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Analysis of Anthropometric Measurement During Pregnancy

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ABSTRACT
Anthropometric assessment during pregnancy is a widely used; low technology procedure that has not been rigorously evaluated. Our objective is to study and determine the anthropometric measurement and examining changes during pregnancy. The study was performed the total 480 pregnant women from urban and rural area of Marathwada region. The height and weight were measured by using digital scale and BMI (Body Mass Index) was Calculated. The collected data was tabulated and analysed statistically. The result of the present study regarding the selected anthropometric measurement of the selected pregnant women indicated that there was non-significant effect of different education over body height. Result also revealed that the pregnant women belonging to low, medium and high-income group were significantly affected on height, Weight & BMI. The mean value of height and body weight of pregnant women of urban areas was noticed to be significantly more than that of the pregnant women of rural areas ($p<0.01$). Whereas statistical analysis of the data revealed that the pregnant women from urban and rural area did not differ significantly in their body mass index values.

Keyword: Pregnant women, Anthropometric measurement, BMI.

Introduction:
Anthropometric measurement is non-invasive quantitative measurement of the body. According to the centres for Disease control and prevention (CDC) anthropometry provides a valuable assessment of nutritional status in children, adults and during pregnancy. Gestational weight gain (GWG) is a normal and expected component of a healthy pregnancy because it reflects the increasing size and weight of the foetus and placenta as well as maternal tissues, blood, extracellular fluid and maternal fat stores, In (2009) the institute of (IOM) medicine committee believed that this last component, maternal fat stores was only malleable component.
Anthropometric evaluation allows the estimation of body composition and proportionality in relation to nutrition and growth. Now a days, anthropometry is widely assessment is used by experts from different fields (sports, education, health, engineering, ergonomics) and the quality of their measures determines correct internation. Indeed, it is important to investigate the ability to measure the success of an intervention. Anthropometric assessment is a widely used, low-technology procedure that has rarely been rigorously evaluated during pregnancy. There are several anthropometric measures that have been used during preconception and pregnancy to evaluate maternal body composition and changes thorough out pregnancy, such as Body mass index (BMI), gestational weight gain and height.

Objective:
To study and determine the anthropometric measurement of pregnant women from Marathwada region.

Methods:
Purposive sampling technique was used to Selection of pregnant women of 1 to 9 months gestation. The total projected number of Sample was 480 respondents from urban and rural area from Marathwada region. All the selected pregnant women were surveyed for dietary pattern which was assess ed for nutritional status. Body Weight (kg) and height (cm.) were two anthropometry measurements recorded for finding the nutritional status of the respondent through body mass index (BMI).
Weight and height were measured by using a digital scale BMI was calculated. The collected data was tabulated and analysed statistically by using standard **'t' and 'z' test** (Panse and Sukhatme 1985)

Anthropometric measurements

Table 1: Anthropometric measurements of the selected pregnant women for different educational level from urban area of Latur and Parbhani district.

Anthropometric measurements	The mean value with SD and range of different Anthropometric measurements of the selected P.W. of different educational level								
	Illiterate n=18		Primary Education n=44		Secondary Education n=90		College level education n=88		'F' value
	Range	Mean ± SD	Range	Mean± SD	Range	Mean± SD	Range	Mean± SD	
Height (cm)	142-153	149.00 ± 5.53	145-166	150.88 + 4.48	140-166	150.70 + 4.84	142-165	150.27 + 4.59	0.811 (NS)
Weight (kg)	44-59	52.91+ 7.83	39-90	51.75+ 8.77	40-75	52.38+ 7.99	35-93	53.00+ 9.60	0.227 (NS)
Body mass index	19.4-26.8	23.81+3.00	17.3-29	22.67+ 3.35	17.9-30.3	23.01+ 3.01	15.15 - 34.17	23.39+ 3.55	0.778 (NS)

NS – Non-Significant

1. **Anthropometric measurements of the selected pregnant women for different education level from urban areas of Latur and Parbhani district.**

Anthropometric measurements of different education level from urban areas of Latur and Parbhani diatrict were given in Table 1.
The measured values of anthropometric measurement for height of the college educated women were 150.27+ 4.59 cm. while the respective value of the illiterate pregnant women was 149.00±5.53 cm. The values for height of primary educated and secondary educated pregnant women were 150.88± 4.48 cm and 150.70±4.84 cm, respectively.
From the above findings it was observed that the educational level of pregnant women shows a non-significant effect on the height of the pregnant men.

Non-significant difference was also observed in mean values of anthropometric measurement for weight of the college educated women (53.00±9.60kg), illiterate pregnant women (52.91±7.83), primary educated (51.75±8.77 kg) and secondary educated (52.38±7.99 kg) pregnant women. However, earlier Dandegaonkar (1994) observed that the college educated pregnant women had significantly higher values for body weight (53.36±8.28) and height (149.01±4.51) than illiterate pregnant women.

In case of body mass index, the values found higher in college educated pregnant women (23.81±3.55) than in the illiterate (23.39±3.00), the primary educated (22.67±3.35) and secondary educated (23.01±3.01) pregnant women. However, the differences observed among the values of body mass index of pregnant women of different educational level were non-significant.

Table 2: Anthropometric measurements of the selected pregnant women for different educational level from rural area

Anthropometric measurements	The mean value with SD and range of different Anthropometric measurements of the selected P.W. of different educational level								
	Illiterate n=47		Primary Education n=110		Secondary Education n=50		College level education n=33		'F' value
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean± SD	Range	Mean± SD	
Height (cm)	134.5-156.5	146.62+6.84	129-159.5	146.37+6.49	135-159	146.50+6.06	140-155	147.30+7.47	0.090 (NS)
Weight (kg)	40.75-62	49.31+7.38	38-64	49.37+6.32	37-68.5	49.75+7.16	47-66	52.19+5.74	0.731 (NS)
Body mass index	18.98-30.83	22.92+3.05	16.75-28.86	23.06+2.74	17.85-29.54	23.22+33.9	22.86-30.05	24.11+29.0	0.585 (NS)

NS – non-significant

2. Anthropometric measurement of the selected pregnant women of different education level from rural areas of Latur and Parbhani district.

Anthropometric measurements of the selected pregnant women for different educational level from rural areas of Latur and Parbhani district given in Table 2.

The measured values of anthropometric measurement for height of the college educated women were 147.30±7.47 cm. while the respective value of the illiterate pregnant women was 146.62+6.84 cm. The values for height of the primary and secondary educated pregnant women were 146.37 ±6.49 cm and 146.50±6.06 cm, respectively.

From the above findings it was revealed that the educational level of pregnant women shows a non-significant effect on the height of the pregnant women from rural area.

The mean values of anthropometric measurement for weight of the college educated women was 52.19 ±5.74 kg., while the respective value of the illiterate pregnant women was 49.31 ± 7.38 kg The values for weight of the primary and secondary educated pregnant women were 49.37 ±6.32 kg. and 49.75 ±7.16 kg respectively which is non-significant.

In case of body mass index, the values were found to be higher in college educated pregnant women (24.11 ± 2.90) than in illiterate (22.92 ±3.05) primary (23.06 ±2.74) and secondary (23.22 ±3.39) educated

women. The differences observed among the values of body mass index of pregnant women of different educational level were found to be non-significant.

It may be concluded that the education level of pregnant women from urban and rural region had no influences on the weight and body mass index.

Table 3: Anthropometric measurements of the selected pregnant women for different income groups from urban area of Latur and Parbhani district.

Anthropometric measurements	The mean value with SD and range of different Anthropometric measurements of the selected P.W. of different income level						
	Low n=53		Medium n=76		High n=111		'F' Value
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean± SD	
Height (cm)	135-156.2	149.11+5.57	145.5-160.5	150.56+3.52	141-162	151.64+4.36	6.608** (S)
Weight (kg)	39-66.5	50.00+8.08	36-70	53.37+8.29	39.5-83.5	54.09+8.85	5.661** (S)
Body mass index	17.45-29.33	22.43+3.05	16.02-30.01	23.44+3.20	17.67-33.2	23.47+3.39	2.852* (S)

** Significant at 1 percent level

*Significant at 5 percent level

3 Anthropometric measurements of the selected pregnant women of families of different income levels from urban area.

The mean values of anthropometric measurements of the selected pregnant women from families of different income levels from urban areas have been given in Table 3.

It was observed that the average values for height of the pregnant women belonging to high income group was 151.64 ± 4.36 cm and that of pregnant women from families of low- and medium-income group was 149.11 ± 5.57 cm., and 150.56±3.52 cm. These findings indicated that the height of the selected pregnant women having low-income group was less than that of high-income group. The average height of three income groups were significantly (P<0.01) differed from each other.

The present finding is in an agreement with Vijayalakshmi (1985) who reported that the height of the pregnant women of low-income group (140.8±7.3 cm) was less than that of the height of the high-income group 153.2±4.7) (1992)

The mean values of body weight of the pregnant women belonging to low, medium and high-income group were 50.00±8.08 53.37±8.29 and 54.04±8.85, respectively. The weight of pregnant women belonging to high income group (Rs. > 4000 per month) was significantly (P <0.01) more than that of the pregnant women belonging to the low-income group.

These findings are in agreement with the findings of Ardhapurkar (1990) who observed that pregnant women of above poverty line group had significantly higher values of body weight than those of the below poverty line group.

The mean values of body mass index of the pregnant women of low, medium and high-income group were 22.43±3.05, 23.44±3.20 and 23.47±3.39, respectively. The body mass index of pregnant women belonging

to low-income group (Rs. 2000 per month) was significantly lower (P <0.05) that of the pregnant women belonging to the high-income group (Rs. > per month).

Table 4: Anthropometric measurements of the selected pregnant women for different income groups from rural area of Latur and Parbhani district.

Anthropometric measurements	The mean value with SD and range of different Anthropometric measurements of the selected P.W. of different income levels						
	Low		Medium		High		'F' Value
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean± SD	
Height (cm)	130-152.2	145.76+6.33	141.5-151.5	147.16+6.39	137-162	148.12+6.94	2.48
Weight (kg)	32-61.5	48.25+6.74	35-63	51.35+5.60	37.5-162	51.06+7.34	5.99*
Body mass index	17.15-29.33	22.73+3.02	16.02-30.01	23.74+2.60	17.37-31.2	23.34+3.42	2.55

* Significant at 5 percent level

4 Anthropometric measurements of the selected pregnant women of families of different income levels from rural areas

Anthropometric measurements of the selected pregnant women of pregnant women of income groups from rural areas were given in Table 4.

The average height of the pregnant women belonging to low medium and high-income group were 148.12±6.94 cm. 147.16±6.39 cm and 145.76±6.33. The average height of the pregnant women of the families of high come groups was found to be significantly higher (P<0.05) than low-income group. These findings are in agreement with the findings of Vijayalakshmi (1985)

The mean values of body weight of the pregnant women belonging to high, medium and low-income group 51.06±7.34 kg, 51.35±5.60 kg and 48.25±6.74 kg respectively which is differed significantly. The weight of pregnant women belonging to the high-income group was significantly (P<0.01) more than that of the pregnant women belonging to low-income group.

The mean value of body mass index of the pregnant women of high, medium and low-income group 23.34±3.42, 23.74±2.60, and 23.73±3.02 respectively. The results revealed that there was significant difference in body mass index of pregnant women of different income group (P<0.05).

Table 5 Anthropometric measurements of the selected pregnant women of urban and rural area

Anthropometric measurements	The mean value with SD and range of different Anthropometric measurements of the selected pregnant women from urban and rural area				
	Urban (n=240)		Rural (n=240		'F' Value
	Range	Mean ± SD	Range	Mean ± SD	
Height (cm)	130-155	150.49+4.54	130-155	146.47+6.44	35.75**
Weight (kg)	30-66	52.51+8.54	30-66	49.48+6.70	9.33*

Body mass index	18.98-33.90	23.33+5.18	18.98-33.90	23.18+4.15	3.007

** Significant at 1 percent level
*Significant at 5 percent level

5 Anthropometric measurements of the selected pregnant women of urban and rural area

Anthropometric measurements of the selected pregnant women from urban and rural areas given in Table 5.

The height of the selected pregnant women of urban area from 135 to 166 cm. with an average value of 150 cm, respectively while that of the pregnant women of rural area varied widely from 130 to 155 cm. with an average height of 142.5 cm, respectively. The height of the pregnant women of rural areas was found to be significantly ($P<0.05$) less than the height of the pregnant women of urban areas from both the districts.

Similar values for height of the pregnant women were reported by NIN (1982). While in the present study the height of pregnant women from rural and urban area was 146.47±6.44 and 150.49+ 4.54 cm. respectively. It is evident from the findings of the present study that the pregnant women were slightly taller from urban areas then the rural pregnant women. These findings are in agreement with the study reported by Dudde (1990). The findings are similar to those reported by NIN (1982). The mean values of body weight of the pregnant women of urban and rural area were 52.51+8.54 and 49.48+6.70 kg, respectively.

The weight of the pregnant women from urban areas from both districts were noticed to be more than that of the pregnant women from rural areas. Statistical analysis indicated a highly significant differences between weights of the pregnant women of urban and rural areas ($P<0.01$).

Prema et al. (1981) reported a value of 45.4±7.23 kg of weight for the pregnant women in Hyderabad, while Bhatia (1983) found 42.2±5.66 kg as the body weight of pregnant women of Wardha. A value of 49 kg of body weight was reported by Sahani (1992) for pregnant women. The differences in socio-economic status, educational level, geographical location, available health care system and the prevailing social prejudices may be considered as some of the possible reasons for the variations noticed between the body weight values of the present study and the other reported studies.

The values of the body mass index of the pregnant women of urban and rural areas were found to be 23.33 5.18 and 23.18 4.15 respectively. Statistical analysis of the data revealed that the pregnant women from urban and rural areas did not differ significantly in their body mass index values.

The weight of the urban pregnant women (52.51+8.54) was found to be more than that of the rural pregnant women (49.48+6.70) in the present investigation. This can be attributed to low nutritional status of rural women as compared to urban women (ICMR, 1989) and rural women do more strenuous physical work than urban women (Srikantiya, 1989). In the traditional societies of the developing world, many women particularly from poor communities would do strenuous physical labour for about 12 to 16 hours a day (UNICF, 1985), Due to economic compulsion or traditional culture the need for doing manual or hard physical labour would continue even during pregnancy (Jimenez and Newton, 1979). Heavy physical work results in the utilization of more calories for the supply of energy. Thus, the heavy manual work more often put a great stress on the state of nutrition leading to under nutrition. Moreover, in the present study, the percentage of illiterate pregnant women was more in rural areas (19.58 percent) than in urban areas (7.5 percent) of same district. It is known fact that education would help in providing better knowledge of

health and nutrition and better awareness about the existing facilities of health and nutrition**.** This might be the reason for higher values of anthropometric measurements observed in urban pregnant women than in rural pregnant women in the present study.

Table 6 Categorisation of the selected pregnant women according to body mass index

Sr. No	Category	Range	Urban		Rural	
			No.	%	No.	%
1	Normal	21-24	134	55.83	147	61.25
2	Low weight normal	<21	33	13.75	24	10.00
3	Obese	>24	71	29.58	67	27.91

6 Categorisation of the selected pregnant women according to body mass index

Based on the standard values of body mass index suggested for non pregnant women, the selected pregnant women were categorized into normal, low weight normal and obese women (Table 27). The per cent of pregnant women found to have normal body mass index from urban and rural area was 55.83 and 61.25 per cent as against per cent of pregnant women with the low weight values of body mass index 13.75 and 10.00 per cent. Only 29.58 and 27.91 per cent of the pregnant women were found to be obese.

From the results it is evident that although the pregnant women gain weight during the course of pregnancy, could not achieve the standard normal values of body mass index meant for nonpregnant women. Hence, it can be said from the body mass index values that majority of the pregnant women in the present study, were found to have normal body weight.

Discussion and suggestion:

Pregnancy is a physically demanding period and the body undergoes significant changes. Gaining weight within the recommended range helps support both the mother's and infant's health. mare studies are are wanted to corroborate our findings and to explore the relationship between these anthropometric changes and metabolic profiles during pregnancy.

Impacting nutrition knowledge would to be the practical and the promising remedy. In the long run as ignorance is considered to be one of the a most important underlying factor for factor for the prevalence of poverty and nutritional status of the pregnant women of Marathwada. Region through implementation of proper intervention programme of nutrition. Apart from the intervention programme, meant for empowering women need to be emphasized.

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