



# “A Study to Find Out Normative Reference Values for 10 Meter Walk Test for Normal Healthy Individuals in India- An Observational Study”

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## KEYWORDS

10 Meter Walk Test,  
Walking Speed, Time,  
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## ABSTRACT:

**BACKGROUND:** - The 10-meter walk test (10MWT) is a simple assessment to measure locomotor capacity in clinical and research settings. Walking speed is associated with several health-related outcomes. Factors that influence walking ability can be classified into six main physiological subsystems: central nervous system, perceptual system, peripheral nervous system, muscles, bone and/or joints, and energy production and/or delivery.

**AIMS AND OBJECTIVE:** - To find out normative value for 10-meter walk test for normal healthy Indian individuals.

**METHODOLOGY:** - 400 subjects were taken on the basis of inclusion and exclusion criteria. Each subject was made to perform the test on a walkway of 10 meter in which the time required to cover the distance was noted. Demonstration about the test measures were done and each subject instructed to walk at a comfortable (Normal Pace) and Fast Pace (As Fast as they could safely without running) for 10 meters. The Calculation of time was done for 6 meters only. 2 meters in the beginning was considered as acceleration phase and at the ending was considered as deceleration phase and hence were not calculated. Speed was calculated from time used to cover distance.

**RESULT:** - The mean value of gait speed with normal pace in age group 20-30 year is  $2.18 \pm$

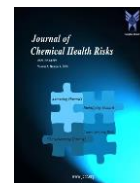
$0.33$  and maximum  $2.80 \pm 0.51$ , normal pace in age group 30- 40 year is  $1.97 \pm 0.29$  march and maximum pace mean value is  $2.51 \pm 0.44$ , normal pace in age group 40- 50 year is  $1.88 \pm 0.31$  and maximum pace mean value is  $2.34 \pm 0.4$ , normal pace in age group 50- 60 year is  $1.90 \pm 0.43$  and maximum pace mean value is  $2.38 \pm 0.51$ , normal pace in age group more than 60 years is  $1.50 \pm 1.50$  & with maximum pace  $1.79 \pm 1.79$ .

**CONCLUSION:** - Present study has established normative reference value for Indian population in age group 20-60 years.

## 1. Introduction

The ability to walk underlies many basic and community functions necessary for independence<sup>[1]</sup> Walking is a complex functional activity with multifarious variables that contributes or influences the walking speed. These variables include individual

health status, motor control, muscle performance and musculoskeletal condition, sensory and perceptual function, endurance, cognitive status, motivation and mental health and the environmental constraints<sup>[2]</sup>



Walk tests, in which the distance covered over a period of time is documented, have been used since 1970s as a part in quantification of functional capacity<sup>[3]</sup> The 10-meter walk test (10MWT) is a simple assessment to measure locomotor capacity in clinical and research settings. Outcome measures originally recommended are the time taken to complete the test<sup>[4]</sup> or the mean velocity<sup>[5,6]</sup> The mean velocity of gait has been termed the sixth vital sign because of its clinical and research relevance.<sup>[7]</sup> Different methods used to obtain outcome measures, such as standing start, walking start, self-selected pace, fast pace, and automatic or manual stopwatch system make the comparison of results between studies challenging, especially concerning the distance used for timing of the test and the pace allowed. Besides, there is a limited number of studies in children with typical development and growth.<sup>[8,9]</sup>

10 Meter walk test has the shortest duration and a short distance and is very easy to perform thus it becomes easier for all the kind of population perform the test. With that 2 meters in the beginning and 2 meters at the end are excluded and only the data of 6 meters in the middle is calculated so that it could give the accurate value of gate speed and time taken by the healthy individuals. As the acceleration and deceleration phase are deducted which gives the peak values of data.

Apart from these diseased population, the 10 MWT has a greater part in normal individuals such as evaluation of functional performance, physical fitness and other health indicators etc. Though there is a strong relationship between age, walking speed and functional performance<sup>[10]</sup>

## 2. Objectives

To find out normative reference value for 10-meter walk test for normal healthy individuals in India.

## 3. Methods

Based on selection criteria subjects were selected & written consent was taken. Basic demographic characteristics (age, gender) and anthropometrics (height, weight) were obtained from the participants before the test performance. Body weight was assessed with abeam scale (to the nearest 0.1 kg precision) and the height with a stadiometer (0.1cm precision) with subjects standing barefoot in light clothing.<sup>[11]</sup>

Following the documentation of subject characteristics, demonstrations about the test measures were done and each participant were instructed to walk at comfortable (normal pace) and fast pace (as fast as they could safely without running) for 10 meter a quiet even uncarpeted corridor. Only the middle 6 m, however, was timed to eliminate the effects of acceleration and deceleration. Start and stop of test's performance time coincided with the toes of the leading foot crossing the 2-m mark and the 8- m mark, respectively. From these data, the speed was calculated by dividing the 10m by the time (in seconds) required to walk the 10m<sup>[12]</sup>

Subjects were selected on the below mentioned criteria.

### Inclusion Criteria -

- Normal Individual
- Age group: 20-60 years
- Gender: Both Male and Female

### Exclusion Criteria -

- Individuals with Co-Morbidities of following systems-
- Musculoskeletal System,
- Neurological System,
- Cardiovascular System
- Those who were using any kind of walking aids

Individual walks without assistance 10 meters (32.8 feet) and the time were measured for the intermediate 6 meters (19.7 feet) to allow for acceleration and Deceleration.

## 4. Results

This study was done to find out average speed (with normal and maximum pace) in normal individual of age group 20 years or above. The subjects were divided into age group of 20-30 years, 30-40 years, 40-50 years, 50-60 years, more than 60 years. Total 400 subjects i.e. 100/ group had participated in this study. Google sheet was used to prepare the results in form of graphs. Below given graphs are arranged in sequencing age group within age gap of 10 years.

**Table 1: Results of various age groups**

Age Group	Mean $\pm$ S.D. Avg. Time (Normal)	Mean $\pm$ S.D. Avg. Time (Max.)	Mean $\pm$ S.D. (Normal Avg. Speed)	Mean $\pm$ S.D. (Max. Avg. Speed)
20- 30	4.6 $\pm$ 0.78	3.69 $\pm$ 0.69	2.18 $\pm$ 0.33	2.80 $\pm$ 0.51
30- 40	5.19 $\pm$ 0.88	4.10 $\pm$ 0.76	1.97 $\pm$ 0.29	2.51 $\pm$ 0.44
40- 50	5.45 $\pm$ 0.94	4.38 $\pm$ 0.78	1.88 $\pm$ 0.31	2.34 $\pm$ 0.40
50- 60	5.52 $\pm$ 1.31	4.40 $\pm$ 0.98	1.90 $\pm$ 0.43	2.38 $\pm$ 0.51
More Than 60	6.88 $\pm$ 1.23	5.81 $\pm$ 5.81	1.50 $\pm$ 1.50	1.79 $\pm$ 1.79

## 5. Discussion

The Primary purpose of this Study was to find the normal gait speed in healthy Indian population. 400 Subjects were taken based on inclusion and exclusion criteria with different age groups and were asked to perform 10-meter walk test. Both male and female were included and the data was divided based on the age. Groups were made based on the age like 20 to 30, 30 to 40, 40 to 50, 50 to 60, More than 60.

Before the test started, the basic demographic data like name, age, gender, height and weight was measured. The subjects were explained the procedure of the test. The test was performed with 3 trials of normal pace and 3 trials of maximum pace.

Time taken by individuals to cover 6 meter was calculated. 2 meters in beginning was considered as acceleration phase and 2 meters at the ending was considered as deceleration phase and hence there was not calculated. 3 Trials were taken for Normal walking speed and also 3 Trials were taken for Maximum walking speed and average of the data is considered as the result.

The result of the present study demonstrated that as the age of an individual increases, the speed decreases and the time taken to cover the distance increases; while comparing between different age groups.

The 10-meter walk is adequate for the capture of kinematics, kinetics, and dynamic electromyography and the measurement of walking speed over such short distances is frequently used as an outcome measure in clinical practice to estimate the individual's capacity to function in the and to address walking endurance during rehabilitation.

10 - meter walk can be utilized as assessment of fitness measure diseased population who cannot perform longer test like 6 MWT, 3 MWT etc.

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