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Maternal obesity: Pregnancy outcome among overweight and obese women in a tertiary care hospital in Kerala

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Abstract

Background: Obesity in pregnancy is of great concern in Kerala. According to the National Family Health Survey-3, Kerala holds second position next to Punjab, with a 34% prevalence of overweight and obesity. Based on consensus guidelines, the BMI categories for Asian Indians have been revised and categorized overweight as a BMI of 23.0 - 24.9 kg/m² and obesity as a BMI \geq 25 kg/m². This study aims to determine the pregnancy outcome among overweight and obese women and compare the pregnancy outcomes among overweight and obese with normal BMI women.

Materials and Methods: A retrospective observational study was conducted at Travancore Medical College Kollam Kerala for six months. The revised consensus guidelines for Asian Indians were considered for BMI categorization.

Results: 63.9% of pregnant women were either overweight or obese of the total 399 pregnant women. Gestational diabetes mellitus (GDM) and pregnancy-induced hypertension (PIH) were the common antenatal complications significantly associated with overweight and obese women. Preterm labor was also significantly increased in overweight and obese women.

Conclusion: Obesity is a rising public health concern in Kerala reflected in pregnancy, with an increase in adverse pregnancy outcomes. Obesity is a modifiable risk factor that health care providers need to address during preconception, antepartum, intrapartum, and postpartum periods, thereby preventing obesity complications.

Keywords: maternal obesity, BMI, pregnancy outcome

Introduction

Obesity in pregnancy is of great concern in Kerala as the incidence of obesity among women is relatively high (44% of women). The prevalence of obesity among the reproductive age group in Kerala is 47.5%^[1]. Kerala holds the second position next to Punjab, having an overweight and obesity prevalence of 34% as per the National Family Health Survey-3^[2].

Obesity is the most prevalent form of malnutrition globally. With economic, technological, and lifestyle changes, there is the availability of cheap, high-calorie junk food, and coupled with decreased physical activity, the obesity risk is high. We are eating more and moving less^[3].

World Health Organization (WHO) defined Maternal obesity as follows^[4]: Body mass index (BMI): Normal: BMI 18.5 to 24.9 kg/m², Overweight: BMI 25 to 29.9kg/m² and Obese: BMI \geq 30kg/m².

BMI classification for overweight and obesity, for Asian Indians had been revised based on consensus guidelines and the categorization is as follows: Overweight: BMI 23.0 to 24.9 kg/m² and Obesity: BMI \geq 25 kg/m². This resulted in the increase of obesity prevalence from 11.81% (as per WHO criteria) to 43.11%^[5].

Obesity in pregnancy has adverse effects on both mother and baby. Obesity has contributed to an increased risk of infertility and its treatments. The maternal complications associated with obesity are miscarriages, gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), and increased cesarean section and operative vaginal deliveries.

GDM is the main antenatal complication associated with obesity in pregnancy. About 17% of women with obesity showed diabetes during pregnancy compared to 1-3% of women with normal BMI^[6].

The risk for the development of GDM has been seen in women who had gained weight, five years before pregnancy, especially in women who were not obese in the beginning^[7]. Obesity with gestational diabetes had increased perinatal complications and later increased risk of obesity and diabetes in adult life.

PIH is significantly associated with obesity in pregnancy. O'Brien *et al.*^[8] demonstrated that the risk of pre-eclampsia was typically doubled with every 5-7 kg/m² increase in prepregnancy BMI. Obesity in pregnancy increased the risk of antepartum hemorrhage and preterm labour^[9]. Obesity is an important risk factor for having thrombo-embolism in pregnancy. The rate of increased cesarean section and increased risk of induction of labor was found in pregnant obese women^[10]. Women who gained excessive weight during their pregnancy and retention of the weight post delivery were found to be the risk factors for the development of obesity and diabetes in their later life. Maternal health has a significant effect on the development of the fetus and hence the health of the child in their later life^[13].

Materials and Methods

This was a retrospective observational study conducted at Travancore Medical College Kollam Kerala over a period of six months (July 2020 - December 2020) after approval from the Institutional ethical committee. All the women who delivered in this institution during the designated period with singleton babies and who had earlier antenatal checkups were included. Women who had multiple gestation and with late registration were excluded. For BMI categorization, we have taken the revised consensus guidelines for Asian Indians which categorize overweight as a BMI of 23.0 - 24.9 kg/m² and obesity as a BMI ≥ 25 kg/m². During the study period, there were a total of 399 singleton deliveries of which 255 (63.9%) pregnant women were overweight or obese. Variables like age, height, weight at first antenatal visit, gestational age at delivery were collected. Pregnancy outcome variables studied include infertility treatments, antenatal complications including PIH, GDM, urinary tract infections (UTI) and genital tract infections (GTI). Labor factors included were preterm labor, mode of induction, mode of delivery - vaginal or instrumental delivery or caesarean section. Postpartum maternal outcomes included postpartum

hemorrhage and wound infection. Neonatal outcome variables included the condition of neonate at delivery, baby weight and Neonatal Intensive Care Unit (NICU) admission were collected from their case records and entered in a proforma.

Statistical Analysis

All the data collected were entered in Microsoft excel sheet and analyzed using SPSS version 20.00. Values were presented as frequencies and percentages. Chi square test was used for comparing categorical data and for all statistical analyses, $p < 0.05$ was considered statistically significant.

Results

During the study period (July 2020 - December 2020), there were a total of 399 singleton deliveries at the institute after the exclusion criteria. Among them, there were a total of 255 (63.9%) overweight and obese pregnant women as per revised consensus guidelines for India in comparison to 162 (40.6%) cases (WHO criteria). There was an increase of 23.3% of overweight and obese pregnant women with the revised consensus guidelines of India (Indian criteria) for BMI classification compared to the WHO criteria. 93 (23.3%) women of the total 255 were overweight and 162 (40.6%) were obese as per the Indian Criteria, whereas 130 (30.6%) of the total 162 cases were overweight and 32 (8%) were obese as per WHO criteria (Table 1).

Table 1: BMI distribution as per Indian criteria and WHO criteria

BMI Category	Indian criteria	WHO criteria
Overweight	93 (23.3%)	130 (32.6%)
Obese	162 (40.6%)	32 (8%)
Overweight + Obese	255 (63.9%)	162 (40.6%)

Age Distribution

The age distribution of study population shows mean maternal age of 27.26 years. 177 women (62.1%) were overweight in the age group 20-29 while 71 women (68.3%) were overweight among the age group 30-39 as per Indian criteria (Figure 1).

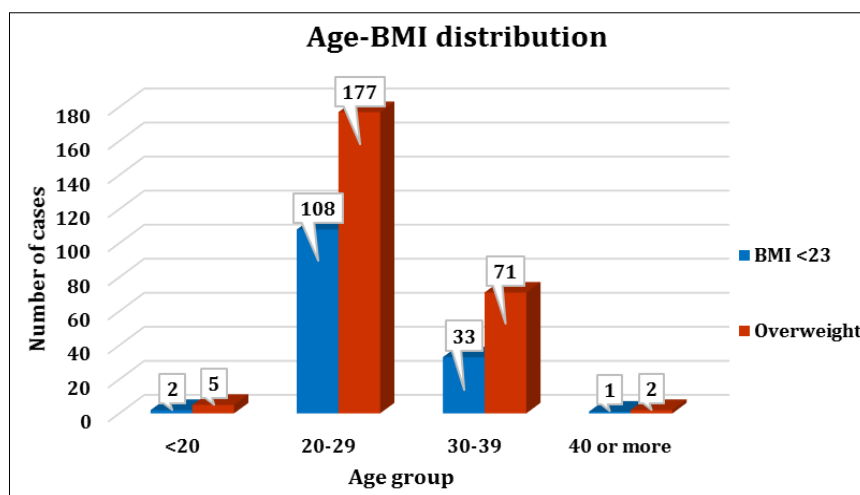


Fig 1: Age-BMI distribution among the study population

Parity

190 (47.6%) of the 399 women were primigravida. 110 (43.13%) of primigravida were overweight and obese which indicates that the obesity trend in pregnancy is increasing.

Maternal outcome

GDM and PIH were the common antenatal complications seen among the pregnant women studied. Out of the 399 women, 95 (23.8%) were having GDM and 46 (11.53%) were having PIH.

Among the 95 ladies who had GDM, 70 (27.45%) were either overweight or obese and was statistically significant ($p = 0.025$). Similarly, 40 (15.69%) out of 255 pregnant women who had PIH were in the overweight and obese group ($p = 0.001$) which was statically significant. 36 (9.02%) of total 399 women had preterm labor. 29 (11.37%) women of overweight and obese group had preterm labor which was statically significant (p value = .029).

Other parameters like UTI, Post-partum hemorrhage (PPH), LSCS, infertility treatment and abortions >1 did not show any statistically significant association with the body weight (Table 2).

Table 2: Parity and maternal outcome

Parameters	Normal BMI	Overweight + Obese	P value
Primigravida	80(55.56%)	110 (43.13%)	
Infertility treatment	14 (9.72%)	26 (10.2%)	$p=0.88$
Abortions >1	6 (4.17%)	22 (8.63%)	$p=0.094$
GDM	25 (17.36%)	70 (27.45%)	$p=0.025$
PIH	6 (4.17%)	40 (15.69%)	$p=0.001$
Preterm labour	7 (4.86%)	29 (11.37%)	$p=0.029$
UTI	27 (18.75%)	58 (22.75%)	$p=0.349$
LSCS	69 (47.92%)	135 (52.94%)	$p=0.336$
LSCS primigravida	38 (47.5%)	56 (50.91%)	$p=0.643$
PPH	14 (9.72%)	19 (7.45%)	$p=0.429$

Chi square Test, $p < 0.05$ shows statistical significance

Neonatal outcome

Neonatal parameters like birth weight and babies requiring NICU admission also did not show any association with maternal body weight (Table 3).

Table 3: Neonatal outcome of the study population

Outcome parameters	Normal BMI <23	Overweight +Obese	P value
Mean birth weight	2.99	3.33	$p=0.414^a$
Low Birth Weight	15 (10.42%)	26 (10.19%)	$p=0.942^b$
NICU admission	18 (13.33%)	49 (20.5%)	$p=0.083^b$

a: Independent T test, b: Chi square Test, $p < 0.05$ shows statistical significance

Discussion

This retrospective study was conducted over 399 singleton deliveries. The study showed that 63.9% of pregnant women were either overweight or obese, which may be considered a warning for the increasing trend of obesity in pregnancy. The revised consensus guidelines for Asian Indians had shown an increasing number of at-risk pregnant women with adverse outcomes during pregnancy compared to the WHO criteria. This may be considered an alert for the health care providers to manage them during the antepartum, intrapartum, and postpartum periods. According to Aziz *et al.* [5] the prevalence of obesity increased from 11.81% with the WHO criteria to 43.11% as per the revised consensus guidelines. Hence 18.47% of pregnant women were reclassified from a low-risk category to a high-risk category. As the number of studies using the revised consensus guidelines was very few, we conducted a study using these guidelines to determine the prevalence of overweight and obese pregnant women and their relationship with various pregnancy outcomes in our study population.

A higher percentage of overweight and obese women was found in our study compared to Aziz *et al.* [5] this maybe because of the sedentary lifestyle and changing eating habits of people of Kerala. Westernization and adopting a sedentary lifestyle,

especially among new generations like eating fast foods and watching television, have increased obesity. Lack of exercise also contributes to the obesity trend. The lifestyle diseases were found more in the general population of Kerala, which may be getting reflected on pregnant women as well. This trend seems to be similar in urban and semi-urban areas. Our hospital is located in a semi-urban area which may be a contributing factor. This study on overweight and obese women showed a significant increase in GDM, which is an adverse pregnancy outcome. The survey conducted by Dasgupta *et al.* [9] in a tertiary health care center in Pondicherry and another study conducted by Chu *et al.* [11] also showed a similar association between obesity and GDM. This highlights the role of having normal BMI preconceptionally and in early pregnancy so that complications to mother and fetus can be significantly reduced. Pregnant women with gestational diabetes are at an increased risk of developing diabetes mellitus in later years; hence they need to be counseled regarding the need to have an ideal body weight by adopting the proper diet plan and exercise.

PIH also showed a significant association with overweight and obese women. A prospective comparative study conducted by Seeniammal *et al.* [12] at the Institute of Mother and Child Health in North Kerala also showed a significant association with hypertensive disorders of pregnancy. Many studies showed a significant association of hypertensive disorders of pregnancy and preeclampsia with obesity in pregnancy [9, 10, 13].

Our study also revealed an increase in preterm delivery among overweight and obese women, which was significant and was similar to the studies of Kulchi *et al.* [13] and Bhavadharini *et al.* [14], which showed a significant association between preterm labor and obesity. Whereas the studies conducted by Dasgupta *et al.* [9] and Zhong *et al.* [15] showed no association between obesity and preterm delivery. Obesity-related antenatal medical complications, especially PIH and GDM, necessitate early termination of pregnancy which may be a contributing factor for the increased preterm delivery.

The number of cesarean sections is also very high among overweight and obese women in this study, even though it was not statistically significant. The increase in cesarean sections may be accounted for by increasing medical disorders associated with obesity in pregnancy. According to Chu *et al.* [16], obesity itself is an independent risk factor of cesarean section even if the comorbidities are controlled.

There was a nearly fourfold increase in the rate of abortion in overweight and obese women, but it was not statistically significant. Regarding other pregnancy outcomes like postpartum hemorrhage and neonatal outcomes, no significant association was found, unlike many other studies [13, 14].

Limitations

This study was conducted in a single institution. A study involving a large number of pregnant women from various other institutions would have given much better results. Moreover, no data was showing the current prevalence rate of obesity and overweight in Kerala in NFHS-4. Hence, the state's current position was considered second to Punjab, which was mentioned in NFHS-3.

Conclusion

Obesity is a rising public health concern in Kerala with changing lifestyles like eating junk foods and lack of exercise. The increasing trend is reflected in pregnancy as well, with an increase in adverse pregnancy outcomes. Obesity is a modifiable risk factor that health care providers need to address during

preconception, antepartum, intrapartum, and postpartum periods, thereby preventing obesity complications. Lifestyle modification needs to be considered an important factor in preventing all obesity-related problems and building a healthy population.

The revised guidelines used for BMI categorization are a good criterion for considering the Indian population, which helps to pick up more 'at-risk' pregnant women compared to WHO criteria and hence manage them better to reduce obesity complications during pregnancy.

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