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COMPARATIVE ANTHROPOMETRY BETWEEN SICKLING AND NON-SICKLING INDIVIDUALS OF LOCAL POPULATION OF RAIPUR CITY OF CHHATTISGARH BY MEASURING MID THIGH CIRCUMFERENCE AND HEAD CIRCUMFERENCE.

Anatomy

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ABSTRACT

Introduction: Studies on child growth and development have always occupied an important position in the scientific research curriculum and are of interest to the researchers of both Medical Science and Physical Anthropology all over the world. Sickle Cell Anemia (SCA) is a hereditary anemia, predominantly seen amongst various tribal populations of India. This problem decreases the amount of oxygen flowing to body tissues which affects growth and nutritional status of individuals. **Materials and Methods:** In present study, 316 subjects of Raipur city 157 cases (sickling) and 159 controls (nonsickling) were taken and anthropometric measurements mid thigh circumference and head circumference were obtained. **Result:** After analysis of data of above parameters, we found cases mid thigh circumference less than control for male and female. At the age of 21 years this difference was statistically highly significant in male; and at 13 and 16 years in female. **Conclusion:** On comparison mean value of mid thigh circumference of cases were less than that of controls for both male and female, but in head circumference, enough variations were observed. Significant differences were observed in mid thigh circumference.

KEYWORDS

Anthropometry, Sickle cell Anemia, Measuring Tape.

INTRODUCTION

Sickle Cell Anemia (SCA) is a hereditary anemia, predominantly seen amongst various tribal populations of India. Sickle gene is found all over the world, particularly amongst people originated/migrated from Malaria endemic areas of Africa & Asia. According to one of the hypothesis, it is a natural mutation in Hemoglobin molecule to protect RBCs from malarial parasites by making them a little rigid, so that malarial parasites can't enter into RBCs. REF.[1][8]SCA occurs due to inherited abnormal hemoglobin (Hb) gene, which produces Hb-S (Hb-Sickle). Due to the presence of Hb-S and because of its abnormal characteristic, converts RBCs into rigid-brittle half moon (Sickle) shaped instead of soft round biconcave shape, which is the main cause of complication of Sickle Cell disease.

REF.[1][8]The fragile, sickle-shaped cells deliver less oxygen to the body's tissues. They can also get stuck more easily in small blood vessels, as well as break into pieces that can interrupt healthy blood flow. These problems decrease the amount of oxygen flowing to body tissues even more.

Sickle cell anemia is inherited from both parents. If we inherit the sickle cell gene from only one parent, we will have sickle cell trait. People with sickle cell trait do not have the symptoms of sickle cell anemia. Life span of RBC in SCD is less than 30 days instead of 90 to 120 days. Anemia results from the bone marrow's inability to produce enough blood cells to keep pace with the rate of destruction.

REF.[2]According to a study, prevalence of SCD in India is highest in the state of Chhattisgarh (23%) and highest for Kurmi (55%) and Teli (53%) caste which belong to backward castes.

This work is an attempt to study the growth status and anthropometric variation of Sickling individuals of Raipur city of Chhattisgarh state and compare them with non - sickling individuals of the same region.

MATERIAL & METHODS

REF.[3]In the present study, data were collected from local population of Raipur Dist. during the months from October 2012 to July 2013.

In order to study the physical growth and nutritional status of Sickling and Non-Sickling individuals, a simple schedule was prepared to record the different Anthropometric variables.

1. Sickling cases taken in this study, were registered cases in Sickle Cell Unit of Pt.J.N.M.Medical College Raipur (C.G.).
2. Sample size 316 [157 cases (sickling) + 159 controls (non-sickling)] according to inclusion and exclusion criteria.
3. Individuals were examined for the following Anthropometric measurement:-
   1. Mid thigh circumference
   2. Head circumference
4. The date were analysed, compared and interpreted by using the proper statistical methods.

Inclusion Criteria

1. Individuals of local population of Raipur district of Chhattisgarh.
2. Age group 10 to 26 years.
3. Apparently healthy individuals for control and
4. Individuals suffering from Sickling who were registered in sickle cell unit of Pt. J.N.M.Medical College Raipur.

Exclusion Criteria

1. Individuals other than local population of Raipur district Chhattisgarh state.
2. Age less than 10 and more than 26 yrs.

Mid Thigh Circumference: REF.[3] The measurement was taken at standing position, and the circumference was taken horizontally at the marked level, that is the midway between tip of anterior superior iliac spine and upper border of patella.
Instrument used: Measuring Tape.

Head Circumference: REF.[4][6][7] It is measured from the occipital protuberance In back and supraorbital ridges in front and above the upper border of the Ear laterally.
Instrument used: Measuring Tape.

RESULT & DISCUSSION

REF.[3]The result of analysis of 2 body measures of case (sickling) and control (non-sickling) individuals of Raipur city of Chhattisgarh, ranging from age 10+ to 25+ years are presented and each body measure is described with regard to mean, standard deviation and distance curve with the help of necessary tables and figures. They are shown separately for males and females. Case and control differences are assessed for all body measures by using "t-test" and "p value"

Mid Thigh Circumference (Table No.1 & 2; Figure No. 1 & 2)
REF.[5]When case and control males and female were compared, it was seen that the distance curve of mid thigh circumference for case ran below the distance curve for control at all age. For male difference is significant at the age periods of 21+ (p value < 0.05). For female difference is significant at the age periods of 13+ and 16+ (p value < 0.05).

Head Circumference (Table No. 3 & 4; Figure No. 3 & 4)
REF.[5] The distance curve of head circumference of male reveals that curve for case runs below the distance curve for control except at the age period of 10+, 11+, 13+, 17+ and 22+ where it is above and at 16+, 24+ where it coincides but the difference is insignificant at all age periods (p value > 0.05).

REF.[5] On comparison of case and control females, it is seen that the distance curve for case runs above the distance curve for except at the age period of 14+, 15+, 17+ , 19+ and 21+ where it is below and at 10+, 11+, 12+, 18+, 23+ where it coincides but the difference is insignificant at all age periods (p value > 0.05).

Assessment of differences in head length, by their direct measurements from the subjects of two groups was done to see if there are any facial changes in cases but almost no significant differences were observed. From the above discussion, it may be tempting to state that the poor growth status of the cases & controls, as judged by stature, in comparison to Indian standard may be due tothe poor socio-economic condition. Apart from under-nutrition, sickling may be responsible for low weight. It is found significantly lower z scores for weight, height, arm circumference, and upper arm fat and muscle areas, delayed skeletal maturation delayed puberty, and poor nutritional status in children with SCD [9]. Growth represents a complex interaction of nutritional intake, absorption and requirements, all of which vary within and among populations. Nutritional requirements alone are complex function of body size, age, health and activity levels [10]. In study of effect of sickling on growth it is concluded that an average reduction in weight, height, sitting height, limb length in patients with sickling (SS) as compared to control [11]. Human growth is a dynamic changing process and is being influenced by heredity and environment. Genetic component and environment both contribute to attain final body structure. Certain factors like disease, proper diet, time, cultural pursuits, geographical conditions etc. have tremendous influence in the growth of a child [12].

CONCLUSION

On comparison mean value of various body measures Mid thigh circumference of sickling cases were less than that of controls for both male and female, but in head circumference, enough variations were observed. Significant differences were observed in mid thigh circumference. It concludes that Sickling affects various body parameters adversely.

TABLE NO - 1
MID THIGH CIRCUMFERENCE(in cm)

Age	Diseased Male			Control Male			t-test	P value
	No.	Mean	S.D.	No.	Mean	S.D.		
10+	6	30.42	2.07	5	31.78	1.67	-1.21	0.26
11+	3	33.23	2.11	5	34.54	1.30	-0.97	0.41
12+	6	33.37	1.39	5	34.80	1.52	-1.62	0.14
13+	8	34.39	1.68	5	35.98	1.43	-1.82	0.10
14+	7	34.30	1.84	5	36.62	2.20	-1.92	0.09
15+	4	37.18	2.31	5	39.00	2.42	-1.15	0.29
16+	7	42.29	1.93	7	44.11	2.48	-1.54	0.15
17+	3	45.80	2.75	5	49.52	2.97	-1.80	0.14
18+	3	51.06	8.37	7	51.67	5.48	-0.12	0.92
19+	2	53.50	2.83	7	54.56	2.19	-0.49	0.69
20+	3	49.13	2.03	5	51.66	2.97	-1.43	0.21
21+	3	44.23	1.97	10	49.02	5.10	-2.43	0.04
22+	3	45.60	7.91	5	50.94	7.27	-0.95	0.39
23+	4	48.68	3.98	6	51.28	3.85	-1.03	0.34
24+	4	55.40	4.41	4	56.48	4.48	-0.34	0.74
25+	5	53.48	0.40	3	55.23	1.37	-2.17	0.15
Total	71	41.42	8.68	89	45.69	8.60		

TABLE NO - 2
MID THIGH CIRCUMFERENCE(in cm)

Age	Diseased Female			Control Female			t-test	P value
	No.	Mean	S.D.	No.	Mean	S.D.		
10+	7	30.46	2.18	4	31.75	2.40	-0.89	0.41
11+	4	32.78	2.23	4	34.78	1.86	-0.92	0.40
12+	8	33.64	2.06	5	35.36	1.77	-1.15	0.29
13+	7	35.24	0.90	5	36.80	0.95	-2.45	0.04
14+	10	35.83	1.81	4	37.70	2.24	-1.49	0.20
15+	7	35.74	1.64	4	37.28	1.92	-1.34	0.23
16+	8	36.83	1.14	5	38.58	1.36	-2.41	0.04
17+	4	39.35	3.04	3	41.80	2.55	-1.16	0.30
18+	7	42.97	2.02	3	44.73	2.00	-1.27	0.27
19+	3	42.00	1.50	9	46.00	8.09	-1.41	0.19
20+	5	43.92	4.42	6	45.48	4.00	-0.61	0.56
21+	3	43.33	0.76	6	46.67	3.72	-2.11	0.08
22+	4	44.65	2.10	3	46.20	2.88	-0.79	0.48
23+	3	39.40	1.28	3	40.50	1.50	-0.97	0.39
24+	2	41.85	2.33	3	44.70	1.37	-1.56	0.30
25+	4	45.43	1.30	3	47.27	1.10	-2.03	0.10
Total	86	38.22	5.42	70	41.17	6.01		

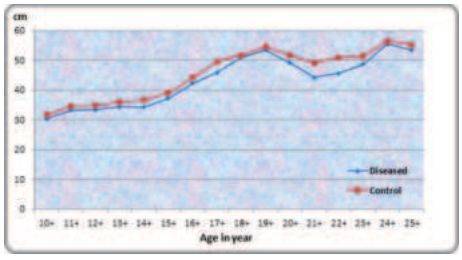

Fig. 1 Mid Thigh Circumference (Male)

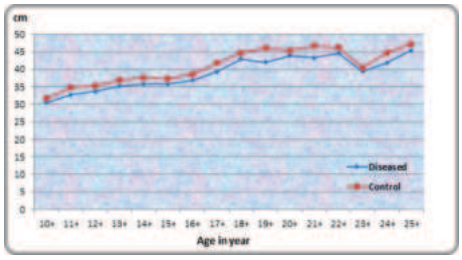

Fig. 2 Mid Thigh Circumference (Female)

TABLE NO – 3
HEAD CIRCUMFERENCE (in cm)

Age	Diseased Male			Control Male			t-test	P value
	No.	Mean	S.D.	No.	Mean	S.D.		
10+	6	50.38	0.12	5	50.36	0.11	0.33	0.75
11+	3	50.73	0.21	5	50.72	0.15	0.10	0.93
12+	6	50.87	0.12	5	50.84	0.11	0.38	0.72
13+	8	51.34	0.21	5	51.30	0.22	0.30	0.77
14+	7	51.57	0.29	5	51.58	0.26	-0.05	0.96
15+	4	52.48	0.41	5	52.50	0.36	-0.10	0.93
16+	7	52.67	0.92	7	52.67	0.92	0.00	1.00
17+	3	53.30	0.26	5	53.24	0.21	0.34	0.76
18+	3	55.33	1.15	7	54.93	0.81	0.55	0.62
19+	2	55.00	0.00	7	55.69	0.89	-2.04	0.09
20+	3	55.00	0.70	5	55.16	0.69	-0.32	0.77
21+	3	55.27	2.73	10	55.31	1.75	-0.03	0.98
22+	3	55.00	1.80	5	54.44	1.55	0.45	0.68
23+	4	53.68	1.16	6	53.97	1.21	-0.38	0.71
24+	4	54.00	1.08	4	54.00	1.08	0.00	1.00
25+	5	53.72	0.90	3	53.97	1.12	-0.32	0.76
Total	71	52.69	1.81	89	53.35	1.97		

TABLE NO – 4
HEAD CIRCUMFERENCE (in cm)

Age	Diseased Female			Control Female			t-test	P value
	No.	Mean	S.D.	No.	Mean	S.D.		
10+	7	49.33	0.17	4	49.33	0.17	0.03	0.97
11+	4	49.85	0.13	4	49.85	0.13	-0.58	0.59
12+	8	50.76	0.09	5	50.76	0.09	-0.22	0.84
13+	7	51.23	0.08	5	51.22	0.08	0.57	0.59
14+	10	51.64	0.12	4	51.65	0.13	-0.13	0.90
15+	7	51.74	0.13	4	51.75	0.13	-0.09	0.93
16+	8	52.01	0.76	5	52.00	0.71	0.03	0.98
17+	4	52.20	0.24	3	52.27	0.25	-0.35	0.74
18+	7	52.67	0.13	3	52.67	0.15	0.05	0.96
19+	3	53.50	1.50	9	54.00	2.33	-0.43	0.68
20+	5	53.48	1.19	6	53.32	1.14	0.23	0.82
21+	3	53.50	1.32	6	54.25	1.72	-0.72	0.50
22+	4	53.53	0.69	3	53.33	0.71	0.36	0.74
23+	3	52.97	0.50	3	52.97	0.50	0.00	1.00

24+	2	53.90	0.14	3	53.63	0.47	0.92	0.44
25+	4	53.35	0.53	3	53.20	0.53	0.37	0.73
Total	86	51.91	1.38	70	52.37	1.78		

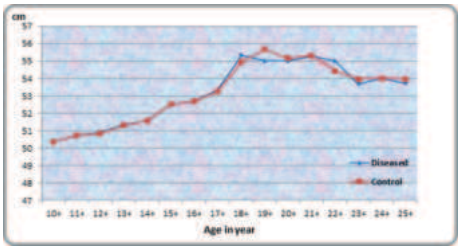

Fig. 3 Head Circumference (Male)

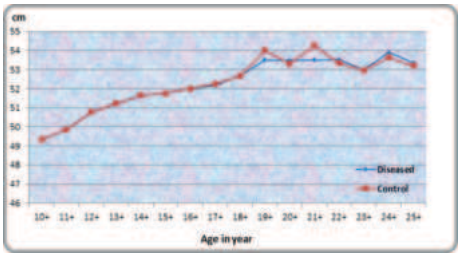

Fig. 4 Head Circumference (Female)

PIC 1 Mid Thigh Circumference Measurement

PIC 2 Head Circumference Measurement

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