, results in loss of fetus and in the second and the third trimester leads to a decrease in birth weight and increased activity of the Hypothalamus hypothysis adrenal axis. It causes a

change in steroidogenesis, destruction of social behavior and fertility rate in adulthood. Also anxiety during pregnancy is accompanied by emotional problems, hyperactivity disorder, decentralization and disturbance in cognitive development of children

1.1 Pregnancy and anxiety

Anxiety and depression during pregnancy remain under diagnosed and undertreated. Although many studies have shown that antenatal anxiety and depression affect the unborn child and increase the risk of adverse birth outcomes, cognitive impairment and other disorders,

Some women may suffer from anxiety and depression during pregnancy due to some nutritional factor and the symptoms may range from mild to severe. Psychiatric morbidity (anxiety and depression) during pregnancy is a major public health concern. World Health Organization (WHO) ranks depression as one of the most burdensome illnesses in the world. Depression is predicted to be the topmost cause of morbidity by 2030 (WHO 2008). It is common during pregnancy, prevalence of anxiety disorders during pregnancy ranges from 12.2% to 39% with panic disorder and obsessive-compulsive disorder being three times more common among pregnant women than in the general population. Furthermore, generalized anxiety disorder and anxiety disorder due to medical condition were found to be twice as common during pregnancy than in non-pregnant women (Adewuya *et al.* 2006, Goodman *et al.* 2014).

1.1.1 Symptoms of Anxiety and depression

It can be tricky to diagnose mood disorders during pregnancy because "some of the symptoms can overlap with symptoms of pregnancy, such as changes in appetite, energy levels, concentration, or sleep," Dr. Smith says. "It's also normal to have some degree of worry over the health of the pregnancy." But if you experience persistent symptoms of depression and/or anxiety, especially if you're unable to function normally, get help.

Symptoms of depression include:

- Being in a depressed mood most of the time for at least two weeks
- No longer enjoying the things you used to enjoy
- Decreased interest in the world around you
- Guilt
- A sense of worthlessness
- Low energy
- Poor concentration
- Appetite changes
- Feeling hopeless
- Thoughts of suicide
- Getting too much sleep, or not enough sleep

The symptoms of anxiety vary by type of anxiety disorder, and include:

➤ Generalized Anxiety Disorder:

- Excessive worry that's difficult to control
- Irritability
- Tension/muscle aches
- Disrupted sleep patterns
- Feeling restless inside
- Fatigue
- Poor concentration

➤ **Obsessive-Compulsive Disorder:**

- Recurrent, persistent, intrusive thoughts.

1.2 Nutrient and anxiety

Few people are aware of the connection between nutrition and depression while they easily understand the connection between nutritional deficiencies and physical illness. Depression is more typically thought of as strictly biochemical-based or emotionally-rooted. On the contrary, nutrition can play a key role in the onset as well as severity and duration of depression during pregnancy. Many of the easily noticeable food patterns that precede depression are the same as those that occur during depression. These may include poor appetite, skipping meals, and a dominant desire for sweet foods. Nutritional neuroscience is an emerging discipline shedding light on the fact that nutritional factors are intertwined with human cognition, behavior, and emotions. In depressed patients, daily consumption of dietary supplements of omega-3 fatty acid that contain 1.5-2 g of EPA has been shown to stimulate mood elevation. Nevertheless, doses of omega-3 higher than 3 g do not show better effects than placebos and may be contraindicative in cases, such as those taking ant clotting drugs. In addition to omega-3 fatty acids, vitamin B (e.g., folate) and magnesium deficiencies have been linked to depression.

Randomized, controlled trials that involve folate and vitamin B12 suggest that patients treated with 0.8 mg of folic acid/day or 0.4 mg of vitamin B12/day will exhibit decreased depression symptoms. In addition, the results of several case studies where patients were treated with 125-300 mg of magnesium (as glycinate or taurinate) with each meal and at bedtime led to rapid recovery from major depression in < 7 days for most of the patients. Previous research has revealed the link between nutritional deficiencies and some mental disorders.

The most common nutritional deficiencies seen in patients with mental disorders are of omega-3 fatty acids, B vitamins, minerals, and amino acids that are precursors to neurotransmitters. Accumulating evidence from demographic studies indicates a link between high fish consumption and low incidence of mental disorders; this lower incidence rate being the direct result of omega-3 fatty acid intake. One to two grams of omega-3 fatty acids taken daily is the generally accepted dose for healthy individuals, but for patients with mental disorders, up to 9.6 g has been shown to be safe and effective. Majority of Asian diets are usually also lacking in fruits and vegetables, which further lead to mineral and vitamin deficiencies. The significance of various nutrients in mental health, with special relevance to depression has been discussed below.

Dietary supplements containing phenyl alanine and/or tyrosine cause alertness and arousal. Methionine combines with adenosine triphosphate (ATP) to produce S-adenosylmethionine (SAM), which facilitates the production of neurotransmitters in the brain. The need of the present paradigm is, more studies shedding light on the daily supplemental doses of these neurochemicals that should be consumed to achieve antidepressant effects. Researchers attribute the decline in the consumption of omega-3 fatty acids from fish and other sources in most populations to an increasing trend in the incidence of major depression. The two omega-3 fatty acids, eicosapentaenoic acid (EPA) which the body converts into docosahexanoic acid (DHA), found in fish oil, have been found to elicit antidepressant effects in human. Many of the proposed mechanisms of this conversion involve neurotransmitters. For instance, antidepressant effects may be due to bioconversion of EPA to leukotrienes, prostaglandins, and other chemicals required by the brain. Others hypothesize that both EPA and DHA influence neuronal signal transduction by activating peroxisomal proliferator-activated receptors (PPARs), inhibiting G-proteins and protein kinase C, in addition to calcium, sodium, and potassium ion channels. Whichever may be the case, epidemiological data and clinical studies have clearly shown that omega-3 fatty acids can effectively treat depression.

1.2.1 Role of carbohydrates on anxiety and depression

Carbohydrates are naturally occurring polysaccharides and play an important role in structure and function of an organism. In higher organisms (human), they have been found to affect mood and behavior. Eating a meal which is rich in carbohydrates triggers the release of insulin in the body. Insulin helps let blood sugar into cells where it can be used for energy and simultaneously it triggers the entry of tryptophan to brain. Tryptophan in the brain affects the neurotransmitters levels.

Consumption of diets low in carbohydrate tends to precipitate depression, since the production of brain chemicals serotonin and tryptophan that promote the feeling of well being, is triggered by carbohydrate rich foods. It is suggested that low glycemic index (GI) foods such as some fruits and vegetables, whole grains, pasta, etc. are more likely to provide a moderate but lasting effect on brain chemistry, mood, and energy level than the high GI foods - primarily sweets - that tend to provide immediate but temporary relief.

1.2.2 Role of proteins

Proteins are made up of amino acids and are important building blocks of life. As many as 12 amino acids are manufactured in the body itself and remaining 8 (essential amino acids) have to be supplied through diet. A high quality protein diet contains all essential amino acids. Foods rich in high quality protein include meats, milk and other dairy products, and eggs. Plant proteins such as beans, peas, and grains may be low in one or two essential amino acids. Protein intake and in turn the individual amino acids can affect the brain functioning and mental health. Many of the neurotransmitters in the brain are made from amino acids. The neurotransmitter dopamine is made from the amino acid tyrosine and the neurotransmitter serotonin is made from the tryptophan. If there is a lack of any of these two amino acids, there will not be enough synthesis of the respective neurotransmitters, which is associated with low mood and aggression in the patients. The excessive buildup of amino acids may also lead to brain damage and mental retardation. For example, excessive buildup of phenylalanine in the individuals with disease called phenylketonuria can cause brain damage and mental retardation.

1.2.3 Role of essential fatty acids

Omega-3 fatty acids

The brain is one of the organs with the highest level of lipids (fats). Brain lipids, composed of fatty acids, are structural constituents of membranes. It has been estimated that gray matter contains 50% fatty acids that are polyunsaturated in nature (about 33% belong to the omega-3 family), and hence are supplied through diet. In one of the first experimental demonstrations of the effect of dietary substances (nutrients) on the structure and function of the brain, the omega-3 fatty acids (specially alpha-linolenic acid, ALA) were the member to take part. An important trend has been observed from the findings of some recent studies that lowering plasma cholesterol by diet and medications increases depression. Among the significant factors involved are the quantity and ratio of omega-6 and omega-3 polyunsaturated fatty acids (PUFA) that affect serum lipids and alter the biochemical and biophysical properties of cell membranes. It has been hypothesized that sufficient long chain PUFAs, especially DHA, may decrease the development of depression. The structural and functional components of membrane in cells of brain which is a lipid-rich organ, include polar phospholipids, spingolipids, and cholesterol. The glycerophospholipids in brain consist of high proportion of PUFA derived from the essential fatty acids (EFAs), linoleic acid and α -linolenic acid. The main PUFA in the brain are DHA, derived from the omega-3 fatty acid α -linolenic acid, arachidonic acid (AA) and docosatetraenoic acid, both derived from omega-6 fatty acid linoleic acid. Experimental studies have revealed that diets lacking omega-3 PUFA lead to considerable disturbance in neural function.

1.2.4 Role of vitamins

- **B-complex vitamins**

Nutrition and depression are intricately and undeniably linked, as suggested by the mounting evidence by researchers in neuropsychiatry. According to a study reported in Neuropsychobiology, supplementation of nine vitamins, 10 times in excess of normal recommended dietary allowance (RDA) for 1 year improved mood in both men and women. The interesting part was that these changes in mood after a year occurred even though the blood status of nine vitamins reached a plateau after 3 months. This mood improvement was particularly associated with improved vitamin B2 and B6 status. In women, baseline vitamin B1 status was linked with poor mood and an improvement in the same after 3 months was associated with improved mood. Thiamine is known to modulate cognitive performance particularly in the geriatric population.

- **Vitamin B12 (Cynocobalamin)**

Clinical trials have indicated that Vitamin B₁₂ delays the onset of signs of dementia (and blood abnormalities), if it is administered in a precise clinical timing window, before the onset of the first symptoms. Supplementation with cobalamin enhances cerebral and cognitive functions in the elderly; it frequently promotes the functioning of factors related to the frontal lobe, in addition to the language function of people with cognitive disorders. Adolescents who have a borderline level of vitamin B₁₂ deficiency develop signs of cognitive changes.

- **Folate**

It has been observed that patients with depression have blood folate levels, which are, on an average, 25% lower than healthy controls. Low levels of folate have also been identified as a strong predisposing factor of poor outcome with antidepressant therapy. A controlled study has been reported to have shown that 500 mcg of folic acid enhanced the effectiveness of antidepressant medication. Folate's critical role in brain metabolic pathways has been well recognized by various researchers who have noted that depressive symptoms are the most common neuropsychiatric manifestation of folate deficiency. It is not clear yet whether poor nutrition, as a symptom of depression, causes folate deficiency or primary folate deficiency produces depression and its symptoms.

1.2.5 Role of minerals

- **Calcium**

A recent study showed that selective serotonin uptake inhibitors (SSRIs) inhibit absorption of calcium into bones. In addition to this, the SSRIs can also lower blood pressure in people, resulting in falls which may lead to broken bones. Indiscriminate prescription of SSRIs by doctors and ingestion by patients at risk of depression or other mental health problems may put them at increased risk of fractures. Compounded by the fact that they may be aging and already taking other medications, may also predispose them to osteoporosis.

- **Chromium**

Many studies on the association of chromium in humans depression have been recorded which indicate the significance of this micronutrient in mental health.

- **Iodine**

Iodine plays an important role in mental health. The iodine provided by the thyroid hormone ensures the energy metabolism of the cerebral cells. During pregnancy, the dietary reduction of iodine induces severe cerebral dysfunction, eventually leading to cretinism.

- **Iron**

Iron is necessary for oxygenation and to produce energy in the cerebral parenchyma (through cytochrome oxidase), and for the synthesis of neurotransmitters and myelin. Iron deficiency is found in children with attention-deficit/hyperactivity disorder. Iron concentrations in the umbilical artery are critical during the development of the foetus, and in relation with the IQ in the child. Infantile anemia with its associated iron deficiency is associated with disturbance in the development of cognitive functions. Research findings pointed out that twice as many women as men are clinically depressed. This gender difference starts in adolescence and becomes more pronounced among married women aged 25-45, with children. Furthermore, women of childbearing age experience more depression than during other times in their lives. These indicate the possible importance of iron in the etiology of depression since its deficiency is known to cause fatigue and depression. Iron deficiency anemia is associated, for instance, with apathy, depression, and rapid fatigue when exercising.

- **Lithium**

Lithium, a monovalent cation, was first discovered and defined by Johan August in 1817 while he did an analysis of the mineral petalite. The role of lithium has been well known in psychiatry. Half a century into its use, its choice for bipolar disorder with antimanic, antidepressant, and antisuicidal property. The therapeutic use of lithium also includes its usage as an augmenting agent in depression, scizoaffective disorder, aggression, impulse control disorder, eating disorders, ADDs, and in certain subsets of alcoholism. But adequate care has to be taken while using lithium, the gold standard mood stabilizer, in the mentally ill. Lithium can be used in patients with cardiovascular, renal, endocrine, pulmonary, and dermatological comorbidity. The use of lithium during pregnancy and lactation, in pediatric and geriatric population needs careful observation about its toxicity.

- **Selenium**

In a large review, Dr. David Benton of the university of Wales identified at least five studies, which indicate that low selenium intake is associated with lowered mood status. Intervention studies with selenium with other patient populations reveal that selenium improves mood and diminishes anxiety.

- **Zinc**

Zinc participates among others in the process of gustation (taste perception). At least five studies have shown that zinc levels are lower in those with clinical depression. Furthermore, intervention research shows that oral zinc can influence the effectiveness of antidepressant therapy. Zinc also protects the brain cells against the potential damage caused by free radicals.

Several studies have revealed the full genetic potential of the child for physical development and mental development may be compromised due to deficiency (even subclinical) of micronutrients. When children and adolescents with poor nutritional status are exposed to alterations of mental and behavioral functions, they can be corrected by dietary measures, but only to certain extent. It has been observed that, nutrient composition of diet and meal pattern can have beneficial or adverse, immediate or long-term effects. Dietary deficiencies of antioxidants and nutrients (trace elements, vitamins, and nonessential micronutrients such as polyphenols) during aging may precipitate brain diseases, which may be due to failure for protective mechanism against free radicals.

Nutritional imbalances can result in anxiety, panic attacks and phobias. Many people with these disorders have deficiencies of essential minerals, an excess of toxic metals, hypoglycemia and other biochemical imbalances.

1.3 Natural Anti-Depressants

Natural substances that can act as anti-depressants include the amino acids DL-phenylalanine and L-tyrosine, about 2 grams per day of each. Correcting a low thyroid condition and improving adrenal gland activity are also very helpful.

1.4 Foods that helps to reduce anxiety and depression

- **Brazil nuts**

Brazil nuts contain selenium, which may help to improve mood. Brazil nuts are high in selenium. Selenium may improve mood by reducing inflammation, which is often at heightened levels when someone has a mood disorder, such as anxiety. Selenium is also an antioxidant, which helps prevent cell damage. It is also anti-carcinogenic, which helps to prevent cancer from developing. Other nuts, animal products, and vegetables, such as mushrooms and soybeans, are an excellent source of selenium. It is important not to consume too much selenium as it can cause side effects. The recommended upper limit for selenium for an adult is 400 micrograms (mcg) per day. So be careful not to take supplements with high doses or eat more than a three to four Brazil nuts a day. Brazil nuts and other nuts are also a good source of vitamin E. Vitamin E is an antioxidant. Antioxidants can be beneficial for treating anxiety, while some research has shown that low levels of vitamin E may lead to depression in some people.

- **Fatty fish**

Fatty fish, such as salmon, mackerel, sardines, trout, and herring, are high in omega-3. Omega-3 is a fatty acid that has a strong relationship with cognitive function as well as mental health. However, recent research has shown that if a person eats too much of another fatty acid, called omega-6, and not enough omega-3, they may increase their risk of developing mood disorders, such as anxiety. Omega-3-rich foods that contain alpha-linolenic acid (ALA) provides two essential fatty acids: eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). EPA and DHA regulate neurotransmitters, reduce inflammation, and promote healthy brain function. A small study on 24 people with substance abuse problems found that EPA and DHA supplementation resulted in reduced levels of anxiety. However, more research is required. Current recommendations suggest eating at least two servings of fatty fish a week. A study conducted on men found eating salmon three times a week reduced self-reported anxiety. Salmon and sardines are also among the few foods that contain vitamin D.

- **Eggs**

Egg yolks are another great source of vitamin D. Eggs are also an excellent source of protein. It is a complete protein, meaning it contains all the essential amino acids the body needs for growth and development. Eggs also contain tryptophan, which is an amino acid that helps create serotonin. Serotonin is a chemical neurotransmitter that helps to regulate mood, sleep, memory, and behavior. Serotonin is also thought to improve brain function and relieve anxiety.

- **Pumpkin seeds**

Pumpkin seeds are an excellent source of potassium, which helps regulate electrolyte balance and manage blood pressure. Eating potassium-rich foods such, as pumpkin seeds or bananas, may help reduce symptoms

of stress and anxiety. Pumpkin seeds are also a good source of the mineral zinc. One study carried out on 100 female high school students found that zinc deficiency may negatively affect mood. Zinc is essential for brain and nerve development. The largest storage sites of zinc in the body are in the brain regions involved with emotions.

- **Turmeric**

Curcumin may help lower anxiety by reducing inflammation and oxidative stress that often increase in people experiencing mood disorders, such as anxiety and depression.

- **Yogurt**

Yogurt contains healthful bacteria, *Lactobacillus* and *Bifidobacteria*. There is emerging evidence that these bacteria and fermented products have positive effects on brain health. According to a recent clinical review, yogurt and other dairy products may also produce an anti-inflammatory effect in the body. Some research suggests that chronic inflammation may be partly responsible for anxiety, stress, and depression. Including yogurt and other fermented food in the diet can benefit the natural gut bacteria and may reduce anxiety and stress.

Fermented foods include cheese, sauerkraut, kimchi, and fermented soy products.

- **Green tea**

Green tea contains an amino acid called theanine, which is receiving increasing scrutiny due to its potential effects on mood disorders. Theanine has anti-anxiety and calming effects and may increase the production of serotonin and dopamine. Green tea is easy to add to the day-to-day diet. It is a suitable replacement for soft drinks, coffee, and alcoholic beverages.

Summary

Nutrients mainly omega-3 fatty acid, amino acid, some vitamins and minerals are effects on anxiety and depression during pregnancy. In this condition adequate amount of food (rich in omega-3 fatty acid, amino acid and vitamin B₁₂) should be given to the diet to reduce anxiety and depression and adequate amount of carbohydrate rich food should be taken because low in carbohydrate tends to precipitate depression, since the production of brain chemicals serotonin and tryptophan that promote the feeling of well-being, is triggered by carbohydrate rich foods. So pregnant women can reduce anxiety and depression by changing daily routine diet.

References

- **Bennett H.A., Einarson A. and Taddio A. (2004)** Prevalence of depression during pregnancy: Systematic review. *International Journal of obstetrics and gynecology*. 103(4):698-709.
- **Blackmore E.R., Tang W., Glover V., Evans J. and Golding J. (2011)** Previous prenatal loss as a predictor of perinatal depression and anxiety. *The British Journal of Psychiatry*. 198(5):373-378.
- **Deave T., Heron J., Evans J. and Emond A. (2008)** The impact of maternal depression in pregnancy on early child development. *International Journal of Obstetrics & Gynaecology*. 115(8):1043- 1051.
- **Faisal Cury A. and Menezes P.R. (2007)** Prevalence of anxiety and depression during pregnancy in a private setting sample. *Archives of Women's Mental Health*. 10(1):25-32.

- **Glover V. (2014)** Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. *Best practice & research Clinical obstetrics & gynaecology*. 28 (1):25–35.
- **Guxens M., Tiemeier H., Jansen P.W., Raat H., Hofman A. and Sunyer J. (2013)** Parental psychological distress during pregnancy and early growth in preschool children. *American Journal of Epidemiology*. 177 (6):538-547.
- **Howell E.A., Mora P.A., Horowitz C.R. and Leventhal H. (2005)** Racial and ethnic differences in factors associated with early postpartum depressive symptoms. *International Journal of obstetrics and gynecology*. 105 (6):1442-1450.
- **Jabbari Z., Hashemi H. and Haghayegh S.A. (2012)** Survey on effectiveness of cognitive behavioral stressmanagement on the stress anxiety, and depression of pregnant women. *Health System Research* . 8(7): 1341- 1347
- **Peen J., Schoevers R., Beekman A. and Dekker J. (2010)** The current status of urban-rural differences in psychiatric disorders. *Journal of nutritional health*. 121 (2):84-93.
- **Rahman A., Hayat Y., Habib Z. and Iqbal J. (2011)** Rural-Urband is parities in Khyber Pakhtunkhwa .*Journal of Agriculture*. 27(3):477- 483.
- **Sajjadi H., Kamal S.H.M., Rafiey H., Vameghi M., Forouzan A.S. and Rezaei M. (2013)** A systematic review of the prevalence and risk factors of depression among Iranian adolescents. *Global journal of health science*. 5 (3):16.
- **Stewart D.E. (2011)** Depression during pregnancy. *New England Journal of Medicine*. 365 (17): 1605-1611.
- **Tarabulsy G.M., Vaillancour M.P. and Bussieres E.L. (2014)** Meta-analytic finding of the relation between maternal prenatal stress and anxiety cognitive outcom. *Dev behav pediatri*. 35 (1):38–43.
- **Westdahl C., Milan S., Magriples U., Kershaw T.S., Rising S.S. and Ickovics J.R. (2007)** Social support and social conflict as predictors of prenatal depression. *Obstetrics and Gynecology*.110 (1):134.