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Mohd. Akbar Ganie
Department of Physical Education Sant Gadge Baba Amravati University, Amravati, Maharashtra, India.

Correspondence
Mohd. Akbar Ganie
Department of Physical Education Sant Gadge Baba Amravati University, Amravati, Maharashtra, India.

Personal habits improvement programme and physical fitness exercises as a remedial measures for lordosis among secondary school children

Mohd. Akbar Ganie

Abstract
Lordosis is the bending of the lumbar spine that gives the vertebral column of humans its characteristic ventrally convex curvature. Postural deformities are commonly encountered among Secondary School children. This alarming problem has forced a great number of researchers to deal with it. Prolonged and improper seating in the school benches, in front of television sets, computers; heavy school bags and insufficient physical activity are some of the causes of body deformities, which affect the elementary/high school and university student population. The aim of the present study was to investigate personal habits improvement programme and physical fitness exercises as a remedial measures for lordosis among Secondary school children. The difference were found between the means of post test of control and experimental group, because mean of post test of control group is 65.33 which is more than mean of post test of experimental group is 59.76, so the difference of mean within these two groups is 5.56. To check the significant difference between post test of control and experimental groups the data was again analyzed by applying‘t’ test. Before applying‘t’ test, standard deviation was calculated and found that S.D of post control group of lordosis is 3.47 while the S. D. of post experimental is 3.99 and their standard error = 0.63 and 0.73 respectively. Therefore significant difference were found between post test of control and experimental group because value of calculated‘t’ = 5.76 which is more than tabulated ‘t’ =2.00 at 0.05 level of significance, which shows that significant improvement were found in experimental group after the implementation of twelve weeks personal habits improvement programme and physical fitness training programme upon the experimental group.

Keywords: Exercise, Lordosis, Personal Habits, Spinal cord, Vertebrae.

Introduction
The spinal column is considered as a part of the body that due to its structural positioning and also connection of different muscles and ligaments has several functions. In this way, the several functions can be accounted for by the spinal column as follows: provide structural support and balance to maintain an upright posture, connection of the head to the rest of the body, and protection for the spinal cord. The spinal curvature can refer to the normal concave and convex curvature of the spine, and it is very important to keep balance, flexibility, and also absorption and distribution of the load applied to the spine. Although, the spinal column reduces the pressures on the vertebrates, however, because of bad habitual positioning, the spine usually gets abnormalities such as kyphosis and lordosis (Letafatkar *et al*., 2010) [18].
Lordosis is the typical convex bending of the human lumbar spine, and is thought to be an adaptation to bipedalism (Preuschoft *et al*., 1988; Robinson, 1973; Schilling *et al*., 2005) [10, 11, 12]. The upright body posture distinguishes humans from most mammals. Despite lordosis and the substantial evolutionary modifications of the human lower spine and hip, the topography of back muscles in humans is remarkably similar to that found in other primates (Schilling *et al*., 2005) [12]. The development of a lumbar lordosis in humans is apparently not genetically determined. Children develop a lordosis as they adopt bipedal standing and walking. Even Japanese macaques gradually acquire a pronounced lordosis of the lumbar spine when they are trained to walk bipedally (Preuschoft *et al*., 1988) [10]. In women, lordosis proliferates substantially during pregnancy (Whitcome, 2007) [13].

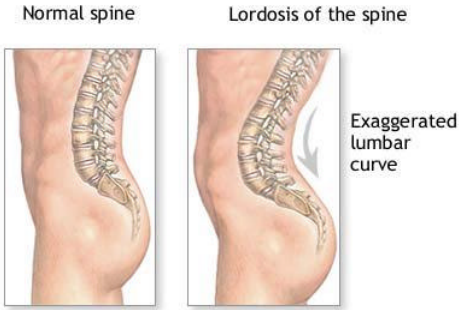


Fig 1: Normal and Lordotic spine.

The biomechanical ideal configuration for the human cervical spine is a posterior concave arc or lordosis (Harrison *et al*., 1996; Jackson *et al*., 1996; Janik, 1996) [1, 2]. This positions the center of gravity of the skull over the mid cervical vertebrae (Kapandji, 1974) [4]. The loss or reversal of the normal cervical lordosis and attendant forward head posture has long been identified with numerous consequential health problems (Wallace *et al*., 1994) [5] including decreased vital lung capacity, (Cailliet and Rejuvenation, 1987) [6] cervical, interscapular and headache pain, (Greigal-Morris *et al*., 1992; Watson *et al*., 1993) [7, 8] and temporomandibular disorders (Lee *et al*., 1995) [9]. Many symptoms may be moderated or eliminated by improving posture (Preuschoft *et al*., 1988) [10]. Lordosis is the typical convex bending of the human lumbar spine, and is thought to be an adaptation to bipedalism (Preuschoft *et al*., 1988; Robinson, 1973; Schilling *et al*., 2005) [10, 11, 12]. The upright body posture distinguishes humans from most mammals. Despite lordosis and the substantial evolutionary modifications of the human lower spine and hip, the topography of back muscles in humans is remarkably similar to that found in other primates (Schilling *et al*., 2005) [12]. The development of a lumbar lordosis in humans is apparently not genetically determined. Children develop a lordosis as they adopt bipedal standing and walking. Even Japanese macaques gradually acquire a pronounced lordosis of the lumbar spine when they are trained to walk bipedally (Preuschoft *et al*., 1988) [10]. In women, lordosis proliferates substantially during pregnancy (Whitcome *et al*., 2007) [13].

Causes of Lordosis

Generally imbalanced diet, improper environment improper development of muscles, obesity, bad habits of walking, sitting, lying, carrying imbalance loads and diseases affecting vertebrae and spinal muscles are such causes which result in lordosis. In addition to these causes, not performing exercises and taking excessive food are also major causes of lordosis.

Materials and Methods

Sources of Data

The required data was collected from the Government Secondary schools of District Kulgam of Jammu and Kashmir State, all the 9th and 10th standard male students ranging in age between 14 to 16 years were considered the source of data for the present study.

Selection of Subjects

Subjects were selected with the help of purposive sampling method from the secondary schools of District Kulgam, Jammu and Kashmir State. Firstly, the local administrative officers were consulted regarding the aims and objectives of the study. The author has then taken the written permission from the Chief Education Officer (C.E.O.) Kulgam to select the subjects. 60 kyphotic students were selected for the present study.

Collection of Data

The data pertaining to the study was collected by using Spondylometer for measuring the angle of deformities of lordosis.

Instrument construction

The instrument spondylometer used for identification of postural defects of lordosis was fabricated under the guidance of Dr. Ab. Rashid Dar, Block Medical Officer (BMO), Kulgam, a renoved orthopedician of the state Jammu and Kashmir. All parts of the spondylometer, i. e. the vertical bar, adjustable pegs, the platform and the holes of vertical bar were measured in presence of the expert so as to ensure the reliability of the instrument for collection of data. The measurements of different parts of the spondylometer were as follows:

- Plat-form- 60cm ×40cm
- Verticalbar- 2.0 m
- Length of Pegs- 20cm
- Distance between holes- 12 cm

Fig 2: Supervision of Dr. Ab. Rashid during the fabrication of Spondylometer

Test Reliability

A number of measurement sessions were taken under the guidance of Dr. Ab. Rashid Dar, Block Medical Officer, Kulgam, to ensure the accuracy of measurements. Finally, in taking measurements, eight subjects were tested.

Administration of Test

Equipment: Spondylometer

Procedure

The curve was taken as a criterion for lumbar thoracic region for Lordosis. After briefing every student for the use of Spondylometer, marked pegs were fixed in the holes made at distance of 3 inches on the Spondylometer. The subject was asked to stand with only lower pent and bare footed on the Spondylometer, on the marked base with feet apart, the back were touch the pegs and hands were down in relaxing positions and they keep the neck straight. The subject was asked to stand with his body in erect position as standing against a wall. The curves in the lumber region were marked on graph paper and the angle of the curvature were measured and was noted down for Lordosis. The intensity of angle was taken as score.

Administration of Training and fitness Programmes

Before imparting the physical fitness training and personal habits improvement programme upon the deformity students, the training programme was prepared according to the nature and intensity of deformity. The subjects were divided into 2 groups homogeneously, keeping them in descending order as per the intensity of the deformity. Out of 60 subjects, 30 subjects were selected for control group and 30 as experimental group. Then the prepared training schedule was applied upon the experimental group only.

The training was carried out daily from Monday to Saturday and prolonged for 12 weeks. Physical fitness training programme was conducted from Monday to Friday. All the deformity subjects of experimental group were also involved in personal habits improvement programme on Saturday, the intensity of physical fitness training was raised after 15 days. The habits like walking, sitting, sleeping, eating, clothing etc, were taken in to consideration during the preparation of training schedule.

Experimental group of students were performing initial fitness activities during their physical fitness training as jogging, sideway neck bending, neck rotation, hip rotation, stretching, forward bending, foot, ankle and knee rotation, sit ups and chin ups. Besides that the following fitness exercises were adapted upon the lordotic students in order to reduce the lordosis

Fitness Exercise for Lordosis

In order to minimize the intensity of lordosis, following exercises were performed to ensure the fitness of abdominal and back muscle (lumber muscles). The exercises were performed in lying and standing positions.

Fig 3: Subjects lying in prone position with hands at side and chin on the ground, keeping both the legs straight with toes together, pointing outward followed by tightening the gluteus muscles and holding the position up to ten counts.

Fig 4: A group of students lying in prone position and stretching the legs together and raising their legs alternately one by one above the floor and holding the same position continue for ten counts.

Fig 5: Subjects taking standing position with feet slightly apart, clasp hands behind the neck, bend trunk side wards and rotate from side to side.

Results and Discussion

Selection of Statistical Treatment

To find out the effect of personal habits improvement programme and physical fitness training on postural deformity of lordosis among secondary school children one tale 't' test statistical technique was employed.

Level of Significance

The level of significance was set at 0.05 level of significance which was considered adequate and reliable for the purpose of this study.

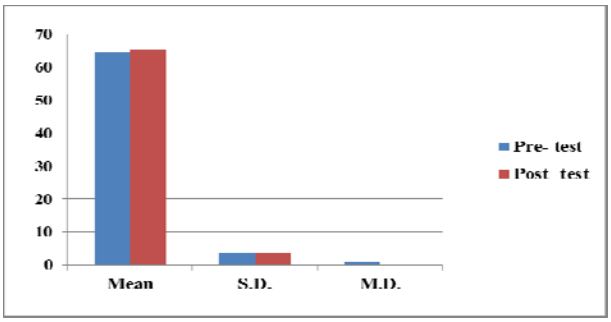
Table 1: Angle of deformity of Lordosis between pre and post test of Control group.

Control Group	Mean	S.D.	S.E.	M.D.	D.F.	O.T.	T.T.
Pre- test	64.36	3.56	0.65	0.96	29	0.10	1.67
Post- test	65.33	3.47	0.63				

Level of Significance = 0.05

Tabulated 't' 0.05 (29) = 1.67

Table-1 Shows that there is a difference between means of pre and post test of control group, because mean of pre test is 64.36 which is lesser than the mean of post test which is 65.33 and therefore mean difference is 0.96. To check the significant difference between pre and post test of control group the data was again analyzed by applying't' test. Before applying't' test, standard deviation was calculated where S.D of pretest was found as 3.56 and the S.D of Post control group was found as S.D. = 3.56 and the standard error of pre test = 0.65 and the standard error of post test = 0.635 respectively. Therefore no significant difference were found between pre and post test of control group because value of calculated't' = 0.10 which is lesser than tabulated 't' =1.67 at 0.05 level of significance, which indicates that the deformity among the post control group were increased by 0.96 average.



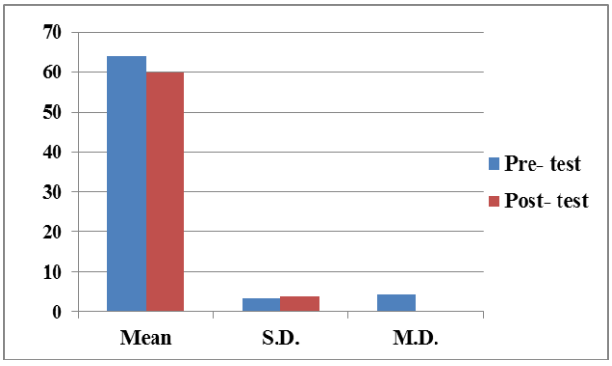
Graph 1: Graphical representation of angle of deformity of Lordosis between pre and post test of Control group.

Table 2: Angle of deformity of Lordosis between pre and post test of Experimental group.

Experimental Group	Mean	S.D.	S.E.	M.D.	D.F.	O.T.	T.T.
Pre-test	64.23	3.48	0.63	4.46	29	0.37	1.67
Post-test	59.76	3.99	0.73				

Level of Significance = 0.05
Tabulated 't' 0.05 (29) = 1.67

Table- 2 indicates that there is a difference between means of pre and post test of experimental group, because mean of pre test is 64.23 which is greater than the mean of post test is 59.76 and therefore means difference is 4.46. To check the significant difference between pre and post test of experimental group the data was again analyzed by applying't' test. Before applying't' test, standard deviation was calculated and result of pre-test are as S. D. = 3.48 and in Post test where S.D. = 3.99 and the standard error of pre test = 0.63 and the standard error of post test = 0.73. Therefore no any significant difference were seen between pre and post test of experimental group because value of calculated 't' = 0.37 which is less than tabulated 't' =1.67 at 0.05 level of significance, which shows no significant improvement was found within post experimental group after the utilized twelve weeks personal habits improvement programme and physical fitness training.



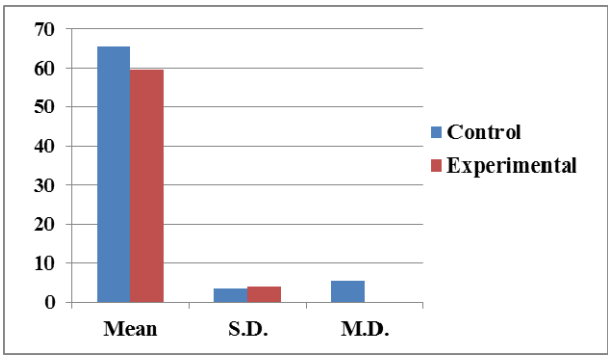
Graph 2: Graphical representation of angle of deformity of Lordosis between pre and post test of Experimental group.

Table 3: Angle of deformity of Lordosis between post- test of Control and Experimental group.

Group	Mean	S.D.	S.E.	M.D.	D.F.	O.T.	T.T.
Control	65.33	3.47	0.63	5.56	58	5.76	2.00
Experimental	59.76	3.99	0.73				

Level of Significance = 0.05
Tabulated 't' 0.05 (58) = 2.00

Table-3 revealed that difference were found between the means of post test of control and experimental group, because mean of post test of control group is 65.33 which is more than mean of post test of experimental group is 59.76, so the difference of mean within these two groups is 5.56. To check the significant difference between post test of control and experimental groups the data was again analyzed by applying't' test. Before applying't' test, standard deviation was calculated and found that S.D of post control group of lordosis is 3.47 while the S. D. of post experimental is 3.99 and their standard error = 0.63 and 0.73 respectively. Therefore significant difference were found between post test of control and experimental group because value of calculated't' = 5.76 which is more than tabulated 't' =2.00 at 0.05 level of significance, which shows that significant improvement were found in experimental group after the implementation of twelve weeks personal habits improvement programme and physical fitness training programme upon the experimental group.



Graph 3: Graphical representation of angle of deformity of Lordosis between post- test of Control and Experimental group.

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