CHAPTER - V

ANTHROPOMETRIC MEASUREMENTS

ANTHROPOMETRIC MEASURMENTS

This chapter deals with the anthropometric measurements related to nutritional status with specific reference to Korwa tribals of Sarguja and Raigarh. This chapter deals with the following aspects;

I) Introduction

II) Earlier Works

III) Result And Discussion,

IV) Conclusion

I INTRODUCTION

Growth is an indicator of health and nutritional status of a community. Growth is an outstanding characteristic of human beings. It is an intricate pattern of certain forces, genetic, nutritional, social and cultural.

Nutritional status is the physical expression of the relationship between an individuals' dietary intake, the bioavailability of these ingested nutrients and his or her physiological requirements.In developing countries of Asia, the percentage of under nutrtion is very high. A mild and moderate form of under nutrition is common in the communities.

Malnutrition is always an ecological problem.It is the end result of multiple overlapping and interacting factors in the communities physical, biological and cultural environment. Over the past few decades, survey by international teams sponsered by FAO and WHO have already identified malnutrition in the developing countries.

According to Jelliffe[145] nutritional anthropometry is concerned with the measurement

of physical dimensions and the gross composition of the human body at different age levels and degree of nutrition. It is generally agreed that the mild and moderate forms of undernuttrition manifest themselves in varying degrees of growth retardation. Since these forms of undernutrition are not very easy to diagnose, the use of anthropometry is very useful.

There are several methods and techniques used for anthropometery.Selection of these methods depend upon the objectives and size of the study. Height and weight measurements are the simplest and commonly used parameters.Arm circumference measures the growth of subjects,whether it is normal,thin or overweight.

Bodymass index and relative body weight percentage, are other anthropometric measurements calculated with the help of height and weight of the subjects.Skin fold thickness is another important anthropometric parameter used for the measurement of subcutaneous fat of subjects.

The selection of equipments for various anthropometric measurements is important.These must be economic, portable,easy to handle and easily available. Standardisation is important in all these measurements, as variations between different groups of person could be introduced by difference in techniques of measurements. WHO and FAO have stressed the need for standardisation of techniques and methods. Local standards should be used for the analysis,which would make the comparision realistic. All the measurements should be compared with the international standards.

II EARLIER WORKS

In the study of rural areas of Tamilnadu, Samuel and Rao (1992)[215] had found 14.1% as having height < 145 cm and 37.39% as having weight < 40 Kg. The study carried out by Tanuja D Karmakar et al[110] in Singhbhoom district of Bihar State on the nutritional status of tribal women; revealed that the tribal women of Singhbhoom district were highly undernourished. It was reported that 23.9% tribal women were having height <145 cms and 95.9% having weight < 45Kg. If < 35 Kg is taken as cut off for weight then 36 % of these women can be termed as of low weight .This is quite high when compared to studies reported from other parts of India.

D. Hanumantha Rao et al[98] made anthropometric studies on MariaGonds of Maharashtra. The mean height and weight of both the sexes were slightly high upto adolescence and tend to be lowered in the adulthood as compared to their rural counterparts. In another study D.Hanumantha Rao et al [101] studied the nutritional anthropometery of tribal preschool children in three ecological zones of Madhya Pradesh (Jhabua, Bastar and Sarguja). As per the measurements average height and weight of both boys and girls of these areas were compared with their counterparts of rural Madhya Pradesh as well as NCHS values. The tribal children were shorter and lighter than NCHS values.The nutritional situation of children in Sarguja was found better as compared to those of Bastar and Jhabua.

In a study of Jenukurubas D. Hanumantha Rao et al[96] found that the males and females were shorter and lighter than the adults of rural area. The mean values of arm circumference and fat fold at tricep indicated that Jenukurubas have thinner arms and less fat reserve, as compared to their counterparts.

In a study of Khonsdier, R; on Khasi children of Meghalaya , it was seen that the mean value of height for age in relation to the reference of the Indian Council of Medical Research was much higher but was found to be lower than the standards of US National Centre For Health statistics reference.[296]

M.M. Shrivastava and N.V. Patel[297] have compared various anthropometric measurements and nutritional status of tribal and urban slum preschool children of Bija and Narayanganj block of Mandla district and urban slums of Jabalpur respectively.The mean weight of tribal children was more than that of slum children in contrast to the previous observation in the tribals of Madhya Pradesh. At all ages tribal boys and girls were taller than their urban pears in contrast to earlier findings in tribal region.

In a study KKN Sharma and BM Mukherjee[143] found that the average height of Hill Korwa males was 156.77 cm and weight was 48.43Kg. Average height for females was 146.39 cm while their average weight was 38.72 Kg. In another stud y on Hill Korwas, it was found that 55.4% subjects surveyed were of short stature, 24.8% subjects out of total subjects were found "below medium" and the rest were found "above medium" stature[297]

Anderson[298] in a study on women reported that 50.69% of women in Gujrat and 635 women in Maharashtra have body weight less than 40 kg. In another study from Uttar Pradesh 54.6% mothers were found to have body weight less than 40 kg and 31.3% were found to have height less than 145 cm.[299]

III RESULTS AND DISCUSSIONS

The different anthropometric measurements of subjects are tabulated and presented in table no. 17A to 30B.

2 way and 3 way ANOVA were also used for anthropometric measurements where height, weight, midarm circumference, body mass index and relative body weight percentage were dependent variables and independent variables were age, sex and tribe. Hill Korwa's anthropometric measurements were compared with the various measurements of Kamar tribe.

HEIGHT

Height is one of the important anthropometric measurement. Height is directly related to growth. Height is affected in undernourished children, the femur normally grows relatively faster than other parts of the skeleton, so that change in length or critical height may provide sensitive index of inadequate nutrition in the young.

The mean height of males in different age group were; for 0-6 months 45.2cm, for 7-12 months 55.6 cm, for 1-3 years79.11 cm, for 4-6 years 100.44 cm, for 7-9 years 112.8 cm, for 10-12 years 126.22 cm. For adolescent age group the average height was 148 cm and 152.58 cm for age 13-15 years and 16-18 years, respectively.

The mean height of the male adult was 153.16 cm for 19-35 years and 153.67 cm for 36-55 yearsand 153.67 cm for above 55 years of age.

The mean height for females was 44.57cm for 0-6 months of age,and 52.32 cm for 7-12 months age group. The mean height for children was, 78.9 cm for 1-3 years, 98.7 cm for 4-6 years, 120.98 cm for 7-9 years and 130.11 cm for 10-12 years. Above data show that the average height of females is higher than the male children for 7-9 years and 10-12 years.(Table 17a)

In adolescent age group height for 13-15 years of age was 142.36 cm and for 16-18 years, of age it was 148.28 cm. In adult age group height was 149.35 cm for 19-35 years of age, 148.23 cm for 36-55 years of age and 147.2 cm for above 55 years of age. (Table 17a)

As compared to ICMR standard it was observed that data is quite low, but in some cases like age group of 7-9 years female children had better height as compared to ICMR standard As compared to tribe of Maharashtra[254] findings are quite low. As per the American standard[300] for the adult males and females these figures are quite low.(Table 18, 19A). As compared to the three tribal districts of Sarguja, Bastar and Jhabua, height of Hill Korwa males, females and children were quite low. The height of Hill Korwa male, female and children were low as compared to rural M.P. and Well-To-Do Indian standards also. [301] (Table 20A)

The result in adult group was not different from children's result. The average height of Hill Korwa males was 153.67 cm, and average height for females was 147.2cm. The height of male and female Hill Korwas was lower than the other three tribal districts of Sarguja, Bastar and Jhabua of MP. [252] (Table20A)

In the age group 1-3 years males, the mean height was 91.63% of the Well-to-do Indian standard. In the same way it was 89.63% in 4-6 years age group, 87.63% in 7-9 years age group and 87.79% in 10-12 years age group. In adolescent 13-15 years age group the mean height percentage observed was 91.6% of Well-To-Do Indian standards and 90.04% in 16-18 years age group.[299]

But in female children group the height was 94.91% of Well To Do Indian standards[299] in 1-3 years age group, 67.58% in 4-6 years age group which is quite low, 90.029% in 10-12 years age group, 99.59% in 7-9 years age group, and 92.62% in 13-15 years age group. In the age group of 16-18 years female the mean height was 95.6% of Well To Do Indian standards.[294] (Table 20A)

The obtained F ratio of "Sex" is significant at 0.0001 level [F (1958) = 33.27 < 0.0001]. The obtained F ratio of "Age" was significant at 0.05 level [F (1958) = 3.11 <0.005]

The obtained F ratio of "Tribe X Sex" was significant at 0.001 level [F (1958) = 8.35 < 0 001]. The obtained F ratio of "Tribe x Sex x Age" was significant at 0.001 level [F (1958) = 10.32 < 0.0001] (Table 30 A).

WEIGHT

Weight is also another simplest measurement of growth and nutritional status. To assess the nutrition of a person, weight is used along with height . There is direct relation between growth retardation and weight loss. Change in weight during pregnency indicates the maternal nutritional status of a lady.

The weight of the Hill Korwa males of different age groups was 3.96 kg for 0-6 months, 6.75 Kg for 7-12 months 8.45 kg in 1-3 years, 14.33 kg in 4-6 years , 18.51 kg in 7-9 years, 28.78 kg in 10-12 years, 38.84 kg in 13-15 years, 40.58 kg in 16-18 years, 47.34 kg in 19-35 years, 44.17 kg in 36-55 years and 45.03 kg in above 55 years group. (Table 17A)

The mean value of weight of female Hill Korwa infant group was 3.34 kg in 0-6 months, and 4.5 kg in7-12 months. In children group mean weight was 9 kg in 1-3 year, 13.49 kg. in 4-6 years, 21.69 kg in 7-9 years, and 30.42 kg in 10-12 years .In adolescent group the mean weight was 38.18 kg in 13-15 years age group and 43.18 kg in 16-18 years. The mean weight of adult woman was 42.16 kg, 42.15 kg , and 40.77 kg in 19-35 years, 36-55 years and above 55 years respectively. (Table 17A)

As compared to NMMB[303] data, the mean weight of Hill Korwa males and females was found to be quite low. (Table18)

As compared to Maharashtra tribal children , the weight of Hill Korwa children was similar but in age group of 4-6 years and above 12 years, weight was found higher than Maharashtra tribal children whereas the mean weight of all age groups of male children was lower than the ICMR standards (Table19)

The mean weight of female Hill Korwa children was higher in 4-6 years and 7-9 years as compared to Maharashtra tribal children but mean weight was lower than ICMR standards.(Table 20 B)

The mean weight of 10-12 years of male Hill Korwa children was found higher than the Jhabua and Bastar district children of same age group. In age group 10-12 years in female children , the weight was found to be higher than the Sarguja, Bastar and Jhabua district tribal children [252] (Table 21B)

In adult subjects the weight of Hill Korwas for 19-35 years of age group was higher than the Bastar tribal males, but lower than the Sarguja and Jhabua district tribal males. Similar data have been observed for female Hill Korwas also. In age group 36-55 years the weight is quite similar to the three tribal districts in both sexes. (Table 21B)

As compared to Well to do Indian standard with different age group of male subjects , it was found that the weight of 1-3 years of age group was 65.76% of the standards, for age group 4-6 years 74.63% of the standard, in 7-9 years 72.5%, in 10-12 years 83.96%, in age group 13-15 year , 82.76%,and in16-18 years 72.76% of the standard was found. In female children as compared to Indian standards,the results were: for 1-3 years of age 93.9%, for 4-6 years age 73.84%, for 7-9 years 82.57%, for 10-12 years 81.92%, for 13-15 years 83.78% and for 16-18 yerars 88.12%. (Table 23B)

The obtained F ratio of "Tribe" was significant at 0.001 level [F (1958) = 7.85 < 0.001]. The obtained F ratio of "Age" was significant at 0.0001 level [F (1958) = 5.69 < 0 0001]. The obtained F raio of "Tribe X Sex" was significant at 0.005 level [F (1958) = 4.46 < 0.0001]. The obtained F ratio of "Tribe x Age" and "Sex x Age" was insignificant. The obtained F ratio of "Tribe x Sex x Age" was significant at 0.05 level [F (1958) = 8.98 < 0 05] (Table 30 A).

MIDARM CIRCUMFERENCE

The informations about fat deposition and status of muscle development are assessed by mid arm circumference.The average midarm circumference of the females 0-6 months old was 6.29 cm. and for 7-12 months 8.7 cm . In the subjects of 1-3 years it was 9.74cm, for 4-6 years it was 13.08cm, for 7-9 years 13.04cm and for 10-12 years age it was 16.23 cm. In the adolescent age groups of 13-15 years it was 19.11 cm and in 16-18 years it was 21.89 cm. In adult group of 19-35 years, it was 23.51 cm for 36-66 years was 23.04cm and above 55years it was 22.7cm. (Table 17A)

For male subjects the average mid arm circumference for different age groups was 7.35 cm in 0-6 months,9.71 cm in 7-12 months . In children the average mid arm circumference was 12.12 cm in 1-3 years, 14.85 cm in 4-6 years, 15.67cm in 7-9 years, 16.41 cm in 10-12 years. For adolescent age group 13-15 years, it was 18.98 cm and in 16-18 years it was 20.39 cm. For adult age group of 19-35 years it was 24.4 cm, for 36-55 years it was 23.64cm and for above 55 years it was 24.74cm. (Table 17)

As compared to NNMB [303] data for below 25 years of age, the average mid arm circumference of males was found to be lower , but mid arm circumference was found quite similar in 19-35 years of age with NNMB data. For 36-55 years of age, results of study are quite similar with NNMB . (Table 18)

The mid arm circumference of male Hill Korwas was observed to be quite similar to other tribals, of Sarguja, Jhabua and Bastar districts in 1-3 years age group. But it was higher than Jhabua and Bastar districts,in 4-6 years group. In age group 7-9 years it was higher than Bastar district.Similar results have been observed for 10-12 years age group

also. In 16-18 years of age group, it was quite higher than those of Hanumantha Rao et al[252] who studied three tribal districts of Madhya Pradesh.(Table 22)

For females the measurement was lower in the age groups of 1-3 years, 4-6 years, 7-9 years,10-12 years and 13-15 years. But in 16-18 years age group the mid arm circumference of Hill Korwas was found to be higher than the Bastar's tribal result. (Table 17A)

The mean arm circumference value in 1-3 year male children group,was 75.77% of Well to do standards, similarly it was 91.16% for 4-6 years, 69.54% for 7-9 years, 85 47% for 10-12 years, 66.57% for 13-15 years and 63.56% for 16-18 years. In the case of female children the mean arm circumference values were for 1-3 years age group 62 45% and 79.76% for 4-6 years, 73.67% for 7-9 years, 61.96% for 10-12 years, 87.66% for 13-15 years and 50.92% for 16-18 years. (Table 22B, 23C)

.According to Jellife[145], the mid arm circumference of adult male and adult female should be 29.3 cm and 28.5 cm, respectively.

In this study the mid arm circumference of Hill Korwas range from 26.5cm -21.6 cm in adult males and from 25.5 cm –20 cm in adult females. The low arm circumference values may be well correlated with the low calorie intake and low fat intakeof Hill Korwa population. (Table 24)

The obtained F ratio of the "Tribe" was insignificant . The obtained F ratio of sex was siginificant at 0.05 level [F (1958) = 41.40 < 0.001]. The obtained F ratio was insignificant for "Age", "Tribe x Sex", Tribe x Age", "Sex x Age", and "Tribe x Sex x Age" respectively (Table 30A).

BODY MASS INDEX

The body mass index was calculated with the help of weight and height measurements

The average "body mass index " values of various groups of males and females are presented in table 16, 17 and 18. The average body mass index value of 0-6 months old males was 15.44 kg/m^2, for 7-12 months males it was 16.01 kg/m^2,for 1-3 years age group it was 12.5kg/m^2, 13.79 kg/m^2 for 4-6 years, 12.56 kg/m^2 for 7-9 years,16.57kg/m^2 for 10-12 years, 18.21kg/m^2 for 13-15 years and 18.30 kg/m^2 for 16-18 years. In adult males it was 20.38 kg/m^2,19.53kg/m^2, 20.25 kg/m^2 for 19-35 years, 36-55 years and above 55 years respectively

The data for females were 10.47 kg/m^2 for 0-6 months and 11.63 kg/m^2 for 7-12 months. For the age group 1-3 years the values were 12.52 kg/m^2,for 4-6 years the values were 12.63 kg/m^2, for 7-9 years the values were 13.46 kg/m^2 and for 10-12 years 16.04 kg/m^2 . In adolescent group it was 18.88 kg/m^2 and 17.82 kg/m^2 for 13-15 years and 16-18 years, respectively. In adult female group it was 18.88 kg/m^2 for 19-35 years ,18.96 kg/m^2 for 36-55 years and 18.72 kg/m^2 for 55 years and above. (Table 17B)

Body mass index can be considered as an index for assessing the nutritional status. Body mass index is used as an index to assess the extent of chronic energy deficiency (CED) in adults. Adults with BMI below 13.5 are considered to suffer from chronic energy deficiency. The standard values as suggested by Thunsberg et al[141] for males and females are 20.25 kg/m^2 and 19.24 kg/m^2, respectively.

In the present study 14.49% adult males of 19-35 years age group were within the standard range of BMI and 85.51% subjects were below the standard range. In 36-55 years 13.05% males were within the standard range. In the age group above 55 years 10.45% males were within the standard range and 89.55% males were below the standard range of BMI. (Table 25)

In females 14.01%, 14.03%and 6.82% were within the standard range for 19-35 years,36-55 years, and above 55 years respectively. 85.99%, 85.97% and 93.18% fe-

males were below the standard range for 19-35 years, 36-55 years and above 55 years of age respectively. (Table 25)

The obtained F ratio of "Tribe" was insignificant. The obtained F ratio for "Sex" was significant at 0.001level[F(1958) = 41.40 < 0.001]. The obtained F ratio was insignificant for "Age", "Tribe x Sex", "Tribe x Age", "Sex x Age" and "Tribe x Sex x Age", repectively. (Table - 30B)

RELATIVE BODY WEIGHT PERCENTAGE

Relative body weight percent was calculated from the actual weight of the subjects and the ideal body weight, in accordance with their height , age and sex, thus providing a more realistic picture.

In males of various age groups, the observations were 54.77% for 0-6 months,and 60.94% for 7-12 months. In children it was 71.02% for 1-3 years, 82.78% for 4-6 years, 75.38% for 7-9 years and 82.19% for 10-12 years.In adolescents it was 80.98% for 13-15 years, and 72.94% for 16-18 years. In adults the relative body weight was 52.86%, 79.09% and 75.78% for 19-35 years,36-55 years and above 55 years respectively.

In females the figures were 53.47% in 0-6 months, 55.82% in 7-12 months, 70.96% in 1-3 years, 79.54% in4-6 years, 68.13% in 7-9Years, 82 4% in 10-12 years 81.42% in13-15 years,and 76.51% in 16-18 years. In the adult age group it was 81.74%, 82.35% and 77.85% for 19-35 years, 36-55 years and above 55 years of age respectively. (Table 17B)

In the adult age group , relative body weight percentage was higher in females than the males.Changes in body weight depend on the physical activities and dietary habits of the population. The study on tribals by Hanumantha Rao[126] revealed that the Onges of little Andamans and the Nikobar have been surveyed by NIN twice over a span

of 15-20 years.The Onges were surveyed in the year 1969 and 1989 and the Nicobarese in 1973 and 1989. The data indicated that the adult male Onge , on an average were taller by 2 centimeter, and heavier by 4.5 kg in the year 1989 as compared to the data of 1969. The mean arm circumference and fat fold values were also higher in 1989.

Similarly the male Nicobaries were taller by 4.5cms and heavier by 4.6 kg in 1989 as compared to 1973.No difference were noticed in the mean arm circumference values. The increase was 1.2 cm in height, 3.7 kg in weight ,1.0 cm in arm circumference in females over the same period.

In present study out of the total subjects 10% males and 2.39 % females of 19-35 age group were in 100% range.32.48% males and 28.16%females were in 90% range.44.91% males and 42.83 % females were in 80% range,13.69% males and 17.92% females were in 70% range and 5.73% males and 8.7% females were in 60% range of the ideal relative body weight . The relative body weight percentage range in this study for males was between 103.46-62 89% and for females it was between 106.23-60.41% (table-26).

The obtained F ratio of "Tribe" was significant at 0.0001 level [F (1958) = 63.82 < 0.0001]. The obtained F ratio of "Sex" was significant at 0.0001 level [F (1958) = 457.74 < 0.0001] . The obtained F ratio of "Age" was significant at 0.0001 level [F (1958) = 117.14 < 0.0001]. The obtained F ratio of " Tribe x Sex" was significant at 0.0001 level [F (1958) = 108.23 < 0.0001]. The obtained F ratio of "Sex x Age" was significant at 0.001 level [F (1958) = 130.23 < 0.001]. The F ratio of "Tribe x Sex x Age" is significant at 0.0001 level [F (1958) = 128.39 < 0.0001]. [Table 30(b)]

SKIN FOLD THICKNESS

The main component of the human body are, water, protein, fat and minerals. The percentage of these components may change with the age and state of nutrition. Out of the different methods used in determination of body composition, nutritional antropometery is one of them. To assess the total body fat, skin fold calipers is used.

Jelliffe[145] has suggested that measurement of skin fold thickness can be carried

out in three areas, viz

I) On the back, one inch below the angle of scapula

II) On the chest over the lower rib in the midaxillary line and

III) On the back of the arm over the triceps muscle midway between the top of the shoulder and the elbow.

The sum of the above three measurements give a better index of the subcutaneous fat than any one of them.

In the study tricep muscles of left arm of subjects were taken for measurement using Halton skin fold calipers.

The skin fold thickness of adult Hill Korwa females was 4.10 mm for 0 - 6 months, 5.52 mm for 7 - 12 months, 7. 12 mm for 1 - 3 years, 7. 7 mm for 4 - 6 years, 8.01 mm for 7 - 9 years and 8.51mm for 10 - 12 years. In adolescent age group skinfold thickness was 7.6 mm in 13-15 years and 7.01 mm for 16 - 18 years. In adult age-group it was 12.63 mm, 12.33 mm and 12.38 mm for 19 -35 years, 36 - 55 years and above 55 years respectively.

In male subjects skin fold thickness was 4.34 mm for 0 - 6 months and 5.07 mm for 7 - 12 months. In children group the measurements were 7.25 mm for 1 - 3 years, 6.64 mm for 4-6 years, 6.35 mm for 7-9 years and 6.35 mm for 10 - 12 years. In adolescent age group findings were, 6.4 mm in 13 - 15 years and 7.63 mm for 16 - 18 years. In adult age group it was 9.48 mm, 9.54 mm and 9.4 mm for, 19-35 years, 36-55 years and above 55 years age group respectively. (Table - 17B)

In adult male subjects of 19 - 35 years of age 29% subjects were in 90% range of skinfold thickness, 44.64% male in 80% range, 25.80% males were in 70% range, 24.64% in 60% range, and 2.03% of males in 8.50% range. In 36-55 years 1.59%, 37.48%, 47.41%, 15.54% and 1.99% males were in 90%, 80%, 70%, 60% and 50% of range respectively. In above 55 years of age. 23.88% males were found in 80% range, 43.28% males were in 70% range and 26.87% males were in 50% range.

In females of 19-35 years of age 1.59%, 33.76%, 39.81%, 25.57% and 0.64% females were in , 90%, 80%, 70%, 60% and 50% of standard range while 0.95% females were found in 110% range. In 36 - 55 years of age, 0.88% females very observed in 110% range, 23.68% females in 80% range, 35..09% females were observed in 70% range, 35 01% females in 60% range and 0 88% females in 50% range. In the above 55 years of age, 6.5%, 25%, 50%, 15.91%, and 2.27% females were in 90%, 80%, 70%, 60%, and 50% range respectively. (Table 27)

IV CONCLUSION

Nutritional status of Hill-Korwas was assessed anthropometrically using height, weight, mid arm circumference, Bodymass index, triceps skinfold thickness and relative body weight percentage measurements. The data were found to be on lower side when compared to Well-To-Do Indian standards as described by Hanumantha Rao et al.

The figures for height, weight and mid arm circumference were lower than the NNMB data in both the sexes. As compared to the three tribal districts of Sarguja, Bastar and Jhabua height of Hill Korwa males, females and children were found to be quite low. The average weight of Hill Korwa females was found to be better as compared to their male counterparts Arm circumference values were found to be better than the three tribal districts namely Sarguja, Bastar and Jhabua. The BMI values of the majority of the subjects in both the sexes were found to be below the standard measurements. The relative body weight percentage values were found to be higher in females than in males. The skinfold measurement which is the indicator of subcutaneous fat of body, was found to be lower in all the age groups and in both the sexes.

Anthropometric measurements when used along with other methods of nutritional status assessment viz. Dietary survey & Biochemical estimations give a better idea of the status of nutrition of an individual or group.

TABLE - 17 A

MEAN ANTHROPOMETRIC MEASUREMENTS (HEIGHT, WEIGHT, MID ARM CIRCUMFERENCE) OF THE HILL - KORWA POPULATION.

Age Group	MALE						FEMALE					
	Height (Cm)		Weight (Kg)		Midarm Circumference (Cm)		Height (Cm)		Weight (Kg)		Mid arm circumference (Cm)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
0 - 6 Months	45.20	± 8.36	3.96	± 1.10	7.35	± 1.00	44.57	± 6.36	3.34	± 1.12	6.29	± 0.94
7 - 12 Months	55.60	± 1.56	6.75	± 0.25	9.710	± 0.74	52.32	± 3.77	4.50	± 0.79	8.70	± 1.31
1 - 3 Years	79.11	± 11.33	8.45	± 1.67	12.12	± 1.40	78.90	± 5.63	9.00	± 1.37	9.74	± 0.91
4 -6 Years	100.44	± 7.85	14.33	± 2.52	14.85	± 2.07	98.70	± 6.62	13.49	± 2.24	13.08	± 0.89
7 - 9 Years	112.28	± 3.62	18.51	± 2.44	15.67	± 2.04	120.98	± 3.40	21.69	± 1.23	13.04	± 0.98
10 - 12 Years	126.22	± 5.93	28.78	± 1.72	16.41	± 1.28	130.11	± 5.18	30.42	± 3.10	16.23	± 0.87
13 - 15 Years	148.00	± 4.15	38.84	± 3.95	18.98	± 1.87	142.36	± 3.34	38.18	± 1.4	19.11	± 0.92
16 - 18 Years	152.58	± 1.98	40.58	± 2.10	20.34	± 1.65	148.94	± 1.59	43.18	± 1.63	21.89	± 1.02
19 - 35 Years	153.16	± 2.96	47.34	± 3.04	24.40	± 0.76	149.33	± 4.65	42.16	± 6.80	23.51	± 0.74
36 - 55 Years	153.67	± 2.97	44.17	± 5.12	23.64	± 0.511	148.28	± 2.36	42.51	± 3.97	23.04	± 0.52
> 55 Years	153.67	± 2.63	45.08	± 3.70	24.74	± 0.96	147.20	± 2.66	40.77	± 3.16	22.70	± 0.47

TABLE - 17 B

MEAN ANTHROPOMETRIC MEASURMENTS (BODYMASS INDEX, RELATIVE BODY WEIGHT %, SKINFOLD THICKNESS) OF THE HILL - KORWA POPULATION.

Age Group	MALE						FEMALE					
	Bodymass Index (Kg./m²)		Relative Body Weight (%)		Skinfold thickness (mm)		Bodymass Index (Kg./m²)		Relative Body Weight (%)		Skinfold thickness (mm)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
0 - 6 Months	15.44	± 9.64	54.77	± 20.96	4.34	± 5.39	10.47	± 2.28	53.47	± 16.11	4.10	± 3.20
7 - 12 Months	16.10	± 1.12	60.94	± 12.15	5.07	± 3.74	11.83	± 1.28	55.82	± 11.73	5.52	± 0.35
1 - 3 Years	12.69	± 2.56	71.02	± 9.14	7.25	± 0.98	12.52	± 2.65	70.96	± 9.85	7.12	± 0.43
4 - 6 Years	13.79	± 2.47	82.78	± 12.55	7.14	± 1.85	12.63	± 2.34	79.54	± 6.05	7.67	± 1.03
7 - 9 Years	12.56	± 1.09	75.38	± 6.89	6.64	± 0.67	13.46	± 1.45	868.13	± 5.20	8.01	± 1.36
10 - 12 Years	16.57	± 1.89	82.19	± 7.79	6.35	± 0.98	16.04	± 1.00	82.40	± 5.92	8.51	± 0.52
13 - 15 Years	18.21	± 3.29	80.98	± 9.75	6.49	± 0.76	16.87	± 1.34	81.42	± 3.29	7.69	± 1.06
16 - 18 Years	18.30	± 0.98	72.94	± 4.35	7.63	± 0.95	17.82	± 1.45	76.51	± 3.06	67.01	± 0.37
19 - 35 Years	20.38	± 1.69	52.86	± 3.84	9.48	± 1.15	18.88	± 2.01	81.74	± 3.75	12.63	± 1.63
36 - 55 Years	19.53	± 1.57	79.09	± 3.50	9.54	± 1.22	18.96	± 2.01	82.35	± 3.35	12.33	± 1.62
> 55 Years	20.25	± 1.65	75.78	± 3.38	9.41	± 1.18	18.72	± 1.37	77.85	± 4.47	12.38	± 1.51

TABLE - 18

MEAN ANTHROPOMETRIC MEASURMENTS OF ADULT HILL - KORWAS AS COMPARED TO OTHER STUDIES

Age Group in years	Sample Status	Height (Cm)		Weight (Kg)		Midarm Circumference (Cm)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
< 25 years							
NNMB Males1980	206	162.6	± 6.52	47.7	± 6.06	23.3	± 2 02
Present Study16-18 years	40	152.58	1.98	40.58	2.1	20 39	1.65
26 - 35 years							
NNMB Males1980	211	164.1	± 6.53	50.5	± 7.39	24.3	± 2.02
Present Study19-35 years	345	153.16	2.96	47.34	3.04	24.4	0.76
36 - 45 years							
NNMB Males1980	248	163.5	± 6.4	50.4	± 7.88	24	± 2.23
Present Study36-55 years	2.51	153.67	2.97	44.17	5.12	23.64	0.511
> 46 years							
NNMB Males1980	140	163.5	± 6.49	50.3	± 8.57	23.6	± 2.53
Present Study > 55 years	67	153.67	2.63	45.08	3.70	24.74	0.96

TABLE - 19 G

MEAN VALUE OF HEIGHT AS PER AGE OF HILL KORWA INFANT & CHILDREN AS COMPARED TO OTHER DATA

	MALES			FEMALES		
Age in years	Maharashtra Tribal*	ICMR Standard**	Present study	Maharashtra Tribal*	ICMR Standard**	Present study
0 - 3 Months	60	56.2			55	44.57
4 - 6 Months	62.2	62.2	45.2	53	60.4	
7 - 9 Months	68.7	62.9	55.6	65.9	64.7	52.32
10 - 12 Months	69.4	69.5		68.6	66.7	
1- 2 Years	75.4	73.9	79.11	74.9	72.5	78.9
2 -3 Years	83.4	81.6		83.4	80.1	
3 - 4 Years	91.5	89.8	100.44	92.9	87.2	98.7
4 - 5 Years	103.2	96.0-102.1		98	94.5-101.4	
6 - 7 Years	114.1	108.5-113.9	112.28	110.6	107.4-112.8	120.98
8 - 9 Years	124.6	113.3-123.7		123.3	118.2-122.9	
10 - 11 Years	128.5	128.4-133.4	126.22	130.5	128.4-133.6	130.11
12 & above	137.2	138.3-144.6		140.6	139.2-143.9	

* D.RANNDY AND KAMAL SATYAN NIKETAN

** ICMR STANDARD

TABLE - 19 B

MEAN VALUEOF WEIGHT AS PER AGE OF HILL - KORWA INFANT & CHILDREN AS COMPARED TO OTHER DATA

Age in years	MALES			FEMALES		
	Maharashtra Tribal*	ICMR Standard**	Present study	Maharashtra Tribal*	ICMR Standard**	Present study
0 - 3 Months	4.7	4.5	3.96	-	4.2	3.34
4 - 6 Months	6.5	6.7		5.0	5.6	
7 - 9 Months	7.1	6.9	6.75	5.4	6.2	4.5
10 - 12 Months	7.2	7.4		6.5	6.6	
1- 2 Years	7.0	8.4	8.45	8.0	7.8	9.0
2 -3 Years	10.5	10.1		10	9.6	
3 - 4 Years	12.2	11.8	14.33	11.7	11.2	13.49
4 - 5 Years	14.1	13.5		13.2	12.9	
6 - 7 Years	17.2	14.8-16.3	18.51	15.4	14.5-16.9	21.69
8 - 9 Years	18.9	18-19.7		18.5	17.6-19.4	
10 - 11 Years	22.3	21.5-23.5	28.78	22.8	21.3-23.6	30.42
12 & above	27.8	25.9-32.1		32.7	26.4-33.3	

* D.RANNDY AND KAMAL SATYAN NIKETAN

** ICMR STANDARD

TABLE - 20 A

MEAN HEIGHT OF HILL - KORWA CHILDREN AND ADOLESCENTS AS COMPARED TO OTHER STUDIES

Age in years	MALES						FEMALES					
	SARGUJA	JHABUA	BASTAR	RURAL M.P.	WELL-TO-DO INDIANS	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	RURAL M.P.	WELL-TO-DO INDIANS	PRESENT STUDY
1.	72.7	71.5	71.0	70.5	73.2		70.7	69.1	70.8	71.9	72.8	
2.	79.3	76.2	78.0	77.8	85.5	79.11	79.8	76.7	78.6	78.9	83.8	78.9
3.	88.5	83.3	86.5	83.2	94.0		86.1	82.6	86.2	85.8	92.8	
4.	92.1	92.6	93.8	90.7	104.8		95.2	92.5	93.1	88.8	104.0	
5.	101.4	100.9	98.5	99.6	112.4	100.44	100.0	99.6	100.1	98.0	112.5	98.7
6.	111.7	106.5	107.3	105.0	118.8		110.4	107.7	107.8	108.5	47.8	
7.	114.6	114.6	112.6	111.0	123.2		116.7	112.9	112.7	116.3	123.2	
8.	122.0	119.6	117.5	117.7	127.9	112.28	122.0	118.8	116.5	117.1	127.2	120.98
9.	124.1	126.5	125.3	122.8	133.3		127.1	123.1	123.6	126.3	132.5	
10.	131.5	130.5	127.6	127.6	138.0		130.9	127.9	128.7	126.5	138.2	
11.	134.6	134.3	133.6	132.7	142.7	126.22	135.2	134.9	133.8	132.0	145.1	130.11
12.	139.0	138.4	135.6	137.5	148.4		139.5	135.0	135.0	134.2	151.5	
13.	144.1	144.0	141.1	141.4	155.0		144.4	140.6	138.3	140.3	153.8	
14.	147.6	149.9	145.4	147.1	162.6	148	144.7	145.7	141.3	147.8	154.5	142.36
15.	150.4	153.2	150.4	154.0	165.5		148.7	148.0	145.2	146.6	155.8	
16.	151.5	159.7	154.3	158.8	168.9		150.4	150.8	14707	148.3	155.6	
17.	158.7	157.0	156.9	158.7	169.8	152.58	152.0	149.4	149.3	152.0	-	148.94
18.	156.4	158.1	157.4	161.8	171.5		150.7	150.2	148.0	150.9	-	

TABLE - 20 B

MEAN WEIGHT OF HILL - KORWA CHILDREN & ADOLESCENT AS COMPARED TO OTHER STUDIES

	MALES						FEMALES					
Age in years	SARGUJA	JHABUA	BASTAR	RURAL M.P.	WELL-TO -DO INDIANS	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	RURAL M.P.	WELL-TO -DO INDIANS	PRESENT STUDY
1.	81.6	8.3	7.4	6.3	19.3		7.6	8.9	7.2	7.8	8.3	
2.	9.6	9.0	8.9	9.4	18.5	8.45	9.4	8.9	'8.7	8.9	10.5	9.00
3.	12.0	10.3	10.9	11.5	13.5		11.2	9.6	10.4	10.5	12.3	
4.	12.7	13.0	12.0	11.3	15.7		12.9	12.5	12.0	11.3	14.5	
5.	14.8	15.0	13.7	13.4	19.2	14.33	13.9	15.1	13.5	13.1	13.6	13.49
6.	17.7	16.7	15.3	16.0	21.9		17.0	16.6	15.2	15.9	20.5	
7.	19.4	13.5	17.3	17.7	24.3		18.4	18.3	16.6	18.1	23.8	
8.	21.0	19.9	18.9	20.2	26.1	18.51	21.0	20.9	18.3	18.5	26.0	21.69
9.	21.4	23.0	21.8	18.6	29.2		23.6	21.6	20.5	23.0	29.0	
10	24.9	24.3	22.5	22.0	31.0		24.6	24.5	23.5	23.1	23.6	
11.	26.9	25.0	24.4	24.6	34.0	28.78	26.8	29.3	26.5	24.0	36.3	30.42
12.	29.3	27.4	26.8	26.1	37.8		29.8	26.9	26.5	27.4	42.5	
13.	31.9	31.4	29.7	31.6	42.4		34.0	30.0	29.7	34.2	43.9	
14.	35.3	33.9	32.5	35.5	47.3	38.84	34.6	33.9	31.1	36.5	45.0	38.18
15.	36.8	37.1	36.8	38.6	51.1		39.6	38.7	35.9	38.8	47.3	
16.	38.8	42.4	39.8	41.9	54.8		41.2	41.3	38.9	41.9	49.0	
17.	44.4	43.5	43.2	44.3	55.0	40.58	44.7	44.7	41.3	42.6	-	43.13
18.	47.7	44.1	42.5	47.2	57.5		43.4	43.6	40.4	44.3	-	

TABLE - 21 G

MEAN VALUES OF HEIGHT (CM) AS PER AGE OF ADULT HILL - KORWA POPULATION AS COMPARED TO OTHER TRIBAL DATA

	MALES						FEMALES					
Age in years	SARGUJA	JHABUA	BASTAR	RURAL M.P.	AMERICAN	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	RURAL M.P.	AMERICAN	PRESENT STUDY
19	161.0	159.0	159.9	161.9			149.9	150.6	149	158.9		
20 - 24	160.2	160.4	159.5	163.5		153.16	150.5	151	148.9	148.1		149.33
25 - 29	161.8	163.0	160.1	163.6	175.5		150	149.5	148.5	151.7	161.4	
30 - 34	160.3	160.5	159.3	163.4			150	148.3	148.8	149.6		
35 - 39	160.0	159.9	159.2	163.6			147.9	148	148.6	150	161.4	
40 - 44	157.9	158.8	159.9	163.0		153.67	149.4	147.7	148.2	149.6	160	148.28
45 - 49	160.2	160.3	159.3	163.7	174.0		148.4	147.2	148.2	148.8		
50 - 54	159.1	158.8	158.1	162.8			149.8	147.1	147.7	148.2	158.8	
55 - 59	160.7	158.3	157.2	163.3	171.0	153.67	149.1	148.9	146.6	150.8		147.2
> 60	159.3	159.1	158.0	162.3	168.9		148	147.2	146.3	145.6	158.6	

TABLE - 21 B

MEAN VALUES OF WEIGHT (Kg) AS PER AGE OF ADULT HILL - KORWAS AS COMPARED TO OTHER TRIBAL DATA

	MALES						FEMALES					
Age in years	SARGUJA	JHABUA	BASTAR	RURAL M.P.	AMERICAN	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	RURAL M.P.	AMERICAN	PRESENT STUDY
19	47.7	44.1	42.5	47.2			42.7	41.6	40.7	46.3		
20 - 24	45.0	45.7	45.4	48.4	70.0		42.5	43.7	40.7	43.3	62.0	
25 - 29	49.7	47.4	46.1	49.8		47.34	43.1	43.2	40.6	43.9		42.16
30 - 34	48.9	46.0	45.5	49.3	78.0		42.2	42.6	39.8	44	65.0	
35 - 39	48.7	46.0	45.9	53.2			42.0	41.3	39.4	42.6		
40 - 44	48.6	44.7	46.0	50.8	77.0	44.17	41.5	42.4	38.9	42.9	66.0	42.51
45 - 49	47.8	44.1	45.1	50.8			40.1	40.9	38.3	43.0		
50 - 54	47.9	43.4	44.9	51.5	76.0		40.6	39.0	38.8	45.2	66.5	
55 - 59	49.2	42.8	43.4	47.2		45.03	39.9	38.3	37.4	46.3		40.77
> - 60	47.0	41.5	43.0	46.5	75.0		39.4	37.0	36.2	37.9	66.0	

TABLE - 22 A

MEAN VALUES OF MID ARM CIRCUMFERENCE OF HILL-KORWA POPULATION AS COMPARED TO OTHER TRIBAL DATA

	MALES					FEMALES				
Age in years	SARGUJA	JHABUA	BASTAR	WELL-TO-DO INDIANS	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	WELL-TO-DO INDIANS	PRESENT STUDY
<1	11.0	11.9	10.7	15.1	9.71	10.9	11.6	10.3	14.5	8.70
1	12.0	12.0	11.3	15.5		11.2	12.0	11.2	15.1	
2	11.9	12.3	11.8	15.9	12.12	12.2	12.5	11.6	15.6	9.74
3	12.9	12.7	12.2	16.2		12.4	12.7	12.0	16.1	
4	13.0	13.1	12.2	16.4		13.0	13.1	12.4	16.6	
5	13.3	13.5	12.8	16.0	14.35	13.0	13.0	12.5	16.1	13.08
6	14.1	13.3	13.1	16.5		14.2	13.6	13.0	16.5	
7	14.7	13.9	13.4	17.4		14.3	14.0	13.4	17.3	
8	14.8	14.4	13.9	17.4	15.61	15.2	14.6	13.8	17.5	13.04
9	15.0	15.2	14.6	18.1		16.0	15.1	14.5	18.3	
10	16.3	15.6	15.1	18.5		15.8	15.9	15.5	19.1	
11	16.2	15.0	15.9	19.2	16.41	17.3	16.8	16.5	19.5	16.23
12	17.2	16.6	15.9	20.1		17.8	17.0	16.6	20.8	
13	17.8	18.3	16.8	20.8		19.5	18.3	17.2	21.2	
14	18.8	18.4	17.9	22.0	18.98	19.2	19.4	17.6	21.8	19.11
15	19.0	19.4	18.8	23.0		20.9	21.0	19.1	22.6	
16	19.9	21.8	19.5	24.0		21.1	21.2	20.0	23.0	
17	21.8	21.7	20.7	24.3	24.74	20.6	21.8	20.8	24.3	22 70
18	22.1	21.7	20.6	25.0		21.8	22.4	20.4	25.0	

TABLE - 22 B

MEAN VALUES OF MID ARM CIRCUMFERENCE OF HILL-KORWA POPULATION AS COMPARED TO OTHER TRIBAL DATA

Age in years	MALES					FEMALES				
	SARGUJA	JHABUA	BASTAR	WELL-TO-DO INDIANS	PRESENT STUDY	SARGUJA	JHABUA	BASTAR	WELL-TO-DO INDIANS	PRESENT STUDY
19	24.0	21.6	20.9	25.5	24.4	21.5	22.2	20.3	25.5	23.51
20 - 24	23.3	22.8	21.4			21.5	22	20.2		
25 - 29	23.7	22.47	21.6			22	21.6	20.12		
30 - 34	23.8	22.47	21.7			21.9	21.6	20.4		
35 - 39	23.7	22	21.6		23.46	21.6	21.6	20.5		23.04
40 - 44	23.6	21.7	21.7			21.8	22	20.4		
45 - 49	23.3	21.7	21.5			21.6	21.6	20.1		
50 - 54	23.1	21.3	21.2			21.4	20.6	20.3		
55 - 59	22.29	20.6	20.6		24.74	20.7	20.6	19.8		22.7
60	22.3	20.5	20.3			20.8	20.1	19.4		

TABLE - 23 A

MEAN HEIGHT OF "HILL KORWA" CHILDREN AND ADOLESCENTS AS COMPARED TO WELL-TO-DO INDIAN DATA

	MALES			FEMALES		
Age in years	Well - To - Do Indians	Present Study (Mean)	Standard Percentage	Well - To - Do Indians	Present Study (Mean)	Standard Percentage
1.	80.2			78.2		
2.	90.0			88.5	78.9	
3.	98.5	79.11	88.32	97		89.76
4.	104.8			104		
5.	112.4			125.5	98.7	85.34
6.	118.8	104.44	93.25	117.3		
7.	123.2			123.2		
8.	127.9			127.2	120.98	94.79
9.	133.3	112.28	87.63	132.5		
10.	138			138.2		
11.	142.7			145.1	130.11	89.77
12.	148.4	126.22	88.08	151.5		
13.	155			153.8		
14.	162.6			154.5	142.36	92.02
15.	168.5	148	91.13	155.8		
16.	168.9			155.8		
17.	169.8				148.94	95.6
18.	171.5	153.67	90.04			

TABLE - 23 B

MEAN WEIGHT OF "HILL - KORWA" CHILDREN & ADOLESCENTS AS COMPARED TO WELL - TO - DO INDIAN DATA

	MALES			FEMALES		
Age in years	Well - To - Do Indian	Present Study (Mean)	Standard Percentage	Well - To - do Indian	Present Study (Mean)	Standard Percentage
1.	10.5			9.8		
2.	13.5	8.45	65.86	4.3	9	98.9
3.	14.5			13.3		
4.	17.2			15.7		
5.	19.2	14.33	74.63	18.6	13.49	73.84
6.	21.2			20.5		
7.	24.3			23.8		
8.	26.1	18.51	72.5	26	21.69	82.57
9.	29.2			29		
10.	31			32.6		
11.	34	28.78	84.40	36.3	30.42	81.92
12.	37.3			42.5		
13.	42.4			43.9		
14.	47.3	38.84	82.76	45	38.12	83.78
15.	51.1			47.3		
16.	54.8			49		
17.	55	40.58	72.76		43.18	88.12
18.	57.5					

TABLE - 23 C

MEAN MID ARM CIRCUMFERENCE OF "HILL - KORWA" CHILDREN & ADOLESCENTS AS COMPARED TO WELL - TO - DO INDIAN DATA

	MALES			FEMALES		
Age in years	Well - To - Do Indian	Present Study (Mean)	Standard Percentage	Well - To - Do Indian	Present Study (Mean)	Standard Percentage
1 - 3	15.8	12.12	75.77	15.6	9.74	62.45
4 - 6	16.3	14.85	91.10	16.4	13.08	79.76
7 - 9	17.5	15.67	89.54	17.7	13.04	73.67
10 - 12	19.2	16.41	85.47	19.8	16.23	61.96
13 - 15	21.9	18.98	66.57	21.8	19.11	87.66
16 - 18	24.4	20.39	63.56	24.1	21.89	50.92

TABLE - 24

DISTRIBUTION OF 1249 MALE AND FEMALE "HILL - KORWAS" AS PER ARM CIRCUMFERENCE MEASUREMENTS

SEX	AGE IN GROUP	Number	100%	90%	80%	70%	RANGE (mm)
Male	19 - 35 Years	345	-	31 (8.98)	236 (68.41)	78 (22.61)	26.5 - 21.6
	36 - 55 Years	251	-	16 (6.37)	177 (70.52)	58 (23.11)	26.5 - 22.3
	> 55 Years	67	-	5 (7.46)	47 (70.15)	15 (22.39)	26.3 - 22. 8
Total		663		52 (7.84)	460 (69.38)	151 (22.78)	26.5 - 21.6
Female	19 - 35 Years	314	-	20 (6.37)	203 (64.65)	91 (28.98)	26.2 - 20.0
	36 - 55 Years	228	-	10 (4.39)	155 (67.98)	63 (27.63)	25.7 - 21.6
	> 55 Years	44	-	2 (4.54)	28 (63.64)	14 (31.82)	25.9 - 22.3
Total		586	-	32 (5.46)	386 (65.87)	168 (28.67)	25.7 - 20.0

Percentage given in parenthesis

Sex	Standard	90%	80%	70%	60%
Male	29.3 cm.	26.3 cm	23.4 cm	20.5 cm	17.6 cm
Female	28.5 cm	25.7 cm	22.8 cm	20 cm	17.1 cm

TABLE - 25

DISTRIBUTION OF 1249 MALE AND FEMALE "HILL - KORWAS" AS PER BODY - MASS INDEX VALUES

SEX	AGE GROUP YEARS	NO.	WITHIN STANDARD RANGE		BELOW STANDARD RANGE		RANGE (Kg/m²)
			NO.	PERCENT	NO.	PERCENT	
Males	19 - 35	345	50	14.49	295	85.51	16.02 - 23.19
	36 - 55	251	34	13.55	217	86.45	16.24 - 22. 67
	Above 55	67	7	10.45	60	84.55	16.00 - 21.91
Total	19 - >55	663	91	13.73	572	86.27	16.00 - 23.19
Female	19 - 35	314	44	14.01	270	85.99	13.88 - 23.80
	36 - 55	228	32	14.03	196	85.97	15.31 - 23.64
	Above	44	3	6.82	41	93.18	15.04 - 20.17
Total	19 - > 55	586	79	13.48	507	86.52	13.88 - 23.80

Standard value

Male - 20.25 (Kg/m²)

Female - 19.24 (Kg/m²)

TABLE - 26

DISTRIBUTION OF MALE AND FEMALE "HILL - KORWAS" AS PER RELATIVE BODY WEIGHT PERCENTAGE

SEX	AGE GROUP	NO.	110%	100%	90%	80%	70%	60%	RANGE
Males	19 - 35	345	-	13	123	159	41	9	103.46 - 74.62
			-	3.77	35.65	46.09	11.88	2.61	
	36 - 55	251	-	7	38	88	97	21	103.86 - 63.91
				2.79	15.14	35.06	38.64	8.37	
	>55 Years	67	-	2	5	38	16	36	101.60 - 62 89
				2.99	7.46	56.72	23.88	5.43	
	Total	663	-	22	166	285	154	66	103.46 - 62.89
				(3.32)	(25.04)	(42.99)	(23.23)	(9.95)	
Females	19 - 35	314	-	10	102	141	43	18	106.23 - 63.26
				(3.19)	(32.48)	(44.91)	(13.69)	(5.73)	
	36-55	228	-	4	61	86	50	27	101.25 - 61.68
				(1.75)	(26.75)	(37.72)	(21.93)	(11.84)	
	> 55 Years	44	-	-	2	24	12	6	91.84 - 60 41
					(4.54)	(54.55)	(27.27)	(13.64)	
	Total	586		14	165	251	105	51	106.23 - 60 41
				(2.39)	(28.16)	(42.83)	(17.92)	(8.7)	

percent values shown in parenthesis

TABLE - 27

DISTRIBUTION OF MALE AND FEMALE "HILL - KORWAS" AS PER TRICEPS SKIN - FOLD MEASURMENTS

Sex	Age in Group	No.	110%	100%	90%	80%	70%	60%	50%	RANGE m.m.
Male	19 - 35 Yrs	345	-	-	10	154	89	85	7	7 - 12
					(2.9)	(44.64)	(25.81)	(24.64)	(2.03)	
	36 - 55 Yrs.	251	-	-	4	84	119	39	5	7 - 12
					(1.59)	(33.47)	(47.41)	(15.54)	(1.99)	
	> 55	67	-	-		16	29	18	4	7 - 10
						(23.38)	(43.28)	(26.87)	(5.97)	
	Total	663	-	-	14	254	237	142	16	7 - 12
					(2.11)	(38.31)	(35.75)	(21.42)	(2.41)	
Female	19 - 35	314	3	-	5	106	125	74	2	9 - 17
			(0.95)	-	(4.39)	(33.76)	(39.81)	(25.57)	(0.64)	
	36 - 55	228	2	-	10	106	125	74	2	9 - 17
			(0.88)	-	(1.59)	(33.76)	(39.81)	(25.57)	(0.64)	
	> 55	44	-	-	3	11	22	7	1	9 - 17
					(6.82)	(25)	(50)	(15.91)	(2.27)	
	Total	586	5	-	18	171	227	161	5	9 - 17
			(0.85)	-	(3.07)	(29.18)	(38.74)	(27.47)	(0.85)	

Percentage value shown in parenthesis

	Standard	90%	80%	70%	60%
Male -	12.5 mm	11.3 mm.	10 mm.	8.8 mm.	7.5 mm.
Female -	16.5 mm.	14.9 mm.	13.2 mm.	11.6 mm.	9.9 mm.

TABLE - 28

MEAN ANTHROPOMETRIC MEASUREMENTS OF HILL KORWA MALES AS COMPARED TO KAMAR TRIBE OF MADHYA PRADESH

	HILL KORWA MALE N = 663					KAMARS MALES N = 351				
Age Group	**Height (cm)**	**Weight (Kg.)**	**Midarm circumference (cm.)**	**Bodymass Index (Kg/m^2)**	**Relative Body Weight (%)**	**Height (cm)**	**Weight (Kg.)**	**Midarm circumference (cm.)**	**Bodymass Index (Kg/m^2)**	**Relative Body Weight(%)**
19 - 35 Years	153.16	47.34	24.4	20.38	52.68	151.85	45.62	24.4	20.17	75.75
Hill Korwa	± 2.96	± 3.04	± 0.76	± 1.69	± 3.84	± 6.89	± 5.05	± 1.37	± 3.64	± 9.99
n =345										
Kamar										
N = 207										
36 - 55 Years	153.67	44.17	23.64	19.53	79.09	153.3	46.25	24.29	19.78	77.22
Hill Korwa	± 2.97	± 5.12	± 0.511	± 1.57	± 3.5	± 6.71	± 4.7	± 0.85	± 2.25	± 7.73
n=251										
Kamar										
n=120										
> 55 Years	153.67	45.03	24.74	20.25	75.78	150.34	44.03	23.66	19.99	73.78
Hill Korwa	± 2.63	± 3.07	± 0.96	± 1.65	± 3.38	± 6.25	± 3.36	± 1.16	± 3.11	± 5.61
n=67										
Kamar										
n = 23										

TABLE - 29

MEAN ANTHROPOMETRIC MEASUREMENTS OF HILL KORWA FEMALES AS COMPARED TO KAMAR TRIBE OF MADHYA PRADESH

	HILL KORWA FEMALE N = 586					KAMARS FEMALES N = 348				
Age Group	**Height (cm)**	**Weight (Kg.)**	**Midarm circumference (cm.)**	**Bodymass Index (Kg/m²)**	**Relative Body Weight (%)**	**Height (cm)**	**Weight (Kg.)**	**Midarm circumference (cm.)**	**Bodymass Index (Kg/m²)**	**Relative Body Weight(%)**
19 - 35 Year	149.33	42.16	23.51	18.88	81.74	146.01	40.53	23.32	19.15	80.97
Hill Korwa	± 4.65	± 6.8	± 0.74	± 2.01	± 3.75	± 4.84	± 4.32	± 0.89	± 2.54	± 8.63
n = 314										
Kamar										
n = 205										
36 - 55 Year	148.28	42.51	23.04	18.96	82.35	143.15	39.6	22.6	19.27	81.54
Hill Korwa	± 2.36	± 3.97	± 0.52	± 2.01	± 3.35	± 5.12	± 3.7	± 1.07	± 1.91	± 7 49
n = 228										
Kamar										
n = 110										
> 55 Year	147.2	40.77	22.7	18.72	77.85	145.58	40.74	23.23	14.52	79 21
Hill Korwa	2.66	3.16	0.47	1.37	4.47	4.07	3.73	1.05	2.13	7 4
n = 44										
Kamar										
n = 33										

TABLE - 30 A

SUMMARY OF ANOVA FOR ANTHROPOMETRIC MEASUREMENTS

SOURCE	HEIGHT				WEIGHT				MID ARM CIRCUMFERENCE			
	SS	DF	MS	F Ratio	SS	df	MS	F Ratio	SS	df	MS	F Ratio
Tribe	1436.79	1	1486.79	74.23586	177.4686	1	177.4686	7.854795	1.836529	1	1.836529	2.558767
Sex	8681.66	1	8681.66	433.4787	4464.007	1	4464.007	197.5778	296.1258	1	296.1258	412.5809
Age	124.67	2	62.33	3.112367	257.4828	2	128.7414	5.89812	42.5703	2	21.28517	29.65582
Tribe x Sex	167.4	1	167.4	8.358181	100.979	1	100.979	4.469351	0.71199	1	0.71199	0.991989
Tribe x Age	7.59	2	3.8	0.189632	76.97077	2	38.48953	1.7033	5.669769	2	2.834884	3.949738
Sex x Age	362.64	2	181.32	9.053419	77.26367	2	38.63184	1.709853	2.515829	2	1.257915	1.752605
Tribe x Age x Sex	413.61	2	206.803	10.32577	403.0266	2	203.0133	8.985407	74.14112	2	37.07058	51.64901
Error	38773.98	1948	20.03	-	43741.34	1948	22.54366	-	1389.544	1948	0.71774	-

TABLE - 30 B

SUMMARY OF ANOVA FOR ANTHROPOMETRIC MEASUREMENTS

SOURCE	BODY MASS INDEX				RELATIVE BODY WEIGHT			
	SS	DF	MS	F Ratio	SS	df	MS	F Ratio
Tr be	8.747556	1	8.797556	1.776816	2257.031	1	2257.031	3.82
Sex	205.0322	1	205.0322	41.40973	16188.51	1	16188.51	457.7483
Age	12.91389	2	6.456946	1.30409	8285.828	2	4142.914	117.1456
Tribe x Sex	16.73732	1	16.73732	3.380386	2365.196	1	2365.196	66.87858
Tribe x Age	3.143479	2	1.571739	0.317439	7658.932	2	3829.466	108.2825
Sex x Age	20.85889	2	10.42945	2.106403	9211.392	2	4605.696	130.2312
Tribe x Sex x Age	9.890713	2	4.945356	0.998799	9081.698	2	4540.849	128.3976
Error	9585.727	1948	4.951305		68467.65	1948	35.36552	-