

Original Research Article

## Comparison of Six Minute Walk Test in Urban Versus Rural Indian Children in the Age Group of 6 - 11 Years

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### ABSTRACT

**Objective:** This study compared the performance of six minute walk test in children aged 6 to 11 years in urban and rural areas of Maharashtra (India).

**Method:** Prospective, cross sectional design. *Participants/patients:* 300 children between 6 to 11 years of age were selected by convenient sampling from rural, urban slum and urban affluent areas. The socioeconomic status and physical activity level of each child was assessed. The six minute walk test was conducted on each of these subjects and parameters like heart rate, blood pressure and respiratory rate were recorded before and after the test. The distance covered during the walk test was noted.

#### Results and Conclusion:

A difference in the distance covered in six minutes by children was observed between the three categories. The children in the rural areas covered the maximum distance of  $632.32 \pm 96.17$  meters, followed by affluent urban children of  $492.92 \pm 100.60$  meters and least distance was covered by those dwelling in the urban slums ie  $399.27 \pm 901$  meters. A moderate positive correlation was observed between physical activity and the distance covered during the test. Thus the study concluded that the socioeconomic status and physical activity level should be considered while assessing the 6 minute walk test in children.

**Key words:** Children, Physical activity, Rural, Urban, Six minute walk test

### INTRODUCTION

Most activities of daily living are performed at submaximal levels of exertion. <sup>[1]</sup> Thus submaximal exercise tests can be a good reflection of one's functional capacity. Six minute walk test (6MWT) is a simple, practical, reliable, and valid test that is used to assess the submaximal level of functional capacity in patients as well as healthy subjects. <sup>[1,2]</sup> The self-paced six minute walk test is also increasingly being used as a measure of functional exercise capacity in children. <sup>[3-7]</sup> Previous studies with respect to six minute walk test have been done on healthy children to establish the normative values in various countries. <sup>[8-11]</sup> D`Silva C.

et al <sup>[12]</sup> & Chitroda J. et al <sup>[13]</sup> performed the 6 minute walk test on Indian school children to establish normative values in healthy Indian children aged 6-12 years.

However, these studies do not take into account the vast variability between the city life consisting of urban children having a moreover sedentary lifestyle and gaming pattern as opposed to those in rural areas (villages) having a relatively active lifestyle and outdoor activities. <sup>[14,15]</sup> Also, between these two extremes lies the population residing in a pity state in the urban areas in slums with a compromised nutrition as well as environment. <sup>[15]</sup>

Thus, this study focuses on comparing the six minute walk test parameters in these three geographically, habitually and culturally different populations present in India & study if these factors of variable lifestyle affect the 6 minute walk test performance.

## METHODOLOGY

Approval for this prospective cross-sectional study was taken from the Ethics committee of D. Y. Patil University, Navi Mumbai. 300 healthy children, of both genders, in the age group of 6 to 11 years were selected through convenient sampling from schools in Mumbai and rural area near Mumbai. Children involved in sports activity at professional level or with any known cardio-respiratory, musculoskeletal or neurological disorder in the past six months were excluded from the study. School as well as parental consent for all children was taken. For children above 8 years of age, an informed assent was additionally was taken.

The Kuppaswamy's socioeconomic classification [16] was used to classify the socioeconomic status (SES) of the subjects. 100 children (47 girls and 53 boys) were from Mumbai in the class I & II (Upper & Upper middle), 100 (49 girls and 51 boys) were slums in Mumbai from the class III to V (Lower middle, Upper lower & Lower) and the remaining 100 (48 girls and 52 boys) were from rural area near Mumbai which were from lower middle class. Demographic data and physical activity levels using the Physical Activity Questionnaire- Elementary Children (PAQ-C) [17] was recorded for each subject.

Subjects were instructed to wear comfortable clothing & appropriate shoes for walking

A light meal was acceptable before early morning or early afternoon tests. The 6 minute walk test was carried out as per American Thoracic Society guidelines. [1] Instructions to the children were given in the language that they could easily understand. The outcome of the test was the distance covered in six minutes. The rate of perceived exertion at the end of the test was recorded using the Pictorial Children's Exertion Rating Table (PCERT). [18]

## RESULTS

The data was analysed using SPSS and the level of significance was set at 0.05. Comparison of various parameters between the three groups was done using ANOVA and post-hoc by Tamhane except exertion rating which was compared using Kruskal-Wallis test.

Overall about 15% of the children from the entire data were found to be underweight and approximately 6% were overweight. The body mass index (BMI) was observed to be least in the urban slum children followed by rural children and most in urban affluent children while the PAQ score was significantly more in rural children as compared to urban affluent and slum children (Table 1). The analysis of 6 minute parameters revealed that the maximum distance was covered by the rural children and least by the urban slum children (Fig 1) with no significant difference in the change between pre and post- test blood pressure and heart rate values in the three groups. The perception of rating was more in urban affluent children as compared to rural children though they comparatively covered lesser distance (Table 2). A moderate positive correlation (r=0.6416) was observed between physical activity score and 6 minute walk distance.

**Table 1: Demographics and PAQ score**

Parameters	Group A (Upper and Upper Middle class)	Group B (Urban slum)	Group C (Rural)	P values
Age	8.04 ± 1.669	7.73 ± 1.370*	7.99 ± 1.133 <sup>#</sup>	0.2487
BMI	14.21 ± 1.479	13.025 ± 1.564**	16.179 ± 2.609** <sup>##</sup>	<0.0001
PAQ score	3.137±0.8635	2.663±0.8272 <sup>**</sup>	3.97±0.5312 <sup>**<sup>##</sup></sup>	0.000

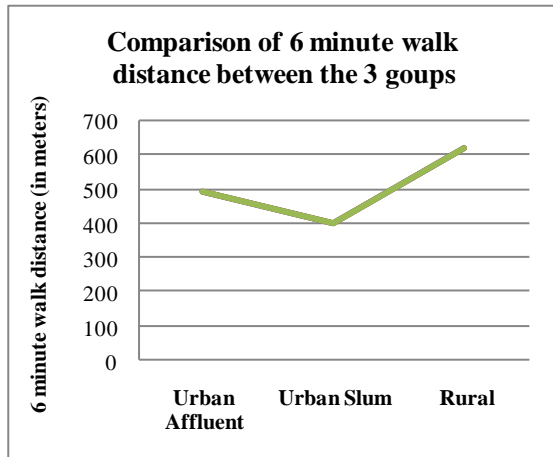
\*comparison with group A, # comparison with group B, \*\*P<0.05, <sup>##</sup>P<0.05, \*P>0.05, #P>0.05

**Table 2: Comparison of 6 minute walk test parameters between the 3 groups**

Parameters	Group A (Upper and Upper Middle class)	Group B (Urban slum)	Group C (Rural)	P values
Distance covered (meters)	492.92±100.60	399.27±66.901**	632.32±96.17**:#	0.000
Mean difference in Systolic Blood Pressure <sup>†</sup>	0.67±9.682	-1.51±13.803*	1.21±10.922*:#	0.220
Mean difference in Diastolic Blood Pressure <sup>†</sup>	-0.56±5.852	-0.49±10.054*	-0.83±9.552*:#	0.96
Mean difference in Heart rate <sup>†</sup>	5.72±8.215	4.95±7.322*	4.95±10.672*:#	0.781
RPE	2.44 ± 0.8327	3.4 ± 0.964*	3.1 ± 0.9898**:#	<0.0001

<sup>†</sup> difference between pre and post walk

\*comparison with group A, # comparison with group B, \*\*P<0.05, ##P<0.05, \*P>0.05, #P>0.05



**Fig 1: Comparison of 6 minute walk test parameters between the 3 groups**

## DISCUSSION

A study by Karkera et al revealed that children from a rural set up demonstrate higher cardiovascular endurance as compared to their urban counterparts. [19] In the rural areas, modern gadgets like TV's and computers may not be so prevalent as entertainment sources. As a result these children play more outdoor games as a source of entertainment which may be increasing their physical activity levels. Additionally walking is a part of their daily activity which may also contribute to high physical activity level. [20] These factors may have contributed to the longer distance covered by the rural children as compared to the urban children as observed in the current study.

A systematic review on socioeconomic status and health behaviours in adolescence in Scotland reported a consistently positive association between SES and physical activity levels. More children from upper SES had moderate to high levels of physical activity as compared to children from lower SES. [21] Another study observed that children from upper

SES were more active physically in their leisure time as compared to children from lower SES. [22] Similar observations were also seen in the current study wherein the affluent children performed better in the 6 minute walk test as compared to the children from the slum areas. Children from the upper SES use computers, videogames, television etc as an entertainment source which may make them relatively sedentary. Additionally these children are equipped with cars and other vehicles of public transport for travelling which makes their life less active. However they have access to facilities like swimming pools, club houses, skating rinks etc where they can participate in recreational activities in leisure time. [21] In contrast, the children from low SES are partially prey to disadvantages of both urban and rural children. They are less likely to report easy access to the recreational facilities stating cost as the main barrier. [21] Residing in a city, they can utilize the transportation thus have very little walking or cycling. The comparatively higher level of physical activity maybe the contributing factor to a longer distance been covered by the affluent children as compared to the children from slums.

## CONCLUSION

Children from rural areas were observed to demonstrate better 6 minute walk test performance as compared to urban affluent and urban slum children. The physical activity level and socioeconomic status may need to be taken into consideration while assigning the normative values to 6 minute walk distance in children. Further studies to assess the influence of nutrition on 6 minute walk test performance may be done.

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