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ROLE OF EXERCISE IN POSTPARTUM WOMEN WITH GESTATIONAL DIABETES MELLITUS (GDM)

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Summary:

Gestational Diabetes Mellitus (GDM) is seen as the prevalence of diabetes or hyperglycemia that initiates at the stage of pregnancy. Several factors are seen to be responsible for the onset of GDM, and research has revealed that numerous women having previous instances of GDM consume more calories, engage in less physical activity, gain overweight after giving birth, and have higher body mass index (BMI) numbers, which raises their risk of developing postpartum T2DM and pre-diabetes. The investigation was focused over exploring the role of physical activity within postpartum women in the effective prevention of long-term effects of GDM. Therefore for the mediation of the investigation, several other studies were evaluated to mediate a correlation between physical activity and the effectiveness in controlling GDM. Therefore it can be suggested that though physical activity are important in regulating the onset of blood glucose,particularly type 2 diabetes, alternation of diet within the patients are also important for maintaining the healthy lifestyle postpartum.

Keywords- Exercise, Postpartum women, Gestational diabetes mellitus (GDM), Body mass index (BMI)

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Introduction:

Gestational Diabetes Mellitus (GDM) is seen as the prevalence of diabetes or hyperglycemia that initiates at the stage of pregnancy. Prevalence of GDM is seen to be increasing across the globe with a rate of around 2% - 26% which is dependent on the criteria of diagnosis used for the study (Hedeager *et al*. 2021). Several studies indicated severe physiological impact followed by GDM, where significant development of type 2 diabetes (T2DM) was seen in later life (Li *et al.* 2020). Studies predict that up to 50% of women affected with GDM will develop T2DM within a span of 10 years (Teh *et al.* 2021).

Figure 1: Physiological Impacts of GDM

(Source: https://www.sciencedirect.com/science/article/pii/S0753332221009677)

Several factors are seen to be responsible for the onset of GDM, and research has revealed that numerous women having previous instances of GDM consume more calories, engage in less physical activity, gain overweight after giving birth, and have higher body mass index (BMI)

numbers, which raises their risk of developing postpartum T2DM and prediabetes (Di Biase *et al.* 2019).

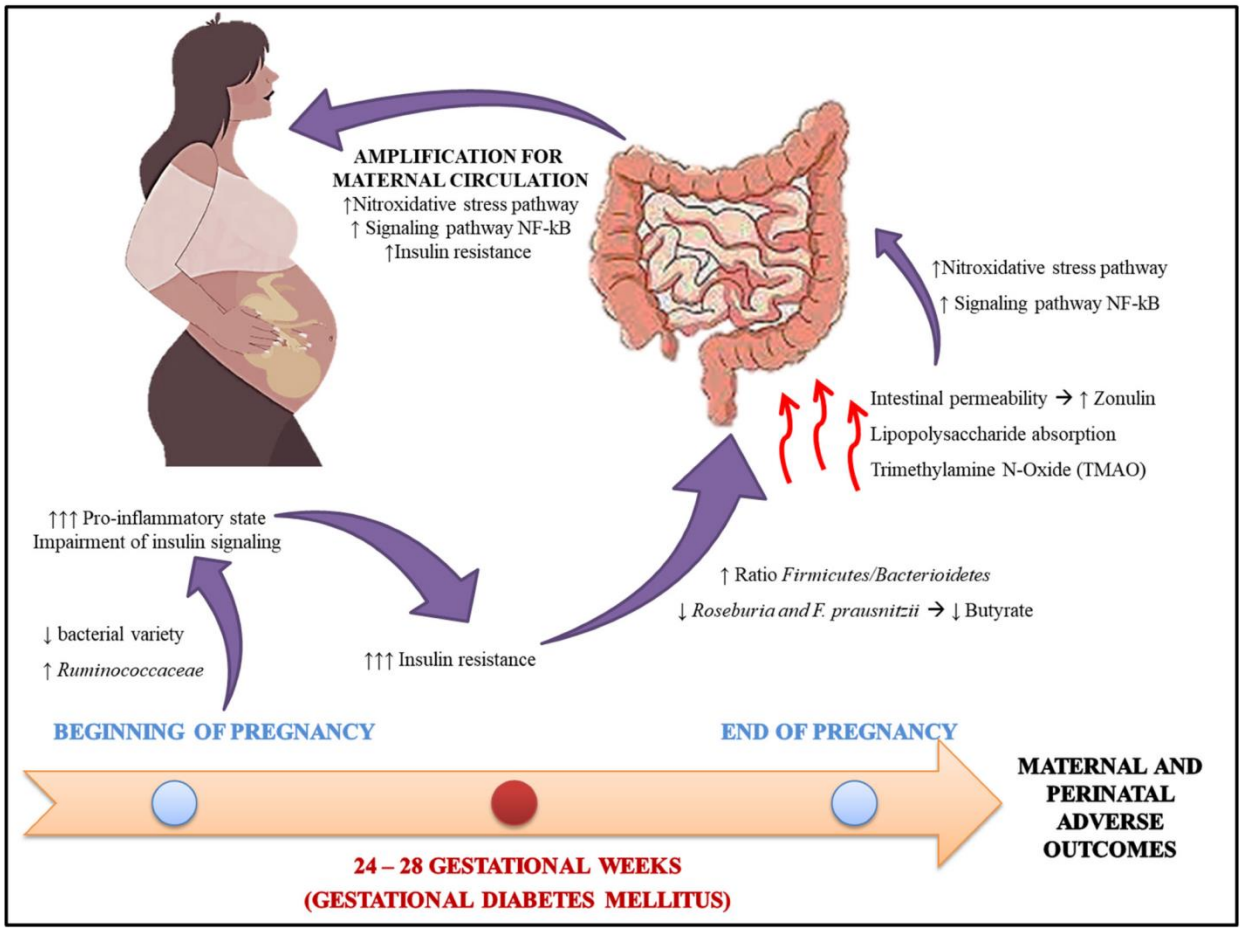

Figure 2: Relation between Insulin resistance and post-partum condition of women

(Souce:https://www.mdpi.com/antioxidants/antioxidants 00129/article_deploy/html/images/antioxidants-11-00129-g002.png)

Indeed several investigation revealed significant relationship among the inflammation, oxidative stress, and the gut microbiota as one of the potent elements that effects the health of the mother within the short as well as long terms (de Mendonça *et al.* 2022).

The mediation of physical activity within and after the pregnancy period is seen as significant for coping with GDM as indicated in several pieces of the investigation. Therefore this study aims in exploring the role of physical activity within postpartum women in the effective prevention of long-term effects of GDM (Onaade *et al*. 2021).

Discussion

Several investigations highlight the positive correlation between physical activity and the control of blood glucose levels. In fact, studies by Carbone *et al*. 2019 showed that physical activity and exercise training positively affect the outcome of the disease. The investigation showed that approx 150 min of weekly physical exercises positively correlates with cardiological fitness within the studies individual and effective cardiological fitness negatively affects the onset of T2DM within the cohort of the patients.

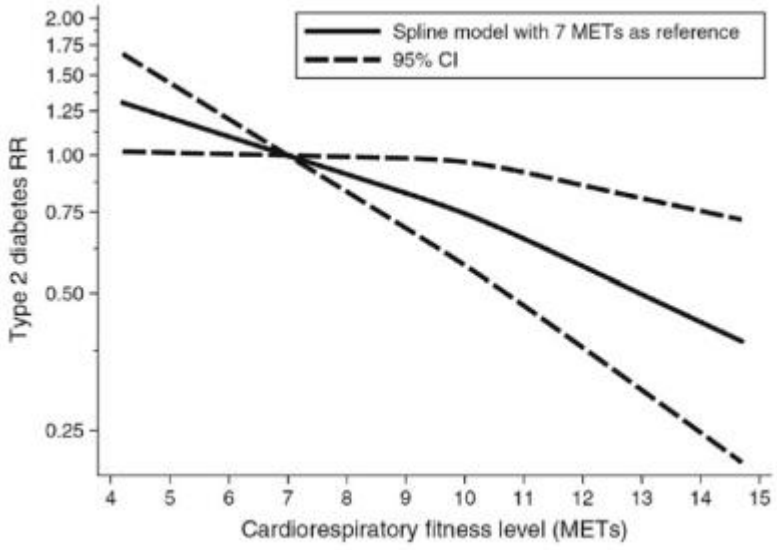

Figure 3: Relation between cardiorespiratory fitness and T2DM

(Source: https://drive.google.com/file/d/1GBe1W7jtrTkv9D856QhSyuk7Lz9DpIm7/view)

As seen from the above figure a negative correlation is observed, between cardiological fitness and T2DM. Therefore the investigation proposes the need for the incorporation of physical activity within the lifestyle for reduced occurrence of T2DM. Again studies mediated by Tang *et al*. 2022 showed the optimal techniques for controlling gestational diabetes were determined by reviewing more than forty studies that tracked in excess of 16,000 women. This investigation discovered that lifestyle change and regular exercise were helpful in reducing gestational diabetes. Therefore, it is probable that glucose tolerance and insulin sensitivity will rise and the enhancement lasts above the exercise session. Similar to the outcomes, multiple additional systematic studies found that physical activity itself was helpful in avoiding GDM.

Several other investigations also revealed a positive relation in the management of GDM through the mediation of lifestyle interventions. Investigation mediated by Huvinen *et al.* 2018, indicated similar findings within the investigation that has been mediated within the region of Finland over the postpartum women. Finland recorded an increasing rate of GDM among women, reaching an elevated level of around 18%. When contrasted with women lacking previous instances of GDM, women who have a background of GDM face a sevenfold increased chance of getting type 2 diabetes. They additionally face a higher risk of acquiring additional metabolic disorders at some point in life. The investigation was mediated with two groups, that is control and intervention groups, where the intervention groups were treated with lifestyle changes in the form of diet changes as well as incorporation of physical exercises. The result from the investigation, with traditional glucose tests such as the IFG, impaired fasting glucose and IGT, impaired glucose tolerance revealed significant improvement in the prevention of T2DM within women having GDM, where at 6 weeks postpartum, impaired glucose regulation were seen within approx 1% of the women within the intervention group, compared with approx 7% of the studied women present within the control groups having a significance level of P=0.045.

The results at 12 months of postpartum, within the GDM affected women also revealed significant results where compared with the 9.5% of the impaired glucose regulation within the control group, the level of impaired glucose regulation within the intervention group that was recorded is 2.4% which indicated that the effectiveness in the incorporation of lifestyle changes within intervention groups.

In contrast to the IFG as well as the IGT levels, the Glucose AUC and 2-hour plasma glucose are seen as effective in better prediction of the risks associated with type 2 diabetes along with the declining functioning of the beta cell.

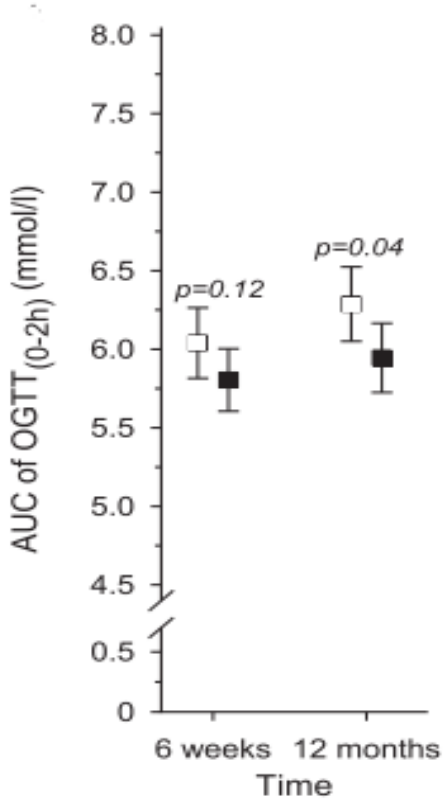

Figure 4: Glucose AUC values at 6 weeks and 12 months postpartum

(Source: https://watermark.silverchair.com/jc.2017-02477.pdf?token=AQECAHi208BE49)

The above graph as obtained from the investigation of Huvinen *et al.* 2018, that shows the study of physical activity at the glucose levels within the GDM affected women during the postpartum period. As seen from the graph, no such significant differences were obtained in the case of 6 weeks after the delivery, but as seen from the 12 months postpartum there were significant differences within the two groups that were taken for the investigation, which is a control group and intervention group having a significance level less than 0.05 as seen within the investigation.

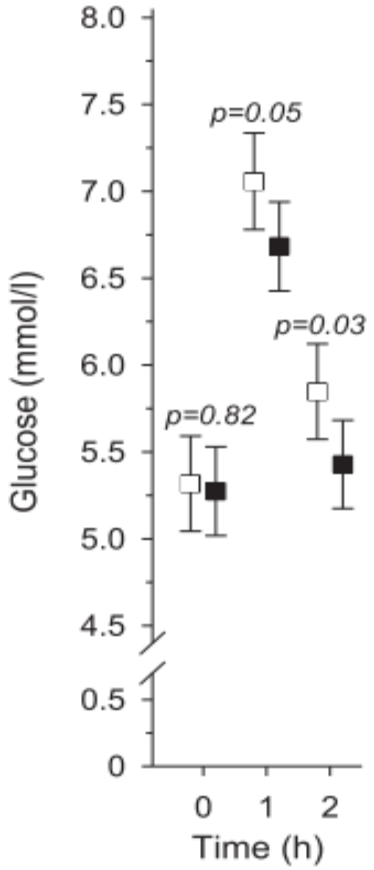

Figure 5: Plasma glucose concentrations in 75-g, 2-hour OGTT at 12 months postpartum

(Source: https://watermark.silverchair.com/jc.2017-02477.pdf?token=AQECAHi208BE49)

The above graph shows the Plasma glucose concentrations in 75-g, 2-hour OGTT at 12 months postpartum. From the above graph, it can be seen that the glucose tolerance level in the case of the GDM affected women at 12 months postpartum are lower significantly in the case of the intervention group that has received treatment in the form of a lifestyle intervention that included physical activity as compared with that of the control group that has not received any treatments. As seen from the graph, the glucose tolerance level at 1 hour and 2 hours after the incorporation of glucose was lower in the case of the intervention groups. Indeed, investifation by Huvinen *et al.* 2018 showed effective reduction in the weight of the women are seen in the case of the intervention group in both the 6 weeks and 12 weeks as indicated in figure 4.

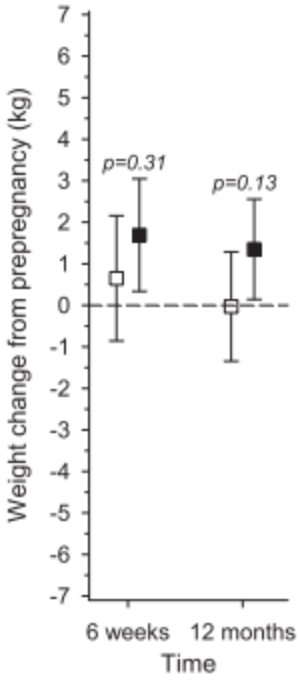

Figure 6: Weight Changes at 6 weeks and 12 months postpartum

(Source: https://watermark.silverchair.com/jc.2017-02477.pdf?token=AQECAHi208BE49)

Again according to the studies mediated by Di Biase *et al.* 2019, revealed significant relation in physical activities and delaying of T2DM in postpartum women suffering from GDM. Exercise enhances emotions and cardio-respiratory fitness without showing any deleterious impact on the volume and content of mother milk. After giving birth, physical exercise aids in achieving and maintaining an appropriate weight for women, and once coupled with a sufficient calorie restriction, it aids in reducing weight of the women. Women that had previously affected with gestational diabetes mellitus may prevent or postpone the onset of this condition by engaging in physical exercise and eating a healthy diet.

Studies mediated by Shin *et al*. 2022 revealed positive corelation among the higher mass of muscle and lower risks associated with the attainment of T2DM at the postpartum stages.

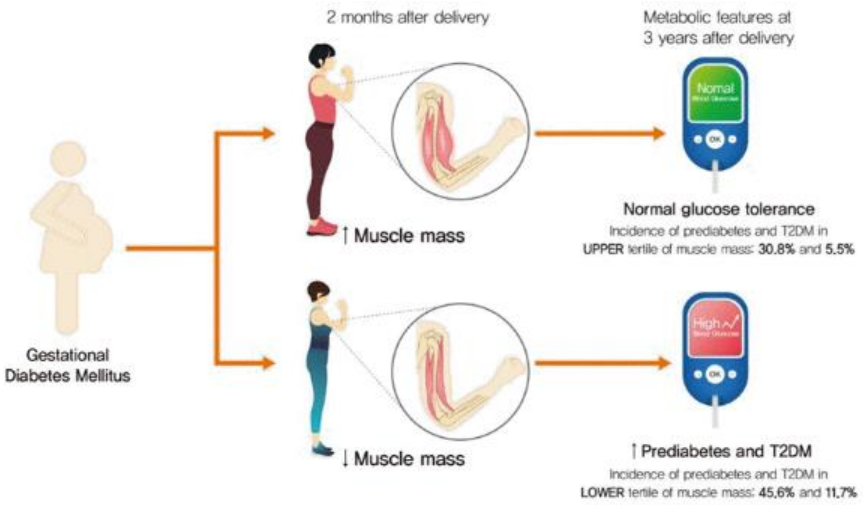

Figure 7: Relation between increased muscle mass and the onset of T2DM

(Source: https://synapse.koreamed.org/articles/1516080251)

As seen from the above figure, the investigation points out important relationship amog the muscle mass and onset of diabetes. Within this investigation, prospectively, incident prediabetes and T2DM were assessed in greater than 300 women having GDM starting 2 months following childbirth and yearly after that. During the first postpartum visit, bioelectrical impedance analysis was utilised to measure the appendicular skeletal muscle mass (ASM). ASM was broken down by body mass index (BMI) or squared height and the overall ASM were employed as muscle mass indices. Employing a logistic regression model within the investigation, the risk of developing incident prediabetes and T2DM was evaluated in accordance with the tertiles for these indices.

The results associated with the investigation revealed that at postpartum conditions and follow up upto 3 years, the groups of the participants that has the greatest ASM/BMI tertile group will have upto 60% less chances of developing prediabetes and T2DM at later stages within the participating women. This is significant with the topic of the investigation that reveals that with greater amount of physical activities that contributes to greater muscle, the onset of the T2DM are delayed in case of postpartum women (Benedetti *et al.* 2018).

Studies by Killion, 2018 also revealed that similar results in consistant with the other studies that were mentioned within the investigation. Significant relation among the physical activities and the

prevention of type 2 diabetes were revealed for postpartum women. The articles indeed, promotes the incorporation of physical activities on a daily basis for the postpartum women to get significant results in preventing the onset of type two diabetes within these women.

Conclusion:

The investigation was focused over exploring the role of physical activity within postpartum women in the effective prevention of long-term effects of GDM. Therefore for the mediation of the investigation, several other studies were evaluated to mediate a correlation between physical activity and the effectiveness in controlling GDM. Indeed several investigations reveal that with significant levels of physical activity after the pregnancy period results in decreasing the tendency to develop T2DM which is seen as one of the threatening physiological effects that threaten millions of individuals across the globe. These results from various investigation indicated significant relation among the levels of physical activity that will aid in the development of resistance in acquiring T2DM. Increasing the level of physical activity increases the levels of physical fitness among the women, that increase both the cardiological fitness as well as the muscle mass that in accordance with several investigation. Again several authors also revealed that lowering of blood glucose parameters like the AUC when measured in case of postpartum women after the changes in lifestyle of these women, where incorporation of physical activities are seen as one of the important factors. Therefore it can be suggested that though physical activity are important in regulating the onset of blood glucose,particularly type 2 diabetes, alternation of diet within the patients are also important for maintaining the healthy lifestyle postpartum.

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