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The effect of pre-pregnacy BMI and gestational weight gain on pregnancy and fetal outcome in rural hospital in Sullia, Dakshina Kannada

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Abstract
Objective: To study the effect of pre-pregnancy Body Mass Index on maternal and fetal outcomes in pregnancy among women having antenatal care in rural hospital. A recent increase in the prevalence of overweight and obese women of reproductive age in India has been shown by many studies.
Methods: The prospective observational study was conducted in Department of Obstetrics and Gynaecology at KVG Medical College Hospital, Sullia, Dakshina Kannada. 238 pregnant women who came to hospital for delivery and fulfilled the inclusion criteria were included after informed consent. Maternal and fetal outcomes were evaluated based on body mass index in pre pregnancy. Body mass index was calculated by the equation: Weight in kg/ height in meters squared. BMI categories were defined according to WHO Classification.
The data was expressed in the form of frequencies, percentages, charts or graphs.
Nominal categorical data between the group was compared using Chi-square test. P<0.005 was taken to indicate a statistical significant difference. The normal category of BMI was assumed as the reference category. Data analysis was done using SPSS version 25 and was analysed.
Result: Out of which about 51.19% of women were in the normal BMI group. 9.9 % of women belonged to underweight category. 26.96 % women were overweight and 11.95% were in the obese category. The incidence of obesity was almost similar either in primigravida and multiparous women without any significant difference. Total of 33.4 % in the study group had gestational diabetes. Incidence was more in obese category and was 60%. The incidence in normal BMI group was 28.7 % whereas in underweight group was 17.2%. In overweight group the incidence was 36.7%. Gestational diabetes and gestational hypertension were the two outcomes which showed significant association with body mass index. The incidence of GDM was 43.9% in women with BMI more than 25 where as 26.8% in those with BMI less than 25.

Keywords: pre-pregnacy BMI, gestational weight gain, rural hospital

Introduction

- A healthy foetus from a healthy mother, was coined by Sir Juleus Huxley [1].
- The global safe motherhood initiative launched in 1987, is Designed to improve antenatal care and counselling throughout the world [1].
- Nutritional status of a women in her pregnancy is one of the main modifiable factors influencing pregnancy and perinatal outcome.
- BMI, body mass index is an important predictor of nutritional status of pregnant woman which has been considered as an important prognostic indicator of pregnancy outcomes.
- High maternal BMI is related to adverse pregnancy outcomes such as pre-eclampsia, gestational hypertension, pre-and post-term delivery, induction of labour, macrosomia, caesarean section and post-partum haemorrhage [2].
- In 1990, Institute of Medicine (IOM) published a report showing association between pregnancy weight gain and infant size and provided target ranges of recommended weight gains by pre-pregnancy BMI.
- In 1995 World Health Organization Collaborative Study on Maternal Anthropometry and Pregnancy Outcome reviewed information from different countries to define desirable maternal weight gain.
- Overweight and obese pregnant women are at increased risk of gestational diabetes, pre-eclampsia, operative vaginal delivery and caesarean delivery [1].
- Their offspring are at increased risk for macrosomia, birth defects, low Apgar scores and neonatal complications[3,4] whereas underweight (BMI < 19.8 kg/m2) has been shown to be associated with increased risk of preterm delivery, low birthweight and anaemia and a decreased risk of pre-eclampsia, gestational diabetes, obstetric intervention and post-partum haemorrhage [5].

Objective of the study

1. To study the effect of pre-pregnancy Body Mass Index and gestational weight gain on maternal and fetal outcomes in pregnancy among women having antenatal care in rural hospital.

Materials and Methods

- **Setting:** Department of Obstetrics and Gynecology, K.V.G. Medical College Hospital, Sullia
- **Duration:** From 1st September 2020 - 31st September 2021
- **Type of study:** Prospective observational study
- **Sampling Size calculation:** Universal sampling

Inclusion criteria

1. Pregnant women who are booked having delivery and regular antenatal care (>5 visits)
2. ≤ 12 weeks GA at booking visit
3. Singleton pregnancy
4. Gives informed consent
5. Not a known case of diabetes or hypertension /hypothyroidism

Exclusion criteria

1. Consent not given
2. Multiple pregnancy
3. <5 ANC visits to KVG hospital.

Data collection procedure

- The study consisted of 238 early booked (< 12 weeks) singleton pregnancy without known medical complications like chronic hypertension, diabetes, were included in the study.
- In the first visit their height and weight were measured and BMI was calculated.
- Using the formula, BMI= weight kg/ height m2
- According to BMI, study population was divided in four groups: underweight (<18.5 kg/m2), normal weight (18.5–24.9 kg/m2), over weight (25–29.9 kg/m2) and obese (≥ 30kg/m2).
- Clinical data was obtained regarding age, parity, presenting complaints, socioeconomic status, gestation at which patient was admitted for delivery.
- Total antenatal weight gain were calculated and all the patients were divided in three groups (low, nor-mal, high pregnancy weight gain) as per IOM recommendation.
- Different complications during antenatal periods e.g., gestational diabetes mellitus (GDM), gestational hypertension, mode of delivery, post-operative complication, neonatal complication were recorded during hospital stay and in the postnatal period.
- Then the pregnancy outcomes were compared in different gestational weight gain groups.
- All relevant clinical information of the cases were recorded systematically in the predesigned clinical data sheet.

Data analysis

- The data was entered in Microsoft excel version 2007 and IBM SPSS Version 25 and was analyzed.
- The data was expressed in the form of frequencies, percentages, charts or graphs.
- Nominal categorical data between the group was compared using Chi-square test. P<0.005 was taken to indicate a statistical significant difference.

Results

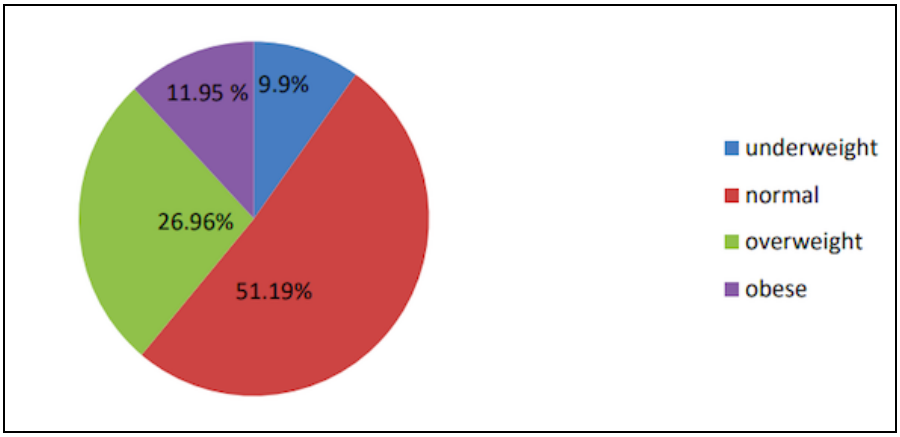

Fig 1: Body Mass Index Distribution

In our study 52% were under normal BMI category, 26.9% were under overweight category, 11.95 % were under obese category

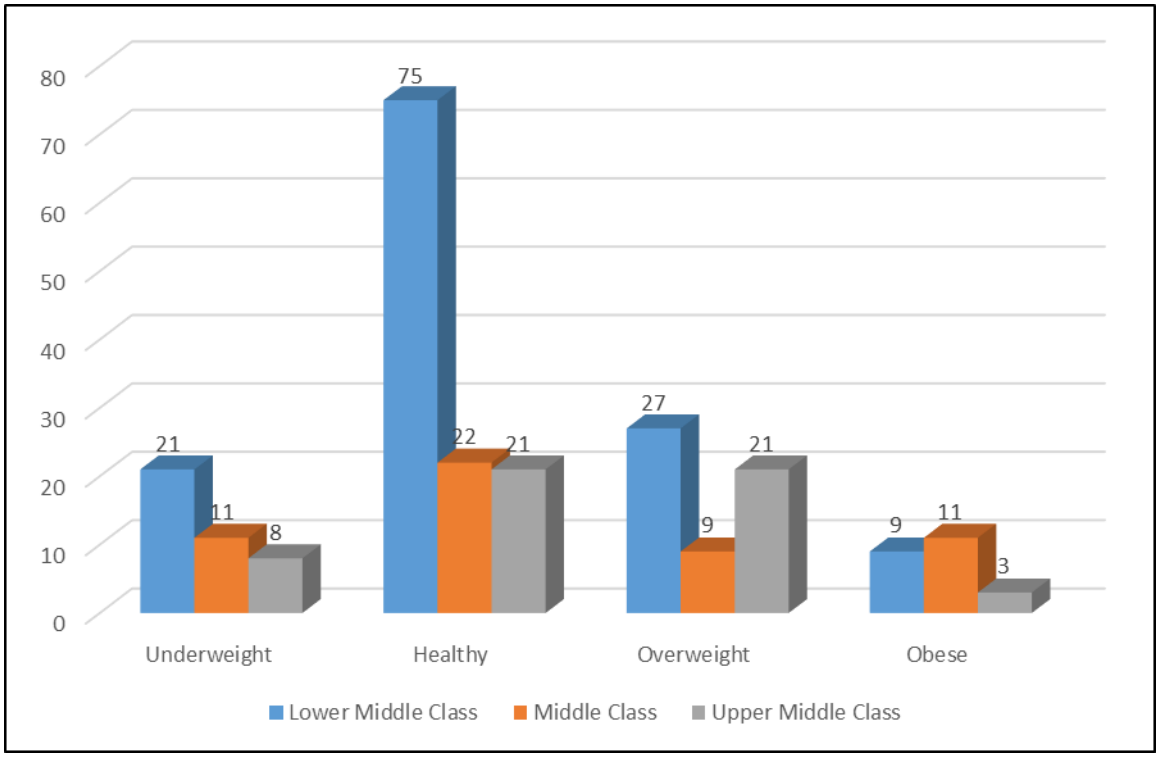

Fig 2: Distribution of cases according to Socio-economic class with BMI

In our study the majority population was hailing from the rural area, in all the BMI groups.

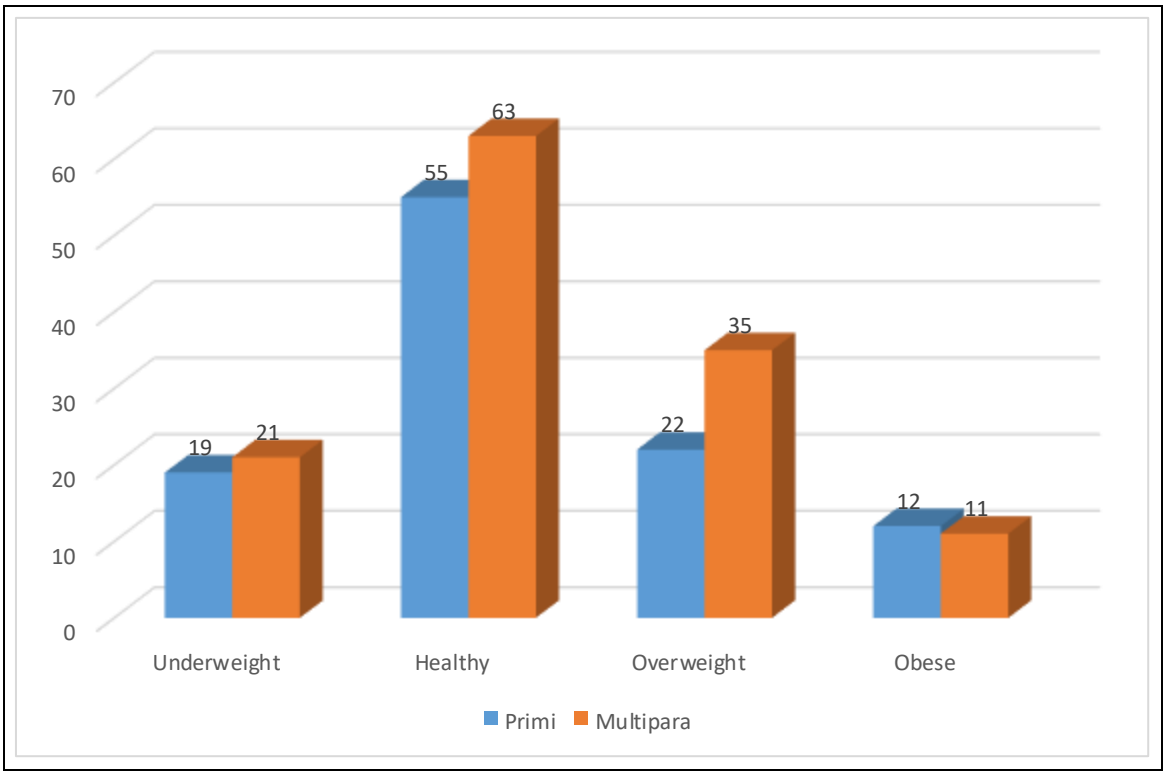

Fig 3: Distribution According to Gravida with BMI

The cases were divided based on gravida, and maximum population were in healthy BMI group.

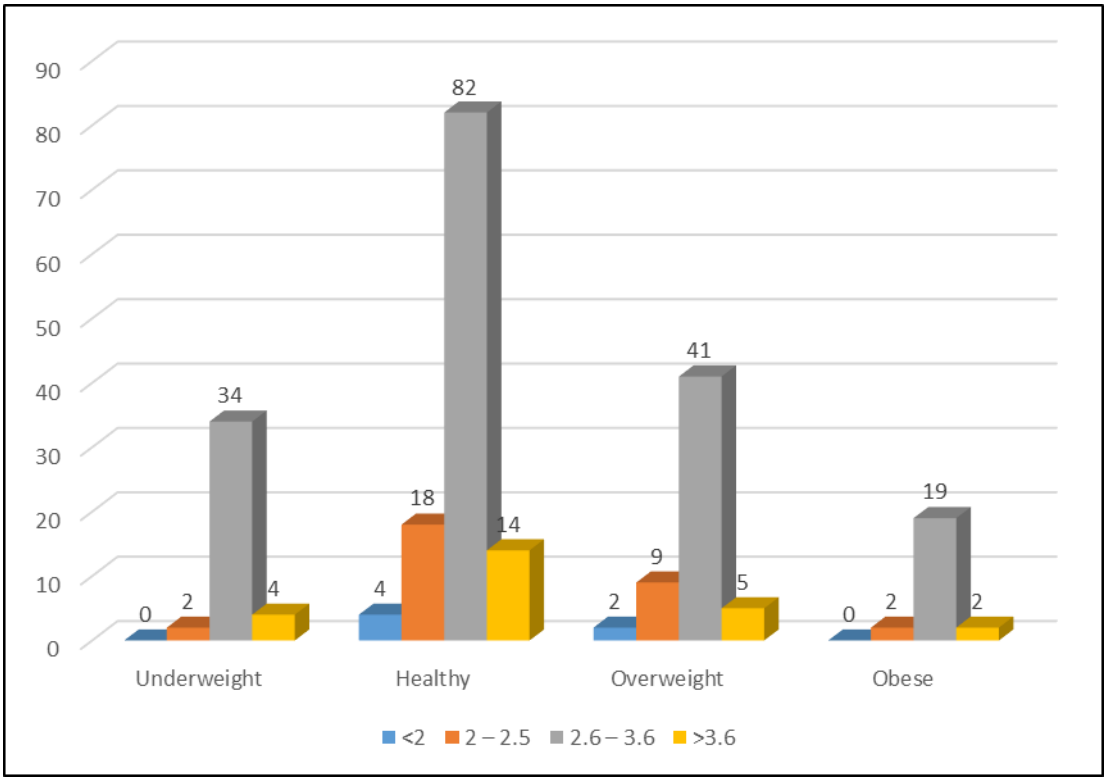

Fig 4: Distribution of Cases Accor Birthweight with BMI

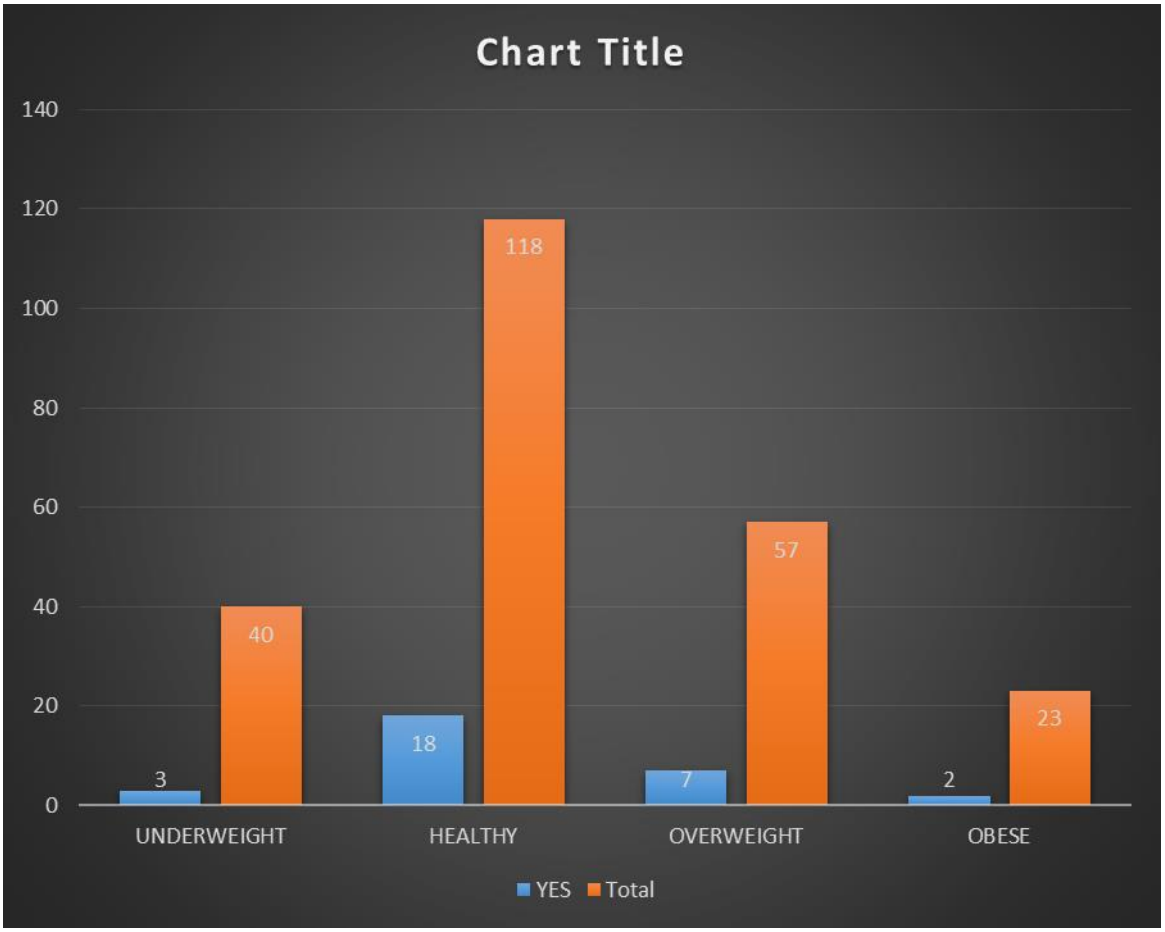

Fig 5: Incidence of Nicu Admission In Variuos Bmi Groups

ANTENATAL WT GAIN	UNDERWEIGHT	HEALTHY	OVERWEIGHT	OBESE	TOTAL	P VALUE
LOW WEIGHT GAIN	12(92.3)	95(75.2)	25(38.5)	2(11.8)	134	<.001
NORMAL WEIGHT GAIN	1(7.7)	32(21)	29(44.6)	7(41.2)	58	<.001
HIGH WEIGHT GAIN	0	6(3.8)	11(16.9)	8(47.1)	36	<.001

GESTATIONAL WEIGHT GAIN DURING PREGNANCY AND ASSO WITH BMI

Fig 6

Discussion

There were 238 women included in the study.

Out of which about 51.19% of women were in the normal BMI group. 9.9 % of women belonged to underweight category. 26.96 % women were overweight and 11.95% were in the obese category.

Study conducted by Vinturache A *et al* included 65.8% normal weight group. Over weight category included 23.6% and obese women were 10.6% which was similar to our study group

The incidence of obesity was almost similar either in primigravida and multiparous women without any significant difference.

Total of 33.4 % in the study group had gestational diabetes. Incidence was more in obese category and was 60%. The incidence in normal BMI group was 28.7 % whereas in underweight group was 17.2%. In overweight group the incidence was 36.7%. in a study by Dasgupta A *et al* [4] reported the similar finding, the risk of GDM was observed with obesity (OR: 5) with odds rising to eight fold with morbid obesity, the meta-analysis study conducted by Chu SY *et al* [13] supports the findings.

Gestational diabetes and gestational hypertension were the two outcomes which showed significant association with body mass index.

Gestational diabetes mellitus were more common in obese and overweight women.

The incidence of GDM was 43.9% in women with BMI more than 25 where as 26.8% in those with BMI less than 25.To get maternal and fetal outcomes as divided in two groups as body mass index more than 25 which included overweight and obese pregnant women and less than 25 which included normal and underweight, as shown in table:

VARIABLE	UNDERWEIGHT/ NORMAL	OVERWEIGHT/OBESE	P VALUE
GDM	48(26.8%)	50(43.9%)	0.003
GHTN	8(4.5%)	14(12.4)	0.014
PRE ECLAMPSIA	3(1.7%)	1(0.9%)	1
LSCS	43(24%)	29(25.4)	0.784
FTNVD	102(57.3%)	63(55.3)	0.732
INSTRUMENT DELIVERY	32(17.9)	22(19.3)	0.76
FORCEPS	24(13.4)	17(14.9)	0.717
VACCUM	8(4.5%)	5(4.4)	0.973
POST PARTUM INFECTIONS	4(2.2)	5(4.4)	0.318
MACROSOMIA	4(2.2)	1(0.9%)	0.652
NICU ADMISSIONS	16(9%)	14(12.4)	0.352

Fig 7

- No significant association was found between the BMI and mode of delivery whereas study conducted by Cedergren M *et al*[10] they reported that high gestational weight gain increased the risk for cesarean delivery in all maternal BMI classes, and same findings were reported by Barau G *et al* [6].

Conclusion

- The conclusions which were derived from the study were

1. There was significant association between body mass index and socio-economic status & maternal outcomes of gestational diabetes and gestational hypertension
2. The pregnant women who have body mass index in the overweight and obesity category of WHO classification has increased risk of gestational diabetes and gestational hypertension
3. There was no significant association between body mass index and mode of delivery
4. Body mass index is not a predictor of gestational age of delivery.
5. 29.5% of the patients had weight gain within normal range as described by the IOM.
6. The increase antenatal weight gain also increases the risk of developing GDM, hypertension, wound infection.

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