Smart Phone Addiction And Reaction Time In Geriatric Population

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Abstract: Background: Smart phones are the new generation of mobile phones; they have emerged over the last few years. Technology has developed so much that it has become part of our life and mobile phones are one of them. These smart phones are equipped with the capabilities to display photos, play games, watch videos and navigation, etc. The advances have a huge impact on many walks of life. The adoption of new technology has been challenging for the elderly. But, elder population is also moving towards digitally connected lives. As age advances there is a decline in the motor and cognitive functions of brain and hence the reaction time is affected. The study was undertaken to assess the usefulness of smart phones in improving cognitive functions. Aims and Objectives: The aim of the study was to observe the effects of smart phone addiction on reaction time in elderly population Material and Methods: This is an cross sectional study. 100 elderly subjects were enrolled in this study randomly from urban areas. They all were using smart phones for several hours a day. They were divided into two groups according to the scores of mobile phone addiction scale.(MPAS) Simple reaction time was estimated by Ruler drop method. The reaction time was then calculated for each subject in both groups. The data was analyzed using mean, standard deviation and Pearson correlation test. Results: The mean reaction time in Group A is 0.27+ 0.040 and in Group B is 0.20 + 0.032. The values show statistically significant change in reaction time. Conclusion: Group A with high MPAS score has low reaction time compared to Group B with low MPAS score. Hence, it can be concluded that the use of Smartphones in elderly is useful, delaying the neurological decline and smarten the brain. [Shete A Natl J Integr Res Med, 2020; 11(5):66-70]

Key Words: Smartphones, MPAS, reaction time, Geriatric population

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Introduction: Smart phones are the new generation of mobile phones; they have emerged over the last few years. Mobile phones are now part of our life and considered as essential thing in our life. Smart phones are equipped with the capabilities to display photos, play games, play videos, navigation etc[1]. Kwon M et al stated that these advances have changed our life very much and had a huge impact on many walks of life[2]. Adoption of new technology has always been challenging for the elderly. It was observed by an report; Ericsson Mobility Report in 2017 that with an increase in the greying population, the elderly are also found moving toward more digitally connected lives[3]. In India also, the use of smart phones is in all ages is rapidly increasing. The use of smart phones is increasing in urban as well as rural India.

Park CJ et al in his study observed that Smart phone addiction has become severe these days [4]. But, Subramanyam A et al in his study stated that older adults can benefit from the use of smart phones in a number of ways. Mobile services available on smart phones may help older adults enhance communication with their families and friends, enrich their personal interests, and check various healthcare related information[5]. It has a positive effect on their autonomy and cognition related issues, preventing people from cognitive decline and improving autonomy and everyday functioning [6]. Better cognitive abilities are found in the elderly who appropriately used Internet to simplify some of the everyday tasks and used technology in a balanced way[7].

Reaction speed is the ability to give a quick motor response to a definitive stimulus[8]. Reaction time (RT) has been used as a test of cognitive functioning for over a century. As per Slegers K et al ; two of the most common RT tests are simple and choice RT (SRT and CRT, respectively)[9].

Simple reaction time shortens from infancy into the late 20s, then increases slowly until the 50s and 60s, and then lengthens faster as the person gets into his 70s and beyond. In other words, adolescents will probably have slower reaction times than adults [10].

Age associated Cognitive decline is among the greatest challenges to improve the wellbeing of older patients. Older group are treated as a burden to the society. If by any means you can delay these changes it will be helpful for the society. No research has been done which deals with the Effect on Reaction Time which tends to decline as one age in India. It is a known fact that

elder age group show less interest and excitement in conventional treatment. With use of smart phone we can also enhance the quality of the exercises. So that conclusion of study could signify their role in physiotherapy treatment. Therefore, the aim of this study is to determine the Effect of Smartphone Addiction on Reaction time in Elderly Population in Indian population .

Material & Methods: This study is of cross-sectional design. Institutional Ethics Committee permission was taken before beginning the study. 100 subjects both male and female with age group of 60-70 years were selected by Random sampling. Subjects were taken from in and around Aurangabad Discrict who were able to communicate well, used Smartphone for several hours per day (3-8 hours per day) with the Education should be at least 12th class or more.

Smartphone owners interact with their phones approximately 3 hours minimum to 8 hours maximum, including immediately upon waking up, just before going to sleep, and even in the middle of the night. 59 males had participated in the study with 41 females. The subjects who had any auditory, visual or perceptual deficits, sensory loss and with any kind of neurological conditions were excluded from this study as this population was unable to perform the test effectively. Null Hypothesis of the study was stated as there will be no significant effect of Smartphone Addiction on RT in Geriatric Population and Alternate Hypothesis was that there will be significant effect of Smartphone Addiction on Reaction Time in Geriatric Population.

Procedure: Informed consents were obtained from all the subjects. They all used a Smartphone for several hours per day. Mobile Phone Addiction Scale (MPAS), a self-report measure designed to assess the incidence of behavioural and cognitive symptoms of problematic cell phone usage was given . Participants were asked to rate their agreement with each item on the MPAS using a 5-point Likert scale, ranging from 1 “Not at all”, to5 “Always”. Reliability for the scale was demonstrated by a Cronbach’s alpha of .90. Scores on the MPAS ranged from the lowest possible score of 17 to a high score of 77 (out of a possible 85), and were categorized into groups as follows: low scores ranging from 17 to 38, moderate as 39 to 47, and high as 48 to 77 as mentioned [11]. The subjects were divided into 2 groups A, B of both male and female according to their scores on MPAS. Group A subjects within the range of low score, Group B subjects within the range of moderate to high score.

The reaction time is measured by a simple testing of Ruler Drop Method (RDM) Simple reaction time was estimated by asking the participants to catch a falling ruler. RDM for reaction time have good intra rater reliability (0.81) and moderate-to good degree of validity (0.54)[12].

The subjects were asked to sit on a chair with their dominant hand kept in the mid- prone position, elbow flexed to 90°, and forearm supported on a table. The assessor held the ruler vertically, with its lower end between the participant’s thumb and index finger. He or she was then instructed to catch the ruler using a pinch grasp as quickly as possible when the assessor released it at an unannounced time.The reaction time (in seconds) of each participant was calculated with the following equation.

$t = \sqrt{(2d/a)}$ Distance

d was calculated by the difference between the initial (0cm) and final grasping height of the ruler, and a=980 (cm/s2) represents the gravity constant. Fong SSM et al reported that familiarize trial was carried out before the actual test. Best of 5 trials is taken with a rest period of 1 min[13].

Results: The mean reaction time in Group A is 0.27+ 0.040 and in Group B is 0.20 + 0.032. The values show statistically significant change in reaction time. Data was analyzed through calculations of Mean, Standard deviations and ANOVA. A total number of participants were 100. Table 1 shows the relation between MPAS and RDM.

The result was significant. The value of mean and SD for Low Score is 0.27+0.040, the mean and SD for High Score is 0.20+0.032 which indicates that the population with high MPAS score has less RT as compared to other group. The results were statistically significant.

Table I Ruler Drop Method Values

Score	Mean	SD	N	F	P	Result
Low score	0.27	0.040	50	42.376	≤ 0.001	significant
High score	0.20	0.032	50			

Table 2 shows the Pearson's Correlation between the MPAS Score and Ruler Drop Method (RDM). The Mean and Standard Deviation for the RDM Score is 0.23+0.046 and the Mean and Standard Deviation for the MPAS Score is 42.32+12.342. The table value of correlation is -0.656 which is less than 0.001 Which proves that there is a strong significant relation between the two tools (MPAS Score and RDM Score).

Table II Correlation Of Ruler Drop Method Score And MPAS Score

Pearson Correlation	RDMS	MPAS
Mean	0.23	42.32
SD	0.046	12.342
N	100	
Correlation	-0.656	
Table value	0.205	
P value	<0.001	
Result	Significant	

Discussion: The study was carried out to determine the effect of Smartphone Addiction on Reaction Time in Geriatric Population. The result of the present study showed that the RT of the High Score group is comparatively less than the low group which indicated that the old aged who were Smartphone addicted have better response time than the old aged who are not using the Smartphone. Geoffery M et al [14] in his study reported that the reduced RT in smart phone addicted is due to the stronger brain activity in the somato sensory cortex when smart phone users did a lot of typing and swiping, and the signal strength depended on how recently such digital activity occurred.

The researcher Mégevand P[15] found that the more the volunteers had used their smart phone in the days before the EEG recording session, the more intense their brain responses to tactile stimulation of the thumb. Cortical Fingertip Representations in Touch screen Phone Users Differ from those Found in Nonusers. The increased cortical activity in touch screen users compared to nonusers could be due to a more intense usage of the hand; in the sense that the former group used the right thumb more than the latter group did this can explain the dominant hand activity while catching the ruler. Alternatively, it could be due to the development of touch screen-specific motor routines or ''skills'' as the movements associated with push buttons (in nonusers, who used only old-technology mobile phones) versus taps or swipes on a smooth screen (in touch screen phone users) were distinct as per Gindrat AD et al.[16]

It was seen by Iancu I et al[17] ; Technology can be used as an assistive manner by the elderly, and the elderly can be significantly helped through technology in different situations. Technology may delay or prevent the onset of disability, stimulate new activities and interests, facilitate communication, enhance knowledge, elevate mood, and improve psychological well-being was the observation seen by Schulz R et al[18].

Memory function improves in older adults as carried out in Smartphone-based memory training for older adults[19]. Action game play can improve players' ability to reduce interference between competing response tendencies in order to facilitate goal directed action Hutchinson CVet al[20], so we can enhance the patient's therapeutic exercises using the goal-directed strategy. Older people who are able to use computers and the videogames can improve their cognitive skills by these techniques.

As we already know that RT is the testing parameter for cognition[21] and the technology including Smart phones improves the cognition directly or indirectly affects the RT. It seems, however, that when they have higher self-concept, they can achieve more cognitive improvements as stated by Kyllonen PC, Zu J[22].

Use of videogames can be thought of. Connectivity between the different circuits of brain gives clear idea about their linking as the basal ganglia consist of a number of parallel circuits with similar homologous connectivity. In each case, multiple cortical areas feed into the basal ganglia which then target a specific cortical structure. Therefore, although motor behaviour represents only one domain in which slowing of processing can be documented; the findings in this area can potentially be generalized to other domains including cognition and emotion[23].

Moreover during exercise sessions old people take exercises as boredom to them so to reduce the boredom the introduction of Smart phones and their not only excites the Geriatric population but also influence them to participate in the exercise sessions more actively and voluntarily.

Another study NPD Group (2009)[24] on Cognitive benefits of computer games for older adults found that there is great potential for digital action games originally developed for the entertainment of young adults to produce cognitive benefits in older adults and it is seen that one domain relate with the other, digital games improve memory and cognition in older adults would have important implications for using games as an intervention A similar study Lamotha CJ et al[25] showed that healthy elderly can benefit from a videogame based exercise program to improve balance and that all subjects were highly motivated to exercise balance because they found gaming challenging and enjoyable.

In digital era the introduction of these gadgets will be benefited.

Conclusion: The Geriatric population who were smart phone addict have better response to the stimulus. The RT of the high MPAS Score is less than the low MPAS Score group. The study concludes on the basis of this relatively small study that, in order to prevent the problems of cognitive decline and functional disability to an extent usage of Smartphone are proved to be useful. These are targeting our brain functions directly or indirectly and thus help in delaying the neurological decline in older people.

Limitation Of The Study: Sample size was small, total number of participants were 100.The ratio of males and females were unequal. The age limit is 60-70 years which is small. Only educated people were taken to fill the MPAS but illiterate people were not taken which may show variations in results.

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