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The effect of depression on the risk of pregnant women getting gestational diabetes in the first two trimesters

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ABSTRACT

The paper is to explore the relationship between depression and how it affects the risk of women getting gestational diabetes during their first two trimesters of pregnancy. It has a background on both the key terms, data and graphs, data analysis, a conclusion as well as an evaluation and a bibliography citing my sources.

Keywords— Depression, Gestational Diabetes, First two trimesters

1. RESEARCH QUESTION

To what extent does depression during the first two trimesters of pregnancy increase the subsequent risk of gestational diabetes in pregnant women?

2. PERSONAL ENGAGEMENT

Mental health is a topic that has always been of great interest to me and I have always been curious to learn about how it affects our physical health. Untreated depression or anxiety can lead to several problems in the various systems, such as the cardiovascular system, immune system, nervous system and more, present in our bodies and affects people all around the world regardless of their age. In addition to this, it can also cause harm to pregnant women and consequently, can lead to complications in the birth of their child as well. It is extremely crucial for pregnant women and those around them to constantly be aware of the women's mental health in order to avoid any harm from reaching the pregnant woman and her child.

3. BACKGROUND INFORMATION

Pregnancy is a unique maternal experience for women as they go through psychological, physiological and biochemical effects on women.[1] Pregnant women face a variation of emotions as they go through their various stages of pregnancy however, these varying emotions may not only be a side effect of the pregnancy but can also be due to a mental health disorder such as depression or anxiety.

4. HOW DEPRESSION CHANGES THE BODY

Although pregnancy changes a woman's body, the body of those who have gone through depression is usually different from the body of those who haven't, namely the brain. For example, researchers have noted differences in the brains of people who have been diagnosed with clinical depression as compared to those who have not. The hippocampus, a part of the brain that is vital to the storage of memories, appears to be smaller in those who have had a previous diagnosis of depression as compared to those who haven't. There are fewer serotonin receptors in a smaller hippocampus. Serotonin is one of the many chemicals present in our brain known as neurotransmitters. These neurotransmitters allow communication across the various circuits that connect different brain regions that are concerned with processing emotions. However, there is not a definite reason as to why the hippocampus is smaller in the brains of those with depression. Some researchers have found that a stress related hormone, Cortisol, is produced in excess in people with depression and that it has a "shrinking" effect on the hippocampus. In contrast to this, some scientists believe that some people are born with smaller hippocampus and hence, are more prone to depression.[2]

5. ABOUT DEPRESSION IN WOMEN:

While it is always advisable for everyone to be aware of their own mental health, pregnant women should be especially cautious about their mental health during pregnancy. It is a known fact that women are more prone to depression as compared to men and about 6% of

women go through depression in their lifetime. Due to the vulnerability and the changes that occur in a pregnant woman's body through the different stages of pregnancy, the percentage of women that go through depression during pregnancy increases to about 10%. This increase in number, as mentioned before, is the effect of hormone changes that affect the brain chemicals, hence causing depression and anxiety.[3]

5.1 Factors leading to depression, symptoms and diseases caused due to depression

Many women, during their pregnancy, do not realize that they are going through depression and undermine it, thinking that it is just a side effect of the pregnancy. There are several factors that can lead a pregnant woman to depression.[4] Some of them are:

- Lack of social support
- Marital status
- Domestic violence
- Unintended pregnancy
- Previous diagnosis of depression or chronic stress
- Socioeconomic status, etc.

There are several symptoms that can indicate depression such as: [5]

- Major changes in appetite (extensive increase or decrease in the daily food intake)
- Changes in sleeping patterns and amount of time spent sleeping
- Fatigue and lack of energy
- Feeling solemn and worthless
- Unprovoked crying (crying for no reason)
- Loss of interest or pleasure in activities normally enjoyed

It is very important for pregnant women to consult a psychiatrist if they have any of the symptoms mentioned above. Many people ignore symptoms and it is extremely dangerous if left untreated. In pregnant women, depression can lead to miscarriages, premature birth and giving birth to a low weight baby. Additionally, it can also lead to postpartum depression, a condition that can last for many months after giving birth. [5]

6. ABOUT POSTPARTUM DEPRESSION [5]

Postpartum depression is often confused with baby blues. "Baby blues", on one hand, is a mild form of postpartum depression that is experienced by many new moms. It usually starts 2-3 days after the birth of the child and can last from a period of 10 days upto a few weeks. "Baby blues" can lead to mood swings in the women – they can be crying one second and laughing the next. It can also lead to anxiety, confusion or trouble eating or sleeping. However, "baby blues", which is experienced by upto 80% of new mothers, is much more common as compared to postpartum depression. Postpartum depression is experienced by only 13% of women and is much more serious and longer lasting. A mother with a family history of depression is usually more prone to getting postpartum depression. Some of the symptoms include:

- Panic attacks and anxiety
- Feeling an extreme lack of care for the child
- Feeling sad, hopeless and out of control

6.1 Effect of a mother's depression on babies

However, depression during pregnancy doesn't affect only the mother. Babies, with moms diagnosed with depression during pregnancy, have higher levels of a hormone called cortisol, a stress related hormone. This raises a baby's risk of developing depression, anxiety and behavioral disorders later in life.

6.2 Treatment of depression

Despite all of this, depression is not untreatable. It is advisable for pregnant women to consult psychiatrists if they feel any of the symptoms and can be treated in several ways, some of them being:

- Social support
- Individual or family therapy
- Medication: SSRIs (selective serotonin reuptake intake) are drugs that are most commonly used to treat depression. SSRIs increase the level of serotonin in the brain and can ease the symptoms of moderate or severe depression [6]

6.3 About gestational diabetes and depression

One of the side effects of depression during pregnancy is gestational diabetes in the pregnant woman. Gestational diabetes is when the body cannot control blood-sugar levels. Diabetes, during pregnancy, can put both the mother and the child at risk. Women can develop preeclampsia which is a condition which leads to high blood-pressure and can turn out to be life-threatening. In addition to this, babies can grow too large within the uterus, which can make birth difficult. A 2011 study has found that people who have type 2 diabetes and experience symptoms of depression often have higher blood sugar levels. [7] Depression and stress release a hormone called cortisol which is also responsible for the fight and flight response. During the fight and flight response, the body releases extra energy into our bloodstream in the form of glucose. If the same happens during stress and depression, it can lead to excess buildup of glucose in our

bloodstream causing diabetes. [8] Although all these are suitable treatments for depression, taking antidepressants during pregnancy is not advisable. The newborns of mother who are antidepressants can have symptoms such as fast breathing, tremors, irritability and poor feeding. However, these symptoms are usually mild and usually pass within 2 weeks. [9]

7. HYPOTHESIS

I believe that the higher the median depression score, the higher the risk of gestational diabetes and increased blood sugar level in a pregnant woman. This is because, since depression causes the release of the fight to flight hormone, Cortisol, it can lead to an excess buildup of glucose in the bloodstream of the person.

8. METHODOLOGY

In a study carried out to track women’s as well as their baby’s health during and after pregnancy, researchers looked at data from around 2800 women who had enrolled for the study. The women were enrolled in gestational weeks 8-13, with five study visits which were occurring during the period of pregnancy. These women filled questionnaires during their first and second trimesters of pregnancy and at six weeks after they had given birth, to see whether they had any symptoms of depression. The researchers then calculated the median depression scores of these women and reviewed their medical records to see if whether or not they had been diagnosed with gestational diabetes. The results showed that the women who had higher depression scores were three times more prone to getting gestational diabetes as compared to those who had lower depression scores. Additionally, the researchers found that those who had diabetes were four times more prone to being diagnosed with postpartum depression as compared to those who didn’t. This information is taken from a longitudinal study of depression and gestational diabetes in pregnancy and the postpartum period published on 19 September 2016.

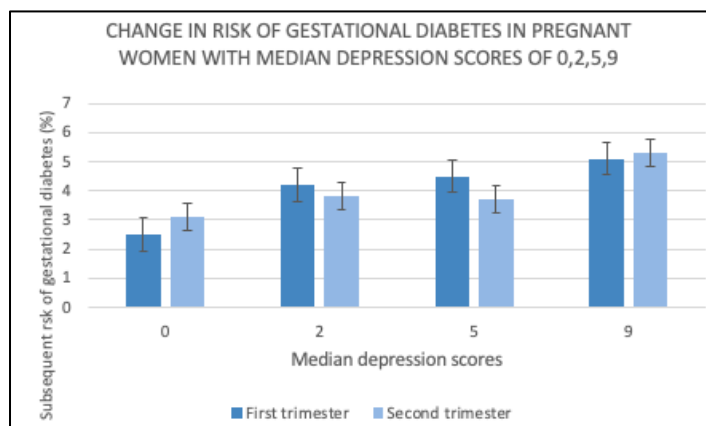
Link - <http://link.springer.com/article/10.1007/s00125-016-4086-1>
<https://www.livescience.com/56157-depression-gestational-diabetes-link.html>

Table 1: Comparing the change in risk of gestational diabetes in people with median depression scores of 0, 2, 5 and 9

Quartile number	Number of people in experiment	Depression scores - median (range)	Subsequent risk of gestational diabetes	Coefficient correlation (calculated using excel)
First trimester				
1	474	0 (0-1)	2.5	= 0.88587052
2	523	2 (2-3)	4.2	
3	691	5 (4-6)	4.5	
4	789	9 (7-27)	5.1	
Second trimester				
1	388	0 (0-0)	3.1	= 0.92779044
2	791	2 (1-3)	3.8	
3	655	5 (4-6)	3.7	
4	638	9 (7-23)	5.3	

Microsoft Excel was used to make graph and table.

Quartile number	Depression scores - median	Subsequent risk of gestational diabetes (%)	
		First trimester	Second Trimester
First Trimester			
Quartile 1	0	2.5	3.1
Quartile 2	2	4.2	3.8
Quartile 3	5	4.5	3.7
Quartile 4	9	5.1	5.3



9. CONCLUSION

9.1 Graph and data analysis

As we can see from both the graph and the data table, it can be said that depression early on in pregnancies has a higher subsequent risk of gestational diabetes in the mother. In both the table and the graph, in the first trimester, as the depression scores increase from 0-9, so does the subsequent risk of gestational diabetes. Similarly, in the second trimester as well, when the depression score moves from 0 to 9, the subsequent risk of gestational diabetes increases as well. It is also seen that in both the trimesters, even when the depression score is 0, there is still a risk of gestational diabetes. This is because both depression and gestational diabetes are both extremely prevalent among women who are of reproductive age.[11] Hence, even when the depression score is 0, there is still a risk of gestational diabetes in women. Another thing we can observe from these tables is that the rate at which subsequent risk of gestational diabetes changes with a change in the median depression score.

Another thing that is shown in the data table is the coefficient correlation between the median depression scores and the subsequent risk of gestational diabetes. In the first trimester, the correlation is approximately 0.886 and the second trimester has a correlation of 0.928. When the correlation is more than 0.7, it means that the two variables have a very strong positive relationship. This shows us that the risk of a depressed pregnant women getting gestational diabetes in both the trimesters is very high. Additionally, since the correlation of the second trimester is more, we can conclude that the risk of a pregnant women diagnosed with depression getting gestational diabetes is higher than that for women in their first trimester.

9.2 How depression can cause diabetes and other complications in pregnancy

However, the data found and processed answers the research question that is mentioned at the beginning as it shows how the blood sugar level (risk of gestational diabetes) is affected by depression. Depression and stress release a hormone called cortisol which is also responsible for the fight and flight response. During the fight and flight response, the body releases extra energy into our bloodstream in the form of glucose. If the same happens during stress and depression, it can lead to excess buildup of glucose in our bloodstream causing diabetes. [12]

Although gestational diabetes sounds like a relatively harmless disease, in pregnant women, it can lead to high blood pressure and preeclampsia, as mentioned before. Along with affecting the pregnant woman, it can also cause damage in the child. It can lead to preterm birth as well as excessive birth weight. Hence, it is extremely essential for pregnant women to take care of their mental health in order to keep both themselves and their child healthy and to reduce the risk of any complications in the future. [13]

9.3 Evaluation

Hence, through this, we can see that depression left untreated can have an extremely harmful effect on a pregnant woman. There are several factors that play a role in the health of a pregnant woman. Some of these are age, weight, previous medical history, family history of diseases, etc. Many of these factors play a role in whether a person is prone to getting diabetes. For example, a person with a parent who has diabetes is at a higher risk of getting diabetes as compared to someone whose parents do not have a history of diabetes. Similarly, even weight plays a role in whether or not a person is more capable of getting diabetes. None of these factors were taken into account when the experiment was taking place and hence, this can lead to errors, whether they be major or minor, in the calculations of how prone a pregnant woman is to get gestational diabetes. These errors are interpreted in the graph with the error bars. In contrast to this, there was a large number of trials taken during the experiment varying from 388 to 791. The more the number of trials, the more reliable an experiment is and hence, we can see that this experiment is reliable as the numbers were taken after a large number of trials.

This experiment can be extremely helpful for pregnant women all around the world. It proves that the risk of diabetes in the second trimester is significantly higher as compared to in the first trimester and hence, it tells us that although it is advisable for pregnant women to always be aware of their mental health, in the second trimester, they should be extra careful so as to reduce the risk of any complications.

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