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Physical fitness profile of children with various locomotors disability in Ahmednagar district

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Introduction

Disability according to WHO is an umbrella term, covering impairments, activity limitations and participation restrictions. Disability is thus not just a health problem; it is a complex phenomenon reflecting the interaction between features of persons' body and features of society in which he/she lives. As per the census 2011 in India, out of 121 crore population about 2.68 crore persons are disabled which is 2.21% of total population.[1]

Physical activity (PA) participation is widely recognized as a critical component of health and development for disabled and non-disabled children. Engagement in moderate to high intensity physical activity (PA) during childhood is advocated for in the promotion of optimal health outcomes and may offset predisposed risk for the development of secondary health conditions experienced by disabled children. [2]Participation in physical activity opportunities is a fundamental childhood experience that fosters the psychosocial development of interpersonal skills, self-confidence, and self-efficacy.[3]

Increased PA participation is a primary goal expressed by parents and professionals for disabled children.[4]

According to the Healthy Children 2010 report, people with disabilities are less likely to participate in sustained or vigorous exercise than people without disabilities.[5] Children with disabilities tend to be weaker and more susceptible to early fatigue than their peers.[6] They have higher metabolic, cardiorespiratory, and mechanical costs of mobility, which cause early fatigue and decreased exercise performance.[7] Therefore consistent understanding of the physical activity participation construct is necessary to successfully describe the health status of disabled children.

Strength training and endurance training are components of physical fitness that may prevent secondary disorders, lower energy costs of movement, and enhance quality of life for children with disabilities. [8]Less is known about how to design and disseminate programs of exercise for persons with disabilities. Yet, optimizing physical activity for people with disabilities may be even more important to their general welfare. Disabilities commonly cause

"a cycle of deconditioning" in which physical functioning deteriorates, leading to further reduction in physical activity levels.

Therefore it is critical need to examine physical function in disabled children which can be measured as a health indicator for disabled children.

Aim: To investigate physical fitness level aspects among children with disabilities in Ahmednagar district.

Objectives: 1) to evaluate and compare the components of physical function in disabled children of Ahmednagar district.
2) To evaluate and compare taluka wise performance of disabled children of Ahmednagar district.

Need of the study: There are not enough articles on evaluation of physical function in disabled children. Information about physical fitness among these children may help us to formulate more appropriate treatment guidelines which in turn will improve their functional status leading to improvement in Quality of life. Therefore the purpose of the study is to find out physical fitness level in disabled children of Ahmednagar district.

Methodology

Research design: the research design of this study is observational cross sectional study.

Study setting: rural children with locomotor disability in Ahmednagar district (Kopargaon, Jamkhed, Karjat, Shrigonda)

Duration of the study: 6 months

Samples size: 135

Sampling method: convenience sampling

Criteria for sampling:

Inclusion criteria:

1) Children from the age group 3-16 years
2) Children who are willing to participate.

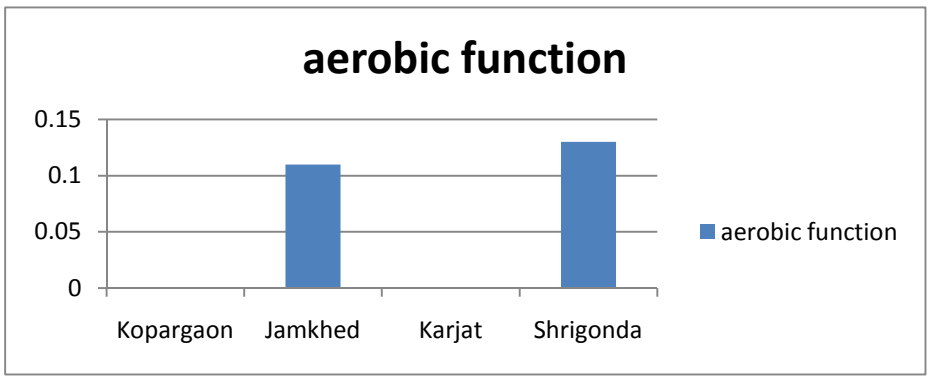
Exclusion criteria: Children who are not willing to participate.

Procedure: We visited various talukas of Ahmednagar district, i.e Kopargaon, Jamkhed, Karjat, Shrigonda. Prior information was given about the visit to those areas and pamplets were also distributed to gather as many children with disability as possible. The procedure was explained to the children and their care taker/ guardian. An informed consent was taken. Only those children who gave consent were included and physical fitness test was taken.

Outcome measure: physical fitness test which includes the components; aerobic function and musculoskeletal function which included strength/ endurance, flexibility and range of motion.

Results

1) Aerobic function:

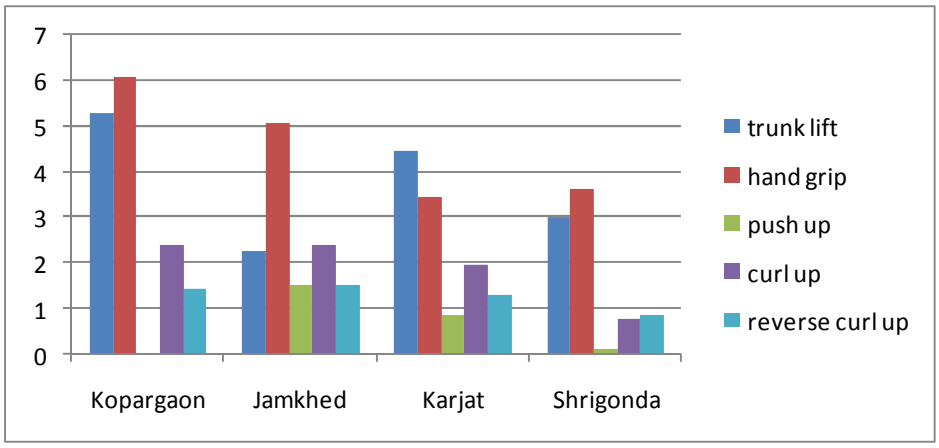


Graph 1: aerobic function (mean of 1 mile walk test) result in all the 4 areas.
X axis: areas covered in Ahmednagar; y axis: 1unit=0.02cm

Subjects participated in the study, faced difficulty in performing 1 mile walk test. The subjects of Kopargaon and Karjat were unable to perform the test. The participants of shrigonda and jamkhed could perform to certain extent. Out of all 4 areas shrigonda performed well in comparison to other 3 areas.

2) Musculoskeletal functions

a) Strength/ endurance

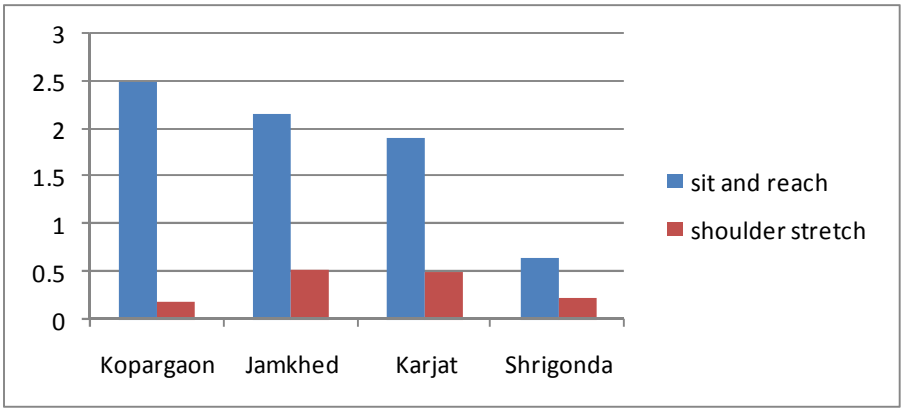


Graph 2: musculoskeletal functions (mean of trunk lift, hand grip, push up, curl up, and reverse curl up results) in all the 4 areas

X axis: areas covered in Ahmednagar; y axis: 1unit= 1cm

The subjects of Kopargaon performed trunk lift the most than karjat. Karjat performed better than shrigonda. The least was performed by subjects from Jamkhed.Kopargaon subjects had good grip strength whereas karjat was poor. Jamkhed and shrigonda subjects showed fair grip strength.Subjects from Jamkhed were able to perform the most number of push ups followed by Karjat. The subjects from shrigonda could perform push ups to a certain extent whereas the subjects from kopargaon were unable to perform it. Subjects from kopargaon and jamkhet performed almost equal number of curl ups, whereas subjects from karjat performed comparatively less than the previous two. Subjects from shrigonda performed the least.The most number of reverse curl up was performed by the subjects from Jamkhed followed by Kopargaon, Karjat and shrigonda.

b) Flexibility:

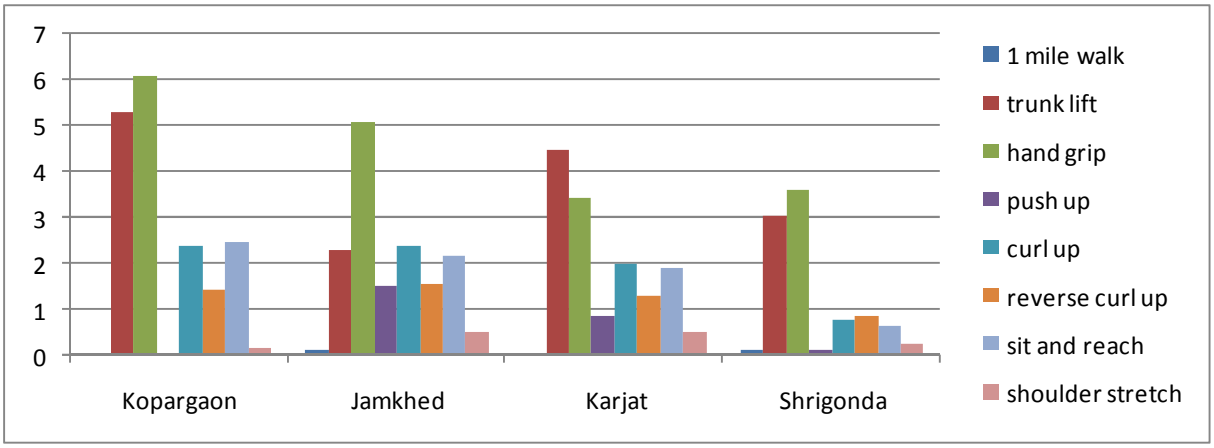


Graph 3: flexibility (mean of sit and reach, shoulder stretch result) in all the 4 areas.

X axis: areas covered in Ahmednagar; y axis: 1 unit=0.05cm

The graph shows regression in terms of flexibility from Kopargaon to Shrigonda.Maximum number of subjects from Jamkhed and Karjat were able to do the test. The number of subjects who could perform this test was half than the subjects from the other two areas in Shrigonda. Kopargaon subjects performed the least.

Physical function in all the 4 areas:



Graph 4: all components of the test performed in all 4 areas
X axis: areas covered in Ahmednagar; y axis: 1 unit=0.1 cm.

This graph denotes total physical function in Ahmednagar district. Out of all 4 Kopargaon shows more physical function in their disabled subjects.

Values showing each components of physical function:

	1 mile walk test	Trunk lift	Hand grip	Push up	Curl up	Reverse curl up	Sit and reach	Shoulder stretch
Values	0.10 ± 0.14	3.77 ± 1.3	4.5 ± 1.25	0.63 ± 0.70	1.89 ± 0.76	1.29 ± 0.30	1.80 ± 0.80	0.36 ± 0.17

While comparing all the components of physical function test in disabled children of Ahmednagar district, the component which was most affected was 1 mile walk test as the subjects were not able to stand and walk independently. Whereas the least affected component was hand grip followed by trunk lift. Rest all the components were relatively affected.

Values showing area wise physical function:

	Kopargaon	Jamkhed	Karjat	Shrigonda
Values	2.24±2.3	1.95±1.50	1.81±1.50	1.18±1.36

While comparing physical function of disabled children in Ahmednagar district, subjects from Kopargaon had better performance than other areas. The most disabled subjects were found in Shrigonda. Performance of subjects from Jamkhed and Karjat was satisfactory.

Taluka wise values of physical function:

Talukas	Aerobic function	Musculoskeletal function a) Strength/ endurance	Musculoskeletal function b) Flexibility
Kopargaon	0	3.05±2.58	1.34 ± 1.64
Jamkhed	0.11	2.57±1.46	1.34 ± 1.16
Karjat	0	2.4± 1.5	1.2 ± 0.98
Shrigonda	0.13	1.6 ± 1.53	0.44 ± 0.28

Aerobic function was poor in Kopargaon and Karjat. Strength was comparatively better in Kopargaon. Flexibility in Kopargaon and Jamkhed was fairly equal.

	1 mile walk	Curl up	Push up	Sit and reach
Normative values	>30 sec	>5	>5	>3cm
Values obtained	0.10 ± 0.14	1.89 ± 0.76	0.63 ± 0.70	1.80 ± 0.80

According to the study conducted by Maria A. Fragala-Pinkham et.al, we have taken the noramative values and compared with the values obtained in all the 4 areas.

Characteristics of participants:

Talukas	Mean age	Neurological involvement	Musculoskeletal involvement	Total no of participants
Kopargaon	10.44	16	6	22
Jamkhed	7.99	26	8	34
Karjat	10.38	34	16	50
Shrigonda	8.15	24	5	29

Discussion

The aim of our study was to evaluate the physical fitness in children with locomotors disabilities. Physical inactivity is common in all demographic groups but, it appears to occur disproportionately among people with disabilities. As age increases, their physical activity levels continue to decline. Besides the cardiovascular system, physical inactivity is also associated with such other adverse health effects as osteoporosis, diabetes, etc. Therefore primary outcome measure to assess this level of physical function we used was physical function test, which included aerobic function and musculoskeletal function. To assess the aerobic function 1 mile walk test was conducted; musculoskeletal function was divided into strength and flexibility, for which we took trunk lift, hand grip, push up, curl up, reverse curl up, sit and reach, and shoulder stretch.

We conducted a study in various talukas of Ahmednagar district, where we evaluated physical fitness of children with disability. The sample size included 135 subjects. The whole study required 6 months. We found out that while testing aerobic function, Kopargaon and Karjat were inefficient in performing those tests, whereas Shrigonda had better results than other areas. Study conducted by Rimmer JH et al. supports our result that, many people with disabilities are incapable of performing lower limbs exercise tests that are widely used in the diagnosis of coronary heart disease.[9] Thus we can say that children who have poor aerobic function are prone to cardiovascular problems.

For the musculoskeletal function we found out that, compared to endurance, strength was better. This was confirmed by comparing the results of hand grip and rest of the components; where we found out that hand grip had better results than trunk lift, push up, curl up and reverse curl up. This can help us to say that children with physical disability had better strength but had poor endurance; this can lead to increase fatigability in these children while performing any physical activity.

The other component of musculoskeletal function was flexibility, which when we compared with normative data was found out to be less. Thus we can say that flexibility component is also affected in children with affected physical function.

The development of muscular strength and joint flexibility is important as it improves the ability to do occupational and recreational tasks and reduces the potential for injury. In particular, people with disabilities may benefit from flexibility and resistance training to improve the ability to do activities of daily living. Children with disabilities often are unable to participate in community activities or prefer not to participate because it is difficult for them to keep up with peers who have normal physical function.

A limited number of fitness programs are available for children with disabilities. Therefore in our study we aimed to document the components affected so that the therapists can consider these components while formulating the exercise protocol for children with impaired physical function.

Conclusion

We can conclude the study by saying that, while performing physical fitness test in disabled children the most affected component was 1 mile walk test, i.e. aerobic functioning and the least affected component was grip strength followed by trunk lift. Also while comparing those talukas we found out that subjects from Kopargaon performed comparatively better than the rest whereas the subjects from Shrigonda were least able to perform those tests.

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