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BODY WEIGHT'S IMPACT ON PREGNANCY'S RESULTS

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ABSTRACT

Background and objectives: To research the relationship between maternal problems and BMI throughout early pregnancy. To ascertain the relationship between early pregnancy BMI and delivery results. To examine the impact of early pregnancy BMI on the outcome of the newborn. To assess the relationship between gestational weight growth and early pregnancy BMI. To assess the possibility of negative maternal and foetal outcomes in women with excessive BMI levels.

Method: 320 pregnant women with singleton, uncomplicated pregnancies who were scheduled at Department of O&G, govt- medical college and hospital, Namakkal district, Tamil nadu state, India between the first 12 weeks of gestation between April 2022 to March 2023 participated in a prospective observational study.

Result: Frequency and percentage distribution are shown in the table above. 50.3% of individuals had normal BMIs. Overweight participants comprised 24.6%.Obesity was 10.6%.

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Underweight women comprised 14.3% of the population. PIH was most common in obese patients (30.43%) and women with normal BMI (0.7%).Using chi-square analysis. X 2 = 14.73, p 0.01) showed a strong association between BMI and PIH. Compared to women with normal BMI, obese women had the most LGA kids. Most SGA kids were born to underweight women. Chi-square analysis was done. Birth weight was significantly correlated with BMI. (X2 =38.598, p<0.001).

Conclusion: BMI strongly correlated with worse maternal outcomes in this study. Underweight mothers had low Apgar scores, anaemia, lower fluid volume, and higher rates of caesarean sections. Overweight and obese women had a higher risk of adverse maternal outcomes like gestational diabetes, pregnancy-induced hypertension, increased liquor volume, PPROM, instrumental deliveries and caesarean sections, postpartum complications like postpartum haemorrhage and delayed wound healing, and delivering LGA babies with low Apgar scores. Overweight and obese women gained the most weight, whereas underweight women gained the least. The relative risk of various pregnancy outcomes in high- and low-BMI patients was also assessed and supported.

Keywords: Pregnancy, Apgar score, SGA, BMI, LGA

INTRODUCTION

Pregnancy outcomes that are not favourable can be predicted by factors like early pregnancy, BMI, and weight increase. Previously, low BMI was more of a factor in pregnancy complications, but with changing lifestyles, obesity is on the rise, especially in metropolitan areas, and could pose a serious threat to public health in the future [1,2,3].

According to studies, obese and overweight moms were more likely to experience foetal death in utero, large for gestational age (LGA), emergency caesarean sections, postpartum haemorrhage, wound infections, and gestational diabetes. Contrarily, underweight women were more likely to experience anaemia and unfavourable newborn outcomes such as intrauterine growth retardation (IUGR) and preterm [3,4].

A pregnant woman's and her unborn child's health and quality of life are significantly impacted by the nutritional state of the mother. The BMI and patterns of weight gain during pregnancy need to be given top priority because they are modifiable risk factors for unfavourable pregnancy outcomes. One ought to be familiar with the symptoms and warning indicators of unfavourable pregnancy outcomes. An enormous improvement in antenatal

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recommendations has resulted from a greater understanding of the intricate relationships between the mother and foetus. In order to achieve healthy pregnancy outcomes, the Institute of Medicine (IOM) published guidelines regulating weight growth during pregnancy based on pre-pregnancy BMI [4,5].

Fewer studies have been conducted on the Asian population than have been conducted in the Western countries. The purpose of the study is to assess how body weight affects pregnancy outcomes in our Indian community. By carrying out this study, it would be possible to assess the link between BMI and its negative impact on pregnancy outcomes. It would also be possible to examine the relationship in our Indian context between BMI and gestational weight increase. This study would also make it possible to assess the relative risk of various pregnancy outcomes that a patient with extremes in BMI can experience [5,6].

MATERIAL AND METHODS

During the first 12 weeks of gestation, between April 2022 to March 2023, 320 pregnant women with singleton, uncomplicated pregnancies who had been scheduled at Department of O&G, govt- medical college and hospital, Namakkal district, Tamil nadu state, India undertook a prospective observational study.

Inclusion criteria:

1. Only pregnant patients.
2. Pregnancy in the first trimester, booking.
3. Pregnancy in a singleton.

Exclusion criteria:

1. Patients with pre-existing medical conditions include SLE, overt hyperglycemia, chronic hypertension, and over hypothyroidism.
2. Several pregnancies
3. In the first trimester of pregnancy, there are no antenatal appointments.

Methodology

In our study, we looked at women who had singletons without complications and who had appointments at PSG Hospital within the first 12 weeks of pregnancy. Written consent was obtained. In the initial exam, basic data including height and weight were gathered with the aid of a predesigned questionnaire, and BMI was computed in accordance.

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Patients were classified into 4 groups based on their BMI, which was computed using the formula weight (kg) / height (m2) (QUETELET'S Index): Underweight (18.5 kg/m 2), Normal (18.5-24.9), Overweight (25-29.9), and Obese (30 and above). Every visit's weight increase was observed, and any prenatal difficulties throughout the pregnancy were noted. Following delivery, information was gathered from the case sheets on postnatal problems, gestational age at delivery, as well as birth weight and the neonate's Apgar score.

Patients who failed to follow up were removed from the trial, and new participants were added to keep the sample size at 320 [6,7].

RESULT

Table 1: Frequency and distribution of BMI At FirstVisit

BMI	Number of subjects	Percent
Normal	161	50.3
Overweight	79	24.6
Obese	34	10.6
Underweight	46	14.3
Total	320	100.0

In the table above, frequency and percentage distribution are displayed. 50.3% of the participants had a normal BMI. A total of 24.6% of the participants were overweight.10.6% of the participants were classified as obese. 14.3% of the female population was underweight.

Table 2: Distribution of subjects based on Weight GainIn Pregnancy

Weight Gain	Number of Subjects	Percentage
0 – 7	68	21.2
8 – 13	162	50.6
> 13	90	28.1
Total	320	100

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Table 3 : Weight gain in Association To BMI

BMI		Weight Gain(kg)			Total
		0 - 7	8 - 13	> 13	
Normal	Number %	30 18.6 %	92 57.14 %	39 24.22 %	161 100 %
Overweight	Number %	19 24.05 %	32 40.50 %	28 35.44 %	79 100 %
Obese	Number %	8 23.52 %	11 32.35 %	15 44.11 %	34 100 %
Underweight	Number %	11 23.91 %	19 41.30 %	16 34.78 %	46 100 %
Total	Number %	68 21.25 %	154 48.12 %	98 30.62 %	320 100 %

Table 4: **Association between BMI and DiabetesMellitus (DM)**

BMI		Diabetes Mellitus(DM)		Total
		DM (-)	DM (+)	
Normal	Number %	139 86.33 %	22 13.66 %	161 100 %
Overweight	Number %	54 68.35 %	25 31.64 %	79 100 %
Obese	Number %	24 70.58 %	10 29.41 %	34 100 %
Underweight	Number %	34 73.91 %	12 26.08 %	46 100 %
Total	Number %	251 78.43 %	69 21.56 %	320 100.0 %

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Table 5: Association between BMI and PregnancyInduced Hypertension

BMI (kg/m2)		**PIH**		**Total**
		PIH (-)	**PIH (+)**	
Normal	Number	140	21	161
	%	86.9 %	13.04 %	100.0%
Overweight	Number	68	11	79
	%	86.07 %	13.92 %	100.0%
Obese	Number	21	13	34
	%	61.76 %	38.23 %	100.0%
Underweight	Number	32	14	46
	%	69.56 %	30.43 %	100.0%
Total	Number	261	59	320
	%	81.56 %	18.43 %	100.0%

In our study, the highest percentage of obese patients (30.43%) and women with normal BMI (0. 7) got PIH.Chi-square analysis was used. The findings revealed a significant correlation between BMI and PIH (X 2 = 14.73, p 0.01)

Table 6: Association between BMI and Birth weight

BMI		Birth weight			Total
		Normal (2.5 - 4 kg)	LGA (> 4 KG)	SGA (< 2.5 KG)	
Normal	Number	133	3	25	161
	%	82.6%	1.8%	15.52%	100.0%
Overweight	Number	62	2	15	79
	%	78.4%	2.5%	18.9%	100.0%
Obese	Number	18	6	10	34
	%	52.9%	17.6 %	29.4%	100.0%
underweight	Number	27	0	18	46
	%	58.6%	0.0%	39.1%	100.0%

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Total	Number	240	11	68	320
	%	75%	3.4%	21.25%	100.0%

The findings were examined. In comparison to women with normal BMI, it was shown that obese mothers gave birth to the majority of LGA newborns. Similarly, the majority of SGA babies were delivered by underweight women. There was a Pearson Chi square analysis. It revealed a meaningful correlation between BMI and birth weight. ($X2 = 38.598$, $p<0.001$).

DISCUSSION

We prospectively observed 320 pregnant women. women with uncomplicated singleton pregnancies who were scheduled at PSG. Within 12 weeks of gestation, hospital deliveries had been performed. The subjects in this experiment ranged in age from 18 to 40. 25 was the average subject age. 53.8% of the research population were nulliparas. 46.2% of sentences are multipara. Patients on term made up 92.1%. 7.9% were preterm at 37–40 weeks. 37 weeks or less. Weight problems affected 17.4%. adding 0–7 kg. 53 % added 8 to 10 pounds. 13 kilos while pregnant. 29.6% of women who gained more than 13 kg were found to be overweight. There were four groups of women in the study. BMI ranges based on BMI during early pregnancy. At BMI 13.4%, the population had an average weight of 18.5 kg/m2. Between 18.5 and 24.9 kg/m2 was the BMI range for 55.3 percent of females. Between 25.0 and 29.9 kg/m2 was the BMI range for 24.5 percent of females. BMI of 30kg/m2 or above was seen in 6.7% of females. The study's female participants made up 55.3% of the overweight and obese group and 31.2% of the normal BMI group. It's important. Obesity is on the rise as lifestyles change, especially among youngsters in metropolitan areas, and could pose a serious health risk [7,8,9].

While underweight people acquired the least weight, many obese ones gained the most. Using Chi-square testing on early pregnancy BMI, it was discovered that gestational weight gain was connected with weight gain (p 0.01). In a similar study, Ihunnya O. Frederick et al. discovered that pregnant women who were underweight lost less weight than pregnant women who were obese, $p = 0.001.2$ In a different J.E. Brown et al. examination, research revealed that obese women gave birth to large newborns while underweight women had neonates with lower birth weights. Therefore, maintaining a healthy weight throughout pregnancy is essential; doing otherwise can lead to difficulties. Thus, it is important to encourage expectant women to adhere to IOM recommendations for general weight gain based on pre-pregnancy. BMI In this study, 10.7% of the Normal patients were impacted.

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Diabetes was present in the BMI range. 25.8% of people with diabetes are overweight. 35.3% of those with an obese BMI developed diabetes. Only 1% of the underweight BMI group DM developed. The highest percentage of diabetic patients (35.3%) and the lowest percentage of underweight patients (1%), respectively, were obese [10,11].

Chi-Square analysis was used to link BMI to Diabetes Mellitus and shown that BMI increases with diabetes (p 0.01). In a D.A. on 331 women, Dohertya found that 188 of them (6.6%) were obese and that they had a higher risk of developing gestational diabetes. Worst danger was indicated by relative risk. In comparison to women with normal BMI, obese women have a threefold greater risk of diabetes, overweight women a twofold increase, and underweight women no increased risk. 0.7% of participants in this study were obese. People with normal BMIs developed PIH. 5.9% of PIH cases were among underweight individuals. 9.7% of the group with an overweight BMI developed PIH, compared to 17.6% of the group with an obese BMI. In comparison to women with normal BMI (0.7%), obese patients (17.6%) had the highest prevalence of PIH. A significant association between increasing BMI and PIH was discovered by Chi-square (p 0.01) According to Srivastava Reena (FOGSI), a comparable study by Meenakshi found that obese women were more likely to be obese and were associated with undesirable outcomes like PIH at p 0.05 [12,13].

Obese women had 25 times more PIH after calculating relative risk, the greatest risk of getting compared to normal BMI. Overweight women are thirteen times more likely to develop PIH than women with normal BMI, and underweight women are eight times more likely. 8.6% of patients with a Normal BMI developed diabetes and anaemia. 11.3% of the overweight group experienced anaemia. Obese individuals did not experience anaemia. Anaemia affected 20.6% of patients who were underweight. Female underweight prevalence is 20.6%. Compared to 8.6% of women with normal BMI, overweight women (11.3%) developed anaemia. A study that used chi-square analysis revealed a strong correlation between anaemia and low BMI. ($p< 0.05$). 26.5% were detected in Adam, 46's 1136 research. There was a strong association between anaemia and low BMI (p 0.05) in the population of underweight females. No obese participants in this study developed diabetes. Anaemia made it impossible to calculate relative risk. It appeared that women who were overweight had a twofold increased risk of developing anaemia. However, as compared to people with normal BMI, underweight women had a twofold higher risk of having anaemia [14,15,16].

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We must place focus on this because we're evolving. Rural sections of the country are prone to anaemia. In the current study, 6.5% of participants who were overweight had polyhydraminos, and 5.9% of obese participants had a BMI that was 0.7% lower than that of normal people. There were no polyhydraminos patients who were underweight, however there were more oligohydraminos patients who were underweight (14.7%). a BMI of 4.3%. The majority of people with more severe The majority of underweight people had polyhydraminos, and those with high BMIs and oligohydraminos were also present. Chi-square test liquor volume and BMI showed a correlation (p 0.05). Obese people had a higher relative risk, and although women with normal BMI were eight times more likely to develop polyhydramnios, overweight women were nine times more likely to do so. Patients that were underweight lacked polyhydraminos. Unable to estimate relative risk, the underweight group's oligohydraminos risk was found to be three times higher than that of people with normal BMI. Results showed that patients with normal BMI made up 13.6% of PROM patients, compared to 5.9% of obese patients and 12.9% of overweight patients. The underweight rate in the population is 11.8%. People who had PROM women (13.6%) experienced a lower BMI than average. There was no discernible difference in the outcomes. PROM variations between BMI categories (p=0.05). A comparable experiment, carried out by Meenakshi and Srivastava Reena (FOGSI), demonstrated that obese people were not unique. PROM in females when p > 0.05. According to PPROM results, 11.8% of obese people had 3.2% of the PPROM. Only 1.4% of patients had PPROM compared to the group with normal BMI. Category of underweight people with PPROM [17,18].

In comparison to other BMI groups, the data showed the most obese individuals. Chi square analysis was used to determine that there was no significant relationship between BMI and ROM. (p =0.351) Comparative risk analysis showed Women who were obese, overweight, or underweight did not have a higher risk. The majority of obese adults are at risk of PROM, however PPROM risk is seven times higher than normal BMI risk. There was no clear connection between PPROM is more prevalent in obese women (p=0.35). a sevenfold growth. Participants in the experiment were found to be underweight (61.8%) and normal (56.4%). Uncomplicated vaginal births against obese (47.1%) and overweight (41.9%). However, the obese group saw a decrease in the number of patients who experienced difficult vaginal births, and the majority of people in the overweight (54.8%) and obese (41.2%) groups did not experience compared to the other two groups, respectively [19,20].

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A BMI is substantially linked with vaginal delivery, according to chi square analysis (p 0.05). Meenakshi and Srivastava Reena's (FOGSI) study of 215 women discovered that 18 obese women had complicated p 0.05 vaginal births. Compared to women with a normal BMI, obese women had a one-fold increased risk of developing complicated. A study indicated that women with normal BMI had a higher possibility of having a difficult vaginal delivery than women who were overweight or underweight. In our study, obese (41.1%) and overweight (54.8%) patients undergo emergency or elective C sections at a far higher rate than the general population. A substantial correlation between BMI and Caesarean section was found using chi square analysis (p 0.05). Meenakshi and Srivastava Reena's (FOGSI) study of 215 women revealed that 79 of 170 obese women were associated with p 0.01. In our study, the risk is one-fold higher for all three categories compared to women with a normal BMI. In contrast to pyrexia associated with a normal BMI (2.1%), overweight women (4.8%) experienced issues, although fat and underweight women did not. Using Chi square analysis, no correlation between BMI and pyrexia was found in our study ($p = 0.407$). Compared to women with a normal BMI, our research revealed that overweight women are twice as likely to. It was unable to calculate the risk of overweight and underweight women. Pyrexia affected these women. Women in our study who were obese (23.5%) and overweight (23.5%) had higher PPH rates than those who were normal weight (3.6%) and underweight (2.9%). Chi square analysis was used to establish a significant association. ($p<0.05$) PPH and BMI. Only 5 out of 170 obese and overweight women had PPH, according to a study by Meenakshi and Srivastava Reena (FOGSI) 1, demonstrating that there was no significant correlation between PPH and BMI. Our research revealed a strong correlation between BMI and PPH. ($P < 0.05$). According to this study, obese women are six times more likely to develop PPH than women with a normal BMI. Women who are overweight or underweight do not have a higher risk of PPH than those who have a normal BMI. Obese women experienced an 11.8% delay in wound healing compared to other groups [20,21].

25 out of 170 obese and overweight women showed delayed wound healing, according to a study by Meenakshi and Srivastava Reena (FOGSI) 1 on 215 women. This finding had a p value of 0.05. The Chi square test was used to discover this. In the present study, obese women, but not overweight or underweight women, have a five-fold increased risk of delayed wound healing compared to women with normal BMI. Only 5.9% of patients with an obese BMI experienced thromboembolism. BMI was found to be significantly correlated with thromboembolism using Chi square analysis. ($X 2 = 13.937$, $p < 0.005$) [21,22].

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Only one patient in the 253 obese BMI group experienced thromboembolism, making it impossible to quantify the relative risk for the condition. The p value demonstrates that BMI and thromboembolism are related. Obese women had 17.6% more LGA births than women with a normal BMI. Underweight mothers gave birth to 38.2% of SGA children. Low BMI and low birth weight were linked, while obesity and high birth weight were linked. ($p<0.001$). Similar results were observed by J.E. Brown et al. and Ihunnaya O Frederick et al. with p0.001 and 0.0009, respectively. Of the 170 obese and overweight women studied, Meenakshi, Srivastava Reena (FOGSI) 1 discovered that 66 of them gave birth to infants with subpar Apgar ratings. In our study, underweight women had a threefold higher probability of giving birth to an SGA baby than overweight or obese women did, respectively, as compared to the group with normal BMI. Patients who were obese had a 28-fold increased chance of giving birth to LGA children compared to those who were overweight or underweight, who had a one-fold increased risk [22,23].

In contrast to women in the normal BMI category, who had a much larger proportion of kids with good Apgar scores, our study indicated that babies born to underweight (35.3%) and obese (64.7%) mothers had low Apgar scores. 88.6% (Apgar>7). BMI and Apgar score were highly significantly correlated, according to Pearson Chi square analysis (p 0.001). Obese women are five times more likely than underweight women, overweight women are at no risk, and women with a normal BMI to deliver babies with low Apgar scores. The health of a pregnant woman and her unborn child is impacted by her dietary state. Poor pregnancy outcomes are predicted by weight growth and early pregnancy BMI. In our study, we looked at extreme early pregnancy BMI and poor mother and foetal outcomes. BMI was significantly correlated with poor maternal outcomes ($p<0.05$). Inadequate maternal outcomes such as gestational diabetes, pregnancy-induced hypertension, increased alcohol volume, PPROM, increased rate of instrumental deliveries and caesarean sections, postpartum complications such as postpartum haemorrhage, delayed wound healing, giving birth to LGA babies, and low Apgar scores were more common in overweight and obese women. Reduced liquid volume, increased anaemia risk in underweight females, etc. BMI and weight growth during pregnancy were also looked at. Underweight women gained the least weight, whereas obese and overweight women gained more than those with normal BMI. In our study, we looked at how weight increase and BMI in early pregnancy relate to different pregnancy outcomes [24,25].

CONCLUSION

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Numerous studies have shown that early pregnancy BMI and gestational weight increase have a significant impact on unfavourable mother and newborn outcomes. According to the results of the current study, there is a direct correlation between BMI and poor maternal outcomes. Anaemia, decreased fluid volume, an increase in caesarean sections, and SGA deliveries with a low Apgar score have all been observed in underweight mothers. The risk of adverse maternal outcomes, such as gestational diabetes, pregnancy-induced hypertension, increased alcohol volume, PPROM, instrumental delivery and caesarean section rates, postpartum complications, such as postpartum haemorrhage delayed wound healing, and having LGA babies with low Apgar scores, was found to be significantly higher in overweight and obese women. It was shown that obese and overweight women acquired more weight than women with normal BMI, while underweight women gained the least amount of weight. The results were justified. The relative risk of various pregnancy outcomes that a patient with high or low BMI can acquire was also assessed. Due to the fact that they are modifiable risk factors for unfavourable pregnancy outcomes, BMI and the patterns of weight gain throughout pregnancy need to be given the utmost emphasis. One should have a basic understanding of the symptoms and warning indications of unfavourable pregnancy outcomes. Antenatal guidelines have been improved as a result of a greater understanding of the intricate interactions between the mother and foetus.

Few studies have been conducted on the Asian population, compared to the number of studies conducted in Western nations. Previously, in India, low BMI was more often associated with pregnancy complications, but with changing lifestyles, obesity is on the rise, especially in urban areas, and could soon pose a serious threat to public health. This study made it possible to assess the link between BMI and its negative impact on pregnancy outcomes. This study analysed the relative risk of various pregnancy outcomes that a patient with extremes of BMI can acquire, and the findings were convincing. In our Indian setup, it was also possible to analyse the relationship between BMI and gestational weight increase, with results that are all significant.

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Conflict of interest:

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