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Correlations of neck disability index with anthropometric and neck biomechanical variables in Indian obese adolescents

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ABSTRACT

The purpose of the present study was to search the correlations of neck disability index with selected anthropometric and neck biomechanical variables in Indian obese adolescents aged 12-18 years. To solve this problem, three anthropometric variables viz. height, weight and BMI, one body composition component, viz. percent body fat, six neck biomechanical variables, viz. neck range flexion, neck range extension, neck right side flexion, neck left side flexion neck right side rotation and neck left side rotation were measured and neck disability index was estimated on randomly selected 108 Indian obese adolescents (56 boy and 52 girl) aged 12–18 years from two schools of Ludhiana, Punjab, India. An adequate number of non-obese controls (n = 113, 59 boys and 54 girls) were also taken from the same schools for comparisons. In result, one way analysis of variance showed statistically significant between-group differences (p<0.008 - 0.001) in all the variables studied, except, neck right side flexion, neck right and left side rotation among obese and non-obese boys and girls. In obese boys, significant positive correlations (p < 0.05) of neck disability index were found with neck right and left side flexion, and significant negative correlations (p < 0.05 – 0.001) with height and weight, whereas in obese girls, significant negative correlations (p < 0.05 – 0.001) were found with height, BMI, neck right flexion and extension. In conclusion, it may be stated that though neck disability index had some correlations (p< 0.001) with almost all the variables studied, no marked effects of obesity was reported on neck disability index in Indian obese adolescents.

Keywords: Anthropometric variables, Neck biomechanical variables, Neck disability index, Indian obese adolescents.

INTRODUCTION

Childhood obesity is a serious health problem, and obesity epidemics is increasing at an alarming rate[6,8].Many study shows that overweight and obese children are more frequently experience the musculoskeletal problem than do normal weight children[6].

Obesity associated problem and diseases decreases the quality of life span. Significant biological, emotional, intellectual and social changes take place during adolescence and mental health problems are relatively common in

this age group. Adolescent health problem may be short term state or persistent long term pattern. Persistent long term are of concern as they may be precursor of adult psychopathology[9].

Neck pain is the sensation of discomfort in the neck area. Neck pain can result from disorders of any of the structures in the neck, including the cervical vertebra and inter- vertebral disc, nerves, blood vessels, esophagus, larynx, trachea, lymphatic organs, thyroid gland or parathyroid gland. Neck pain arises from numerous different conditions and sometime referred to as cervical pain[1]. Studies from Finland, Sweden and Norway had reported that the lifetime prevalence of neck pain was 71% and that between 12% and 34% of adult experienced neck pain annually. Neck pain is more prevalent among Lower socioeconomic status those performing repetitive, static work or physically demanding work, those with previous neck trauma, and among those suffering from co morbid conditions such as depression ,low back pain and headache[3].

Activity level may influence NSP directly or via other factors Physical characteristics such as Muscle strength, Flexibility, BMI, Muscle endurance or Motor competence may be associated with spinal posture and spinal stability[8]. Thus, there is a need for initial exploratory study to examine the suspected links between adolescent neck shoulder pain and certain physical characteristics. The current research question was weather there is increased prevalence of neck shoulder pain in the obese adolescent or in the average weight adolescent and find out the possible reasons. We also further investigated the cervical range of motion of both obese and non obese boys and girls and fill out from them a self reported questionnaire whose purpose is to find how neck pain is affecting the ability to manage everyday life.

MATERIALS AND METHODS

Participants

The present cross-sectional study is based on randomly selected 108 Indian obese school-going adolescents (56 boy and 52 girl) aged 12–18 years from two schools of Ludhiana, Punjab, India. An adequate number of non-obese controls (n = 113, 59 boys and 54 girls, were also collected from the same classes for comparisons. The age of the subjects were recorded from the date of birth registered in their respective institutes. A written consent was obtained from the subjects. The data were collected under natural environmental conditions in morning (between 8 AM. to 12 noon). The study was approved by the institutional ethics committee.

Anthropometric measurements

Three anthropometric variables, viz. height (HT), weight (WT) and BMI were taken on each subject. Anthropometric variables of the subjects were measured using the appropriate techniques[7] and were measured in triplicate with the median value used as the criterion. One body composition component, viz. percent body fat (%BF) was estimated

The height was recorded during inspiration using a stadiometer (Holtain Ltd., Crymych, Dyfed, UK) to the nearest 0.1 cm, and weight was measured by digital standing scales (Model DS-410, Seiko, Tokyo, Japan) to the nearest 0.1 kg. BMI was then calculated using the formula weight (kg)/height^2 (m)^2. Percent body fat was assessed with standard formula [11] using the four skinfold measurements (biceps, triceps, subscapular and suprailiac) measured by Harpenden Skinfold caliper.

Neck biomechanical variables

A total of six neck biomechanical variables, viz. neck range flexion (NRF), neck range extension (NRE), neck right side flexion (NRSF), neck left side flexion (NLSF) neck right side rotation (NRSR) and neck left side rotation (NLRSR) were measured by standard techniques using goniometer. Neck disability index was estimated with the use of information provided through the neck disability questionnaire [Fairbanks et al. 1980].

Statistical Analysis

Standard descriptive statistics (mean ± standard deviation) were determined for directly measured and derived variables. One way analysis of variance was tested for the comparisons of data among Indian obese and non-obese boys and girls, followed by post hoc Bonferroni test. Pearson's correlation coefficients were applied to establish the relationships between neck disability index and other variables measured. Data were analyzed using SPSS (Statistical Package for Social Science) version 17.0. A 5% level of probability was used to indicate statistical significance.

RESULTS

The descriptive statistics of anthropometric and neck disability variables in Indian obese adolescents was shown in table 1. Obese boys were less tall than non-obese boys, but obese girls were taller than their non-obese counterparts. Both obese boys and girls were heavier than their controls. In case of both BMI and %BF, obese adolescents had the higher mean values than controls. So far neck biomechanical variables were concerned, obese adolescents had the higher mean values in all the variables studied, except, NLSR than their non-obese counterparts. One way analysis of variance showed significant between-group differences ($p < 0.008 – 0.001$) in all the variables, except, NRSF, NRSR and NLSR among these four sets of data.

Table 2. Descriptive statistics of neck disability parameters in Indian obese adolescents. One way analysis of variance showed statistically significant difference (p<.04-.001) in personal care, headache, work, driving, sleeping and subsequently NDI between them.

Table1. Descriptive statistics of anthropometric and neck biomechanical variables in Indian obese adolescents

Variables	Obese boys		Non-obese boys		Obese Girls		Non-obese girls		F	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
HT (cm)	165.7	7.58	168.5	8.87	164.4	4.85	161.5	5.86	9.96	0.001
WT (kg)	74.49	10.19	54.14	9.74	71.59	4.77	49.68	6.67	111.0	0.001
BMI kg/m^2	27.05	2.10	18.94	2.46	26.46	1.29	19.01	2.17	225.0	0.001
%B.F	23.78	2.81	12.91	3.30	32.47	2.75	22.60	3.00	354.5	0.001
NRF (degree)	53.72	4.77	49.82	4.86	54.43	4.73	50.65	4.76	10.94	0.001
NRE(degree)	40.00	3.93	37.86	4.66	38.41	5.03	36.48	4.08	5.13	0.002
NRSF(degree)	49.30	6.69	48.21	8.17	51.36	5.32	48.15	6.61	2.26	0.08
NLSF(degree)	50.12	6.02	46.16	7.74	49.77	6.00	48.98	5.78	4.05	0.008
NRSR(degree)	52.21	4.92	51.25	6.62	51.36	4.74	51.30	6.00	0.29	0.83
NLSR(degree)	51.28	4.77	51.34	6.50	51.02	6.15	50.18	5.82	0.43	0.73

Table 2. Descriptive statistics of neck disability parameters in Indian obese adolescents

Variable	Obese boys		non-obese boys		obese girls		Non-obese girls		F	P
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD		
Pain intensity	o.19	0.39	0.21	0.49	0.39	0.62	.41	.66	2.08	0.10
Personal care	0.28	0.59	.09	.34	0.50	.79	.33	.61	4.06	0.008
Lifting	0.46	0.70	.52	.83	.66	.74	.78	1.14	1.27	0.28
Reading	0.72	0.73	.68	.69	.66	.71	.96	.97	1.66	0.18
Headache	0.44	0.45	.53	.66	.43	.66	.76	.70	2.77	0.04
Concentration	0.63	0.62	.55	.78	.61	.75	.55	.79	0.13	0.94
Work	0.49	0.59	.27	.55	.70	.70	.52	.72	3.86	0.01
Driving	0.37	0.69	.21	.45	.62	.37	.11	.32	2.67	0.05
Sleeping	0.25	0.44	.25	.51	.68	.74	.33	.61	5.55	0.001
Recreation	0.14	0.35	.23	.43	.14	.35	.24	.43	1.01	0.39
NDI	3.93	1.94	3.59	2.7.	4.64	2.68	4.92	3.19	2.74	0.04

Table 3. Correlations of neck disability index with other anthropometric and neck biomechanical variables in Indian obese adolescents

Variable	Obese boys	Non obese boys	Obese girls	Non obese girls	Total
HT	-.483**	-.170*	-.323**	-.025	-.252*
WT	-.283*	-.100	-.110	-.259*	-.125
BMI	.061	.006	.238*	-.286*	-.020
%B.F	.061	.006	.135	-.292*	.104
NRF	.016	-.110	-.246*	-.077	-.067
NRE	-.047	-.115	-.223*	-.006	-.124
NRSF	.271*	-.075	-.070	.239*	.085
NLSF	.224*	-.164*	.10	.354**	.107
NRSR	-.033	-.392**	-.134	-.029	-.168*
NLSR	.061	-.258*	-.026	-.207*	-.157*

The correlations of neck disability index with other anthropometric and neck biomechanical variables in Indian obese adolescents was given in table 3. In obese boys, significant positive correlations ($p < 0.05$) of neck disability

index were found with NRSF and NLSF, and significant negative correlations ($p < 0.05 – 0.001$) with HT and WT, whereas in obese girls, significant negative correlations ($p < 0.05 – 0.001$) were found with HT, BMI, NRF and NRE.

DISCUSSION

The findings of the present study indicated that obese adolescents had significantly higher mean values in almost all the anthropometric and neck biomechanical variables than the non-obese counterparts. These differences were might be due to the physical and physiological differences among them. In obese boys, significant positive correlations of neck disability index were reported with neck right and left side flexion, and significant negative correlations with two anthropometric variables (height and weight), whereas in obese girls, significant negative correlations were found with two anthropometric variables (height and BMI). But in case of non-obese adolescents, neck disability index was significantly negatively correlated with height, neck left side flexion, neck right and left side rotation in boys and with weight, BMI, percent body fat, neck left side rotation and significantly positively correlated with neck right and left side flexion. Thus, the findings did not establish clear cut effects of obesity on neck disability index in these adolescents.

Risk factors –data from studies investigating association of biomechanical and psychological factors in the neck pain. Neck pain was associated with the psychological factors, such as high quantitative job demand and low co worker support. Physical factors of sitting and neck flexion also contributed to development of neck pain[10]. Children with chronic tension-type headache associated with the pericranial tenderness showed less cervical range of motiom than children without headache[5]. One study showed that neck pain was not related to the level or nature of self reported physical activity or type of sedentary activity [2]. However another study showed that neck shoulder pain was associated with fitness and motor competence, varied with gender [8].

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