

## Assessment of Agility in Elderly Population of Islamabad

Maheen Khan<sup>1</sup>, Sana Bashir<sup>1</sup>, Humaira Hussian<sup>1</sup>, Tayyaba Saman<sup>1</sup>, Rida Fatima<sup>1</sup>, Hina Shafi<sup>2</sup>

<sup>1</sup>Student, Doctors in Physical Therapy, Foundation University Institute of Rehabilitation Sciences, Islamabad

<sup>2</sup>Assistant Professor, Foundation University Institute of Rehabilitation Sciences, Islamabad

### ABSTRACT

**Background:** Agility is considered as one of the important components of physical fitness. In older adults, it is of utmost importance in response to any stimulus. The objective of this study was to determine normative values of agility in elderly population of Islamabad.

**Methods:** A Cross-Sectional Survey was conducted in community settings of Islamabad from February–July 2019 after approval by the Ethical Review Committee of Foundation University Islamabad. The calculated sample size was found to be 267, but due to missing data, analysis was done on 250 (100 females and 150 males). Participants were selected by convenient sampling. Physically independent participants were included and diseased population (severe musculoskeletal, neurological, and cardiopulmonary disorders), decreased functional status affecting hearing, vision, memory recall was excluded from the study. PAR-Q was utilized in uncovering any possible health risks linked to exercise. For evaluation of agility, the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD) Agility Test was performed. Agility scoring is based on time in seconds, with higher score representing less agility, and agility score of less than 62 represents good agility. Data were analyzed through SPSS version 21.

**Results:** The mean age, BMI and agility score of participants were 60.7±5.81 years, 26±4.30 kg/m<sup>2</sup> and 22.42±5.2 respectively. There was significant difference (P<0.001) in agility between males and females, with the mean agility score higher in females as compared to males. Similarly, Agility score was significantly high in females as compared to males in BMI range of 18.5 to >30 and all age categories.

**Conclusion:** Elderly population of Pakistan has good agility score

**Keywords:** Agility, older adults, physical fitness

#### Authors' Contribution:

<sup>1-2</sup>Conception; Literature research; manuscript design and drafting; Critical analysis and manuscript review; Data analysis; Manuscript Editing.

#### Correspondence:

Hina Shafi  
Email: hina.shafi@fui.edu.com

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## Introduction

Aging results in a continuous decline in functional capacity, demonstrated by reduced strength of lower limbs, impaired balance and agility. Such alterations may influence a person's everyday activities such as climbing and descending stairs or sitting and standing up from a chair, apart from decreasing capability of the older adults to quickly

react to external stimulus, such as slipping and staggering and to regain balance.<sup>1</sup>

Maintaining physical activity and fitness is of utmost importance in the geriatrics health care system to make elderly population live independently. Work has been done to assess and maintain the functional independence level in elderly population which is essential for their daily activities. This can only be

achieved by improving measures of functional fitness including specific motor abilities such as agility, balance and coordination.<sup>2</sup> Physical fitness comprises of two categories, health related and skill related fitness. Skill related fitness includes several fitness components such as agility, reaction time, balance, coordination, power and speed.<sup>3</sup> Functional independences in older population can be achieved by improving the variables (co-morbidities, body composition, physical activity, agility and walking).<sup>4</sup>

Agility has been, indeed, defined as a rapid whole-body movement with change of velocity or direction in response to a “stimulus”.<sup>5</sup> Available evidence suggests that a lack of effectively integrating neuromuscular and cognitive function during difficult tasks might be an underlying reason for falls in seniors.<sup>6</sup> It is supported by literature that agility declines with increase in age.<sup>7</sup> One reason behind this may be that elderly people usually don’t get health benefits associated with an active lifestyle.<sup>8</sup> Human evolutionary process advocates that the standard for health is related to physical activity. Contrary to this, inactivity has deleterious effect on health throughout life.<sup>9</sup> Physical function in elderly can be conserved or enhanced through agility training.<sup>10</sup> Deterioration in health as well as fitness can be efficiently alleviated through exercise. The proposed conventional training for older adults usually focuses on components of physiological robustness separately such as strength, endurance, balance and flexibility. So, a more comprehensive framework is a requisite for functional drills. There are several agility training perceptions that are collectively addressing strength, balance, spatial orientation and stop and go.<sup>11</sup>

There is no such study done in Pakistan where norms of agility in older adults have been found. More work is done on other components of physical fitness and agility remained a left-out component. So, the purpose of our study is to provide baseline values and current level of agility in elderly population.

## Material and Methods

Cross-Sectional Survey was conducted in community settings of Islamabad from February–July 2019 after approval by the Ethical Review Committee of Foundation University Islamabad. Raosoft was used for sample size calculation with a margin of error 5%, confidence level 90%, and 50% response distribution with population size of 20,000 and found as 267. Data analysis was done on 250 participants instead of 267 due to the factor of missing information. Study participants were selected by convenient sampling; inclusion criteria were the physically independent elderly population of >51 years of both genders (males and females) whereas diseased population (i.e., elderly adults with certain severe musculoskeletal, neurological, and cardiopulmonary disorders) were excluded from the study. After written informed consent; an aneroid sphygmomanometer was used to measure the Blood pressure of participants, a Weight machine, and measuring tape to measure the weight and height of participants. People who were at risk with increased physical activity were identified by the Physical Activity Readiness Questionnaire (PAR-Q.) which consist of seven questions to find out the readiness of the participants to participate in physical activity as well as some questions regarding basic information (age, gender, height, bodyweight. etc). The elderly who answered “NO” to all the 7 questions of PARQ were made part of the study and allowed to perform American Alliance for Health, Physical Education, Recreation, And Dance (AAHPERD) agility test. Firstly, Participants were educated about the AAHPERD agility test which was used to assess the value of agility in seconds and then asked to perform it. Where agility scoring is based on time in seconds, normative values are >99 =very weak, 75-95.15= weak, 63-74 = regular, 43-62 = good, <42 = very good (7). The heart rate and Blood Pressure of every participant were recorded before the performance of the test. The setting of the test

included two cones and a chair (the total span of the setting was approximately 31 ft.

The subject was asked to get up from the chair as the time started and walk towards (with a usual walking speed) and move around the cone on the right side of the chair then return to the chair (to seated position) then get up again from the chair and walk towards (with a usual speed of walking) and move around a cone on left of the chair (both right and left-sided cones were placed at a same distance from the chair). The procedure of the test was demonstrated by the researcher followed by the performance of the test by the participants. The time duration of the second trial was recorded in which the participants completed the whole course. The total test duration was approx. 10-15 minutes for each participant (including, explanation of the purpose of study, attainment of consent, screening, demonstration of the test by researcher, and performance of test by participants). Data was analyzed using SPSS 21. Data was presented in the form of mean and standard deviation. For comparison of gender, independent t-test was used.

For comparison of age and weight categories, one way ANOVA was used. The level of significance was set at < 0.05.

## Results

Agility was assessed within a sample of 250 elderly adults (>51 years age) living in Islamabad, out of which 100 were females (40%) and 150 were males (60%). There was significant difference ( $P < 0.001$ ) in agility score between male and females, with the mean agility score higher in females as compared to males. Similarly, Agility score was significantly high in females as compared to males in BMI range of 18.5 to >30 and all age categories (Table II).

Variables	Mean $\pm$ S.D
Agility (sec)	22.42 $\pm$ 5.2
Age (years)	60.7 $\pm$ 5.81
Height(cm)	164.51 $\pm$ 10.7
Weight(kg)	70 $\pm$ 11
BMI (kg/m <sup>2</sup> )	26 $\pm$ 4.3
Heart Rate(bpm)	77.2 $\pm$ 11.2
Systolic blood pressure(mmHg)	127.4 $\pm$ 12
Diastolic blood pressure(mmHg)	82.2 $\pm$ 10.13

Variables	Categories	Male No. (Mean $\pm$ SD)	Female No. (Mean $\pm$ SD)	p-value
Agility (seconds)		20.24 $\pm$ 3.93	25.70 $\pm$ 5.06	<0.0001*
BMI (kg/m <sup>2</sup> )	Under Weight (<18.5)	6 (20.33 $\pm$ 5.53)	2 (22 $\pm$ 5.65)	0.726
	Normal Weight (18.5- 24.9)	55 (20.35 $\pm$ 3.95)	31 (24.97 $\pm$ 4.58)	<0.0001*
	Overweight (25-29)	69 (20.22 $\pm$ 3.99)	49 (25.94 $\pm$ 5.42)	<0.0001*
	Obese (>30)	20 (20 $\pm$ 3.43)	18 (26.72 $\pm$ 4.86)	<0.0001*
Age (Number of Participant, Mean $\pm$ SD)	51 to 55 Year	21 (18.67 $\pm$ 3.95)	30 (24.97 $\pm$ 5.56)	<0.0001*
	56 to 60 Year	57 (20.56 $\pm$ 3.92)	44 (24.75 $\pm$ 3.71)	<0.0001*
	61 to 65 Year	39 (20.26 $\pm$ 3.89)	16 (27.69 $\pm$ 6.54)	<0.0001*
	66 to 70 Year	19 (21.63 $\pm$ 3.53)	6 (29 $\pm$ 4.52)	<0.0001*
	70 to 75 Year	11 (19.18 $\pm$ 4.19)	2 (26.50 $\pm$ 2.12)	0.038*
	>75 Year	3 (20 $\pm$ 6.24)	2 (31 $\pm$ 7.01)	0.162

\*Significant difference with p-value of <0.05

## Discussion

This study mainly focused on agility normative scores base line data of older adults of Islamabad. According to our study, the mean score of agility is greater in females as compared to males, Hujan et al also reported that physical attributes are the cause behind these differences in scores. Difficulty in personal care and functional ailments during diseased states are usually experienced by elderly females as compared to males of the same age.<sup>14</sup> The literature supports the decrease in scores of agilities with increasing age and the most likely reason behind this is reduced physical activity. Countering this, our study has found a distinct pattern. Holistically, there are a number of reasons for a compromise in physical activity in advanced age.

The built of a person, particularly, the weight and height of the body have a key role in motor wellness stature. Contrary to the results of our study which reveals no significant relationship between agility and weight that might be because of some confounding features including ethnicity, occupation, and daily lifestyle differences, J. Thakur (2016) inferred that a considerable relationship exists between agility and weight.<sup>16</sup> Another research was conducted by JD Liu and his colleagues, regarding senior fitness tests and it concluded that irrespective of body weight stature, every older adult reacted to the components of the test in the same way. The importance of every element of functional fitness was also the same for the participants, having dissimilar bodyweight statures.<sup>18</sup> Pak-Kwong Chang et al conducted a study regarding elements of functional fitness in a community of elderly people in Hong Kong. The study concluded that age-related decline was detected in every element under examination, particularly in agility, flexibility, and balance.<sup>17</sup> Unlike the results of our study, the results of previous studies exhibit that considerable relation

exists between agility and weight and greater Body mass index linked with decreased performance abilities, inhibiting the development of appropriate motor skills ultimately influencing agility.<sup>19,20</sup>

Results of another study conducted by T.Rohilla showed that a significant and positive correlation is there between functional walking capacity and muscle strength of the lower body in older adults. In contrast to our study, it is evident from this research that in older age muscle wasting affects muscle strength which further casts impact on the functional walking capacity and this keeps on going with growing age.<sup>19</sup> Our study provides normative values of agility in older adults which can be taken as a reference for future studies but there are few limitations that should be considered while conducting any similar study such as there was a lack of cooperation from females to participate that might be due to apprehension, related to the test performance. The study sample size was small with a low confidence level. Resources were not enough to approach multiple people over large geographical areas. As physical fitness including all of its components, especially agility may vary depending on the living environment of older adults, so people belonging to different setups can be a confounding factor.

## Conclusion

Elderly population of Islamabad has good agility scores

## Recommendations

Studies must be conducted among different cities in Pakistan and the results should be compared. Further studies should be done focusing on the effects of agility training in older adults and then compare pre and post agility training results in order to investigate the effects of agility training on the risk of falls in the elderly population.

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