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Review

An Overview about Treatment of Gestational Diabetes Mellitus: A Short Communication

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ABSTRACT

Gestational diabetes mellitus (GDM) has become one of the major public health problems for both mothers and children globally. Internationally, the frequency of excess weight and obesity has risen dramatically in women of childbearing age. There seems to be a greater risk of having GDM in overweight or obese women, resulting in problems during pregnancy, birth and neonatal development. Hospital management is a problem for obese pregnant females with GDM and places extra burdens on the healthcare sector. GDM can result in possible risks to the wellbeing of the mother, fetus, and infant, as well as clinically significant negative effects on the mental health of the mother. For females and their developing babies, diabetes may cause problems during pregnancy. Unsatisfactory diabetes control enhances the risk of complications and other birth related issues during pregnancy. It may also cause a woman to suffer severe complications. Numerous maternal and fetal effects are associated with GDM and multiple detection and management methods are also pursued globally in order to reduce the burden of health. An overview of gestational diabetes treatment is given in this review.

Keywords Pregnancy, diabetes, complications, treatment

INTRODUCTION

Gestational diabetes mellitus (GDM) causes several complications during pregnancy. Adverse maternal as well as foetal effects such as elevated risk of pre-eclampsia, caesarean sections, predates, increased fetal weight with related complications and hypoglycemia have been associated with GDM (Group, 2002). Researches have shown that maintaining glycaemic regulation during course of pregnancy decreases the occurrence of unwanted results substantially (Crowther *et al.*, 2005). Globally, the incidence of GDM has increased (Balarajan & Villamor, 2009; Ferrara, Kahn, Quesenberry, Riley, & Hedderson, 2004). The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) research reports that obesity and GDM are separate and combined risk factors that are involved in poor pregnancy outcomes (Catalano *et al.*, 2012). A concurrent rise in weight in women of the reproductive age group recorded in India and neighboring countries has been reported (Biswas, Uddin, Mamun, Pervin, & P Garnett, 2017). Maternal, foetal, perinatal and neo-natal complications have been associated with an enhanced pre-pregnancy Body Mass Index (BMI). The Indian Ministry of Health has lowered the BMI intervention reference standards for Indians while diagnosing and managing obesity as per World Health Organization (WHO) guidelines (Consultation, 2004).

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Treatment of gestational diabetes mellitus

The primary objective of GDM care is to achieve good glycemic regulation that prevents/reduces fetal as well as maternal complications (Kim, 2010). A basic change in maternal and fetal outcomes was seen in the timely identification of GDM and treatment intervention with good glycemic regulation (Crowther *et al.*, 2005).

Effects of treatment of Gestational diabetes mellitus

Compared with those in the intervention group (dietary advice / insulin therapy) in a review of pregnancy outcomes among participants in the Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS), who received routine therapy. The findings showed that counselling substantially decreased the danger of perinatal morbidity as well as showed that maternal anxiety and well-being were alleviated (He *et al.*, 2016). Among the classes, rates of cesarean delivery were similar. An analysis of moderate gestational diabetics in the United States showed that there was a drop in mean birth weight, shoulder dystocia, neonatal fat mass and LGA among the fetal outcomes under care. In either party, no perinatal deaths occurred. Elevated cord blood C-peptide, hyperbilirubinemia, neonatal hypoglycemia, and birth trauma were the criteria which did not show any difference with treatment. The maternal parameters showing a substantial decrease were the number

of deliveries by cesarean section and pre-eclampsia (Landon *et al.,* 2009). Between intervention and routine care classes, the need for induction of labor was the same. A systematic review and meta-analysis concluded that fetal complications of macrosomia, Broad for Gestational Age (LGA), and shoulder dystocia and maternal hypertension were minimized by GDM therapeutic intervention. No major effects were observed on preterm delivery, labour induction requires, cesarean sections, pre-eclampsia, birth trauma, perinatal or neonatal morbidity and neonatal hypoglycemia (Poolsup, Suksomboon, & Amin, 2014). Another systematic study involving 12 studies found that the occurrence of macrosomia and shoulder dystocia was substantially decreased by GDM care. No major reductions in the number of small babies in gestational age or perinatal/neonatal deaths were observed (Horvath *et al.,* 2010). Further studies have shown that the risk of developing type II diabetes in mothers has been minimized by adequate treatment of GDM (Horvath *et al.,* 2010). Clinical research in females having prior exposure of GDM who were on pharmacological treatment or lifestyle intervention found that diabetes mellitus progression was reduced/delayed by up to 50% relative to those treated with placebo. The need for GDM care is aimed at ensuring minimal/nil prenatal complications as well as avoiding/delaying the production of mother and child metabolic disorder(s) (Seshiah, Banerjee, Balaji, Muruganathan, & Das, 2014). Strict glucose regulation and good glycemic control are involved in GDM management. Glucose levels, i.e. fasting glucose, can be tracked up to 4 times/ day and one hour after having each meal has started. After fasting, the predicted glucose levels are 70-90mg/dl and below 120mg/dl post-prandial (Elshahidi, 2019). A fasting glucose target of approximately 90 mg/dl and a 2-hour post-prandial glucose target of approximately 120 mg/dl have been reported in the Indian DIPSI recommendations (Seshiah *et al.,* 2014).

Medical Nutritional Therapy

The recommendation of medical nutritional therapy (MNT) and lifestyle changes involving physical activity is the first step towards maintaining glycemic control (Greuter, van Emmerik, Wouters, & van Tulder, 2012). A research from India on a detailed GDM management protocol, entitled the WINGS project, suggested two weeks of MNT and life-style intervention to follow. If normal glycemic regulation with MNT can be achieved, daily glucose level monitoring should be followed (Yuen & Wong, 2015). In the absence of optimum glucose levels with MNT, it was recommended that insulin or metformin therapy be initiated to treat diabetes (Duncan, 1882). The WINGS project proposed that only insulin be used (Yuen & Wong, 2015). A research also indicated that the dosage of insulin should be modified according to the needs of the particular patient. A systematic study on GDM treatment during pregnancy also found that the use of insulin over oral hypoglycemic medication was favoured by several global protocols (Greuter *et al.,* 2012). MNT requires dietary intake control. The key goal of the MNT was to ensure fetal growth and to avoid ketosis (Kim, 2010). The control of caloric intake during GDM has been modified based on prenatal BMI. For women with normal and increased BMI groups, ACOG recommended caloric intake, composition and distribution (Goetzl, 2002). The goal of diet regulation was to maintain optimum gestational weight gain without compromising on fetal nutrition and growth and also without ketosis, as per Institute of Medicine (IOM) guidelines. The caloric intake requirement was similarly suggested by the Ministry of Health and Family Welfare of India. To calculate the daily energy requirement as per BMI and the degree of physical activity, be it sedentary, moderate or strong, a set of formulas has been established. 350 kcal per day was applied to the adult female energy requirement to meet the energy requirement of a pregnant woman. Finally, in the case of underweight BMI, 500kcal/day was added to the regular requirement and in the case of obese women; 500kcal/day was deducted from the requirement. In summary, the Indian recommendation has taken into account the type of physical activity performed by the subject in the calculation of the calories required per day and is also based on Indian BMI cut-off values. The role of exercise was to increase the sensitivity of insulin. Exercise to decrease the need for insulin has been documented and has also helped maintain adequate glycemic control (de Barros, Lopes, Francisco, Sapienza, & Zugaib, 2010; Horton, 1991). Exercise regimens adopted by GDM mothers have been found to decrease insulin therapy requirements and doses and also boost glycemic control (Cremona, O'Gorman, Cotter, Saunders, & Donnelly, 2018; Sanabria-Martínez *et al.,* 2015).

Pharmacological management of Gestational Diabetes mellitus

Insulin or other medical pharmacological options should be started in subjects whose fasting and post-prandial glucose levels are not lowered by MNT (Dirar & Doupis, 2017; Elshahidi, 2019). A study stated that the majority of studies insist that only insulin is used to control GDM. Studies have confirmed, however, that oral hypoglycemic agents such as metformin can be used in GDM and have been successful in preventing complications in pregnancy, and that the protective effects of metformin are comparable to those of insulin. The investigators found that patients preferred to use metformin as opposed to insulin (Liang, Ma, Xiao, & Tan, 2017; Rowan, Hague, Gao, Battin, & Moore, 2008). Studies have been performed on the development of alternative medicinal therapies such as glyburide and glibenclamide in the treatment of GDM. Both therapies have been tested in terms of their success in preventing maternal and fetal GDM complications as well as maintaining tight glycemic regulation (Jayasingh Sr *et al.,* 2020; Maqbool & Gani, 2018; Maqbool, Naeem, & Aamer, 2018).

Ayurvedic and Unani management of GDM

Milk and drugs from the *Madhura* category are recommended during pregnancy, according to *Ayurvedic* texts. At certain stages of pregnancy, additional dietary components such as honey, ghee, freshly made butter, meat soup, *krishra (khichadi)*, and *paayas (kheera)* are added. Overall, the diet recommended is high in micronutrients and beneficial to both mother and child's health. Milk is a complete diet, and *madhura varga* medicines are both nourishing and antioxidant. Preventing gestational diabetes with a daily snack of leafy green vegetables, fruit, and milk has been shown in clinical trials. Yoga helps to alleviate anxiety, depression, and other unpleasant pregnancy symptoms. Incorporating yoga into regular pregnancy will help with anxiety, depression, and overall well-being. Yoga can potentially be an effective therapy in minimizing GD, hypertensive-related pregnancy complications, and improving fetal outcomes, according to a randomized study conducted in high-risk pregnancies (Chandla, Tomer, & Gupta, 2017; Chen *et al.,* 2017; Sathananthan *et al.,* 2015). In addition, studies have shown that the systematic and healthy implementation of a yoga therapy module can be effective in

reducing stress levels in high-risk pregnancies (GDM). Yoga has previously been shown to improve the quality of life of pregnant women, improve their ability to perform social roles, and potentially avoid adverse obstetric outcomes in a noninvasive, cost-effective, and simple-to-learn study. Pregnancy is a unique phase in a woman's life, and yoga will provide her with the ability and resources to make the most of it. Meditation, breathing, and calming exercises, all of which are important components of yoga, have been shown to have a significant and beneficial effect on the autonomic nervous system's behaviours in pregnant women (Chandla *et al.*, 2017; Deshpande *et al.*, 2013; Khan & Maqbool; Maqbool, Dar, *et al.*, 2019; Rakhshani, Maharana, Raghuram, Nagendra, & Venkatram, 2010).

Punica granatum, Trigonella foenum graecum, Gymnema sylvestre, Aloe vera, Azadirachta indica, Acacia arabica, Momordica charantia, Eugenia jambolana, and others are single drugs used in formulations with anti-diabetic and associated beneficial properties in GDM. With a comprehensive approach that involves numerous photochemical groups such as alkaloids, terpenes, and phenolics, phytomedicine used in Unani medicine offers an exciting potential for the creation of new forms of therapeutics for diabetes mellitus. These medications include antioxidants, bitter, and other activity linked to carbohydrate metabolism disturbances, in addition to hypoglycemic activity. *Roghane Qusht, Sharbate Afsanteen, Qurse Tabasheer, Qurse Dhayabitus, Qurse Marwareed, Qurse Gulnar, Dawaul Misk Talkh, Safoof Gilo,* and *Ma-Usshaeer* are some of the decoctions, infusions, capsules, pills, and powders used. *Qurs Ziabetus, Qurs Kushta baiza murgh, Dolabi* pills, *Qurs Kushta Zamarrud, Diab-eaze, Safoof Ziabtes,* and other commonly marketed formulations (Hamiduddin, Ali, Jahangeer, & Al, 2018; Maqbool, Khan, Mohammad, Adesina, & Fekadu, 2019; Zehravi, Maqbool, & Ara, 2021).

DISCUSSION

GDM (gestational diabetes mellitus) is any degree of glucose sensitivity that develops or is first recognized during pregnancy (Metzger, Coustan, & Committee, 1998). GDM has a huge effect on both the mother and the baby's pregnancy outcomes. Despite the fact that it is recognized as a serious illness that affects pregnant women's lives, it is still a controversial topic with contradictory recommendations and treatment protocols. During pregnancy, metabolic changes occur to aid in the transition of nutrients to the developing fetus. Glucose is the most essential nutrient that crosses the placenta. While amino acids and lipids do cross the placenta, in far smaller amounts. Other vital nutrients, such as vitamins, are also needed for fetal growth and development. To ensure that certain vitamins are available to the fetus, their metabolism is impaired during pregnancy. During pregnancy, the metabolism adjusts to the needs of the developing foetus, providing a steady supply of nutrients, especially glucose, to aid in its development. Beta cell hyperplasia is promoted by elevated maternal oestrogen and progesterone during early pregnancy, resulting in an increase in insulin release (Carr & Gabbe, 1998; Rieck & Kaestner, 2010). Therefore, in early pregnancy, glucose tolerance is normal as insulin sensitivity is normal (Catalano, Tyzbir, Roman, Amini, & Sims, 1991; Catalano *et al.*, 1992). By mid-pregnancy, however, the steady rise in fetoplacental factors has decreased maternal insulin sensitivity and stimulated the transfer of fuels other than glucose to the growing fetus (RYAN & ENNS, 1988). Glycemic regulation is the foundation of GDM treatment, and it has been shown to reduce adverse effects in pregnant women with GDM (Mills *et al.*, 1998). Dietary counselling, also known as "Medical Nutrition Therapy," (MNT) is the first line of treatment for GDM (de Lima *et al.*, 2013). MNT has been shown to help women achieve glycemic regulation and reduce pregnancy and perinatal complications. Exercise combined with dietary changes increases glycemic regulation as compared to diet alone (Jovanovic-Peterson, Durak, & Peterson, 1989). When women struggle to achieve their goals with traditional treatment, pharmacological intervention is used. Despite the fact that many women with GDM achieve sufficient glycemic regulation by lifestyle changes, 30-40% need additional pharmacotherapy to control hyperglycemia (Durnwald & Landon, 2005). Insulin is the most commonly used pharmacological treatment, but oral hypoglycemic agents (metformin and glyburide) are also gaining popularity (Magon & Seshiah, 2011; Nicholson *et al.*, 2009). GDM is a rapidly rising issue even in poorer countries, according to recent reports from developing countries. There are additional problems in these nations. Access to GDM treatment and its affordability are other obstacles in developing countries like India, in addition to rising diabetes rates, high rates of maternal mortality and morbidity, and insufficient access to obstetric care. Unfortunately, GDM is still a neglected area that has the potential to harm the health of millions of mothers and their children. As a result, a multi-pronged approach to GDM treatment is needed.

CONCLUSION

Gestational diabetes mellitus (GDM) is a significant pregnancy complication wherein patients without previously diagnosed diabetes experience chronic hyperglycemia during gestation. In most cases, this hyperglycemia is the result of reduced glucose tolerance on the basis of chronic insulin resistance because of pancreatic β-cell dysfunction. Genetic, epigenetic and environmental factors are all likely to contribute to the development of GDM, and over a significant period of time, the processes involved are complex and gradual. The treatment and diagnosis of gestational diabetes is subject to much debate, stressing the significance and validity of clarification and consensus. In order to establish successful therapies and prevention strategies, greater awareness of these processes and their contribution to GDM is needed.

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CONFLICT OF INTEREST

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