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Metabolic issues, Screening Criteria and Diagnosis of Gestational Diabetes Mellitus

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Abstract

The study's purpose is to see how useful WHO guidelines are for detecting gestational diabetes (GDM) in pregnant women, as well as how effective they are at minimizing negative repercussions for the mother and newborn in women under the age of 18. In a 35-year-old woman, there were no evident risk issues for GDM. The method used in this retrospective study is based on 1,360 pregnant women that gave birth and were tracked at the hospital in Istanbul University. All participating pregnant women between 24th to 28th week underwent the test for 75g Oral Glucose Tolerance. The WHO's standard criteria that were already formalized were used to establish whether there was evidence of gestational diabetes in each case. The study included the test of oral glucose tolerance utilized to identify around 28% of pregnant women under 35 who had no risk issues related to GDM complications. The rate of primary caesarean sections in the group with GDM, was radically greater than that in the group without gestational diabetes. Premature birth has also been linked to GDM complications. The observations indicated that the admission to NICU, Neonatal critical care unit, was strongly associated to diagnosis of Gestational Diabetes Mellitus (GDM). In neonates, no substantial concerns with airway anomalies. There is a lot of variation in the groupings. The correlation between metabolic problems and gestational diabetes was moderate. According to the WHO's criteria, childbearing women with no clear risk issues were identified with GDM. It was studied that treatment for these women may reduce their risk of neonatal and maternal hyperglycemia-related problems like caesarean section, polyhydramnios, premature delivery, NICU admission, LGA, and low infant mass.

Keywords: Screening • Outcomes • Gestational • Diabetes • Polyhydramnios

Introduction

GDM is a type of condition for intolerance of glucose occurring in the pregnancy period or is first denoised during pregnancy period [1]. GDM is the highly general metabolic disease among pregnant women today [2], and it is on the rise [3].

Macrosomia, and infant hypoglycemia, and shoulder dystocia are the most common unfavorable pregnancy outcomes associated with GDM.

There is currently no agreement on GDM screening criteria, and there is no widely accepted technique for selective screening or screening at global level of pregnant women, making it impossible to determine GDM occurrence across communities., Culture has been recognized as a risk element for Gestational diabetes mellitus in and of itself [4,5]. The goal of the study was to understand and establish the functionality of WHO criteria for recognizing GDM in a subgroup of the home-grown population, as well as their efficacy in stopping bad motherly and newborn consequences in women under 35 who had no clear risk issues for GDM.

Material and Methods

The reflective population study comprised a total of 1360 pregnant women. From September 2012 to October 2013, they were born and observed in an Istanbul university hospital. All the participants were under 35 years of age and had no recognized risk issues for GDM. The participating women having chronic systemic disease, type 1 or type 2 diabetes, or a record of many pregnancies were excluded. To determine gestational age, all pregnant women between period of 24th to 28th week underwent the Oral Glucose Tolerance Test (OGTT) and the ultrasound; GDM was diagnosed in all cases following WHO criteria [4,5]. After an all-night fast of 8 hours at least, blood was collected to determine the glucose level, and the patient was given 75 g of glucose orally. The second sample of blood was carried out two hours later to evaluate the glucose level. GDM is defined by the WHO as blood sugar in fasting > 126 mg/dL and 2-hour post dose value > 140 mg/dL. Gestational diabetes mellitus patients were given a customized diet and/or insulin treatment, as well as blood sugar self-monitoring. Blood sugar levels are measured daily using a glucometer (on an empty stomach and 1 hour after each meal). Every two weeks or more frequently depending on the indication, all patients underwent follow-up examinations. The treatment outcomes were assessed using the company's recommendations. In the United States of America, diabetes is a serious problem [6]. All the patients' demographic information (age, family history of diabetes, parity, including self-reported pre-gravidity mass) was gathered from the medical histories of the participants. These data also included information on birth mode (vaginal delivery or caesarean), preterm delivery (delivery before 37 weeks of pregnancy), labor induction, oligohydramnios gestational hypertension, polyhydramnios, and preeclampsia.

The admission to NICU is subjected to conditions of stillbirth, nerve paralysis, infant death, dystocia, bone fracture. It includes respiratory complications that consists of Transient-Tachypnea of Newborn (TTN) and Respiratory-Distress-Syndrome (RDS). The occurrence is as the weight gain during birth, macrosomy (birth weight > 4000 g), age of small for gestation (SGA, definite theoretically as weight < 10th% tile), large for gestational of age (LGA, weight > 90th% tile), includes the metabolic problems like Hypocalcemia, that results into the condition where level of hemoglobin is ≥ 20 g / dL, hypoglycemia, where level of blood sugar is ≤ 35mg/dL, and hyperbilirubinemia that requires phototherapy procedures.

Results

In this research, 1,360 pregnant women were tested for gestational diabetes. In the period from September 2012 to October 2013, 1,360 women participants were assessed, with 380 (28%) being diagnosed with GDM and 980 (72%) being determined to be disease-free. The biochemical, clinical, and anthropometric characteristics of all subject pregnant women who do not have risk issues related to GDM are mentioned below in Table 1.

The two groups had substantial differences in weight gain during delivery and at 75g OGTT, maternal age, and BMI. Glycemic levels observed were substantially smaller in the GDM group both fasting glucose load samples

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and post glucose load samples. Insulin was administered to 102 (27%) of the 380 women with GDM, comparatively the rest 278 (73%) were managed with dietary modifications. Polyhydramnios was the only unpleasant incidence reported by 18 of 380 participating women.

The objective of the logistic regression study was to discover if analyzing participating pregnant women under 35-year age for Gestational Diabetes Mellitus, without risk issues resulted in neonatal and maternal adverse outcomes regardless of sufficient glycemic management. Gestational Diabetes Mellitus was the study's dependent variable. The maternal outcomes of the participating women in experiment are mentioned below in Table 2a.

As observed, the observed rate of primary caesarean (CS) in Gestational Diabetes Mellitus group was significantly higher compared to that within the group without GDM [29.6% in GDM group vs 15.3% in non-GDM group; Odds-Ratio OR = 02.350, CI of 95%, 1.53–3.64, p = 0.001]; additionally, the difference persisted substantial when considered after pre-pregnancy BMI, parity, and age were added into consideration as shown in Table 2a. Following vaginal labor induction, both groups when observed, had the same rate of caesarean section. Among the participating women who had earlier delivered through caesarean, secondary CS was greatly related to Gestational Diabetes Mellitus [Adjusted Odds-Ratio (AOR) = 05.05, confidence interval of 95%, 2.110 – 012.08, p = 00.0010]. Considering unaltered examines, the grouping of preeclampsia and Gestational-Hypertension was related to Gestational Diabetes Mellitus (OR = 2.44, confidence interval of 95%, 1.050 – 05.650 , p = 00.0370), and in consideration of preterm delivery (OR = 02.430, confidence interval of 95%, 1.11–5.29, p=0.025); however, these associations were not substantial after adjustments were made for pre-pregnancy BMI, parity and age (for the grouping of preeclampsia and Gestational-Hypertension with AOR = 2.03, confidence interval of 95%, 0.830 – 04.970, p = 00.1200, and for preterm delivery with AOR = 01.650, confidence interval of 95%, 0.32–8.51, p = 0.549). Gestational Diabetes Mellitus was related to polyhydramnios (AOR=4.48, confidence interval of 95%,1.20–16.73, p=0.025) even when pre-pregnancy BMI, parity and age were monitored for. A connection between feotal pain and oligohydramnios was not discovered as shown in Table-2a. The fetal outcomes of the research participants are mentioned in Table 2b.

Among the babies in either group, there were no stillbirths, nerve palsy or newborn deaths. When maternal age, gestational age, and pre-pregnancy BMI at delivery were all considered, infants of women with GDM observed were substantially weightier (p=0.001). The identification of GDM was substantially related to admittance to NICU after controlling for BMI, parity, infant weight, and age (AOR = 4.39, Confidence interval of 95%, 1.44–13.37, p=0.009). Other significant prenatal outcomes, such as bone fracture and shoulder dystocia (AOR = 1.47, Confidence interval of 95%, 0.81–2.63, p = 0.202), indicated no major variations between two groups.

The group identified with GDM had substantially more babies with LGA (AOR=3.53, Confidence interval of 95%, 1.34–9.34, p=0.011), despite no significant differences in SGA or macrosomia across the groups. The two separate groups had significant difference in terms of TTN and RDS, as well as newborn respiratory issues during delivery. Gestational Diabetes Mellitus seemed to be related to metabolic problems (OR = 2.86, Confidence interval of 95%, 1.050 – 7.800, p = 00.040), although no such relationship was seen after controlling for BMI, gestational birth age, parity, and the age. Even though all important relationships were independent of BMI; the Pearson's test indicated that pre-pregnancy BMI was related to main caesarean section (r = 00.1030, p = 00.0170), newborn mass (r = 00.1220, p = 00.0050), and Large for Gestational Age (r = 00.113, p = 00.009), all of which were independent of GDM.

Table 1: All pregnant women in the research had similar clinical, anthropometric, and biochemical characteristics.

	No-GDM (n=980)	GDM (n=380)	p-value
Age (in years)	30.8±3.2	29.3±3.4	<0.001
BMI (in kg/m2)	21.4±1.9	22.9±1.9	<0.001
Pregnancy(n)	2.50 ± 00.6	2.50 ± 00.7	0.934
Week spent at OGTT	27.10 ± 0.8	27.10 ± 1.2	0.23
Glucose after Fasting (in-mg/dL)	79.40 ± 5.7	91.400 ± 8.97	< 00.0010
Glucose-postprandial 2-h (in-mg/dL)	111.6±18.9	140.5±21.8	<0.001
Weight gain at OGTT (in kg)	7.0±2.7	9.8±3.4	<0.001
Weight gain at delivery (in kg)	12.0±2.7	14.3±3.3	<0.001

Values are represented as mean±SD.

OGTT is defined as Oral Glucose Tolerance Test; and

BMI is defined as Body Mass Index.

Table (2a): Pregnancy results in women with and without Gestational Diabetes Mellitus.

Outcome	No GDM (n=980)	GDM (n=380)	OR (95% CI)	OR (95% CI)[a]	p- value	p-value[a]	Power(%)
Primary-cesarean section (CS), n (%)	147 (15)	112 (30)	2.4 (1.5–3.6)	1.9 (1.2–3.1)	<0.001	0.006	>95
Secondary cesarean section, n (%)	37 (4)	42 (11)	3.9 (1.8–8.8)	5.1 (2.1–12.1)	0.001	<0.001	85.2
Cesarean-section after labor, n (%)	27 (3)	7 (2)	0.6 (0.2–2.4)	0.6 (0.1–2.2)	0.498	0.401	9.7
Labor-induction, n (%)	4(1.0)	5(1.0)	4.30 (0.4–48.1)	3.8 (0.3–53.3)	0.233	0.314	13.5
Gestational-hypertension, n (%)	15.0(2)	15.0(4)	2.60 (0.9–7.8)	1.7 (0.70–7.2)	0.095	0.173	33.4
Preeclampsia, n (%)	12 (1)	10 (3)	2.2(0.6–77.6)	1.7 (0.4–6.7)	0.223	0.443	18.1
Fetal-distress, n (%)	26(3)	11(3)	1.10(0.40–3.20)	0.90 (00.30 –3.0)	0.896	0.879	8
Polyhydramnios, n (%)	11 (1)	18 (5)	4.5(1.3–14.1)	4.5 (1.2–16.7)	0.016	0.025	58.7
Oligohydramnios, n (%)	7 (1)	9 (2)	2.9(0.6–13.1)	1.7 (0.3–8.5)	0.166	0.549	28.5
Preterm delivery, n (%)	33 (3)	31 (8)	2.4 (1.1–5.3)	1.9 (0.8–4.5)	0.025	0.116	52.3
Breech presentation, n (%)	81 (8)	39 (10)	1.2 (0.7–2.3)	1.2 (0.7–2.2)	0.502	0.563	9.9

[a]Values included were defined for parity, pre-pregnancy BMI, and maternal age.

Calculation of Power post hoc was done using the formula G*Power, using the coefficient of R-squared correlation multiple that was gained through regression for particular trait.

OR is defined as Odds Ratio; and

CI is defined as Confidence Interval.

Table (2b): Fetal/neonatal outcomes in women with and without Gestational Diabetes Mellitus.

Outcome	GDM (n=380)	No- GDM (n=980)	OR (95% CI)	OR (95% CI)[a]	p-value	p-value[a]	Power (%)
Birth-weight (in kg)	03.20 ± 00.4	03.090 ± 00.30	*	*	0.002[a]	<0.001[b]	>95
Serious-perinatal-complications,(n) (%)	44.0 (12)	84.0 (9)	1.50 (0.8-2.6)	1.2 (0.7-2.3)[c]	0.199	0.497[c]	17.2
Dystocia,(n)(%)	0.0 (0.0)	0.0 (0.0)	*	*	*	*	*
Bone-fracture,(n)(%)	4.0 (1.1)	0.0 (0.0)	*	*	*	*	*
Admission to NICU,(n)(%)	24.0 (6)	14.0 (2.0)	04.100 (01.50-11.40)	4.4 (1.4-13.40)[d]	0.006	0.009[d]	68.5
RDS,(n)(%)	6 (2.0)	4(1)	3.30(0.50-19.70)	2.7 (0.4-17.4)[e]	0.197	0.306[e]	26.3
TTN,(n)(%)	9 (3)	8 (1)	2.9(0.7-13.1)	1.9 (0.3-10.7)[e]	0.167	0.472[e]	27.8
Macrosomias(≥4 kg),(n)(%)	5(1.0)	16 (2.0)	1.50(0.20-8.70)	0.50(00.9-2.70)[c]	0.694	0.482[c]	28.7
LGA,(n)(%)	33 (9)	18 (2)	4.9 (1.9-12.4)	3.5 (1.3-9.3)[c]	<0.001	0.011[c]	85.6
SGA,(n)(%)	10 (3)	14 (2)	1.8 (0.5-6.0)	1.9(0.5-7.4)[c]	0.331	0.311[c]	16.5
Metabolic-Complications,(n)(%)	20.0 (5)	18.0 (2)	2.90 (01.0-7.8)	2.3(0.8-7.1)[c]	0.04	0.137[c]	46.6
Hypoglycaemia,(n)(%)	3.0 (0.1)	0.0(0.0)	*	*	*	*	*
Hyperbilirubinemia,(n)(%)	08.0 (2)	6.0 (1)	2.90 (0.60-13.10)	1.2(0.20–5.8)[c]	0.164	0.824[c]	27.5
Hypocalcemia,(n)(%)	5 (1)	5 (1)	2.2 (0.3-15.5)	5.3(0.7-41.4)[c]	0.443	0.113[c]	15.4
Polycythemia,(n)(%)	4 (1)	5 (1)	2.2 (0.3-15.5)	2.2(0.3-18.7)[c]	0.443	0.474[c]	15.4

[a]Calculated were obtained using Mann-Whitney U test.

[b]Calculated were obtained after adjustment is made for BMI for pre-pregnancy; gestational age at birth; and maternal age; using linear regression analysis.

[c]Values were calculated after adjustment is made for parity, BMI for pre-pregnancy; maternal age and gestational birth age; using logistic regression analysis.

[d]Values were calculated after adjustment is made for parity, pre-pregnancy BMI; neonatal weight; and maternal age; using logistic regression analysis.

[e]Values were calculated after adjustment is made for parity, pre-pregnancy BMI; delivery mode; and maternal age; using logistic regression analysis.

NICU is defined as Neonatal-Intensive-Care-Unit;

RDS is defined as Respiratory-Distress-Syndrome;

TTN is defined as Transient-Tachypnea of Newborn;

LGA is defined as Large for Gestational-Age;

SGA is defined as Small for Gestational-Age

OR is defined as Odd Ratio;

GDM is defined as Gestational Diabetes Mellitus.

Discussion

GDM is a sort of diabetes that's utmost common disease revealed in pregnancy, affecting 1% to 14% of all pregnancies [1]. GDM is becoming more common across the world [7]. Both the mother and the child may experience significant morbidity because of GDM [8]. Polyhydramnios, macrosomia, prenatal hypertension, Stillbirth, and caesarean delivery have all been linked to GDM in women [9]. Gestational Diabetes Mellitus usually goes away post-delivery, but it shows that further pregnancies raise the risk of recurrent type-II diabetes and GDM, and in later stage of life issues related to cardiovascular problems [10,11]. Although the exact role of GDM-related risk issues (obesity, multiparity, etc.) in the disease is unknown, they will be categorized as maternal variables or pregnancy-related [12].

The importance of early-stage diagnosis in the avoidance of fetal and maternal problems cannot be overstated [5,13].

Since the adoption of the two-hour 75 g OGTT in pregnancy, World Health Organization has suggested the identical diagnostic limit standards for diagnosis of indicative glucose tolerance in nonpregnant women [14,15]. Here World Health Organization defined GDM as impaired GT and diabetes (range of plasma glucose in fasting is 7 mmol/dL or 126 mg/dL; after 2-hour plasma glucose range 7.8 mmol/dL or 140 mg/dL, respectively) in 1999 [16], and their recommendations have remained unaltered to this day.

Early detection and proper medical and obstetric treatment should be used to prevent the risks of increased newborn illness and perinatal mortality related with Gestational Diabetes Mellitus [17,18]. As in women with constant hyperglycemia of mother, consumption of further oral therapeutic treatments, lifestyle changes, and insulin therapy has been shown to improve perinatal results. Medical nutrition counselling and food treatment to promote a complete healthy lifestyle are effective in managing the Gestational Diabetes Mellitus [19-21] and results can enhance foetal and maternal results [22,23].

The goal was to explore if WHO's GDM criteria were helpful in lowering poor newborn and maternal results in women under the age of 35 who had no clear risk issues for Gestational Diabetes Mellitus diagnostic, and if dietary modifications were beneficial in avoiding those outcomes. 1360 participant pregnant women took the OGTT between 24th and 28th week of pregnancy, with no prior understanding of any risk issues. Approximately 28% of patients were identified with Gestational Diabetes Mellitus diagnostic and treated, decreasing the risk of harmful neonatal & maternal hyperglycemia results such as preterm birth, admission to the NICU polyhydramnios, higher newborn weight, LGA, and primary CS. The rate of harmful happenings in the group was like that of all other participating women with GDM. Studies with related outcomes were reported in a peer-reviewed journal [24,25].

Even though group with Gestational Diabetes Mellitus were older in age and had a greater BMI compared to participating women without Gestational Diabetes Mellitus, all the observed relationships remained substantial pre-pregnancy BMI and after age were considered, suggesting that Gestational Diabetes Mellitus was an independent risk issue. Gestational Diabetes Mellitus and greater BMI are both associated to poor mother and infant outcomes, with the combination having a larger effect, according to our data. Several unfavorable pregnancy outcomes were associated to pre-pregnancy BMI, even when it was within the normal range (25 kg/m2) and regardless of Gestational Diabetes Mellitus, according to our research. According to our findings, the majority of GDM cases were discovered at baseline and 2 hours during the OGTT.

The study's findings can only be interpreted with a limited sample size. Excessive medical therapy may have resulted in a more risk of preterm birth in Gestational Diabetes Mellitus patients, as well as a rise in CS and NICU admission rates. On the other hand, group with Gestational Diabetes Mellitus, had more risk of polyhydramnios and LGA, which explained for the greater numeral caesarean sections in the group, even if over-treatment did not clarify the neonatal key results, such as higher neonatal weight and LGA. The results

of our GDM group are all much lower than those of other GDM studies in common population [25].

In Turkey, studies on Gestational Diabetes Mellitus occurrence have been published. Akbay et al., [26], on the other hand, found an 8.9% prevalence, while Köşüş et al., [27] found an 8.6% prevalence. Few of the related studies were reviewed [28-31]. In all studies, Gestational Diabetes Mellitus was identified after a test of 50 g glucose-screening was conducted and then a 100g glucose OGTT in two stages. Even though just a few studies using the 75 g OGTT in accordance with WHO recommendations have been published, this procedure offers the benefit of having a screening test as well as a diagnostic test in one. Further research and studies are required to substantiate our outcomes.

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References

1. Obstetrics, Williams. "Cunningham GF, Leveno KJ, Gilstrap LC, Hauth JC, Wenstrom KD, Bloom SL ed." (2005).
2. Fauci, A. S., D. L. Kasper, D. L. Longo and E. Braunwald, et al. Harrison's Principles of internal medicine. (2008).
3. Fernández-Real, José Manuel, Abel López-Bermejo and Wifredo Ricart. "Cross-talk between iron metabolism and diabetes." *Diabetes* 51 (2002): 2348-2354.
4. International Association of Diabetes and Pregnancy Study Groups Consensus Panel. "International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy." *Diabetes Care* 33 (2010): 676-682.
5. Griffin, M. E., M. Coffey, H. Johnson and P. Scanlon, et al. "Universal vs. risk factor-based screening for gestational diabetes mellitus: detection rates, gestation at diagnosis and outcome." *Diabet Med* 17 (2000): 26-32.
6. Mellitus, Gestational Diabetes. "American diabetes association publication." *Diabet Med* 26 (2003): S103-S105.
7. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes care* (2007);30:45–6.
8. Kjos, Siri L., and Thomas A. Buchanan. "Gestational diabetes mellitus." *N Engl J Med* 341 (1999): 1749-1756.
9. Keshavarz, Maryam, N. Wah Cheung, Gholam Reza Babaee and Hamid Kalalian Moghadam, et al. "Gestational diabetes in Iran: incidence, risk factors and pregnancy outcomes." *J Endocrinol Invest* 69 (2005): 279-286.
10. Bo, Simona, L. Monge, C. Macchetta and Guido Menato, et al. "Prior gestational hyperglycemia: a long-term predictor of the metabolic syndrome." *J Endocrinol Invest* 27 (2004): 629-635.
11. Retnakaran, Ravi, Ying Qi, Philip W. Connelly and Mathew Sermer, et al. "Glucose intolerance in pregnancy and postpartum risk of metabolic syndrome in young women." *J Clin Endocrinol Metab* 95 (2010): 670-677.
12. Ben-Haroush, A., Y. Yogev, and M. Hod. "Epidemiology of gestational diabetes mellitus and its association with Type 2 diabetes." *Diabet Med* 21 (2004): 103-113.
13. Saydah, Sharon H., Anjani Chandra and Mark S. Eberhardt. "Pregnancy experience among women with and without gestational diabetes in the US, 1995 National Survey Of Family Growth." *Diabetes Care* 28 (2005): 1035-1040.
14. National Diabetes Data Group. "Classification and diagnosis of diabetes mellitus and other categories of glucose intolerance." *Diabetes* 28 (1979): 1039-1057.
15. WECoD, Mellitus. "WHO expert committee on diabetes mellitus: second report." *World Health Organ Tech Rep Ser* 646 (1980): 1-80.
16. Alberti, Kurt George Matthew Mayer and Paul Z. Zimmet. "Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Provisional report of a WHO consultation." *Diabet Med* 15 (1998): 539-553.
17. Beischer, Norman A., Peter Wein, Mary T. Sheedy, and Bettina Steffen. "Identification and treatment of women with hyperglycaemia diagnosed during pregnancy can significantly reduce perinatal mortality rates." *Aust N Z J Obstet Gynaecol* 36 (1996): 239-247.
18. Langer, O. "Is normoglycemia the correct threshold to prevent complications in the pregnant diabetic patient?." 4 (1996): 2-10.
19. Bantle, J. P., Wylie--Rosett J, Albright AL and Apovian CM, et al. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association." *Diabetes Care* 31 (2008): S61.
20. Reader, Diane M. "Medical nutrition therapy and lifestyle interventions." *Diabetes Care* 30 (2007): S188-S193.
21. Reader, Diane, Patricia Splett and Erica P. Gunderson. "Impact of gestational diabetes mellitus nutrition practice guidelines implemented by registered dietitians on pregnancy outcomes." *J Am Diet Assoc* 106 (2006): 1426-1433.
22. Han, Shanshan, Caroline A Crowther, Philippa Middleton and Emer Heatley. "Different types of dietary advice for women with gestational diabetes mellitus." *Cochrane Database Syst Rev*. (2013):CD009275.
23. Walker, J. D. "NICE guidance on diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period. NICE clinical guideline 63. London, March 2008." *Diabet Med* 25 (2008): 1025-1027.
24. Cosson, Emmanuel, Amélie Benbara, Isabelle Pharisien and Minh Tuan Nguyen, et al. "Diagnostic and prognostic performances over 9 years of a selective screening strategy for gestational diabetes mellitus in a cohort of 18,775 subjects." 36 (2013): 598-603.
25. Avalos, Gloria E., Lisa A. Owens, Fidelma Dunne and Atlantic DIP Collaborators. "Applying current screening tools for gestational diabetes mellitus to a European population: is it time for change?." *Diabetic Med* 36 (2013): 3040-3044.
26. Akbay, Ebru, Sevda İdil Torun, H. Yalçınkaya and Cihangir Uzunçakmak, et al. "Prevalence of gestational diabetes among pregnant women attending in MD Sadi Konuk Training and Research Hospital." Türkiye Klinikleri Jinekoloji Obstetrik 20 (2010): 170-175.
27. Köşüş, Nermin, Aydın Köşüş, Müzeyyen Duran, and Nilgün Ö. Turhan. "Effect of number of abnormal oral glucose tolerance test (OGTT) values on birthweight in women with gestational diabetes." *J Obstet Gynaecol* 26 (2013): 95.
28. Inamdar, Saunitra A., Himanshi Agarwal, Sourya Acharya, and Anil Inamdar. "Coexistence of hypertriglyceredemia and hypercholesterolemia with gestational diabetes mellitus in pregnancy: A case report." *Medical Science* 24 (2020): 594-598.
29. Unnikrishnan, B., A. Singh, P. Rathi and S. K. Bhat, et al. "Risk factors of gestational diabetes mellitus: A hospital-based pairmatched case-control study in coastal South India." *S Afr J Obstet Gynaecol* 26 (2020): 13-17.
30. Jankar, Jayshri Sadashiv, Kumud Namdeorao Harley, Kanchan Manoharrao Mohod, and Vijay Yashwantrao Babar. "Association of Urinary Albumin with HbA1c Levels in Subjects of Type 2 Diabetes Mellitus in Central India." *J Evol Med Dent Sci* 9 (2020): 3921-3926.

31. Shrivastava, Priyal, Mahalaqua Nazli Khatib, Shilpa Gaidhane and Dipti Shrivastava et al. "Assessment of mean platelet volume (MPV) in subjects with Type 2 Diabetes Mellitus (T2DM) in a rural backdrop of central India." *Med Sci* 24 (2020): 12-21.

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