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A STUDY OF ANTHROPOMETRIC MEASUREMENTS AND HAEMOGLOBIN LEVEL OF RURAL WOMEN IN NAGPUR DISTRICT

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ABSTRACT:
The health of Indian women is intrinsically linked to their status in the society, especially for those living in a rural area. Anthropometric indicators may be reflective of past events, predictive of future events, or indicative of current nutritional status. The study was conducted in seven villages viz., Gourala, Khairi, Devli, Kalmana, Chikna, Salai and Vihirgaon of Nagpur District. About 200 rural women between the age group of 21 – 40 years were selected on the basis of purposive sampling from the selected villages. A structured questionnaire was developed which consisted of questions related to demographic and socioeconomic profile and anthropometric measurements. The interview cum questionnaire method was used for eliciting information. The anthropometry viz., height, weight and mid arm circumference were recorded as per standard methods. Haemoglobin status was also recorded. Only 61% of 21-30 years and 65% of 31-40 years of age group of women were found in normal BMI category (18.5 to 24.9 kg/m2). A significant difference was observed between the women of both the age group with respect to BMI (t=2.082, p= 0.039) and mid upper arm circumference (t=2.837, p= 0.005). The statistical analysis did not show a significant difference (t=0.627, p= 0.531) between the mean haemoglobin levels of 21-30 and 31-40 years of women. But about 61% women of 21-30 years and 57% of 31-40 years had moderate anaemia. Hence the conclusions can be drawn that there is a necessity of nutritional programmes in rural areas among the rural women.

Keywords: - Rural women, Nutritional status, Anthropometry, Body mass index.

INTRODUCTION :

The health of Indian women is intrinsically linked to their status in the society, especially for those living in a rural area (Mittal, 2013). In India, the concern over health is gradually becoming a common talk especially for women employees (Majied and Shafiq, 2015). Women are the pivots around whom the family, society and the whole humanity move. The prosperity and growth of a nation depend on the status and development of women as they constitute half of its population and play crucial role in agricultural and livestock production, household economy and market activities besides performing their domestic chores and reproductive functions (Zanvar and Kharwade, 2017). Rural women constitute an overwhelming majority of women in developing countries. Women play multiple roles in a family, primarily as mother and housekeeper's also equally important role as wage earners, agriculture producer, nutrition provider etc. They are instrumental in the acquisition of food, its preparation, storage and distribution. However, very often they are subjected to malnutrition and form a group highly vulnerable to morbidity and mortality due to under nutrition. A women's health will be less productive in the labour force (Lakshmi and Babitha, 2014). In a developing country like India, nutritional status is directly related to several practices including; levels of education, standard of living and social status. Thus it could be said that over nutrition is widely prevalent among high socio economic status and under nutrition among low income

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category (Vatsala et al. 2017). The nutritional status of an individual is assessed by anthropometry, which includes height, weight and other body measurements. The information on height throws light on the past nutritional status, that indicates how well-nourished they have been from the beginning. Body weight gives an indication of the current nutritional status to identify the individual as overweight, underweight or retarded growth. Bulkiness of an individual or body mass index is assessed by calculating the body weight and height so as to classify them into groups depending on their nutritional status (Bellurkar, 2015).The anthropometric indices, Body Mass Index (BMI) is considered to be more nutritionally than genetically related. Thus, in a country with diverse ethnic groups like India, it is more appropriate to use BMI as an indicator of the nutritional status of adult population. BMI is useful and practical method for assessing the level of body fatness (Glawe et al.2008). Good health is a requirement throughout life and vital to women in terms of their daily activities, but nutritional anaemia is a major problem for women in India. Health is fundamental to human progress. Women's health status affects their productivity and thereby their roles in society and their own development (Bellurkar, 2015). Hence the present study was undertaken to assess the anthropometric measurements and haemoglobin level of rural women of Nagpur District.

MATERIALS AND METHODS:

The study was conducted in seven villages viz., Gourala, Khairi, Devli, Kalmana, Chikna, Salai and Vihirgaon of Nagpur District. About 200 rural women between the age group of 21 – 40 years were selected on the basis of purposive sampling from the selected villages. A structured questionnaire was developed which consisted of questions related to demographic and socioeconomic profile and anthropometric measurements. The interview cum questionnaire method was used for eliciting information. The maternal anthropometry viz., height, weight and mid arm circumference were recorded as per standard methods (Jelliffe, 1966). Haemoglobin status was also recorded. The data was analyzed statistically using the statistical tool 'Tool Pak' of Microsoft Office. The data was tabulated and analyzed for frequency, percentage, mean, standard deviation and t test.

RESULTS AND DISCUSSION:

Socio-demographic Profile

In the present study, the women were classified into two groups according to age viz., 21-30 years and 31 to 40 years. The per cent distribution of women according to their age group and socio demographic characteristics are presented in Table 1.

There were 100 women each in 21-30 and 31-40 years age group. Table 1 depicts that the majority of women in both the groups got married below 21 years of age. About 91% and 93% of women of 21-30 years and 31-40 years belonged to Hindu religion respectively. Majority of women i.e. 68% each lived in nuclear family. In 21-30 years age group 17% and 6% in 31-40 age groups were staying with joint families. In 21-30 years age group 20% of families and 10% of families of 31-40 years age group had 1-3 members in the family. The majority of both the groups (67% and 85%) had 4 to 6 members in the family. A very small percentage (2%) of 21-30 years and (1%) 31-40 years women had family size more than 9 members. All the (100%) women in 21-30 years age group were married but in the 31-40 years age group 98% were married and 2% were widows.

The data presented in Table 1 also shows that the majority of both the groups (57% and 68%) had their total family income ranging between Rs. 10,000 – 15,000 per month. The mean monthly income of 21-30 years and 31-40 years

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were Rs. 11445.00 ± 2874.03 and 11631.00 ± 3239.27 respectively.

Education and Occupation

The per cent distribution of women according to educational status and occupation is shown in Table 2.

The Table 2 reveals that the number of illiterate women was 1% and 2% in the 21-30 years age group and 31-40 years age group respectively. About 20% and 4% of women in the 21-30 years and 31-40 years age groups were graduates respectively. The majority of women studied up to SSC and HSSC in the 21-30 years (49% and 30%) age group and in the 31-40 years (76% and 18%) age group.

The per cent distribution of women according to their occupation has also been shown in the table. The data shows that the majority of women i.e. 82% and 83% were labourers in both age groups. Only 2.00% of women each were found to be in service in both groups. About 16.00% of women of 21-30 years and 15.00% of the 31-40 years age group were working on their own farms.

Mean Anthropometrics Measurements

The mean anthropometric measurements of women under study are presented in Table 3.

In the present study, the mean height of 21-30 years and 31-40 years women were 152.48 ± 5.96 and 151.72 ± 5.17 cm respectively. However, no significant difference was observed between the women of both age groups (t=0.955, p= 0.341). (Compared with p=0.05). The mean weight of 21-30 years and 31-40 years women were 49.80 ± 8.41 and 51.83 ± 9.02 kg respectively. An insignificant difference was observed between the women of both age groups (t=1.648, p= 0.101). The mean BMI of 21-30 years and 31-40 years women were 21.44 ± 3.51 and 22.46 ±3.49 kg/m^2 respectively whereas the mean mid upper arm circumference (cm) of 21-30 years and 31-40 years women were 24.27 ±2.30 and 25.23 ± 2.53 cm respectively. A significant difference was observed between the women of both age groups with respect to BMI (t=2.082, p= 0.039) and mid upper arm circumference (t=2.837, p= 0.005).

According to a study reported by Bellurkar (2015), the average height of the farm women was 149.46 cm while the average weight noted was 51.20 kg, and the average body mass index of the women was 22.88 kg/m^2. Lakshmi and Babitha (2014) reported the mean height of the women was 153 cm and the weight of the women was 53.5 kg. According to Manjunath et al. (2017), the mean height of the women was 150.78 ±5.90 cm and the mean weight was 51.69±9.75. The mean BMI of the women was 22.49. Hassan and Shukla (2013) stated the mean weight, height, and BMI was found to be 46.29 kg, 147.28 cm, and 21.24 kg/m2 respectively. Vatsala et al. (2017) reported that with increasing age, the pattern of weight gain was found to be gradually increasing. The highest mean weight was recorded among the subjects in the age group of 36- 40 years (60.43 ± 11.74 kg). A considerably higher percentage (13.6%) of the subjects in the age group of 20-25 years was below the desirable BMI range. A small number of subjects were observed to have body mass index (BMI) greater than 35 kg/m^2. Statistical analysis showed that the differences among different age groups were not significant (p=0.58).

In the present study the mean waist circumference of 21-30 years and 31-40 years women were 77.51 ± 9.08 and 78.87 ±9.81 cm respectively. However no significant difference was observed between the women of both the age group (t=1.013, p= 0.312) with respect to waist circumference. The mean hip circumference of 21-30 years and 31-40 years women were 93.50 ± 7.54 and 94.88 ± 8.34 cm respectively. However, no significant difference was observed between the women of both the age group (t=1.226, p= 0.222). The mean Waist

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Hip Ratio (WHR) of 21-30 years and 31-40 years women were 0.827 ± 0.46 and 0.829 ± 0.049 respectively. Women of both the age group did not show any significant difference (t=0.304, p= 0.761) with respect to WHR. The study concluded that with the inference of an increase in age, there is a significant increase in BMI and mid upper arm circumference. Manjunath et al. (2017) reported that the mean waist circumference was 71.41± 9.48 cm and mean hip circumference was 85.35±10.9 cm. 36.67% of women had a waist- hip ratio of more than 0.85 and the mean waist-hip ratio was 0.83±0.05.

Body Mass Index (BMI)

The mean Body Mass Index of women of the present study is shown in Table 4.

The distribution of women according to BMI is presented in Table-4. About 61% of 21-30 years age group of women and 65% of the 31-40 years of age group of women were found in a normal BMI range (18.5 to 24.9 kg/m^2). The mean BMI of the normal range of 21-30 years and 31-40 years women were found to be 21.21 ±1.65 kg/m^2 and 21.73 ±1.67 kg/m^2 respectively. The prevalence of chronic energy deficiency (BMI < 18.5) was observed in 21% women of 21-30 years and 13% in 31-40 years of age group. The prevalence of obesity (BMI > 30) kg/m^2 was observed in 1% in both age groups.

Prakruthi and Prakash (2013) found that 18.7% of women were suffering with chronic energy deficiency, 42.3% were normal, 27% were overweight and 12% were obese. According to Srivastava and Singh (2014) the highest percentage of undernourished women were in age group of 18- 30 years i.e. 25.79 per cent followed by 12.91 and 12.89 per cent in 31-50 years and >50 years, respectively.

Manjunath et al. (2017), observed that, majority of the women ie. 58.3% had a normal BMI between 18.50 and 24.99, 27.2% of the women were overweight, 6.1% were obese and 14.4% of women were undernourished. According to Misra et al. (2019), the mean BMI (±SD) was 23.3(±4.6) kg/m^2.

Anaemia

Anaemia is the late manifestation of a deficiency of nutrient (s) needed for haemoglobin synthesis. Based on the classification of WHO, women were classified as non-anaemic, mild anaemic, moderate and severe anaemia is presented in Table 5.

Table 5 shows the mean haemoglobin level of women of 21-30 years and 31-40 years of age groups. The data depicts that the majority of women of 21-30 years (61%) and 31-40 years (57%) had moderate anaemia whereas 2% and 3% had severe anaemia respectively. Only 9 % and 16% women of 21-30 years and 31-40 years were non anaemic respectively. The mean haemoglobin levels of mild, moderate and severe anaemia for 21-30 years of age were 11.32 ± 0.32, 10.09 ± 0.62 and 7.30 ± 0.00 g/dl respectively. The mean haemoglobin levels of mild, moderate and severe anaemia for 31-40 years of age were 11.42 ± 0.24, 10.06 ± 0.71 and 6.83 ± 0.67 gm/dl respectively. The statistical analysis did not show a significant difference (t=0.627, p= 0.531) between the mean haemoglobin levels of 21-30 and 31-40 years of women. Hassan and Shukla (2013) reported that the mean haemoglobin was found to be 10.02gm%. Shobha et al. (2011), reported that the mean haemoglobin of women was 11·07 g/dl. Only 23 % had Hb above the normal cut-off (Hb ≥ 12 g/dl) while 77 % were suffering from some degree of anaemia: 59 % of the women were suffering from mild anaemia (Hb = 10–12 g/dl), 16 % were suffering from moderate anaemia (Hb = 8–10 g/dl) and only 2·2 % were suffering from severe anaemia (Hb < 8 g/dl).

CONCLUSION:

About 61% of 21-30 years and 65% of 31-40 years age group of women were found in normal BMI range (18.5 to 24.9 kg/m^2). The prevalence

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of chronic energy deficiency (BMI < 18.5) was observed in 21% women of 21-30 years and 13% in 31-40 years of age group. An insignificant difference was observed between the women of both the age group with respect to height, weight, waist circumference, hip circumference and WHR. A significant difference was observed between the women of both age groups with respect to BMI (t=2.082, p= 0.039) and mid upper arm circumference (t=2.837, p= 0.005). The overall mean of haemoglobin levels of both age groups were 10.59 ± 1.04 and 10.69 ± 1.31(g/dl). The statistical analysis did not show a significant difference (t=0.627, p= 0.531) between the mean haemoglobin levels of 21-30 and 31-40 years of women. But about 61% of women of 21-30 years and 57% of 31-40 years had moderate anaemia. Thus it can be concluded from the study that there is a need for nutrition education programmes among rural women to improve their nutritional status.

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Table 1- Distribution of women according to socio demographic characteristics

Sr. No.	Particulars	Age			
		21-30 years (n= 100)		31-40 years (n = 100)	
		No.	%	No.	%
1	**Age of marriage (years)**				
	Below 21	59	59.00	66	66.00
	21-25	41	41.00	34	34.00
2	**Religion**				
	Hindu	91	91.00	93	93.00
	Buddha	09	09.00	07	07.00
3	**Type of family**				
	Joint	17	17.00	06	06.00
	Nuclear	68	68.00	68	68.00
	Nuclear +1 Dependent	13	13.00	23	23.00
	Nuclear + 2 Dependent	02	02.00	03	03.00
4	**Family size**				
	1-3	20	20.00	10	10.00
	4-6	67	67.00	85	85.00
	7-9	11	11.00	04	04.00
	Above 9	02	02.00	01	01.00
5	**Marital status**				
	Married	100	100.00	98	98.00
	Widow	00	00.00	02	02.00
6	**Family Income (Rs. Per month)**				
	<10000	34	34.00	26	26.00
	10001-15000	57	57.00	68	68.00
	>15000	09	09.00	06	06.00

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Table – 2 Distribution of women according to education and occupation

Sr. No.	Particulars	Age			
		21-30 years (n= 100)		31-40 years (n = 100)	
		No.	%	No.	%
1	**Education of women**				
	Illiterate	01	1.00	02	2.00
	Up to SSC	49	49.00	76	76.00
	Up to HSSC	30	30.00	18	18.00
	Graduate	20	20.00	04	04.00
2	**Occupation of women**				
	Working in own farm	16	16.00	15	15.00
	Labour	82	82.00	83	83.00
	Service	02	2.00	02	2.00

Table 3- Mean Anthropometric Measurements of Women

Sr. No.	Anthropometric Measurements	Age		t test	P Value
		21 – 30 years N = 100 Mean ± SD	31 – 40 years N = 100 Mean ± SD		
1	Height (cm)	152.48 ± 5.96	151.72 ± 5.17	0.955	0.341
2	Weight (kg)	49. 80 ± 8.41	51.83 ± 9.02	1.648	0.101
3	BMI (kg/m^2)	21.44 ± 3.51	22.46 ± 3.49	2.082	0.039
4	Mid Upper Arm Circumference (cm)	24.27 ± 2.30	25.23 ± 2.53	2.837	0.005
5	Waist Circumference(cm)	77.51 ± 9.08	78.87 ± 9.81	1.013	0.312
6	Hip Circumference(cm)	93.50 ± 7.54	94.88 ± 8.34	1.226	0.222
7	Waist-Hip Ratio (WHR)	0.827 ± 0.46	0.829 ± 0.49	0.304	0.761

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Table 4- Mean Body Mass Index (BMI) of women

Sr. No.	BMI (Kg/m²)	Age group					
		21 – 30 years			31 – 40 years		
		N = 100	%	Mean ± S D	N = 100	%	Mean ± S D
1	<18.5 Under weight	21	21	17.18 ± 1.27	13	13	17.37± 0.84
2	18.5-24.9 Normal	61	61	21.21±1.65	65	65	21.73±1.67
3	25.0-29.9 Over weight	17	17	27.00±1.51	21	21	27.54± 1.58
4	≥30.00 obese	01	01	30.04± 0.00	01	01	30.08± 0.00

Table 5- Haemoglobin Levels of Women

Sr. No.	Cut off Value for Haemoglobin by WHO (g/dl)	Age					
		21 – 30 years N = 100			31 – 40 years N = 100		
		No.	(%)	Mean ± S D	No.	(%)	Mean ± S D
1	>12 (Non-anaemic)	09	09	12.41 ± 0.25	16	16	12.57 ± 0.44
2	11.0 - 11.9 (Mild anaemia)	28	28	11.32 ± 0.32	24	24	11.42 ± 0.24
3	8.0 - 10.9 (Moderate anaemia)	61	61	10.09 ± 0.62	57	57	10.06 ± 0.71
4	<8 (Severe anaemia)	02	02	7.30 ± 0.00	03	03	6.83 ± 0.67
	Over all Mean ± SD			**10.59 ± 1.04**			**10.69 ± 1.31**

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