Original Research Article

Antenatal determinants of maternal weight gain during pregnancy in nulliparous women of urban and suburban parts of Maharashtra

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ABSTRACT

Background: Weight gain in pregnancy remains a matter of great concern for women and health care providers. Adherence to a balanced diet throughout pregnancy, influences maternal body weight as well as short- and long-term health of mother and child. Objective of this study was to study antenatal maternal and social factors affecting maternal weight gain among Nulliparous women.

Methods: study was carried out in antenatal clinics of tertiary care hospital and a suburban health center with sample size 197 and 97 respectively. Maternal weight was measured at the first antenatal clinic visit and at delivery. Statistical analysis was done with SPSS version 20. Statistical tests used were mean, percentages and chi square.

Results: The antenatal determinants of maternal weight gain were: being underweight at the booking visit, maternal complications during pregnancy, passive cigarette smoking during third trimester, low educational level and low per capita income, controlling for the effect of gestational age.

Conclusions: maternal educational level, per capital income, passive smoking, caloric and protein deficiency, early pregnancy body mass index determines the weight gain during pregnancy.

Keywords: Antenatal, Determinants, Maternal, Nulliparous

INTRODUCTION

India is home to one sixth of the world's population and one fifth of the world's births. Weight gain in pregnancy remains a matter of great concern for women and health care providers. Women's knowledge about appropriate gestational weight gain, attitudes and beliefs about weight, and weight gain, as well as healthcare providers advice regarding gestational weight gain can affect the amount of weight women gain during pregnancy. According to the American College of Obstetricians and Gynaecologists (ACOG), components of preconception care should include addressing excess weight gain.[1] In India obesity was reported in about 12.6% of pregnant women, with 21.04% being overweight and 14.79% being underweight in a nationwide study.[2] Adherence to balanced diet throughout pregnancy, influences maternal body weight as well as health of mother and child.[3-5]

In this study we studied the antenatal sociodemographic, maternal obstetric factors and maternal weight gain in the pregnant women nullipara registered in antenatal clinic of tertiary establishment and antenatal clinic of suburban slum area. We compared two groups because in hospital-based population well trained specialists examine and treat the patients while in community-based clinics residential doctors (post graduate students) examine and treat patients on a daily basis. The specialists (assistant professors) are available once a week at community based urban health centers. Hence the preference of pregnant

women for hospital based or community-based services is influenced by multiple variable factors directly or indirectly influencing the quality of service.

The present study was planned to assess the validity of correlating antenatal socio-demographic and maternal and obstetric factors with maternal weight gain and the extent to which this can be used as a cost-effective technical tool to be used by grass root level workers and the Medical officers at the primary health centres.

METHODS

Present Study was observational prospective study conducted in two groups; group 1 in King Edward Memorial hospital ANC clinic and group 2 in urban health center ANC clinic for the period of 1year and 6 months from August 2015 to May 2016.

Sample size of Group 1 was 197 and Group 2 was 97.

Inclusion criteria

Nulliparous pregnant women within 12 weeks of pregnancy without high risk attending antenatal OPD who have given their consent were selected by convenient sampling i.e. all women registered in that duration were included in the study.

Exclusion criteria

Primigravida women having complications of pregnancy like twin's pregnancy, diabetes mellitus, healer disease in pregnancy, pregnancy induced hypertension were excluded from study.

They were weighed and their weight and height were measured during first trimester before 12 weeks of pregnancy using standardized calibrated instrument and the same instrument was used for all study subjects. Body mass index was calculated by using the formula, weight/height in metres.[2] Maternal weight was measured again during third trimester when the women came for delivery. All of the women were categorized according to the modification for Asian population proposed by WHO,

as BMI less than 18.5 kg/m^2 (underweight), BMI between 18.5 and 24.9 kg/m^2 (normal weight), BMI between 25 and 29.9 kg/m^2 (overweight), BMI of 30 kg/m^2.[6] Maternal outcomes like mode of delivery, amount of blood lost, maternal complications, duration of hospital stay, time required for resumption of normal routine by mother were assessed after delivery.

All responses were tabulated by the investigator using Microsoft-Excel 2007 Software. Data was analysed by using SPSS Software version 20.0. Statistical tools used were percentages, mean and categorical variables were analysed by chi-square statistics. For small numbers, Fisher exact test was applied wherever required. P<0.05 was considered as statistical significance.

Ethical clearance was obtained from the Institutional Review Board of the College after submitting the protocol and subsequently answering all their queries. Permission was obtained from the Head of department of obstetrics and gynaecology for conducting the study after giving detailed explanation of all the procedures. Preliminary self-introduction was given and rapport building was done with the respondents. The subjects were oriented regarding objectives of the study. During the preparatory phase for formulation of a questionnaire, a pilot study was done on 20 subjects to assess communication needs and contents of the questionnaire. A semi-structured questionnaire was prepared in accordance with the study objectives. In subsequent meetings, informed written consent was taken from the registered pregnant women and then questionnaire was administered to the study subjects.

RESULTS

Socio-demographic and economic characteristics of participants are described in Table 1. Tertiary care hospital respondents belonged predominantly to Hindu religion while in suburban hospital respondents were predominantly Muslim. Majority Primigravida in both the groups were educated till 10th standard, unskilled workers and we're having per capital income lower than 6000 INR.

Table 1: Socio demographic information of respondents in both the groups.

Variable	Range	Tertiary care antenatal clinic N (%)	Suburban antenatal clinic N (%)
Religion	Hindu	125 (63.5)	23 (23.7)
	Muslim	51 (25.9)	62 (63.9)
	Christian	12 (6.1)	7 (7.2)
	Others	9 (4.6)	5 (5.2)
Education	Primary	46 (23.4)	48 (49.5)
	Secondary	98 (49.7)	41 (42.3)
	Higher secondary	30 (15.2)	2 (2.1)
	Graduate and above	14 (7.1)	0 (0)

Continued.

Variable	Range	Tertiary care antenatal clinic	Suburban antenatal clinic
		N (%)	N (%)
Occupation	Unskilled	27 (13.7)	16 (16.5)
	Skilled	7 (3.6)	0 (0)
	Semiprofessional	5 (2.5)	0 (0)
Per capita income	≤3000 Rs.	73 (37.1)	40 (41.23)
	3001-6000 Rs.	101 (51.3)	53 (54.6)
	6001-9000 Rs.	18 (9.1)	4 (4.12)
	>9000 Rs.	5 (2.5)	0 (0)
Socioeconomic classification (Kuppuswamy)	Upper middle	15 (7.6)	0 (0)
	Lower middle	62 (31.5)	42 (43.3)
	Upper lower	120 (60.9)	55 (56.7)

Table 2: Maternal characteristics of both the groups.

Variable	Range	Tertiary care antenatal clinic	Suburban antenatal clinic
		N (%)	N (%)
Age (in years)	≤20	20 (10.2)	21 (21.6)
	21-25	111 (56.3)	63 (64.9)
	26-30	48 (24.4)	13 (13.4)
	>30	18 (9.1)	0 (0)
Dietary calorie intake	Average intake	1971.68 Kcal	1867.78 Kcal
	Average deficit	412.32 Kcal	489.94 Kcal
	Average excess	434.69 Kcal	283.64 Kcal
Dietary protein intake	Average intake	69.64 grams	68.09 gram
	Average deficit	11.36 grams	11.69 gram
	Average excess	5.17 grams	4 gram
Early pregnancy BMI (kg/m²)	Low BMI <18.5	82 (41.62)	48 (49.48)
	Normal BMI 18.5-24.9	102 (51.78)	42 (43.30)
	Overweight/obese BMI >25	13 (6.60)	7 (7.22)
Weight gain during pregnancy	Low (<8 kg)	33 (16.75)	46 (47.42)
	Normal (8-16 kg)	148 (75.13)	45 (46.39)
	High (>16 kg)	16 (8.12)	6 (6.19)

Table 3: Association between socio demographic, maternal characteristics of respondents and their weight gain during pregnancy in Group 1 (n_1=197).

Socio demographic and maternal characteristics in tertiary care hospital		Maternal weight gain		χ^2	P value
		Less than or equal to 8 Kg	More than 8 Kg		
Age of nullipara (in years)	<30	31	156	0.080	1
	≥30	2	8		
Education	Illiterate	30	53	7.284	0.007
	Literate	3	111		
Per-capita income	<3000 INR	10	63	4.575	0.032
	≥3000 INR	23	101		
Passive smoking	Yes	30	54	7.285	0.007
	No	3	110		
Calorie deficit	Yes	32	39	7.31	0.004
	No	1	125		
Protein deficit	Yes	3	2	6.881	0.034
	No	30	162		
Early pregnancy BMI (kg/m²)	<18.5	11	28	4.575	0.032
	≥18.5	22	136		

Table 2 shows maternal characteristics. Mean age of study subjects in group 1 was 24.38 and 23 in group 2. Majority nullipara in both the groups were below 30 years and were having diet deficient in calories and proteins. Nearly half of the respondents in suburban hospital were underweight (early body mass index less than $18.5 kg/m^2$). Majority respondents in tertiary care hospital gained normal weight (8 to 16 kg) in pregnancy while majority in suburban slum hospital gained less than 8 kg weight during pregnancy.

Table 3 and 4 shows association of socio-demographic, maternal characteristics with maternal weight gain during pregnancy in tertiary care hospital and suburban slum hospital respectively. In both the groups significant association was found between maternal weight gain and maternal education, per capital income, passive smoking, calorie and protein deficient and early pregnancy body mass index indicating that maternal education, per capital income, calorie and protein deficiency, passive smoking and low early pregnancy Body mass index are the antenatal determinants of maternal weight gain during pregnancy.

Table 4: Association between socio demographic and maternal characteristics of respondents and their weight gain during pregnancy in group 2 (n$_2$=97).

Socio demographic and maternal characteristics in tertiary care hospital		Maternal weight gain		χ^2	P value
		Less than or equal to 8 kg	More than 8 kg		
Age of nullipara (in years)	<30	41	50	3.308	0.098
	≥30	5	1		
Education	Illiterate	16	5	8.96	0.003
	Literate	30	46		
Per-capita income	<3000 Rs.	28	12	54.859	< 0.001
	≥3000 Rs.	18	39		
Passive smoking	Yes	29	6	8.485	0.004
	No	17	45		
Calorie deficit	Yes	46	40	11.19	0.001
	No	0	12		
Protein deficit	Yes	46	40	11.19	0.001
	No	0	11		
Early pregnancy BMI	<18.5	44	2	7.284	0.07
	≥18.5	4	47		

DISCUSSION

In our study we found that maternal education, per capital income, nutritional calorie and protein deficient, passive smoking and early pregnancy body mass index are found to be the determinants of maternal weight gain during pregnancy.

Education of the women was associated with weight gain. Our results were consistent with the findings of a US based larger study, including secondary data, reported by Howie.[31] In contrast, several studies had failed to report any association between educational level and excessive weight gain.[7-9] This may be attributed to the use of different cut-off values for categorizing educational achievements in the studies. Possibly, a low level of education deprives people of access to necessary information on healthy life styles as well as making them less attentive to heeding the advice of experts. Indeed, in Sri Lankan culture, pregnant women are encouraged to consume more food in order to meet with demands of the developing fetus.

According to our study, per capital income was associated with maternal weight gain. Our results were consistent with the findings of the study reported by Hickey and Rodrigues who found that higher income levels were positively associated with weight gain.[9,10] The former study was a review and the latter a cohort study conducted in another developing country.[9,10] In contrast, Chasan-Taber had reported that income was not associated with gestational weigh gain.[8]

Our study revealed that body mass index in early pregnancy, passive smoking during third trimester and low educational level were determinants of weight gain. We could not find any other studies that assessed the effect of passive cigarette smoking for weight gain. All the participants in our study were non-smokers. Several studies assessed the effect of active cigarette smoking for excessive weight gain and found that it had a negative association with gestational weight gain.[9-11] In contrast to the findings of the above studies, two US based cohort studies reported by Brawarsky and Chasan-Taber found that cigarette smoking had no significant association with excessive weight gain.[7,8]

In several papers, there were no significant associations reported between age and gestational weight gain which is in agreement with the results of our study.[12-14]

Limitations of this study were study included the population living in high-end areas of the city with modern health facilities and others who live in the slums, not being able to access even the basic health facilities. All women (e.g. high-risk pregnancy) were not included in the study. This may present as a limitation in generalizing the results of this study to the whole population.

CONCLUSION

Maternal educational level, per capital income, passive smoking, nutritional caloric and protein deficiency during pregnancy, early pregnancy body mass index determines the weight gain during pregnancy. This implies that for monitoring the maternal weight during antenatal period needs one to monitor and address antenatal factors affecting the same during pregnancy to all pregnant women.

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