



Assessment of Risk Factors of Diabetes Mellitus in Postpartum Women in a Tertiary Hospital in Maharashtra, India: Results from a STEPS Survey

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ABSTRACT

Introduction: Diabetes is a major public health problem and its prevalence is rising all over the world, with India being called Diabetes capital of the world. India is home to about 62 million people with type 2 diabetes mellitus (DM) and this number is likely to increase up to 79.4 million by 2025. We therefore, conducted a study to assess presence of risk factors for developing diabetes mellitus among postpartum women admitted in a tertiary care centre in Maharashtra, India. **Objective:** To study risk factors for diabetes mellitus in postpartum women, correlate them with socio demographic profile of the study subjects and to recommend preventive and promotive health care strategies to those at risk. **Methodology:** The cross sectional study was carried out on fifty (50) postpartum women (all within one week of delivery) using the WHO STEPS questionnaire along with anthropometric and blood pressure measurements. **Results:** 50% of the study subjects have secondary educational qualification, i.e. inbetween standard sixth to tenth. Only 18% subjects are graduates. More than three fourth (78%) subjects live in family structure with three generations and almost three fourth (74%) of the study subjects come from Socio Economic Class 3. Also, while 58% of them have high oil consumption, 100% of them take less than 20 gm fibre per day. Further, 98% of them do not take any nuts in their daily food. 72% are overweight or obese while 46% of them have a waist to hip ratio of 0.86 or higher. 62% of the subjects exercise less than 150 minutes per week. While 82% subjects didn't have history of hypertension, and only 18% reported PIH, 74% were found to be pre-hypertensive. **Conclusion:** Our findings clearly show a significant risk of DM amongst majority of study subjects in the backdrop of rural background and lack of awareness. This calls for the need to launch awareness programs to eliminate risk factors and timely action to prevent occurrence of Diabetes Mellitus.

Keywords: Risk factors, Diabetes mellitus in postpartum women, Lifestyle, Intervention

INTRODUCTION

The WHO defines diabetes as a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads, over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't produce enough insulin. Diabetes is a major public health problem and its prevalence is rising all over the world. The number of people having diabetes is likely to increase from 171 million in 2000 to 366 million in 2030^[1,2]. In India, the cases may rise to about 15.1%, from 31.7 million in 2000 to 79.4 million in 2030. Rapid urbanization, aging population, obesity epidemic and less physical activity have contributed to the increased prevalence. The prevalence rates range from 4.6% to 14% in urban areas and 1.7% to 13.2% in rural areas. There are about 62 million people with type 2 diabetes mellitus (DM) and this number is likely to increase up to 79.4 million by 2025 in India^[3,4].

The prevalence of gestational diabetes mellitus, i.e. diabetes diagnosed during pregnancy, increases in parallel with the diabetes prevalence^[5]. The longest follow-up data suggested that up to 50% of women with a history of GDM may develop DM over a 20–30-year period^[6] or that 30% will develop DM within 10 years of childbirth^[7]. The DM onset rate in women with GDM is approximately 7 times higher than in those without GDM^[8].

In India, studies indicate that GDM may be associated with increasing socio-economic status^[9] and similar trends have been found for type 2 diabetes^[10].

We therefore, conducted a study to assess presence of risk factors for developing diabetes Mellitus among postpartum women admitted in a tertiary care center. The results would help in development of preventive measures and strategies to combat the increasing disease burden.

AIM

To study risk factors for diabetes mellitus in postpartum mothers admitted in a tertiary care hospital in Maharashtra, India.

OBJECTIVES

1. To study risk factors for diabetes mellitus in postpartum women.
2. To study and correlate the socio demographic profile of the study subjects with risk factors.
3. To recommend preventive and promotive health care strategies to those with the risk factors.

METHODOLOGY

The cross sectional study was carried out on fifty (50) postpartum women in Krishna Hospital, Karad, Maharashtra, India over a period of fifteen days. All women included were within one week of delivery. They were informed about nature of study and those who consented were included in the study. The study protocol was approved by the Institutional Ethics Committee. All women those with history of gestational diabetes and those who were not known cases of Diabetes Mellitus (DM) were included in the study.

All participants were subjected to personal interviews using a pre-validated, structured questionnaire, which was filled up for each participant. The WHO STEP Surveillance (STEPS) questionnaire was used with minor adaptations.^[11]

Step One included questions pertaining to – Basic Demographic information including age, literacy, and highest level of education, family structure, Socio-economic class according to BG Prasad

classification, Tobacco use); Nutrition (intake of salt, oil, fibre and nuts), history of Macrosomia, family history of Diabetes Mellitus (DM), exercise duration per week, hypertension (chronic or Pregnancy induced hypertension-PIH), Gestational Diabetes Mellitus (GDM), Chronic DM, and Stress.

Step Two included physical measurements like weight, height, waist circumference, hip circumference, Blood Pressure.

Their height was measured, in centimetres, barefoot without any head gear using standard equipment. A digital weighing scale was used to measure weight of the individuals barefoot. It was recorded in kilograms. Waist circumference was measured using a measuring tape in centimetres at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest (hip bone). The measurement was taken at the end of a normal expiration with the arms relaxed at the sides. Hip circumference was measured using measuring tape around the widest portion of the buttocks in centimetres. Waist-hip ratio was calculated for each woman using waist and hip measurements thus obtained. Their Blood pressure was measured using standard method and instrument (manual sphygmomanometer).

STATISTICAL ANALYSIS

Data was entered in Microsoft Excel Sheet and analysis was done using SPSS-20 software. 'p' value <0.05 was considered statistically significant where Chi-square test was used for qualitative data. Mean and Standard Deviation were calculated. Logistic Regression analysis was done to calculate Odd's Ratio with 95% Confidence Interval.

RESULTS AND OBSERVATIONS

Table 1: Distribution of study subjects according to demographic profile.

DEMOGRAPHIC Profile		No of Subjects N (%)	Mean \pm Standard deviation
Age Distribution (years)	19-22	13 (26)	10 \pm 4.84 p= 0.0099
	23-26	14(28)	
	27-30	12(24)	
	31-34	9(18)	
	35-38	2 (4)	
	Total	50(100)	
Educational Qualification	Primary	3 (6)	12.5 \pm 9.29 p=0.744
	Secondary	25(50)	
	Higher Secondary	13(26)	
	Graduate	9 (18)	
	Total	50 (100)	

Family Structure	3 generations	39 (78)	16.66 ±19.39 p=0.2751
	Extended Primary	7 (14)	
	Nuclear/Primary	4 (8)	
	Total	50 (100)	
Socio-Economic Class (SEC)	1	1 (2)	12.5 ± 16.58 p=0.2288
	2	4 (8)	
	3	37 (74)	
	4	8 (16)	
	Total	50 (100)	

Table 1 shows distribution of study subjects according to demographic profile. The age distribution of our study sample shows that about 39 (78%) of the subjects are in the age bracket of 19-30 years of age. As age advances the risk of getting Type II Diabetes also increases (p value is significant).

Half of the study subjects, i.e. 25 (50%), have secondary educational qualification i.e. between standard sixth to tenth. Only 9 (18%) subjects are graduates in our study sample. More than three fourth of subjects, i.e. 39 (78%) live in family structure with three generations. And almost three fourth of the study subjects, i.e. 37 (74%) come from SEC 3.

Table 2: Distribution of study subjects according to nutritional risk factors

NUTRITIONAL Profile	Normal Intake (%)	Risk Intake (%)
Salt intake (less than 5 grams per day)	7(14)	43 (86)
Oil intake (600 ml per person per month)	21(42)	29(58)
Fibre intake (less than 20 grams per day)	-	50 (100)
Nuts Intake (daily)	1 (2)	49 (98)

Chi-square value = 45.291 Degree of freedom = 3 P value = <0.0001

Table 2 shows 'p' value is <0.05, therefore above factors play an important role in the causation of disease.

Also in table 2, when we look at the risk factors pertaining to nutritional profile of our study subjects, we note that 86% of the study subjects consume more than 5 grams of salt per day. Whereas, high oil intake is prevalent amongst 58% of them. Also, all 50 of them (100%) take less than 20 gm fibre per day. Further, with exception of one subject, all 49 (98%) of them do not consume any nuts in their daily diet. Diet plays an important role in the causation of diabetes and our Indian women have a poor dietic score.

Table 3: Distribution of study subjects according to other risk factors

Other Risk Factors	Normal (%)	At Risk (%)
BMI	14 (28)	36 (72)
Waist:Hip	10 (20)	40 (80)
Exercise per week	19 (38)	31 (62)
Hypertension	41(82)	9(18)

Chi-square value=30.780 with degree of freedom 3, p=0.0001

Though the subjects were young in the age group of 19-38 according to STEP II approach they belong to risk factor category as p value was <0.0001 which is highly significant.

Table 3 shows that 72% of the study subjects have BMI of 25 and above. Amongst these 52% were overweight and 20% were obese. 34% of study subjects had Waist:Hip ratio from 0.81 to 0.85 while in 46% it was 0.86 or higher.

Only 2 of the study subjects had history of Macrosomia while one had family history of diabetes mellitus. Gestational diabetes was seen in 3 study subjects. Only 4 study subjects said that they are having stress due to some family problems. 62% exercise less than the recommended 150 minutes per week. Only 5 (10%) had normal BP. Close to three fourth, 37 subjects (74%), were found to be prehypertensive. The role of above factors along with diet is very important as 'p'<0.05 and play an important role in web of causation of diabetes, a non-communicable disease.

The other risk factors, besides demographic and nutritional, that we examined included BMI, waist-hip ratio, history of macrosomia, family history of Diabetes Mellitus, level of physical exercise, preexisting hypertension or PIH, gestational diabetes mellitus, stress and high blood pressure.

DISCUSSION

In this cross sectional study conducted in a tertiary care hospital in Maharashtra, we assessed the presence of risk factors for diabetes mellitus in postpartum women.

Most of the study subjects had three things in common- Secondary or lower educational background, lived in 3 generation family structure, belong to SEC 3 type. And most of them belong to age bracket of 19-30 years. All these factors impact their life-style, food and other behavioural traits.

While 43 of them (86%) consume less than 5 grams of salt per day, risk from high oil intake is prevalent amongst 29 (58%) of them.

Also, all 50 of them (100%) take less than 20 gm fibre per day. Further, except one, 49 (98%) of them do not take any nuts in their daily food. This adds significant DM risk as is evident from past findings. Importance of diet for the causation of diabetes has to be stressed on these females.

Lack of education causing low awareness contributes to low intake of fibre, fruits and vegetables while low nuts intake could be because of lack of affordability as majority of them belong to Socio-economic-class 3. A large proportion, 36 out of 50 (72%), are at high risk of developing DM, being overweight or obese. As shown in studies, co-morbid obesity (body mass index [BMI] ≥ 25 kg/m²) increased postpartum T2DM risk 7.59 times (95% CI, 7.33 to 7.86)^[12].

Close to half, 23 out of 50 (46%) of our study subjects have abdominal fat, with waist-hip ratio of 0.86 or higher. Studies have shown that Insulin sensitivity is inversely associated with abdominal fat mass in non-pregnant women^[13].

High BMI, dietary factors (diet low in fruits, nuts and seeds, and whole grains), and tobacco use were found to be the most important risk factors for diabetes^[14].

History of Macrosomia, and family history of DM are not significant risk factors in our sample, as they are found only in 4% and 2% respectively.

Low physical activity is a significant risk, in the sample, as 31 of them (62%) exercise less than the recommended level of 150 minutes per week. The evidence for the effects of physical inactivity on the prevalence of diabetes and cardiovascular diseases can be seen in CUPS (The Chennai Urban Population Study)^[15,16]. It was observed that the prevalence of diabetes was almost three times higher in individuals with light physical activity compared to those having heavy physical activity (23.2 vs. 8.1%, $P < 0.001$)^[15].

While 41 (82%) of the study subjects did not have pre-existing hypertension, and 9 (18%) had PIH, a very large proportion, 37 (74%) of the study subjects were found to be pre-hypertensive. It has been shown in studies that prehypertension is a significant risk factor to cause DM at later stage. Individuals with prehypertension have higher rates of conversion to diabetes than those with normal blood pressure. Much of the diabetes risk associated with prehypertension is explained by disorders related to the insulin resistance syndrome. Subjects with prehypertension have more diabetes risk than those with normal blood pressure regardless of sex, ethnicity, and categories of obesity and glucose tolerance^[17].

In our study, it appears, GDM does not present significant risk as its found only 6% of our study subjects. This is low in comparison to prevalence of 9.89% in a study conducted in Bhubaneswar, Orissa^[5]. Another study conducted in Asia found GDM prevalence to be 8.8% in India^[18].

CONCLUSION

Our findings clearly show a significant risk of DM amongst a large number of study subjects- on account of dietary habits, physical activity, and presence of pre-hypertension. Given the largely rural background of our study subjects, most of them with secondary or lesser education, it calls for need to launch awareness programs by policy makers, on diet (importance of adequate fibre and nuts intake and limited cooking oil consumption) and regular exercise which would further help tackle other risk factors namely, obesity, high waist-hip ratio and high blood pressure.

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