

# Effect of Posture Correction and Moderate Intensity Exercises on Respiratory System in Teenagers

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## Abstract

**Background:** Teenage is the time of shaping health behaviour and preventing postural defects and improving respiratory fitness. The teenagers possess insufficient knowledge about their respiratory system. Postural defects are commonly seen among teenagers due to lack of physical activity and poor postural habits which can lead to non harmonious development of organs and affect respiratory system as well. For efficient respiratory function, moderate intensity exercises with posture correction would be useful. There is paucity of literature showing effect of posture correction and moderate intensity exercises on respiratory system in teenagers, hence this study would be helpful to analyse the same.

**Objectives:** To find out effect of posture correction exercise on respiratory system in teenagers. To find out effect of moderate intensity exercises on respiratory system in teenagers.

**Methodology:** The study was carried out in Karad area. The subjects were selected according to inclusion and exclusion criteria. Total 35 subjects were participated in this study. Prior consent and assent form was taken. Aim and procedure were explained to the subjects in their preferred language before data collection. Pre and post assessment was done by 6 minute walk test for respiratory function and flexicurve was measured using flexible ruler to recognize spinal postural defect. Peak flow meter was used to measure lung function

**Result:** In conducted study, 6 minute walk test, peak flow meter and flexicurve showed statistically significant difference between pre and post treatment values.

**Conclusion:** On the basis of the result of the study, it can be concluded that posture correction and moderate intensity exercises helps in improving respiratory function in teenagers.

**Keywords:** Moderate intensity exercise, spine posture correction, teenagers.

## Introduction

Teenage is the time of shaping health behaviour. Throughout the life there is various body posture changes occur. Teenage is the age where most dynamic changes

occur. The type of posture depends on many factors such as age, gender, day today activities.<sup>1</sup>

If the postural defects are left untreated it may cause spinal deformities in the spine and also can affect development of lungs and other motor organs. Further it can also affect respiratory function due to low oxygen consumption. Lack of physical activity can also cause spinal deformities. Conditions of the external environment in which individuals live have great impact on the posture.<sup>2</sup> Nowadays teenagers spent most of their time in leisure activities such as watching television and playing video games and mostly play

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indoor games. Also habits like wearing school bags on one arm only, maladjustment of school desk to the individual's height, standing with stressing on one leg, and other psychological factors can also cause poor postural habits.<sup>1</sup>

Obesity and overweight are most commonly seen in the society which leads to lack of physical activities, inability to cope in sports. Back pain is commonly seen in the individuals with postural defect. An increasing deformity in the spine can also affect psyche of the individual and lack of acceptance of body image. Neglected or untreated postural habits can further cause defects like scoliosis, rounded shoulders, flat back, kyphosis<sup>1,2</sup>. Postural defect are more commonly found in girls compared to boys. Where the thoracic hyperkyphosis were prevalent in boys at the age of 14 years.<sup>3</sup>

Low level of physical activity not only affects the posture but also the development of osteoarticular system and thus future development of the body. The physical development is marked by increase in sources of energy that are provided in the anaerobic metabolism. The effect of this change improves exercise capacity. These abilities close by the end of the maturation. Hence it is important to stimulate physical activity in younger age because it has beneficial effect on health which also influences adult life.<sup>2</sup>

Metabolic equivalent (MET) is defined as resting metabolic rate, that is, amount of oxygen consumed at rest, which is equal to 3.5 ml O<sub>2</sub> per kg body weight per minute. METS are used to describe the functional capacity of the individual and provide repertoire of activities in which individual can safely participate. Activities requiring only 1- 4 METS are considered low intensity activities and are not suitable for improving respiratory function in normal individuals. Activities in the 5-8 METS are considered as moderate intensity activities and are sufficient for sedentary persons. Activities in the METS above 8 is considered as high intensity activities and are vigorous for fit individuals.<sup>4</sup>

Moderate intensity activities are beneficial for respiratory health. Physically active individuals have controlled blood pressure, favourable plasma lipoprotein profile. Respiratory endurance training is associated with increased levels of circulating high density lipoprotein and reduction of triglyceride level.<sup>5</sup>

### **Moderate intensity exercises**

Cardiac effect:-

They stimulate small myelinated and unmyelinated fibres in skeletal muscles and increase myocardial activity. It involves sympathetic nervous system response which includes peripheral vasoconstriction in nonexercising muscles, increase in heart rate, increase in systolic blood pressure.

Peripheral effect:-

It causes generalized vasoconstriction that allows blood to be shunted from non working muscles to working muscles. There is increase in stroke volume, heart rate, cardiac output, blood flow through working muscles because increase in myocardial contractility. There is also increase in systolic blood pressure.

Respiratory response:-

Gas exchange increases across the alveolar capillary membrane. Alveolar ventilation also increases by 10 to 20 fold during exercise to supply additional oxygen requirement.<sup>6</sup>

Posture correction:-

Posture correction exercise contributes to an increase in lung capacity and increase in depth of breath. Posture correction exercise also positively affect nervous system through simulating the process of maturing the motor areas of brain which contribute to the locomotor skill. All the above factors help in improving posture.<sup>6,7</sup>

Relaxed or slouched posture is characterized by shifting the entire pelvic segment anteriorly resulting in hip extension and shifting of thoracic segment posteriorly, resulting in flexion of thorax. This is mostly caused by relaxed posture in which muscles are not used to provide support.

Flat back posture is characterised by decreased lumbar lordosis and posterior tilting of the pelvis. This is caused by continued slouching or flexion in sitting or standing attitude.

Scoliosis is lateral curvature of spine and it commonly causes due to faulty or poor postural habits. These all types of postural defects most commonly seen among teenagers due to poor postural habits, poor respiratory fitness and due to weak muscles.<sup>6</sup>

Prevention of postural impairments is very difficult procedure of securing general health both physical and

mental. This problem is commonly seen among teenagers and adolescents because during this phase there are many risk factors which can cause posture disorders and these disorders can affect future life. Thus posture correction exercises and moderate intensity exercises can help in improving respiratory system.

### Material and Methodology

This was a study to find the effect of posture correction and moderate intensity exercises on respiratory system in teenagers. The study was carried out in karad area. The subjects were selected according to inclusion and exclusion criteria. Total 35 subjects were taken according to inclusion criteria. The inclusion criteria were subjects with age group between 12 to 18 years and subjects having spinal postural defect. The exclusion criteria were subjects with any recent surgery, any recent trauma, structural deformity, any systemic diseases, and unexplained weight loss. Demographic data of the subjects was taken. Prior consent and assent form was taken. Aim and procedure were explained to the subjects

in their preferred language before data collection. Pre and post assessment was done by 6 minute walk test for respiratory function and flexicurve was measured using flexible ruler to recognize spinal postural defect. Peak flow meter was used to measure lung function Included participants received moderate intensity exercises for 30 minutes daily for 5 times a week. Exercises are run and jump in place, jumping jacks, side to side hop and standing side hop. Participants also received exercises for posture correction. Exercises are chin tuck in 3 sets 10 repetition, scapular retraction 3 sets 10 repetition, cat and camel 3 sets 10 repetition, Patient was taught about reinforcement to reinforce proper performance by using cues throughout the day to check correct posture. The effect of treatment was noted using outcome measures. The experimental results were statistically analyzed.

### Statistical Analysis

The paired T test and one way ANOVA test were used for analysis of data. Statistical analysis of recorded data was done using the software SPSS version 20.

## Findings

### AGE AND GENDER WISE DISTRIBUTION

SERIAL NO.	AGE GROUP	SUBJECTS	GENDER	
			Male	Female
	Age group	Total		
1	12-15 years	21	10	11
2	16-18 years	14	8	6

**Interpretation:** Above table represents , two age group i.e. 12-15 years which consist of 21 subjects (male-10 and female- 11) and in other age group 16 to 18 years which consist of 12 subjects (male-8 and female- 6).

### Walking distance in 6 min walk test:

	PRE	POST	P Value	Inference
Mean + SD	508+ 126.37	544.14+ 121.95	0.0007	Extremely significant

**Interpretation:** In the present stud y pre interventional mean and standard deviation of walking distance in 6 min walk test was 508± 126.37, whereas post interventional Mean± SD was 544.14± 121.95. It concluded that interference was considered extremely significant.

**Peak flow meter**

	Y	G	P value	Inference
Pre	21	14	0.0079	Very significant
Post	9	26		

**Interpretation:** In pre interventional study 21 subjects were in Y Zone while 14 subjects were in G zone whereas in post interventional study 9 subjects were in Y Zone and 26 subjects were in G zone. This was calculated by chi-square test. It concluded that interference was considered extremely significant.

**Cervical lordosis index**

	PRE	POST	P Value	Inference
Mean±SD	31.142± 5.151	29.857± 4.440	0.0007	Extremely significant

**Interpretation:** In the present study pre interventional mean and standard deviation of cervical lordosis index was 31.142± 5.151, whereas post interventional Mean±SD was 29.857± 4.440. It concluded that interference was considered extremely significant.

**Kyphosis index**

	PRE	POST	P Value	Inference
Mean+ SD	34.74+ 5.83	31.44+ 5.74	<0.0001	Extremely significant

**Interpretation:** In the present study pre interventional mean and standard deviation of kyphosis index was 34.74+ 5.83, whereas post interventional Mean±SD was 31.44± 5.74. It concluded that interference was considered extremely significant.

**Lumbar index**

	PRE	POST	P Value	Inference
Mean±SD	48.45± 11.622	45.94± 11.877	0.0095	Very significant

**Interpretation:** In the present study pre interventional mean and standard deviation of lumbar index was 48.45± 11.622, whereas post interventional Mean±SD was 45.94± 11.877. It concluded that interference was considered extremely significant.

**Discussion**

Teenage is the time of shaping health behaviour. Throughout the life there is various body posture changes occur. Teenage is the age where most dynamic changes occur. The type of posture depends on many factors such as age, gender, day today activities. If the

postural defects are left untreated it may cause spinal deformities in the spine and also can affect development of lungs and other motor organs. Further it can also affect respiratory function due to low oxygen consumption. Lack of physical activity can also cause spinal deformities. Conditions of the external environment in which individuals live have great impact on the posture. Nowadays teenagers spent most of their time in leisure activities such as watching television and playing video games and mostly play indoor games. Also habits like wearing school bags on one arm only, maladjustment of school desk to the individual's height, standing with stressing on one leg, and other psychological factors can also cause poor postural habits.

This research was undertaken with the aim to study the effect of posture correction and moderate intensity exercises on respiratory system in teenagers.

The study was carried out and the result was drawn by 6 min walk test, peak flow rate and flexicurve by using flexible ruler.

The study was carried out in karad area. Subjects with a sample of 50 were screened for inclusion and exclusion criteria. Subjects fulfilling inclusion criteria were recruited in the study with a sample of 35. Total 35 Prior consent and assent form was taken. Aim and procedure were explained to the subjects in their preferred language before data collection.

Pre and post assessment was done by 6 minute walk test for respiratory function and flexicurve was measured using flexible ruler to recognize spinal postural defect. Peak flow meter was used to measure lung function

Included participants received moderate intensity exercises for 30 minutes daily for 5 times a week. Participants will also receive exercises for posture correction.

According to previous study of Michel Latalski, Jerzy Bylina, Marek Fatyga, et al Risk factor of postural defects in children at school age. The study concluded that there is relation between physical activity and occurrence of postural defect in children and identification and recognition of risk factors may facilitate their elimination. Hence postural correction exercises may help to prevent postural defects.

Also moderate intensity exercises increases gas exchange across the alveolar capillary membrane.

Alveolar ventilation also increases by 10 to 20 fold during exercise to supply additional oxygen requirement.

It was found that among 35 subjects, 64% subjects belonged to 12-15 years of age group and remaining 36% belonged to 16-18 years of age group. In the age group there were 21 subjects out of whom 10 were males and 11 were females. In the age group there were 14 subjects out of whom 8 were males and 6 were females.

Pre interventional mean and standard deviation of walking distance in 6 min walk test was  $508 \pm 126.37$ , whereas post interventional Mean  $\pm$  SD was  $544.14 \pm 121.95$ . It concluded that interference was considered extremely significant. (P- 0.0007, t- 3.719)

According to American lung association there are three zones used to measure peak flow rate. They are Green zone (G) which indicate 80 to 100 percent of your normal peak flow rate and condition is under control. Yellow zone (Y) which indicates 50 to 80 percent of usual or normal peak flow rate and airways are narrowing and may require treatment and red zone which indicates less than 50 percent of normal rate. It shows that airways are severely narrowing and its medical emergency. As per the present study there were no subjects in the red zone. In pre interventional study 21 subjects were in Y Zone while 14 subjects were in G zone whereas in post interventional study 9 subjects were in Y Zone and 26 subjects were in G zone. This was calculated by chi-square test. It concluded that interference was considered extremely significant. (p- 0.0079)

According to the study of WENDY RHEAULT, MA, STEVE FERRIS, et al, Intertester reliability of the flexible ruler for the cervical spine, the study was done to determine whether flexible ruler had intertester reliability for the cervical spine curvature in normal subjects and the data suggested that flexible ruler is reliable tool for measuring cervical spine curvature.<sup>15</sup> As per the present study pre interventional mean and standard deviation of cervical lordosis index using flexible ruler was  $31.142 \pm 5.151$ , whereas post interventional Mean  $\pm$  SD was  $29.857 \pm 4.440$ . It concluded that interference was considered extremely significant. (P-0.0007, t- 3.707)

According to the study of Teri L Yanagawa, Murray E. Maitland, Keith Burgess, et al. Assessment of thoracic kyphosis using the flexicurve for individuals with osteoporosis, the study was done to assess the test-retest reliability of the measurements of thoracic kyphosis using flexicurve ruler with individuals with osteoporosis

and the study concluded that flexicurve ruler can be used for the measurement of kyphosis in elderly women with osteoporosis based on reliability outcome.<sup>16,17</sup> As per the present study pre interventional mean and standard deviation of kyphosis index was  $34.74 \pm 5.83$ , whereas post interventional Mean  $\pm$  SD was  $31.44 \pm 5.74$ . It concluded that interference was considered extremely significant. (P- <0.0001, t- 5.732)

Pre interventional mean and standard deviation of lumbar index was  $48.45 \pm 11.622$ , whereas post interventional Mean  $\pm$  SD was  $45.94 \pm 11.877$ . It concluded that interference was considered extremely significant. (P- 0.0095, t- 2.750).

Moderate intensity exercise and posture correction is used to improve respiratory function .Moderate intensity activities are beneficial for respiratory health. Physically active individuals have controlled blood pressure, favourable plasma lipoprotein profile. Respiratory function improvement is associated with increased levels of circulating high density lipoprotein and reduction of triglyceride level.<sup>5</sup>

### Conclusion

On the basis of the result of the study, it can be concluded that posture correction and moderate intensity exercises helps in improving respiratory function in teenagers

**Conflicts of Interest:** There is no conflict of interest in this study.

**Source of Funding:** The study was funded by Krishna institute of medical sciences deemed to be university, karad.

**Ethical Clearance:** This study is undergone ethical clearance through the university level ethical committee. Protocol number is 0102/2019-2020.

### References

1. Mitchel Latalski, Jerzy Bylina, Merek Fatyga, Martin Repko, et al. Risk factors of postural defect in children at school age. *Annals of agricultural and environmental medicine*; 2013, vol. 20.
2. Dorota LIZAK, Wojciech CZARNY, Marta NIEWCZAS. The problem of postural defects in children and adolescents and the role of school teachers and counserlors in their prevention. *Scientific review of physical culture*, volume 4.
3. Mikko S. Poussa, Markku M. Heliovaara, Jorma T. Seitsamo, et al. Development of spinal posture in cohort of children from the age of 11 to 22 years. *Eur spine J*; (2005).
4. M. JETTE, K. SIDNEY, G. BLUMCHEN. Metabolic equivalents in exercise testing, exercise prescription, and evaluation of functional capacity. *Clin. Cardiol*; (1990).
5. Matthew A. Nystoriak, Aruni Bhatnagar. Cardiovascular effects and benefits of exercise. *Frontiers in cardiovascular medicine* ;(2018).
6. Carolyn kisner, Lynn allen Colby. Therapeutic exercises foundation technique. Sixth edition. Jaypee brothers medical publishers;2013
7. Marta Motow-Czyz, Aneta Orczyk, Marek Orczyk. Postural defect correction in the process of physical education and sport. *Physical activity review*, VOL2; 2014.
8. Danik Lafond, Martin Descarreaux, Martin C Normand, et al. Postural development in school children: A cross sectional study. *Chiropractic and osteopathy*; 2017.
9. ATS statement: guidelines for the six- minute walk test. *Am J Reapir Crit Care Med* vol 166, pp 111-117; 2002.
10. Silvia Ulrich , Florian F Hildenbrand, Ursula Treder, et al. Reference values for the 6- minute walk test in healthy children and adolescents in Switzerland. *BMC pulmonary Medicine*;2013.
11. karani magutah, Rebecca Meiring, Nilesh B. Patel, et al. Effect of short and long moderate- intensity exercises in modifying cardiometabolic markers in sedentary Kenyans aged 50 years and above. *BMJ open sport and exercise medicine*;2018.
12. H. J. Engels, J. Drouin, W. Zhu, et al. Effect of low impact moderate intensity exercise training with and without wrist weights on functional capacities and mood states in older adults. *Gerontology*; 1998.
13. Pamela K. Levangie, Cynthia C. Norkin. Joint structure and function. Fourth edition. Jaypee brothers medical publishers; 2015.
14. Susan B. O' Sullivan, Thomas J. Schmitz. Physical rehabilitation. Seventh edition. F. A. DAVIS company; 2013.
15. Wendy Rheault, Steve Ferris, Julie Ann Foley, et al. Intertester reliability of flexible ruler for the cervical spine. *The journal of orthopaedic and sport*

physical therapy; January 1989.

16. Teri L Yanagawa, Murray E. Maitland, Keith Burgess, et al. Assessment of thoracic kyphosis using the flexicurve for individuals with osteoporosis. Hong kong physiotherapy journal, vol. 18; 2000.
17. Sedigheh-Sadat Mirbagheri, Amir Rahmani- Rasa, Farzad Farmani, et al. Evaluating kyphosis and lordosis in students by using flexible ruler and their relationship with severity and frequency of thoracic and lumbar pain. Asian spine journal; 2015.