Original Research Article

An evaluation of long term physical exercise on cognitive function in the age group of 40-55 years of both genders

Abstract

Aim: To determine the effect of long term physical exercise on cognitive function.

Introduction: Physical exercise is a strong gene modulator and it affects the brain plasticity by influencing cognitive function. It is also a protein factor of neurodegeneration.

Materials and methods: 20 healthy adults in the age group of 40-55 years of both genders with no history of neurological condition were chosen for the study. The participants were categorised into 2 groups, one with subjects on regular physical exercise for a period of 1 year and another with subjects without any physical mode of exercise.

Result: Attention and calculation tasks conducted on long term physical exercise and non physical exercise are significant and recall tasks conducted on long term physical exercise are significant. The level of registration and language was high in the long term physical exercise population as compared to the non-physical exercise population.

Conclusion: The present study added an innovative evidence that the role of exercise enhances cognitive function in young subjects and reduces cognitive decay. Regular exercise has the potential to reduce risk of various neurological diseases including Alzheimer, Huntington's and Parkinson's.

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Keywords: Cognitive function, Physical exercise, Non-physical exercise, innovative finding

Introduction

Physical exercise affects brain plasticity by influencing cognitive function. Experimental and clinical studies have reported that long term physical exercise induces structural and functional

in the brain determining biological and psychological benefits(1). Physical exercise is incorrectly used interchangeably with physical activity(2,3).

In this review, we illustrate cognitive function on long term physical exercise. Accumulating evidence suggest that exercise has a profound effect on brain plasticity and cognitive function also studies conducted function also studies conducted from several countries reported the relationship between physical exercise and cognitive or cerebral anatomical changes. Aim of present work is to report actual evidence in long term physical exercise on cognitive function.(4)

Physical exercise is a strong gene modulator. It induces structural and functional changes in the brain and also a protein factor of neurodegeneration(5,6). It has positive effects on biological and physiological factors, enormous observation studies have shown that physical exercise promotes cognitive function.(7)

The aim of the present study is to determine the long term physical exercise on cognitive function. Indicators of structural changes correspond to brain volumes, measure of white matter integrity or modulation in neurotrophin level(8). Such metrics can be correlated to cognitive performances by defining the functional neural efficiency(9,10). Experimental and clinical studies have shown that physical exercise induces important structural and functional changes in brain functioning(11,12). It should be emphasized that any morphological change results in modification of the functional properties of neural circuit and vice versa any change in neuronal efficiency and functionality is based on morphological modifications.(13)

The different cognitive processes are thinking, language, memory, learning, attention, perception, and reason(14,15). The cognitive processes associated with executive functions are located in the prefrontal cortex and are necessary for the control of behaviour and include different areas such as attention, working, memory, error detection, problem-solving, reasoning, and planning. Human memory serves as a workplace where we can do our moment to moment activities.(16)

There is a great deal of research indicating that physical exercise helps to improve cognitive functions.(17) Scientists already know that exercise is good for general health and that exercise could prevent different cardiovascular diseases such as high blood pressure and heart attacks(18). When people get older cognitive function starts decreasing.(7,19)

An aspect is the intensity of the exercise, also important to determine different physiological responses such as heart rate, oxygen uptake, physical fitness, BDNF and neurotransmitters such as norepinephrine, endorphins, serotonin, and dopamine.(20) Another aspect to consider is the participant's age or if they have any cognitive decline or disease.(21,22).

Aim of the study

Previous reports suggested that physical exercise causes profound changes in the physiological systems of the body. But there were scanty studies on the concept that physical exercise influences cognitive functions. So the aim of the study ~~is~~ to determine the effect of long term physical exercise on cognitive function.

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Materials and methods

20 healthy adults in the age group of 40-55 years of both genders with no history of neurological condition were chosen for the study. The participants were categorised into 2 groups:

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Group 1: Subjects on regular physical exercise for a period of 1 year.

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Group 2: Subjects without any physical mode of exercise.

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In this study the cognitive function of the long term physical exercise population was compared with the population of non exercisers. Cognitive functions were assessed using MINI MENTAL STATE EXAMINATION where the following functions were analysed.

1. Orientation
2. Registration
3. Attention

4. Calculation
5. Recall
6. Language
7. Copying art

Inclusion criterion:

Subjects undergoing long term exercise for a period of one year in the age of 40-60 years were included in the study.

Exclusion criterion:

Subjects with psychological, neurological and any mental problems were excluded from the study.

Statistical test: The cognitive assessment was made using MINI MENTAL STATE EXAMINATION and the parameters like orientation , registration , recall , copy art, language were evaluated and scores were calculated ~~calculated~~ ~~scores~~ and ~~were~~ tabulated in the excel sheet and analysed. Data entered in the SPSS software and the results were analysed using an independent sample test and represented in the bar graphs.

Result

Orientation tasks conducted on long term physical exercisers and non-physical exercisers were not statistically significant ($p>0.05$), orientation task is not statistically significant ($p>0.05$), registration task is not statistically significant ($p>0.05$), attention and calculation is statistically significant ($p<0.05$), recall task is statistically significant ($p<0.05$) and not statistically significant at language task ($p>0.05$). Total ~~mmse~~ score was higher in long term physical exercisers as compared to the non-physical exercisers.

Level of orientation was higher in the population of long term physical exercisers as compared to the population of non-physical exercisers and the value was not statistically significant. The level of registration was higher in the long term physical exercisers as compared to the non-physical exercisers. Efficiency of language was higher in long term physical exercisers as compared to non-physical exercisers and the value is not statistically significant ($p>0.05$). Efficiency of recall

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was higher in long term physical exercisers as compared to the non physical exercisers, the value is statistically significant ($p<0.05$).

Efficiency of attention and calculation was higher in long term physical exercisers as compared to the non physical exercise and the value is statistically significant at ($p<0.05$). Efficiency of registration and orientation was higher in long term physical exercisers as compared to non physical exercisers is not statistically significant ($p>0.05$). The total MMSE was higher in long term physical exercisers as compared to non physical exercisers and the value is statistically significant.

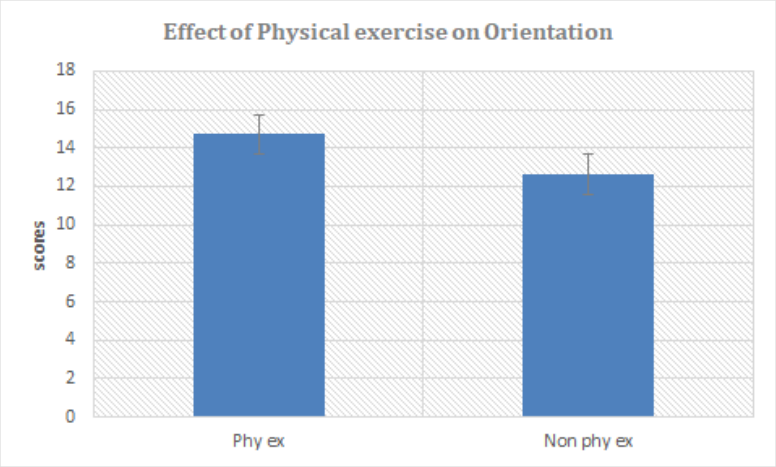

Figure 1 represents the scores obtained for level on orientation in physical exercise and non-physical exercise groups. Bar graph depicts the association between physical exercise and non-physical exercise. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there are increased scores in the level of cognition in physical exercise groups compared to non-physical exercise groups. The independent sample test, p value is 0.127 which is statistically not significant ($p>0.05$).

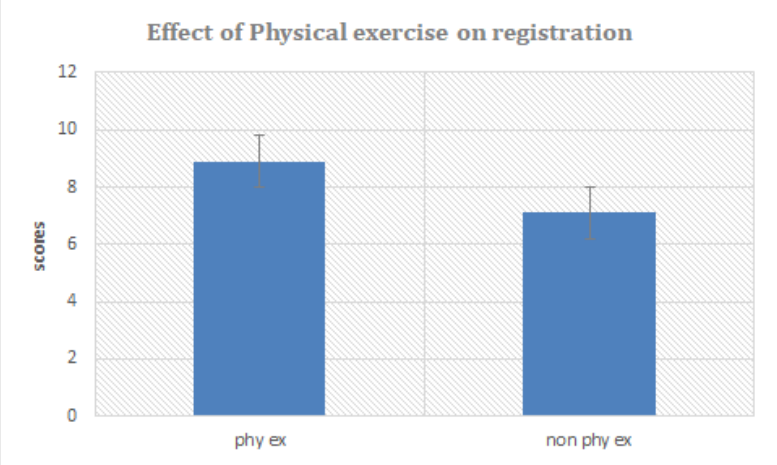

Figure 2 represents the scores obtained for level on registration in physical exercise and non-physical exercise groups. Bar graph depicts the association between physical exercise and non-physical exercise. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there are increased scores in the level of registration in physical exercise groups compared to non-physical exercise groups. The independent sample test, p value is 0.263 which is statistically not significant ($p>0.05$).

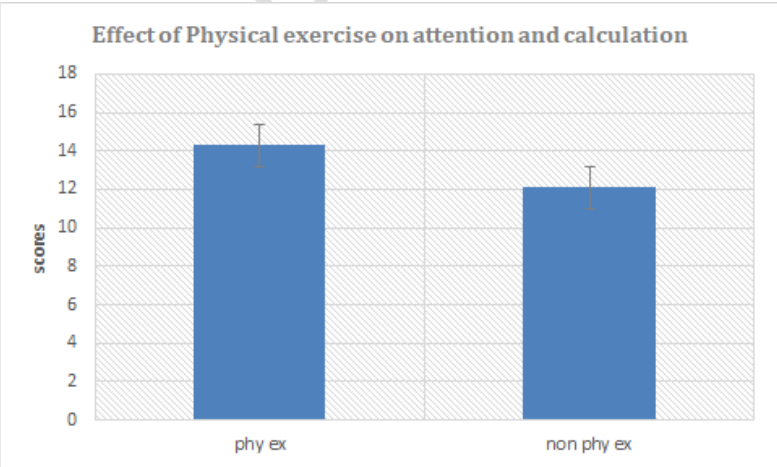

Figure 3 represents the scores obtained for level of attention and calculation in physical exercise and non-physical exercise groups. Bar graph depicts the association between physical exercise and non-physical exercise. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there are increased scores in the level of registration in physical exercise groups compared to non-physical exercise groups. The independent sample test, p value is 0.011 which is statistically significant ($p<0.05$).

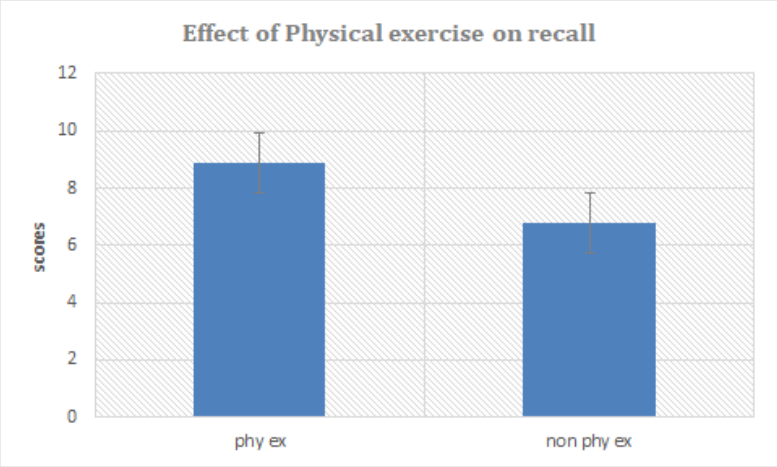

Figure 4 represents the scores obtained for level on recall in physical exercise and non-physical exercise groups. Bar graph depicts the association between physical exercise and non-physical exercise. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there are increased scores in the level of registration in physical exercise groups compared to non-physical exercise groups. The independent sample test, p value is 0.005 which is statistically significant ($p<0.05$).

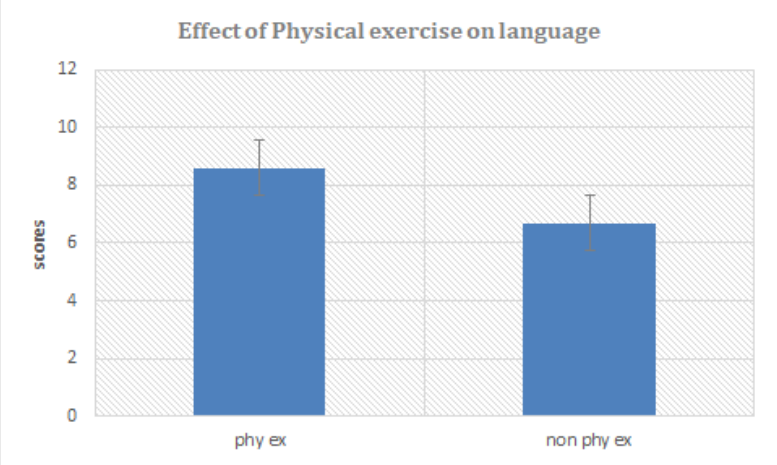

Figure 5 represents the scores obtained for level on language in physical exercise and non-physical exercise groups. Bar graph depicts the association between physical exercise and non-physical exercise. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there are increased scores in the level of registration in physical exercise groups compared to non-physical exercise groups. The independent sample test, p value is 0.101 which is statistically not significant ($p>0.05$).

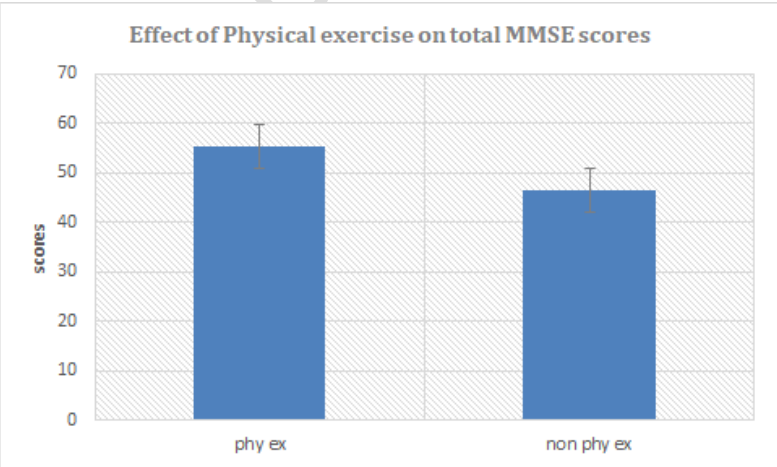

Figure 6 represents the scores obtained for total MMSE scoring in physical exercise and non-physical exercise groups. Bar graph depicts the total MMSE score. X axis represents physical exercise and non-physical exercise groups and Y axis represents scores obtained by physical and non-physical groups.

It is observed that there is an increase in total MMSE scoring in long term physical exercisers as compared to non physical exercisers. The independent sample test, p value is 0.139 which is statistically not significant ($p>0.05$).

Table 1: representing the MMSE scores of individuals under regular physical exercise and non-physical exercise.

MMSE	Group	Mean	Standard deviation
Orientation	Physical exercise	14.70	.483
	Non physical exercise	12.60	.699
Registration	Physical exercise	8.90	.316
	Non physical exercise	7.10	.568
Attention and calculation	Physical exercise	14.30	.483
	Non physical exercise	12.10	1.370
Recall	Physical exercise	8.90	.316
	Non physical exercise	6.80	1.135
Language	Physical exercise	8.60	.516
	Non physical exercise	6.70	1.059
Total MMSE	Physical exercise	55.40	.966
	Non physical exercise	46.60	1.430

Discussion

The results of the present study are highly informative and take us a few steps ahead of understanding the long term physical exercise on cognition function. According to the previous

research done in this topic states that physical exercise on cognition function in non-dementia aging, effects of physical exercise on cognitive functioning and wellbeing, beneficial effect of physical exercise on cognitive functioning and wellbeing, beneficial effect of physical exercise on cognitive function in elderly population, effects of physical activity and exercise on cognitive function of patients with alzheimer disease.(13,23)

In the present study, attention and calculation tasks, recall tasks were statistically significant ($p<0.05$). The cognitive function is more in the population of long term physical exercise as compared to the non physical exercise, this shows that the physical exercisers have performed well as compared to the non physical exercisers in all the tasks conducted. In previous studies, physical exercise was determined as a strong gene modulator that induces structural and functional changes. (16,24)

Previous studies have reported that physical exercise and cognitive learning are linked to each other. 13 to 18 studies provided sufficient information for calculation of statistical power and efficient sizes(25,26). This study has questionnaires for physical exercise and non physical exercise and shows that the population with long term physical exercise has higher cognitive function as compared to the non physical exercise population.(22,27)

LIMITATIONS OF THE STUDY:

The study population was confined only to a small group. If more sample size is added the results would have been statistically significant.

Conclusion

Long term physical exercise has an effect on cognitive function. Population with long term physical exercise has high cognitive function as compared to the population of non physical exercise. Comparing the population of long term physical exercise with the population of non physical exercise, the long term physical exercise population has higher cognitive function and the long term physical exercise population is high in orientation, registration, attention and calculation, recall and language as compared to the non physical exercise population.

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-Add those comparative studies that are in line with the results of your research.

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COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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