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ASIAN OR WHO INTERNATIONAL CUTOFF OF BODY MASS INDEX, A BETTER PREDICTOR OF ADVERSE PREGNENCY OUTCOME?-RETROSPECTIVE STUDY IN A TERTIARY CARE CENTRE IN NORTH KERALA

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ABSTRACT

Background: Obesity has become an important public health problem and the prevalence of obesity is increasing in pregnancy. The revised guidelines for Asian Indians categorize overweight as a BMI of 23.0 – 24.9 and obesity as a BMI≥25. **Objectives**: To assess the impact of revised guidelines of Body Mass Index (BMI) on the prevalence of obesity and overweight in pregnant women and to compare Asian Indian BMI with World Health Organization (WHO) BMI in prediction of adverse pregnancy outcome. **Materials and Methods:** A retrospective analysis of record based data of 790 women, at a tertiary care centre (Dept; of Obstetrics and Gynaecology, Govt. Medical College, Calicut, Kerala). BMI was categorised using the revised consensus guidelines for Asian Indians and the World Health Organization (WHO) criteria. The study was approved by the Institutional Ethical Committee. **Results:** There were a total of 790 patients and the mean age was 26.69**.**The prevalence of obesity increased from 20.4% by WHO criteria to 74.7% with the revised consensus guidelines and led to the re-classification of 156(19.74%) women from a low risk to highrisk. Gestational diabetes, Gestational hypertension and caesarean section was associated more with high risk. **Conclusion:** On applying the revised guidelines, the prevalence of the high risk Asian Indian pregnant women showed a definite increase (3.6 times). Therefore, it would be a better alternative to support adoption of the revised guidelines in obstetric management of Asian Indians.

KEYWORDS: Obesity, BMI, Asian Indian BMI, WHO BMI, adverse outcome, pregnancy.

INTRODUCTION

Obesity has become an important public health problem because of changes in socioeconomic conditions and eating habits.[1] World Health organization(WHO has determined obesity as a global health burden of 21st century and addressed the predominance of occurrence in woman compared to man.[2] The obesity in reproductive period and being overweight before conception causes many problems during and after gestational period. These in turn may be related to fetal and maternal diseases.[3]

The prevalence of obesity is increasing in pregnancy, and hence the American College of Obstetricians and Gynecologists (ACOG) has recommended that the body mass index (BMI) should be recorded for all women at the initial prenatal visit, and that information concerning the maternal and fetal risks related to BMI in pregnancy should be provided. It is well established that an abnormal maternal BMI has deleterious effects on maternal and fetal pregnancy outcome. Maternal obesity is a condition that effects both the fetal growth, newborn health and the heath of the mother during gestation and pre and postpartum period.[4,5]

Overweight/obese are known to bear an increased risk of maternal complications like gestational hypertension, gestational diabetes, postpartum hemorrhage, infection, operative vaginal delivery, and caesarean delivery. They are also at increased risk for foetal complications like birth defects, macrosomia, and morbidities of subsequent childhood obesity. Maternal obesity causes increased chance of shoulder dystocia, neonatal intensive care unit admissions and higher risk for cardiovascular events later in life.[6]

Obesity is defined as excess adipose (fat) tissue and can be measured by BMI. BMI is a reliable more accurate measure of total body fat compared to body weight alone and is calculated using Quetelet's index.

BMI is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults.

Indian states are currently facing the double burden of under nutrition as well as over nutrition. According to the NFHS(National Family Health Survey), the percentage of women aged 15–49 years who are overweight or obese increased from 11 % in NFHS-2 to 15 % in NFHS-3.[7] In South India, Kerala ranks first in obesity (34%) followed by Tamil Nadu(24.4%).[8] The current WHO cutoff points[2] for body mass index (BMI) and waist circumference (WC) do not provide an adequate basis for taking action on risks related to overweight and obesity in many populations in Asia, as these are largely based on the morbidity and mortality data from the white Caucasian populations.[9]

Relation between the BMI and percentage of body fat depends on the age and sex and differs across ethnic groups. Ethnic specific BMI cut off values, especially for Asian populations, have been proposed to address the higher prevalence of diabetes and cardiovascular diseases and the differing associations of BMI with body fat in different populations.[10-12] WHO cutoffs are mainly based on the Western standards, and Asian Indians are at high risk at lower BMI due to increased abdominal obesity, increased subcutaneous and intra abdominal fat deposition and increased ectopic site fat deposition. Guidelines for obesity and overweight based on body mass indices (BMI) for Asian Indians were revised based on consensus developed through discussions by a Prevention and Management of Obesity and Metabolic Syndrome group. As per revised guidelines, BMI > 25 kg/m^2 is categorized as obese and WC (waist circumference), > 80 cm as abdominal adiposity.[13] WC is least implemented in pregnancy, but it is a reliable marker and measure of abdominal adiposity in other patients.

There are many studies based on raised BMI and adverse pregnancy outcome. But many of those studies are done with WHO international cutoffs. In this study, we are analyzing the pregnancy outcome with revised Asian cutoffs and comparing the results with WHO International cutoff outcome to determine the best predictor of maternal and perinatal outcome among the both.

The revised guidelines categorize overweight as a BMI of 23.0–24 and obesity as a BMI≥25 using values lower than the ethnic specific BMI previously advocated for Asian Indians.

Asian Indian BMI	WHO International BMI
Normal—18–22.9 kg/m^2	Normal—20.0–24.9 kg/m^2
Overweight—23.0–24.9 kg/m^2	Overweight—25.0–29.9 kg/m^2
Obese > 25 kg/m^2	Obese > 30 kg/m^2

OBJECTIVES

1) To assess the impact of revised guidelines of BMI on the prevalence of obesity and overweight in pregnant women.
2) To compare Asian Indian BMI with WHO BMI in prediction of adverse pregnancy outcome.

METHODOLOGY

Record based Retrospective analysis of 790 women, at Dept. of Obstetrics and Gynaecology Govt. Medical College Calicut, Kerala. The study was approved by the Institutional Ethical Committee. The study period was 2 months from1st August 2018 to 30th september 2018.

All booked patients having their first antenatal visit within 10 weeks of pregnancy and who delivered at our institute were included. Women with multiple pregnancies, previous caesarean sections, referrals from other hospitals and in whom data was incomplete were excluded. Maternal variables including age, obstetric score, maternal height & weight at the first visit (prepregnancy weight if available), comorbidities, mode of induction gestational age at delivery, mode of delivery, intrapartum, and postpartum complications. Birth weight and Apgar at1'of the newborn were also noted.

After collecting data BMI, was derived from booking weight(kilograms) and height (metres). All BMI values were calculated and categorized into groups based on WHO and Asian Indian criteria at the time of analysis and relative risk for each group were calculated. The overweight and the obese patients under both classification, will be considered as high risk. Patients with normal BMI in WHO group will be reclassified based on Asian Indian criteria. Analysis was done using SPSS statistical package.

Outcome Measures: Outcome measured were gestational hypertension, severe and nonsevere PE, gestational diabetes, labour induction, Caesarean section rate, postpartum haemorrhage and intrauterine fetal growth restriction. Asian and WHO cutoff in predicting antenatal complications, intrapartum, postpartum and neonatal complications were analyzed.

RESULTS

There were a total of 790 patients and the mean age of the study group was 26.69 years. Age distribution of the study group is shown in Table (1). Parity, educational qualification and socioeconomic status were comparable. Out of 790women, 25.3% (200/790) were normal, 54.2% (429/790) overweight and 20.4% (161/790) were obese by WHO. As per Asian BMI, only 5.567% (44/790)

normal, 19.7 % (156/790) overweight, and 74.7% (590/790) obese. Categorisation of the study group by Asian and WHO cutoffs is shown in (fig 1and 2) Out of 200, 156 were re-classified as overweight (78%) and 273(63.64%) turned obese from overweight as per ASIAN INDIAN. There were only 44 patients with normal BMI as per the revised ASIAN INDIAN criteria.

The antenatal complications in the study group is shown in fig (3) GDM was the most common complication in the study group 37.8% (299/790). As per WHO, 65 were normal, 153 were overweight and 81 were obese. On applying ASIAN cutoff, 23 patients were in the normal category and 42 were overweight, 234 were obese. Hence of the 65 patients with normal BMI, 42(64.6%) were shifted to the high risk according to the ASIAN Cutoff and 153 were shifted from overweight to obese category.

GHTN and its complications in the study group were 25.06% (198/790) As per WHO, 39 were normal, 138 were overweight and 21 were obese. On applying ASIAN cutoff only5 were normal 34were overweight and 159 were obese. Hence of the 39 with normal BMI, 34(87.1%) were shifted to the high risk according to the ASIAN Cutoff and 138were shifted from overweight to obese.

Labour was induced in 420(53.16%) and the induction rate was more in High risk 336/420(80%) as per WHO and 398 of 420(94.76%) by Asian Indian. 137(32.61%) patients of the 420 induced patients underwent caesarean section due to failed induction. Of which, 26 patients were normal as per WHO, only 2 were normal as per ASIAN. 24 of the normal were shifted to high risk (92.31%). 135 patients were in high risk group as per ASIAN and only 111 patients were in the high risk by WHO.

Total of 299(37.8%) patients underwent Caesarean section. Of which 67(22.3%) were obese as per WHO category and 238 (79.33%) were obese as per ASIAN. Caesarean section rate was high in the obese group.

There were a total of 82 cases of anaemia, out of which 63 cases (31.5%) were in the normal group. Complications such as postpartum haemorrhage, were higher in the obese group (9cases) than in normal (3 cases) but was not statistically significant. There were 59 patients who had IUGR, of which 56 were in the high risk group as per the ASIAN cutoff and 48 as per WHO Cutoff. Prior hypothyroidism (3.2%) was significantly associated with pregnant women considered high risk.

On applying WHO cutoff in defining the high-risk group, there is a high chance of missing out the risk population. The revised consensus guidelines for BMI in Asian Indians led to the re-classification of 156 (19.74% of total population and78% of WHO normal) pregnant women from a normal category to an overweight category (Table 2).

On analyzing the pregnancy outcome (Table3) within the WHO normal (comparing ASIAN normal vs ASIAN overweight), there was statistically significant changes in the prevalence of GDM.

There was an absolute difference of >10% prevalence of gestational hypertension and >20% of failure of induction, though statistically not significant. There was not much difference in the prevalence of IUGR and caesarean rate (<5%).

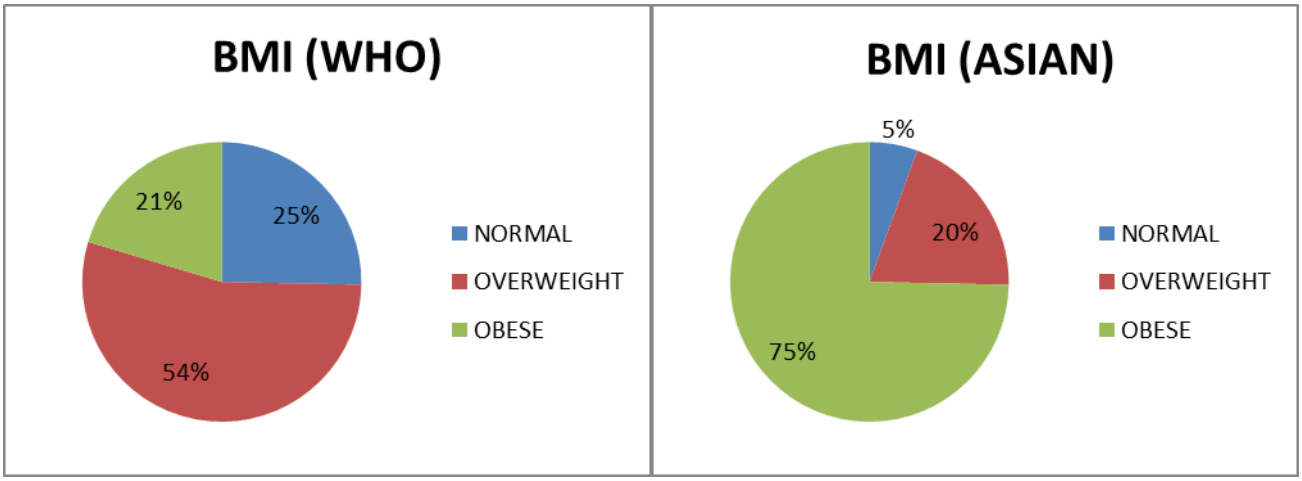

Fig 1 and Fig 2: Study group as per asian and who BMI.

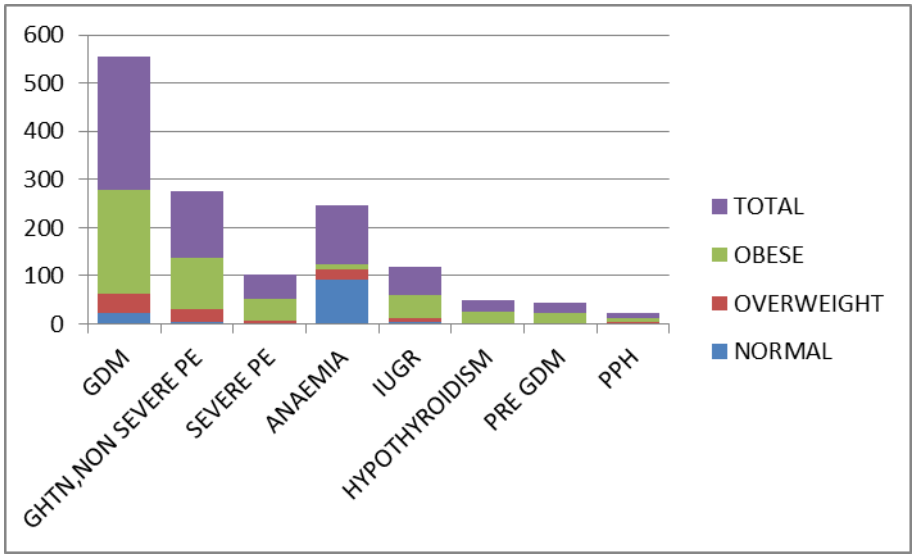

Fig. 3: Antenatal complications in the study group.

Table 1: Age distribution of the study group.

Age (yrs)	Normal	Over weight	Obese	Total
<19	3	13	32	48
20-24	14	62	194	270
25-29	18	47	203	269
30-34	4	26	118	148
>35	5	8	43	56
Total	44	156	590	790

Table 2: BMI (WHO) BMI (ASIAN) Cross Tabulation.

		BMI (ASIAN)			
		Normal	Reclassified Over Weight	Reclassified Obese	Total
BMI (WHO)	Normal	44	156	0	200
	% Within BMIWHO	22%	78%	0	
	Over Weight	0	0	429	429
	% Within BMIWHO	0	0	100%	
	OBESE	0	0	161	161
	% Within BMIWHO	0	0	161%	
Total		44	156	590	
	% Within BMIWHO	5.6%	19.7%	74.7%	

Table 3: Comparison of ASIAN normal vs ASIAN overweight in WHO Normal.

Variable	Asian		p value
	Normal (44)	Over weight (156)	
GDM (overall)	23 (52.3)	41 (26.3)	0.001*
GDM on MNT	11 (25)	19 (12.2)	0.008*
GDM on insulin	12 (27.3)	22 (14.1)	0.009*
Induction failure	2 (8.7)	24 (27.6)	0.058
GHTN, Nonsevere PE	3 (6.8)	29 (18.6)	0.06
Severe preeclampsia	2 (4.5)	5 (3.2)	0.669

*statistically significant

DISCUSSION

Incidence of obesity is increasing worldwide because of changes in socioeconomic conditions and eating habits. As per Anuradha et al obesity was highest in the age group of 30–39 years.[14] Mean age of our study group was 26.69 years. Prevalence of obesity is more in 25-29 year age group, which was lesser than this study.

Slack et al[15] in their a systematic review showed that in South Asian women, maternal pre-pregnancy anthropometrics are associated with mode of delivery GDM and birthweight. Our results showed an increased prevalence of GDM and caesarean section with overweight and obesity.

Balaji et al[16] showed that, Excess as well as less weight gain during pregnancy could lead to adverse pregnancy outcomes. These results highlight the need for gaining adequate weight during pregnancy. Our study also showed there is an increase chance for adverse pregnancy outcome, with elevated BMI in early pregnancy and possibly these patients also might have gained more weight during pregnancy. Further studies needed to prove this.

Demenberg et al in a[17] in the meta analysis among different ethnic groups of BMI and percent body fat, showed that there are differences in BMI among populations of the same age, gender and level of body fatness. Consequently the prevalence of obesity in populations will be over- or underestimated using general cut-off points. In our study on applying Asian Indian cutoff the prevalence of obesity and overweight is increased, hence it will be a better alternative to WHO BMI.

Athukorala et al,[18] in their study on adverse pregnancy outcomes in overweight or obese women, concluded that, The rate of overweight and obesity is increasing in Australian obstetric population and they have an increased risk of adverse pregnancy outcomes, particularly gestational diabetes, pregnancy induced hypertension and pre-eclampsia. Our results were also consistent with this study.

Among the antenatal complications, GDM and GHTN are statistically significant in the high- risk group. These results are almost similar to the Dasgupta et al with 17% GDM and 28.4% GHTN[13] while in our study with 37.8 % GDM and 25.06 % GHTN in high risk group. Significant associations with obesity (gestational hypertension, gestational diabetes, caesarean sections) were retained with the new classification. The re-classified overweight group, previously considered normal, was indeed a “high risk group.

Out of 790 women, 590 were obese as per Asian BMI which is almost four times higher than WHO BMI estimation. The revised consensus guidelines for BMI in Asian Indians increased the prevalence of obesity and overweight pregnant women and retained significant associations with certain maternal and fetal outcomes.156pregnant women previously considered normal (WHO) was now reclassified as overweight and 273,considered overweight was now reclassified as obese. In this study, the prevalence of obesity increased from 20.4% when the WHO criteria was used to 74.7% with the new guidelines.

The re-classification reduced the prevalence of pregnant women with normal BMI from 25.31% to 5.6% and led to 19.7% of pregnant women being reclassified as overweight. Thus, nearly one in five pregnant women were added to the pool of mothers “potentially at risk” for adverse events.

These findings were in concordance with Sharadha et al.[19] In their prospective study, mean age was 26.02 years and prevalence of obesity was more in 20- 25year group. 29.7 % were obese by Asian BMI which is four times higher than WHO BMI. GDM and GHTN are statistically significant in high risk.

In comparison, mean age of our study group was 26.69 years but prevalence of obesity is more in 25-29 year age group. Spectrum of complications in the normal and high- risk group was different. In the normal group, Anaemia(31.5%) was the most common complication, whereas in the high-risk group, GDM(37.8%) was the commonest as with Sharada et al. Obesity is an independent risk factor for maternal complications like GDM,GHTN and caesarean section. This is due to hyperinsulinemia and hyperlipidemia and enhanced oxidative stress resulting in hypertensive disorders of pregnancy and its complications.[9]

Of the number of patients who underwent Caesarean section 299(37.8%), 67(22.3%) were obese as per WHO category and 238(79.33%) were obese as per ASIAN. In our study, there is three fold increase in prevalence of obesity on applying Asian cutoffs.

On analyzing the pregnancy outcome within the WHO normal, there was statistically significance in the prevalence of GDM.

LIMITATION

As our institution is a tertiary care centre, the sample population included a huge proportion of high risk patients.

CONCLUSION

The prevalence of Obesity is increasing and the antenatal complications like gestational hypertension, GDM, Failed induction and caesarean rates are high in high risk group. The use of the revised guidelines led to a larger classification of high risk Asian Indian pregnant women. Hence we recommend adoption of the revised guidelines in obstetric management of Asian Indians.

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