

Association of Body Mass Index and Pregnancy Outcome: A Hospital Record Based Study

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ABSTRACT

Association between pregnancy body mass index in normal cases and in cases with preterm birth was studied in a hospital record based cohort. 400 patients were studied for BMI in pregnancy, 200 cases of preterm labour in Group A and 200 without preterm labour in Group B. Data was analysed and correlated for preterm delivery and its relation to BMI. BMI was categorised as <18.5 (underweight); 18.5–24.9 (normal); 25.0–29.9 (overweight); 30.0–34.9 (obese I); 35.0–39.9 (obese II); and ≥ 40.0 (obese III). It was found that there is increased risk of preterm labour in patients with increase body mass index.

KEY WORDS: BMI, obesity, preterm delivery, preterm labour

INTRODUCTION:

Pregnancy is the most important event in a woman's reproductive life. There are multiple factors which influence its outcome, age at conception, smoking, co-morbidities, lifestyle, psychological health, and of course body weight. Preterm delivery (PTD), defined as birth at less than 37 weeks gestation, has long been a known consequence of maternal underweight^[1]. Almost all the factors have a defined and definite response on the outcome of pregnancy. But amongst all body weight especially body mass index is the most confusing factor.

Cnattingius et al stated that both high and low BMI have adverse effect on pregnancy outcome. They also stated that preterm labour is a leading cause of infant mortality, morbidity, and long-term disability, and these risks increase with decreasing gestational age. Obesity increases the risk of preterm delivery^[2].

Rahman MM et al, observed that maternal underweight was significantly associated with high risk of preterm birth^[3]. Baeten et al found that obesity had a stronger association with early preterm birth (<32 weeks) than overall preterm birth^[4]. Riley KL et al observed that increase risk of spontaneous preterm

birth associated with increase pregnancy body mass index^[5]. Multiple studies have come to contrasting conclusions regarding effect of Body mass index (BMI) on preterm labour. Obese nulliparas without chronic disease had higher risk for spontaneous delivery <28 weeks of gestation^[6].

Maternal obesity is an independent risk factor for PTD in singleton pregnancies but not in multiple pregnancies. Obesity and nulliparity increase the risk of sPTD, whereas obesity and multiparity increase the risk of PTD^[7]. Maternal BMI was associated with more spontaneous preterm deliveries and lower birth weight, and in contrast, higher maternal BMI was associated with a higher birth weight and macrosomia. It was concluded that both high and low maternal BMI have adverse effects on pregnancy outcome^[8].

Gary M. Shaw, et al showed obesity categories I–III to be associated with increased risk of spontaneous preterm birth at 20–23 and 24–27 weeks among those of parity 1 in each race/ethnic group. Underweight was associated with modest risks for preterm birth at ≥ 24 weeks among women in each racial/ethnic group regardless of parity^[9].

MATERIALS AND METHODS:

This retrospective case control, comparative, record based observational study was done in people's college of medical sciences Bhopal for a period of 1 year.

Selection of sample was done in defined period of conduct of study in the records available. 2 comparable groups were selected (group A – preterm

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labour, group B – term labour). In our study those women in preterm labour (Group A) were cases, while those women in term labour (Group B) were controls. Total 400 patients were listed and their BMIs were calculated. The inclusion criteria were singleton pregnancy; Age between 22-30 years; preterm pregnancy, Non smoker, non alcoholic, non diabetic, non hypertensive. The Patients with co-morbidities or disease (eg. deranged lipid profile, cardiac anomalies etc), Multiple pregnancies. Post-term pregnancy were excluded from study.

We divided the patients in 2 groups, 200 cases of preterm labour (patients delivered before 37 week of gestation) and 200 with normal term labour (patients delivered after 38 week of gestation). BMI was categorised as <18.5 (underweight); 18.5–24.9 (normal); >25 (overweight/Obese). Data was analysed and correlated for preterm labour and its relation to BMI.

RESULTS:

There were 46% of preterm birth (mean age 26.4 years) and 12% of term birth (mean age 22.7 years) seen in obese and overweight (>25), and 8% preterm and 0.5% term birth seen in underweight (<18.5). The patients with normal BMI (18.5-24.9) had 46% of preterm and 87.5% of term deliveries (Table 1 Figure 1).

Table 1: Distribution of term and pre-term deliveries according to BMI.

Category (BMI)	Preterm (Group A) (n=200)		Term (Group B) (n=200)		Total (n=400)
Underweight (<18.5)	16	8%	1	0.5%	17
normal (18.5 -24.9)	92	46%	175	87.5%	267
Obese and overweight (>25.0)	92	46%	24	12%	116

The Chi square value is 63.3916. p-value is <.00001. That is significant association was found. NOTE: With normal body mass index and overweight preterm delivery was 46% i.e. same (Table 2).

The Chi square value is 24.139. p-value is <.00001. That is significant association was found. NOTE: With normal body mass index and underweight preterm labour was 46% and 8% respectively.

Table 2: Association in normal BMI and overweights with preterm/term delivery.

	Category 1 (preterm)	Category 2 (term)	Total
Group 1 (normal)	92	175	267
Group 2 (overweight and obese)	92	24	116
	184	199	383

Table 3: Association in normal BMI and underweights with preterm/term delivery.

	Category 1 (preterm)	Category 2 (term)	Total
Group 1 (underweight)	16	1	17
Group 2 (normal)	92	175	267
	108	176	284

DISCUSSION:

We observed that both underweight and overweight or obese women are at high risk of preterm deliveries which is statistically highly significant. This is in line with the results got by Rahman MM et al who conducted a systematic review and meta-analysis of population based cohort and found that maternal underweight was significantly associated with higher risk of preterm birth^[3]. Wang LF, Zhou H et al showed that pre pregnancy obesity was a risk factor for preterm birth^[10]. Enomoto K, Aoki S et al who all found that excess gestational weight gain was associated with higher frequency of large for gestational age and macrosomia, poor weight gain correlated with higher frequency of SGA, Preterm Birth, Preterm Premature rupture of membranes and spontaneous preterm birth and optimal weight gain within recommended range was associated with better outcome^[11]. All these studies were carried out in Asian countries, like our study.

Some contrast studies like one by Riley KL^[5] showed that obesity was not associated with increased risk of spontaneous preterm birth among multiparous women. Women with higher BMI had a decreased risk of spontaneous preterm birth, infact obesity is protective factor for preterm birth. However, but this study was conducted in American population. In view of conflicting studies it may be safe to say that effect of BMI on timing of labour may be population specific.

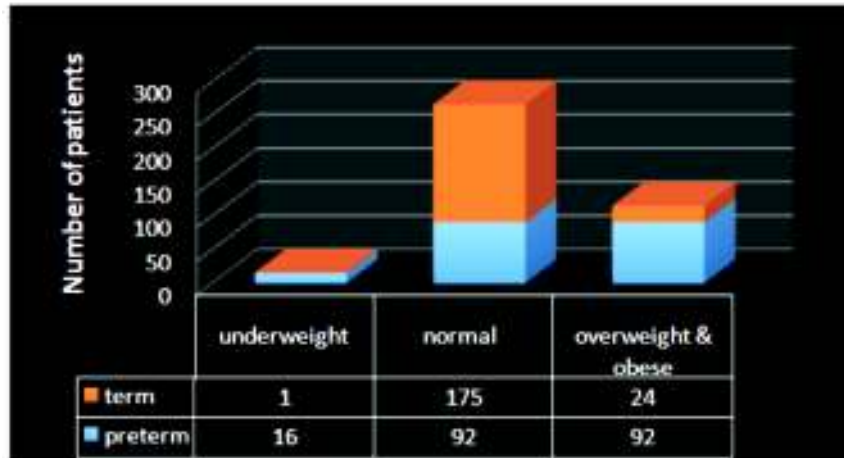


Figure 1: Distribution of term and pre-term deliveries according to BMI

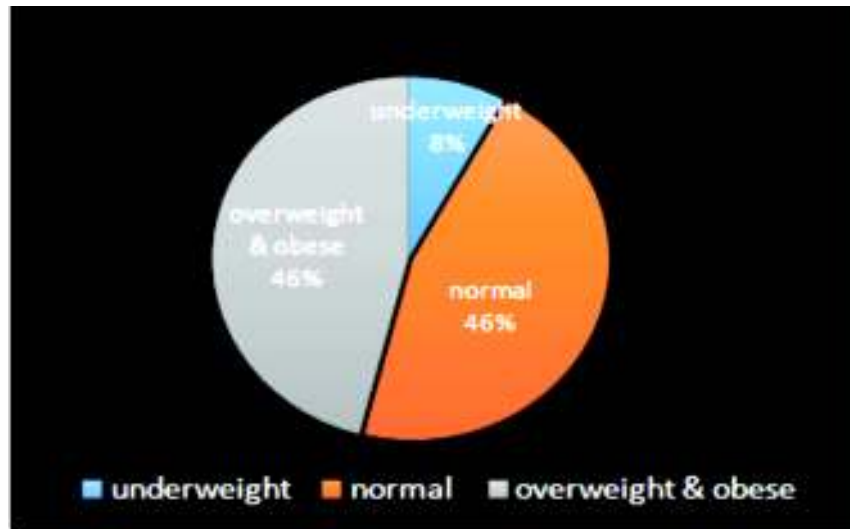


Figure 2: Percentage of Preterm Birth in Relation to BMI.

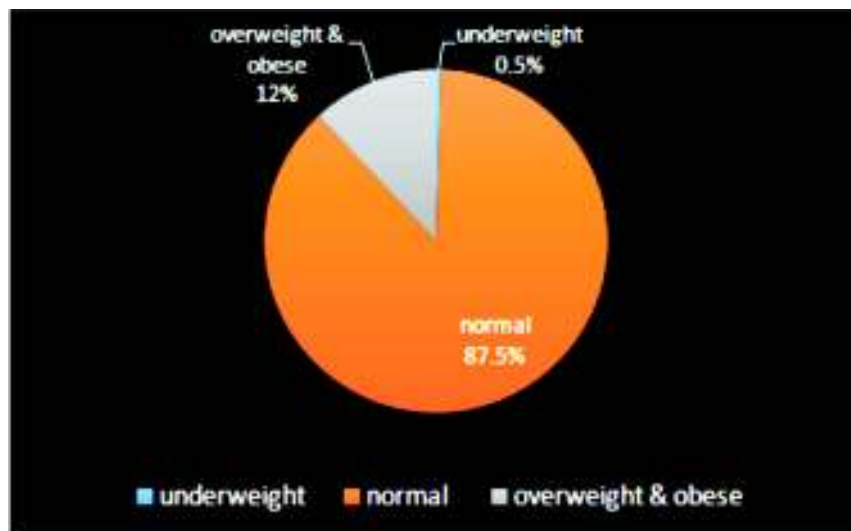


Figure 3: Percentage of Term Birth in Relation to BMI.

Body composition of different populations may have different effects on the pregnancy outcomes.

Both high and low maternal BMI have adverse effects on pregnancy outcome. Increase in maternal Body Mass Index was associated with increased preterm delivery outcome. Pre-conception counselling should include maternal BMI as an important risk factor for adverse pregnancy outcome. Controlling of pregnancy weight gain in overweight women may control and improve pregnancy outcome.

CONCLUSION:

Increase in BMI leads to increased pre term labour, as it can be seen in our study that those with overweight/ obese were having preterm labours as compared to those with normal BMI. While those women who were underweight had comparatively less frequency of preterm labour as compared to obese/overweight. Most of the women with normal labour had term delivery. Hence, maternal BMI is observed an important risk factor for unexpected preterm birth.

LIMITATIONS:

Small sample size of this study is its limitation. Larger studies with multi-centric randomized control trial may be conclusive. Confounding variables like anaemia abnormal lipids etc were not included in the study.

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