Study The Association Of Body Mass Index With Pregnancy Outcome

Dr. Kusum Gaur
Professor, PSM., S.M.S. Medical College, Jaipur, Rajasthan, India
Dr. Anuradha Yadav
Associate Professors Physiology, S.M.S. Medical College, Jaipur, Rajasthan, India
Dr. Dilip Raj
Assistant Professors, PSM., S.M.S. Medical College, Jaipur, Rajasthan, India
Dr. Ashish Jain
Senior Demonstrator PSM Department, S.M.S. Medical College Jaipur, Rajasthan, India

Abstract:
Objective: To Study of the Association of Body Mass Index with Pregnancy Outcome.
Materials and methods: 250 nulliparous singleton term pregnancies who delivered at Mahila Chikitsalaya, which is one of the attached hospital with SMS Medical College, Jaipur (Rajasthan) India, were followed to observed their pregnancy outcome. Along with their body weight and height, study variables as pregnancy outcome were-Anemia in pregnancy, Pre-eclampcia, prolonged lab our, nature of delivery, Birth weight. Risk of pregnancy outcome was inferred by ODD's Ratio in relation to normal weight women.
Conclusions: Pregnant women with Low BMI & High BMI carry a risk for adverse pregnancy outcome. Low BMI have more risk for anaemia whereas high BMI women have more risk for pre-eclampcia, .Risk of underweight babies was more with both. Therefore, women should maintain a normal BMI to achieve a healthy pregnancy outcome.

Key words: BMI, Nulliparous, Single-tone, Gestational weight

1.Introduction

Nutrition is defined as science of food and its relation to health is well known. Nutritional status of women is an important prognostic factor of pregnancy outcome. Body mass index is one of the tool to know nutritional status. In developing countries very few studies are available in this area. Present study was conducted to determine the association of BMI with pregnancy outcome.

2.Material And Method

2.1.Setting
Study was conducted in the Mahila CHikitsalay, one of the attached hospital of SMS Medical College, Jaipur (Rajasthan) India.

2.2.Sample

2.2.1.Study population
250 nulliparous singleton term pregnancies coming for delivery.

2.2.2.Inclusion Criteria
 single-tone term pregnancy without any known disease falling in the age group of 20-30 years and who has their gestational weight gain between 8-12 Kgs.

2.2.3.Exclusion Criteria
- Women of less than 20 years and more than 30 years
- Women with multiple gestation
- Single-tone term pregnancy with gestational weight gain either less than 8 Kgs or more than 12 Kgs.
- Single-tone term pregnancy with any known disease like Diabetes, Hypertension etc.

3.Methodology

Study was started on 1st August 2009 in Mahila Chikitsalaya, each and every case falling in inclusive criteria were contacted and included in the study till 250 cases. Along with socio-demographic details like name, age, parity; information on maternal height & maternal weight in first trimester of pregnancy was taken from the records available. Weight of the mother is also measured before delivery to excludes women had gestational weight gain less than 8 Kgs and more than 12 Kgs. Pregnant women falling in inclusive criteria were inquired, observed and examine for element of any present and past chronic illness. Those women who were not having any chronic illness were further followed to find out pregnancy outcome like anemia, pre-eclampsia in pregnancy, nature of delivery (normal, LSCS, Forceps delivery) and baby birth weight.

Gestational weight gain was determined as difference in maternal weight between before (in first trimester) and after (just before delivery).

BMI was calculated using maternal height and weight information recorded during the first trimester of pregnancy as follows: BMI (Kg/Sq.m) = Weight/height square.

As per BMI women were classified in three categories as follows

Type of person	BMI
Underweight	< 18.5
Normal Weight	18.5 – 24.9
Overweight	25 and above

Table : 1
Source: ICMR

Outcome variables were defined as follows:
- Anemia in Pregnancy – defined as Hemoglobin concentration of venous blood is less than 11 gm/dl in adult pregnant female (as per WHO definition).
- Pre- eclampsia – defined as persistently high blood pressure (Systolic BP > 140mm/Hg and Diastolic BP > 90mm/Hg on more than two occasions) with protienuria.
- Prolonged pregnancy – defined as 40 completed weeks or more from the first day of last menstrual period.
- Nature of Delivery was categorized as normal delivery/LSCS/Forceps
- Birth weight of child was categorized as
  - Low birth weight defined as weight < 2.5 Kg at birth
  - Normal birth weight defined as weight between 2.5 Kg at birth
  - Excess birth weight defined as weight < 3.5 Kg at birth

Outcome variables were studied in association with BMI .Inferences were drawn with the help of computer and suitable statistics. Risk of pregnancy outcome was inferred by ODD's Ratio in relation to normal weight women.

4.Observations And Discussion

Out of 250 women studied, although majority i.e. 136 (54.4%) were of normal weight but 93 (37.2%) underweight (BMI<18.5) and 21 (8.4%) overweight (BMI ≥ 25) were also observed in this study.

Pregnancy outcome in present study was observed during pregnancy as anemia in 105(42%), pre-eclampcia in 40 (16%), Prolonged labour in 5(2%) with significant variation with BMI of pregnant women. In underweight women risk of anemia (OR =4.7) and prolonged labour (OR=2.3) whereas in overweight women risk of pre-eclampcia (OR=11.37) was significantly more than normal weight women (P<.001). Sohinee Bhattaacharya etall[1] also observed increase risk of pre-eclampcia (OR=7.2) with increase weight. Other studies[2,3,4,5,6,7] are also in support of present study observations regarding anemia[2], prolonged labour [3,4,5,6] and pre-eclampcia[3,4,5,6,7] .

Out of these 250 deliveries conducted, 155(62%) were normal, 82 (32.8%) were LSCS and 13 (5.2%) were forceps delivery. Proportion of normal deliveries were highest with normal weight, whereas proportion of LSCS were significantly more in underweight (OR=2.29) and overweight (OR=2.25) in comparison to normal weight women. Risk of Forceps's delivery was extremely high with overweight (OR = 54). These observations are well comparable with the other studies [1,7,8] also.

Birth weight of child born in the present study was observed normal in 171(68.7%). Underweight or overweight children were born more in case of extremes of BMI. Other studies [1,9,10]are also in support of these observations regarding birth weight of child borne; although most of them have OR of having underweight child in underweight women ranging between 1.5 to 3 (1.7, 1.8, 2.69 respectively) whereas in our study it was observed too high i.e. 13.17 in underweight women. Surprisingly even in overweight women underweight child OR was also observed too high i.e. 17.6.

5.Conclusion

Pregnant women with Low BMI & High BMI carry a risk for adverse pregnancy outcome. Low BMI have more risk for anaemia and prolonged labour whereas high BMI women have more risk for pre-eclampcia, .Risk of underweight babies were borned was also more in both i.e. underweight as well as in overweight women. Therefore, women should maintain a normal BMI to achieve a healthy pregnancy outcome.

Pregnancy Outcome BMI ——▶ ↓	Total No. (%)	Anaemia in Pregnancy No. (%)	OR With Normal BMI (Times)
Underweight (BMI < 18.5)	93(100)	61(65.6)	4.7
Normal Weight(BMI = 18.5 to 24.9)	136(100)	39(28.7)	
Overweight(BMI = 25 and above)	21(100)	5(23.8)	0.7
Total	250(100)	105(42)	
Chi-Square Value at DF 2 = 34.011, P value <0.0001, LS = HS			

Table 1: Association Of BMI Of Pregnant Women With Anemia In Pregnancy

Pregnancy Outcome BMI ——▶ ↓	Total No. (%)	Pre-eclampcia in Pregnancy No. (%)	OR With Normal BMI (Times)
Underweight (BMI < 18.5)	93(100)	12(12.9)	1.04
Normal Weight(BMI = 18.5 to 24.9)	136(100)	17(12.5)	
Overweight(BMI = 25 and above)	21(100)	13(61.9)	11.37
Total	250(100)	40(16)	
Chi-Square Value at DF 2 =33.375, P value <0.0001, LS = HS			

Table 2: Association Of BMI Of Pregnant Women With Pre-Eclampcia In Pregnancy

Pregnancy Outcome BMI ——▶ ↓	Total No. (%)	Prolonged Labour No.(%)	OR With Normal BMI (Times)
Underweight (BMI < 18.5)	93(100)	3 (3.2)	2.3
Normal Weight(BMI = 18.5 to 24.9)	136(100)	2(1.4)	
Overweight(BMI = 25 and above)	21(100)	0(0)	
Total	250(100)	5(2)	
Chi-Square Value at DF 2 = 1.336, P value = 0.5127, LS = NS			

Table 3: Association Of BMI Of Pregnant Women With Prolonged Labour

Pregnancy Outcome ⟶ BMI ▾	Total No. (%)	Nature of Delivery No. (%)	OR With Normal BMI (Times)
Normal Delivery - Chi-Square Value=3.886 at DF 2 , P value = 0.143, LS = NS			
Underweight (BMI < 18.5)	93(100)	48(51.6)	0.47
Normal Weight(BMI = 18.5 to 24.9)	136(100)	101(74.3)	
Overweight(BMI = 25 and above)	21(100)	6(28.6)	0.14
Total	250(100)	155(62)	
LSCS - Chi-Square Value at DF 2 = 8.239, P value =.02, LS = S			
Underweight (BMI < 18.5)	93(100)	39(41.9)	2.29
Normal Weight(BMI = 18.5 to 24.9)	136(100)	34(25)	
Overweight(BMI = 25 and above)	21(100)	9(42.8)	2.25
Total	250(100)	82(32.8)	
Forcep's Delivery - Chi-Square Value at DF 2 = 29.064, P value <0.0001, LS = HS			
Underweight (BMI < 18.5)	93(100)	6(6.45)	9.3
Normal Weight(BMI = 18.5 to 24.9)	136(100)	1(0.7)	
Overweight(BMI = 25 and above)	21(100)	6(28.6)	54
Total	250(100)	13(5.2)	

Table 4: Association Of BMI Of Pregnant Women With Nature Of Delivery

Pregnancy Outcome ⟶ BMI ↓	Total No. (%)	Nature of Delivery No. (%)	OR With Normal BMI (Times)
Normal Birth Wt. (2.5 – 3.5 Kg) - Chi-Square Value at DF 2 = 55.920, P value <0.0001, LS = HS			
Underweight (BMI < 18.5)	93(100)	51(54.8)	0.2
Normal Weight(BMI = 18.5 to 24.9)	136(100)	117(86)	
Overweight(BMI = 25 and above)	21(100)	3(14.3	0.03
Total	250(100)	171(68.4)	
Underweight (<2.5 Kg) - Chi-Square Value at DF 2 = 55.925, P value <0.001, LS = HS			
Underweight (BMI < 18.5)	93(100)	42(45.2)	13.17
Normal Weight(BMI = 18.5 to 24.9)	136(100)	8(5.9)	
Overweight(BMI = 25 and above)	21(100)	11(52.4)	17.6
Total	250(100)	61(24.4)	
Overweight (>3.5 Kg) - Chi-Square Value at DF 2 = 28.841, P value <0.001, LS = HS			
Underweight (BMI < 18.5)	93(100)	0(0)	
Normal Weight(BMI = 18.5 to 24.9)	136(100)	11(8.1)	
Overweight(BMI = 25 and above)	21(100)	7(33.3)	5.68
Total	250(100)	18(7.2)	

Table 5: Association Of BMI Of Pregnant Women With Birth Weight Of Delivered Child

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