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Assessment of Anthropometric Characteristic Relate with Lumber Curvature among Santal Community Tribal Children

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Abstract
Objectives: The purpose of the present study was to find out the status of Lumber curvature of the lateral spine and anthropometrics characteristic among Santal community tribal children and how these anthropometrics characteristic related with Lumber curvature.
Methodology: Twenty eight male Santal tribal children (N=28), age ranged from 13-16 years were taken as the subjects from 'Nayantara Charitable Truest', Birbhum District, W.B, India. 'Inclinometer' was used to measure the angle of Lateral Lumber curvature (LLC^0) and T^{12} to S^1 degree of angle was taken respectively [3]. To analyses the anthropometrics characteristic selected variables were measured as following, a) *Standing Height (SH) [4]:* 'Anthropometric Rod', was taken to measure the height. b) *Body Weight (BW) [4]:* 'Weighing machine', was taken for determination the weight. c) *Floor to Navel Height (FNH) [5]:* 'Anthropometric Rod', was taken to measure the floor to navel height. d) *Trunk and Neck Length (TNL) [5]:* The researcher took the nearest millimeter distance to between the tips of the subject's nose and the seat of the chair the subject were sitting in. e) *Body Surface Area (BSA):* Height and weight were taken and put it in the Mosteller's formula (1987) [6], *BSA (m2) = SQR RT ([Height(cm) x Weight(kg)] / 3600).* f) *Waist Hip Ratio (WHR):* Waist and Hip were measured to its nearest centimeters put it in the following formula: *Waist Hip Ratio (WHR) = Waist (cm) / Hip (cm) [7].* The collecting data were calculated by using Descriptive Statistic and Coefficient of Correlation "r" and level of significance was set at 0.05 levels.
Findings: Significant negative co-relational were existed in case of Lateral Lumber Curvature (LLC) with all anthropometrics characteristic variables. Mean and Standard Deviation has been found $35.14^0 \pm 8.38^0$ (LLC), 155.07 cm ± 10.38 cm (SH), 42.03 kg ± 8.63 kg (BW), 93.07 cm ± 6.63 cm (FNH), 63.78 cm ± 5.79 cm (TNL), 1.34 m^2 ± 0.16 m^2 (BSA) and 0.85 cm ± 0.03 cm (WHR) respectively.
Conclusion: All selected anthropometrics characteristic of Santal children were significantly negative co-related with their Lateral Lumber curvature.

Keywords: Lateral Lumber curvature, Anthropometrics, Santal Community, Standing Height, Body Weight, Floor to Navel Height, Trunk and Neck Length, Body Surface Area (BSA), Waist Hip Ratio (WHR), Anthropometric Rod and Weighing machine.

Introduction
The tribes of India comprise about 8% of the total population of the country having probably the largest number of tribal communities in the world [1]. Santals are the largest indigenous community in the India. Subcontinent with a population of more than 10 million and they reside mostly in the India states of Jharkhand, West Bengal, Bihar, Orissa and Assam, and sparsely in Bangladesh and Nepal. Santals peoples have long head and flat nose. Their complexion varies from dark brown to black in color, Santals usually have curly hair. They have well developed musculature body [2].
Body posture is the position in which a person holds the body upright in a spontaneous standing position. It is externally manifested by the mutual spatial alignment of body parts and by the person's figure. Postural abnormalities in vertebral column of children are one of the common problems prevalent in today's society. From an early stage, children are often subjected to this deformity due to distortion in their posture as a result of faulty habits in life style.
Till now in India, socioeconomically status, modern thinking about wellness and fitness culture of tribal community are lower than the average that is somehow indirectly effect on

their children's total health, and that was the researcher's queries that whether the lower status and poor concept about health practice, food and life style affected on normality of the spinal curvature and as well as on their anthropometrics characteristic. Thus, also the present study is an effort for the path of investigation to seek the relationship between lateral Lumber Curvature or Lordotic curvature status and anthropometrics among Santal school going children.

Objectives

The purpose of the present study was to find out the status of Lumber curvature of the lateral spine and anthropometrics characteristic among Santal community tribal children and how these anthropometrics characteristic related with Lumber curvature of the lateral spine.

Methodology

In order to assess the anthropometrics characteristic and Lateral Lumbar Curvature of the lateral spine among tribal school going children and also their interrelationship, Twenty eight male Santal community tribal children (N=28) were randomly selected as the subjects for this study from 'Nayantara Charitable Truest', Bonovila, Birbhum District, W.B, India. Age group of the subjects was ranged from (13-16) years.

To measured the lateral curvature of the spine '4-1/18 inch Angle Finder Magnetic Base Inclinometer' (Made in Taiwan) was used, it used to examined the exert degrees of angle of lateral lumbar curvature, LLC (T12-S1) curvature by measured the angle of T12 and S1 of Vertebral Column respectively [3]. That means the following formula was used:

[Lateral Lumbar Curvature (LLC^0) = 180^0 – (Angle of T^{12} + Angle of S^1)]

To analyses the anthropometrics characteristic of the tribal children researcher selected the following anthropometrics variables

a) Standing Height (SH)
b) Body Weight (BW)
c) Floor to Navel Height (FNH)
d) Trunk and Neck Length (TNL)
e) Body Surface Area (BSA)
f) Waist Hip Ratio (WHR)

To measure the above mansion anthropometrics characteristic of Santal children the following procedure was used by researcher

a) Standing Height (SH) [4]: 'Anthropometric Rod', was taken to measure the height of each subject and will be measured in nearest millimeter. Method: The subject is asked to stand erect barefooted on a plane horizontal surface against a wall, with his heels, back of the shoulders and head touching the wall. He is requested to stretch the body upwards as much as possible without his heels leaving the ground. The anthropometry rod is kept in front of the subject and the crossbar of the anthropometer is adjusted so that its lower edge touches the highest point of the subject's head. Scoring: The measurement is recorded from the anthropometer's eye correct up to 0.1 cm.

b) Body Weight (BW) [4]: 'Weighing machine', was taken for determination the weight of each subject and will be measured with nearest minimum. 5 kg. Method: The subject stands erect on the platform of the balance with equal weight on both feet. Scoring: The weight is usually recorded accurate up to 0.5 kg.

c) Floor to Navel Height (FNH) [5]: 'Anthropometric Rod', was taken to measure the floor to navel height of the subjects and will be measured in nearest millimeter. Method: The subject is asked to stand erect barefooted on a plane horizontal surface against a wall, with his heels, back of the shoulders and head touching the wall. The anthropometry rod is kept in front of the subject and the crossbar of the anthropometer is adjusted so that its lower edge touches the Navel. Scoring: The measurement is recorded from floor to navel distance and recorded accurate up to 0.1 cm.

d) Trunk and Neck Length (TNL) [5]: 'Anthropometric Rod', was taken to measure the Trunk and Neck Length and will be measured in nearest millimeter. Method: The researcher took the distance to between the tip of the subject's nose and the seat of the chair the subject were sitting in. The position were erect with the chair level as zero end of the Anthropometric Rod was placed between the two legs and on the seat level of the chair. Scoring: Measure the trunk and neck length of the subject by took the distance to the nearest millimeter between tips of the nose seat of the chair.

e) Body Surface Area (BSA): To measure the body surface area (BSA) the height were measured by Stadia meter and weight were measured by weighing machine respectively from the subjects and put it in the **Mosteller's formula (1987),** ***BSA (m2) = SQR RT ([Height(cm) x Weight(kg)] / 3600).***

Table 1: Average Values of BSA for Different Age Groups [6]

Neonate	Child of 2 years	9 years	10 years	12–13 years	Women	Men
0.25 m²	0.5 m²	1.07 m²	1.14 m²	1.33 m²	1.6 m²	1.9 m²

f) Waist Hip Ratio (WHR): To find out the Waist Hip Ratio (WHR), Waist and Hip were measured to its nearest centimeters put it in the following formula: ***Waist Hip Ratio (WHR) = Waist (cm) / Hip (cm)*** **[7].**

Table 2: Norms: As Stated by Bray and Gray

Risk	Score
Low	< 0.83
Moderate	0.83 – 0.88
High	0.89 – 0.94
Very High	> 0.94

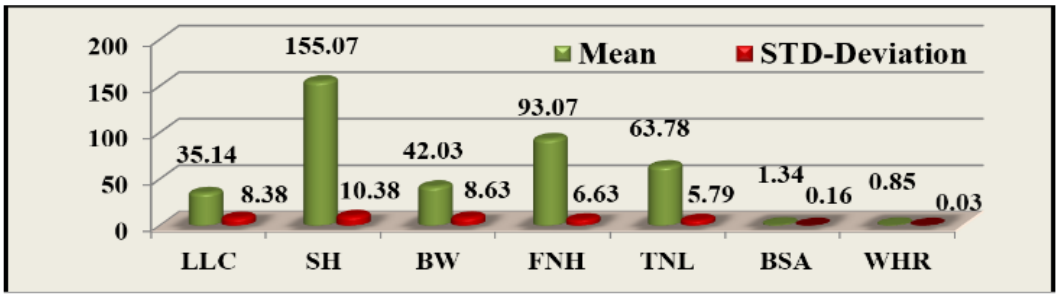
The collecting data were calculated by using Descriptive Statistic and Coefficient of Correlation "r" and level of significance was set at 0.05 levels.

Analysis of Data: To find out the relationship of degree of angle of Total Lateral Lumber Curvature of spine of the Santal tribal children with their selected anthropometrics characteristic, Descriptive Statistic and 'Coefficient of Correlation' "r" was applied at 0.05 level of Significant and it is presented in the following Tables and Figures:

Table 3: Mean and Standard deviation of Lateral Lumber Curvature (LLC), Standing Height (SH), Body Weight (BW), Floor to Navel Height (FNH), Trunk and Neck Length (TNL), Body Surface Area (BSA) and Waist Hip Ratio (WHR)

Sl. No.	Variables	Mean	STD-Deviation
1.	Lateral Lumber Curvature (LLC)	35.14^0	8.38^0
2.	Standing Height (SH)	155.07 cm	10.38 cm
3.	Body Weight (BW)	42.03 kg	8.63 kg
4.	Floor to Navel Height (FNH)	93.07 cm	6.63 cm
5.	Trunk and Neck Length (TNL)	63.78 cm	5.79 cm
6.	Body Surface Area (BSA)	1.34 m^2	0.16 m^2
7.	Waist Hip Ratio (WHR)	0.85 cm	0.03 cm

Table Drown According to Calculated all Collecting Data.



Graphical represent of the Table- 3

Fig 1:

Table 4: 'Coefficient of Correlation' "r" of Lateral Lumber Curvature (LLC) with Standing Height (SH), Body Weight (BW), Floor to Navel Height (FNH), Trunk and Neck Length (TNL), Body Surface Area (BSA) and Waist Hip Ratio (WHR)

Sl. No.	Variables	Coefficient of Correlation "r"
1.	Standing Height (SH)	- 0.702 *
2.	Body Weight (BW)	- 0.640 *
3.	Floor to Navel Height (FNH)	- 0.436 *
4.	Trunk and Neck Length (TNL)	- 0.559 *
5.	Body Surface Area (BSA)	- 0.677 *
6.	Waist Hip Ratio (WHR)	- 0.374 *

Table value- 'r' 0.05 (26) = 0.374, *= Significant, NS=Not-Significant.

Findings: From these findings clearly reveled that, there were significant negative co-relational exist in case of Lateral Lumber Curvature (LLC) with all anthropometrics characteristic variables as because Cal "r" value [- 0.702 (Standing Height), - 0.640 (Body Weight), - 0.436 (Floor to Navel Height), - 0.559 (Trunk and Neck Length), - 0.677 (Body Surface Area) and - 0.374 (Waist Hip Ratio)] equivalent or higher than Tab "t" $_{0.05}$ (26) value (0.374).

Results and Discussion

Within the limitation of the present study the following Conclusions were drawn on the basis of obtaining results. In this study there were significant negative co-relational direction exist in case of Lordotic or Lateral Lumber Curvature with all selected anthropometrics characteristic variables.

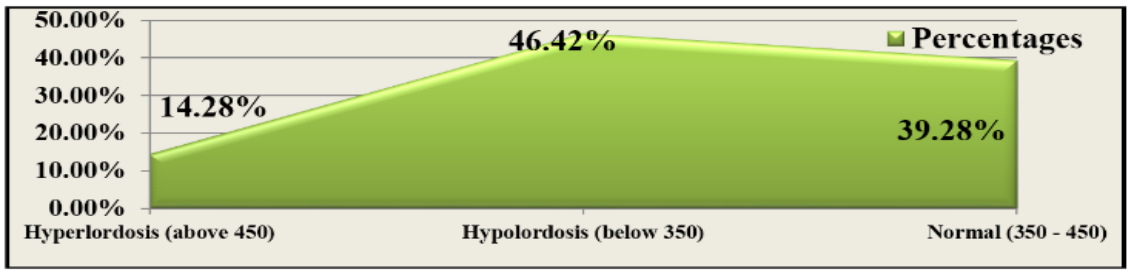
It is also evident from the obtained data shows that the mean and standard deviation of LLC, SH, BW, FNH, TNL, BSA and WHR has been found $35.14^0 \pm 8.38^0$ (LLC), 155.07 cm ± 10.38 cm (SH), 42.03 kg ± 8.63 kg (BW), 93.07 cm ± 6.63 cm (FNH), 63.78 cm ± 5.79 cm (TNL), 1.34 m^2 ± 0.16 m^2 (BSA) and 0.85 cm ± 0.03 cm (WHR) respectively.

From the obtained data the researcher also can show that out of total twenty eight (N=28) subjects four (N=4) had hyperlordosis (above 45^0) [4], thirteen (N=13) had hyperlordosis (below 35^0) [4] and eleven (N=11) had normal Lordotic curvature (35^0 - 45^0). That means the percentage of total hyperlordosis (14.28%), hyperlordosis (46.42%) and normal Lordotic curvature (39.28%), and it is presented in the Table-5 and Figures-2:

Table 5: Lordotic Curvature Status of Total Numbers of Subjects and Their Percentages

Lordotic Curvature (L^0)	Total out of 28 Subjects	Percentages
Hyperlordosis (above 45^0)	4	14.28%
Hypolordosis (below 35^0)	13	46.42%
Normal (35^0 - 45^0)	11	39.28%

According to Obtain Data.



Graphical represent of Table- 5.

Fig 2: Percentage of Total Hyperlordosis, Hypolordosis and Normal Curvature

The scholar is greatly satisfied to mention that the findings have accomplished the purpose for which the study was initially conceptualized. The study done by 'American Medical Association', February-1989, and the review published by 'Australasian Medical & Therapeutic Instruments Pty Ltd'. It said that "the he evaluation of the spine uses inclinometers, rather than Goniometers, for the measurement of range of motion, a technique that provides more accurate, reproducible result. Only the inclinometer will be valid". [8]

Another study done by Łukasz Stoliński, *et. al.* "Active self-correction of child's posture assessed with plurimeter and documented with digital photography", showed that, 126 primary school pupils, 60 girls and 66 boys, aged 7.0 to 13.0 years (9.1 ± 1.6), were examined in standing position twice: in a relaxed posture and in actively corrected posture, the 'Lumber Lordosis' angles in relaxed was as follow 34.8° ± 8.0° [3].

A research work done by Dr. Samiran Bisai, *et al.* (April-June 2010), "Very High Prevalence of Thinness among Kora-Mudi Tribal Children of Paschim Medinipur District of West Bengal, India" showed that, after measured BMI of total 119 Kora-Mudi tribal children, (49.6% boys and 50.4% girls) aged 2-13 years, overall prevalence of thinness, normal weight and overweight were 67.2%, 31.9%, and 0.8 %, respectively [9].

In the study of Subal Das and Kaushik Bose, (2011), "Prevalence of thinness using new international cut-off points among Santal tribal children and adolescents of Purulia District, West Bengal, India", showed that, out of 421 girls and boys, although more girls (44.6%) than boys (38.3%) were undernourished, this sex difference was also not significant. The overall prevalence of thinness (41.3%) was very high among the studied Santal children and adolescents [10].

There was an average BSA of 1.73 m2 for 3,000 cancer patients from 1990 to 1998 in a European Organisation for Research and Treatment of Cancer (EORTC) database [11]. During 2005 there was an average BSA of 1.79 m2 for 3,613 adult cancer patients in the UK. Among them the average BSA for men was 1.91 m2 and for women was 1.71 m2 [12]. However, there is some evidence that BSA values are less accurate at extremes of height and weight, where Body Mass Index may be a better estimate [13].

On the bases of related reviews and result of the present study which the researcher had discussed above the certain conclusion drown by the researcher.

Conclusion

After observed the results the researcher concluded that in the present study there were significant negative co-relational direction were exist in case of all selected anthropometrics characteristic variables with Lateral Lumber Curvature among Santal children. This suggests that there were always having a significant relationship between anthropometrics characteristic and Lordotic curvature, but the relationship always possess towards the negative direction. It also demonstrates that when the Standing Height, Body Weight, Floor to Navel Height, Trunk and Neck Length, Body Surface Area and Waist Hip Ratio (all anthropometrics characteristic) will be high among Santal school children it will may causes of decries of high lateral Lumber curvature or it may causes of prevention of Hyperlordosis.

Most of research in the field of Physical Education and fitness science suggest that obesity or heavy body weight proportionally effect on the spinal curvature that means more BSA and WHR causes of spinal abnormality. But in case of tribal children they are already suffer from malnutrition, poor fitness, and negative health care, poor knowledge about total health and most importantly inadequate muscle & bone mass, because of those reasons most of them suffer from spinal abnormality, as because they have poor muscle & bone mass that directly effect on their posture as well. Because for that the researcher thinks that if they have more BSA and WHR, so proportionally they achieve more muscle mass and also bone mass which help them to put their spinal posture hold in a normal position and also help to maintain normal spinal curvature angle.

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