INTRODUCTION

Ageing is a lifelong and inevitable process; it is a progressive change in the physical, mental and social status of individuals, which begins right from the mother’s womb and ends with death as stated by Southeast Asia report (Bagchi K, 2018). The Indian Council of Medical Research- India Diabetes (ICMR-INDIAB) reported nearly half of the population in the four regions of India of being inactive translating to 392 million inactive individuals in India (Das AK et al, 2014) which intensifies the need to know the physical activity levels of the older adults in our population. Healthy aging is promoted as the lifelong and inevitable process; it is a progressive change in the physical, mental and social status of individuals, which begins right from the mother’s womb and ends with death as stated by Southeast Asia report (Bagchi K, 2018). The inclusion criteria of the study was individuals willing to participate, able to ambulate > 10 feet without an assistive device or physical assistance, age group 60-70 years, both the genders. Pearson product-moment correlation coefficient test was used to know the correlation of physical activity (International Physical Activity Questionnaire) with balance (Timed Up and Go test) and gait parameters (gait speed, stride length) in elderly individuals. In the cross-sectional study, physical activity was moderately correlated with balance (r = -0.5692) suggesting that, as physical activity increases there is better balance of the elderly individuals. Also gait parameters; gait speed and stride length were found moderately correlated with physical activity highlighting the association between the variables. However, the results showed difference in the moderate correlation present in backward and forward walking gait parameters of the normal elderly individuals. The study showed the importance of physical activity in the elderly individuals as it is related to two important aspect of the aging process the balance and gait parameters; both being essential in activities of daily living. Future longitudinal studies can be considered to know the causal relationship between the variables.

ARTICLE INFO

Key Words:
Ageing, physical activity, balance, gait parameters

ABSTRACT

Healthy aging reflects the interactions between individuals and the environments, resulting in trajectories of both intrinsic capacity and functional ability. The study was conducted with the aim to examine correlation of physical activity with balance and gait parameters in 91 elderly individuals. The inclusion criteria of the study was individuals willing to participate, able to ambulate > 10 feet without an assistive device or physical assistance, age group 60-70 years, both the genders. Pearson product-moment correlation coefficient test was used to know the correlation of physical activity (International Physical Activity Questionnaire) with balance (Timed Up and Go test) and gait parameters (gait speed, stride length) in elderly individuals. In the cross-sectional study, physical activity was moderately correlated with balance (r = -0.5692) suggesting that, as physical activity increases there is better balance of the elderly individuals. Also gait parameters; gait speed and stride length were found moderately correlated with physical activity highlighting the association between the variables. However, the results showed difference in the moderate correlation present in backward and forward walking gait parameters of the normal elderly individuals. The study showed the importance of physical activity in the elderly individuals as it is related to two important aspect of the aging process the balance and gait parameters; both being essential in activities of daily living. Future longitudinal studies can be considered to know the causal relationship between the variables.

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Research Article

CORRELATION OF PHYSICAL ACTIVITY WITH BALANCE AND GAIT PARAMETERS IN ELDERLY INDIVIDUALS (60-70 YEARS): A CROSS-SECTIONAL STUDY

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criteria. Individuals willing to participate, able to ambulate > 10 feet without an assistive device or physical assistance, both the genders of age group 60-70 years were included in the study. Any recent lower limb injury or surgery affecting the individuals ambulation, uncorrected visual and auditory problems, not able to follow general instructions, any neurological disorders or deformity were excluded. IPAQ was used to assess physical activity and TUG for balance. Gait analyser (RM Ingeneir Motion and gait analyser) to analyse gait speed and stride length. Permission from the Institutional Ethical Committee was obtained. An informed written consent was obtained. Physical activity was assessed using IPAQ taken by the investigator. They then performed TUG test and the time in seconds was recorded. The participants then performed backward walking followed by forward walking on gait analyser for assessing their gait parameters: gait speed and stride length. They were instructed to walk at their normal comfortable pace. Two practice trials were given to them. Statistical analysis was performed using Pearson product-moment correlation co-efficient test.

RESULT
Out of the total 91 participants (47 males, 44 females), 59 belonged to age 60-65years and 32 to 66-70years. The mean score of IPAQ (in METs-minutes/week) was 1582.5 with SD of ±645.51, values ranging from 900 - 3119 METs-minutes/week. Out of which, 80 individuals belonged to minimal active category and 11 in the health enhancing physical activity; a high active category classified according to the levels of physical activity. TUG (in seconds) showed mean score of 14.72 and SD of ±2.58 with values ranging from 11-20. The gait speed (in meters per seconds) in backward walking had mean score of 0.46 with SD of ±0.11 and of the forward walking ,mean was 0.64 with SD of ±0.09. The stride length (in meters) backward walking presented mean score of 0.24 , SD ±0.24 and forward walking with 1.03 as the mean score and SD of ±0.20

There exist linear correlation between IPAQ with gait speed in backward walking with correlation co-efficient of 0.5393 ; p value of <0.0001; indicating that with increase in physical activity gait speed in backward walking increases.

With p value of <0.0001; there exist linear correlation between IPAQ with gait speed in forward walking with correlation co-efficient of 0.6167; indicating that with increase in physical activity gait speed in forward walking increases.

The correlation co-efficient of IPAQ with stride length in backward walking showed linear correlation with r value of 0.5170 and p value <0.0001. It indicates that with increase in physical activity stride length in backward walking increases.
The correlation co-efficient of IPAQ with stride length in forward walking showed linear correlation with r value of 0.5772 with p value <0.0001; indicating that with increase in physical activity stride length in forward walking increases.

**DISCUSSION**

The study found greater number of individuals in minimal active category of physical activity. The greater the extent of physical activity performed by the individuals, better is the balance with timed up and go scores. With aging there is an increase in sway which is owed to loss of strength of ankle dorsiflexor muscles, decrease in tactile sensitivity, joint position sense and proprioception. Taking this into consideration it can be assumed that an optimisation of somatosensory inputs occurs. This could be achieved by performing physical activity, allowing more efficient postural adaptation (Perrin PP et al, 1999) Study by G. Piastra showed that programs based on muscle reinforcement was significant to improve muscle mass, muscle strength and static balance. As strength being an essential component of frailty, aging; it also comprises the interacting systems responsible for balance (G Piastra et al, 2018). Walking speed influences the fundamental elements of gait— kinematics, ground reaction forces, joint moments, joint power and spatiotemporal parameters. A decrease in ankle power generation could have an effect on the initiation of the swing phase, contributing to decrease knee flexion. These changes could be the underlying causes of decreased walking speed and stride length. This is due to constraint physical activity of the individuals (Stief F et al, 2016). We can presume that decreased physical activity lead to increased safety awareness affecting the gait parameters of the individuals especially the gait speed, stride length. A study by A.J. van Ballegooijen et al found that the joint associations of high sedentary time and low physical activity were associated with higher age, higher BMI and slower walking speed compared to the combination of low sedentary time and high moderate to vigorous physical activity (A.J. van Ballegooijen et al, 2019) The findings are consistent with the present study showing moderate correlation of physical activity with gait speed however, the study population differed. Possible changes of the variation between forward and backward parameters could be due to greater demands on postural control systems, lack of visual information. Reduced visual input is reflected in a more cautious walking strategy (Elboim-Gabyzon M et al, 2016). Therefore, during backward walking individuals may compensate for lack of visual input by receiving more information from the available sensory sources. The gait variability present with moderate relation to physical activity in the study states it essential to improve physical activity thereby increasing strength, interaction of the various systems for adaptation to the environment which encourages healthy aging. When considering the elderly individuals from the Indian population, there are variations present with respect to lifestyle, socio-economic factors. Increasing age and inadequate participation in regular physical activity is associated with a greater likelihood of having a disability; (Thompson WW et al, 2012 ;Beckles GL et al, 2013) a vicious spiral towards poorer health. Taking all this into consideration along with changing lifestyle, exchanges of culture it supports the need to know the association of physical activity with the variables of balance, gait which are related to healthy aging.

**CONCLUSION**

Based on the present findings, physical activity is moderately correlated with balance suggesting that, as physical activity increases there is better balance of the elderly individuals. Also gait parameters; gait speed and stride length was found moderately correlated with physical activity highlighting the association between the variables. Future longitudinal studies can be considered to know the causal relationship between the variables.

**References**


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