ORIGINAL RESEARCH

A study to compare the physical and mental parameters of the people doing gym exercise, with people doing yoga and meditation in Indore city, Madhya Pradesh, India

[1]Dr. Mathur Anuj, [2]Dr. Bhatt Ajay, [3]Dr. Shivhare Krantish, [4]Dr. Randa Vesti

[1]Post Graduate Resident, Department of Physiology, MGM Medical College, Indore, Madhya Pradesh, India
[2, 4] Associate Professor, Department of Physiology, MGM Medical College, Indore, Madhya Pradesh, India
[3]Demonstrator, Department of Physiology, MGM Medical College, Indore, Madhya Pradesh, India

Corresponding Author
Dr. Mathur Anuj
Post Graduate Resident, Department of Physiology, MGM Medical College, Indore, Madhya Pradesh, India

Received: 17 Nov, 2022 Accepted: 21 Dec, 2022

ABSTRACT

Introduction: Health is a complete Physical, mental and Social wellbeing of a person and not merely an absence of any disease or deformity" [1]. Communicable & non-communicable diseases/life style diseases are emerging very fast not only in India but also across the globe. There is strong evidence that physical inactivity plays a pivotal role in the development of several chronic diseases [2].

Objective: study to assess the Physical and Mental Performance in subjects doing Gym Exercise with Yoga and Meditation in Indore city.

Methodology: A comparative cross-sectional study was conducted in the community of Indore. Total 100 subjects of both the gender were selected by Systematic random sampling method. They were administered semi-structured questionnaire based on Anthropometric measurement, Vital Parameter, Specific Instruments and charts were used, by using SPSS 25.

Result: there is a significant difference in the Dominant Hand Grip Exercise of gym exercisers, & in the Video Reaction Time of gym exercisers, & in Dominant Hand Grip Exercise of yoga & meditation exercisers,& in the Non Dominant Hand Grip Exercise of yoga/meditation exercisers,& in Trail Making Test A of yoga & meditation exercisers,& Difference in the Audio Reaction Time of yoga & meditation exercisers,. There is not much difference in the physical performance of the subjects doing gym exercise with the subjects doing yoga & meditation, Video Reaction Time of yoga & meditation exercisers.

Conclusion: There is no difference in the mental performance of the subjects doing gym exercise with doing yoga & meditation.

Key words: Gym exercise, yoga meditation, physical performance, mental performance and gender

Introduction

The American College of Sports Medicine & American Heart Association report on physical activity & health has reinforced the association between regular physical activity & health [3]. These reports have projected the concept that more active individuals tend to have less coronary heart diseases & have lower mortality rates as compared to their sedentary counterparts. Along with beneficial effects on cardiac health, exercises also contributes to positive effects on prevention of metabolic diseases & good glycemic control also adds on to calming effect on mental health which reflects as good decision making skills & clarity of thoughts. In physical exercise, the pace of walking also has a big role in prevention of many diseases [4]. Based on the studies done on yoga & tracing back the history of yoga, it is basically a practice to restore mental harmony. Asana is considered by many to be a close entity to isotonic exercises, though in real terms they both are completely different entities & people who practice yoga daily, develop stability through it on their physical & mental capabilities. Yoga also has a deep impact upon the mental health both at the conscious &

subconscious level. Asana provides improved flexibility & strength, whereas Mantra, Meditation brings healthy effects on the mind & bring calmness and stability to the thought process. Yoga has now become a worldwide accepted practice here comes the role of Physical Exercise and Yoga for promoting healthy lifestyle, and also as a preventive & primary treatment modality. Gym exercises basically involve strength training, heavy weight lifting, aerobic exercises, and cardio exercises mainly. Whereas Yoga is an ancient Indian system of philosophy designed to build balance & health to the physical, mental & emotional dimensions of the individual. Yoga comprises of - *yama, niyama, asana, pranayama, pratyahara, dharana, dyana, samadhi.* Hence, both these modalities have different effect over the mental & physical capabilities of the individual pursuing it. Through this study, we evaluated and compared the physical parameters & mental parameters of the people who have been indulged in any of the above two forms of activities. In our study we analyzed the physical parameters using "Harvard step test" & "Hand grip dynamometry" whereas, mental parameters were accessed by "Trail making test" & "Audio visual reaction time". the hand grip of upper extremities muscles & their tone. Trail making test is a simple assessment tool to measure the attention span & by analyzing the audio-visual reaction time, we can estimate the cognitive function of the central nervous system. The importance of Yoga and Physical exercise lies in the discipline of following these activities on regular basis & inculcating a habit of making it a part of daily routine. In these modern times people have neglected three essence of life: sleep, diet and Exercise. They altogether hold a sensitive balance and once any one of these factors are neglected, they result in a disease. So the aim should be to formulate a mixed modality of activity which would result in benefitting the society both in improving physical and mental health. Difference in the mean value of Trail Making Test B of yoga & meditation exercisers there is significant. G. Piastra *et al* in 2018 studied the effects of two types of 9 month adapted physical activity program on muscle mass, muscle strength, and balance in moderate sarcopenic older women [5]. Jesus Lopez-Torres Hidalgo and the DEP-Exercise Group in 2019 analyzed the impact of exercise on people suffering from depression as an alternative therapy to antidepressants. Exercise also promotes. Formation of new nerve cells and releases proteins such as brain derived neutrophil factor which improves survival of nerve cells [6]. The association of Physical fitness and Physical activities with cognitive function and quality of life was assessed by Lidia Daimiel *et al* in 2020 [7]. They studied the association between physical activity and physical fitness with cognition. In 2011, Jue-Ting Fan and Kuei-Min Chen evaluated the effect of yoga on a population of above 60 years of age suffering from dementia. They drew a comparison that the group which performed yoga exercises was way better than the control group in every single aspect of their study and the [physiological functioning of the body, physical strength, improved significantly along with cardiopulmonary functioning [8]. Arndt Bussing, *et al*. in 2012 did a meta-analysis to see the effects of yoga on mental and physical health. The beneficial effects of yoga might be explained by an increased physical flexibility, by calming and focusing the mind to develop greater awareness and diminish anxiety, reduction of distress, improvement of mood, and so forth. [9] Kristen E. Riley *et al* in 2016 compared Yoga-based stress management with cognitive behavioral stress management and its extent to improve physical and mental health in frontline mental health care providers. [10].

Objective

To assess and compare the physical and mental parameters of the people doing gym exercise with yoga and meditation in Indore city, Madhya Pradesh India

Methodology

A comparative cross-sectional study was conducted in the community of one of the Districts of MP. Total 100 subjects in the urban and rural areas of Indore district were included by systematic random sampling method conducted during the period of one year (June 2021-June 2022) They were administered semi-structured questionnaire based on Anthropometric measurement, Vital Parameter, Specific Instruments and charts were used. Tools and instruments were used for assessment and measurements of parameters which were necessary for the study. Standardized protocol was followed during assessment and while taking the measurements:

Anthropometric measurement (Height, Weight, and Body Mass Index (BMI)): Height by Stature Meter, Weight by Electronic Weighing Machine, Body Mass Index (BMI) calculated by formula: [Weight in Kg / Square of Height in Meter].

Vital Parameter (Blood Pressure, Pulse, and SpO2): Blood Pressure by Electrical sphygmomanometer, Pulse & SpO2 by Pulse oximeter.

Specific Instruments and charts were used for Trail Making Test, Audio-visual Reaction Time, Hand Grip Dynamometry and Harvard Step Test. Trail Making Test was performed in two parts *viz*: Trail Making Test-A and Trail Making Test-B. Audio-visual Reaction Time was using standard Audio-visual Reaction Time Apparatus. Hand Grip Dynamometry was performed using Hand Grip Dynamometer. Harvard Step Test was done using Step board and Stop Watch. Study started after the approval from Institutional Ethical Committee, randomly selected patients were administered a validated semi-structured questionnaire for relevant data collection. Data were entered into a Microsoft Excel spread sheet and

analyzed by SPSS-25 (crosstab analysis) and the P Value < 0.05 was considered as statistically significant.

Results

Table 1: Distribution of the study population according to gender and age

Gender	N (%)
Total	100 (100%)
Male	80 (80%)
Female	20 (20%)
Age	N (%)
18-25	16 (16%)
26-33	53(53%)
34-41	14(14%)
42-50	17(17%)
Total	100 (100%)

Table1 shows the distribution of the study population according to Gender (Males and females) and Age was between 18-50 years. Males were 80% and females were 20.0%. In 18-25 years age group participants were 16.0%, 26- 33 years age group participants were 53%, 34-41years age group participants were 14% and 42- 50 years age group people were 17. Also, male participants were in majority & belonged maximally to age group 26-33 years.

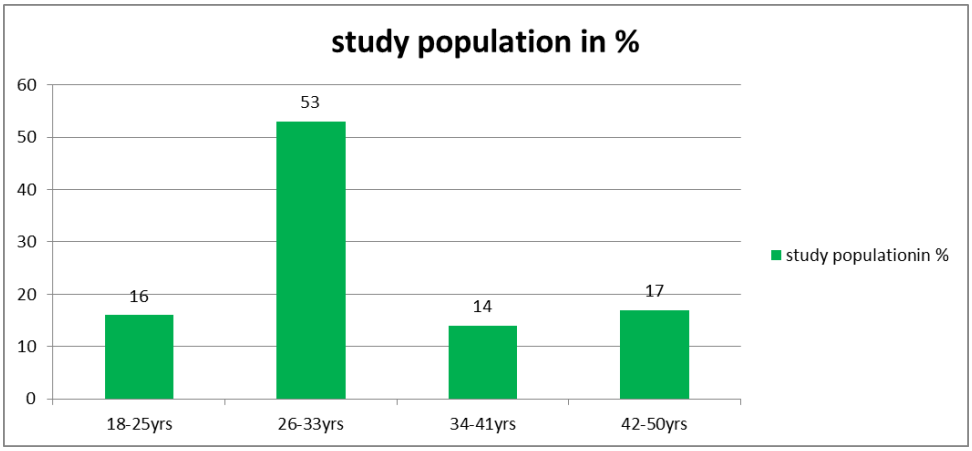

Fig 1a: Age group wise percentage distribution of Subjects

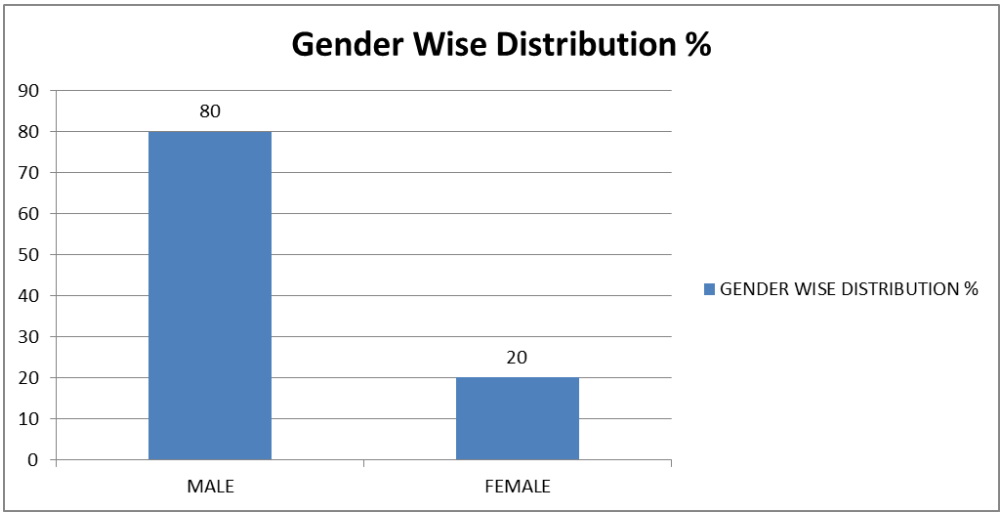

Fig 1b: Gender wise distribution of Subjects

Table No. 2 One-Sample Test hand grip dominant

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
HGD/ Dominant Hand Grip	24.461	49	0.000	5.10000	4.5412	5.6588
HGND/ Non-Dominant Hand Grip	21.323	49	0.000	4.06000	3.5497	4.5703

Table 2 shows that, there is a significant difference in the mean value of Dominant Hand Grip Exercise of gym exercisers (p<0.000) & there is a significant difference in the mean value of Non Dominant Hand Grip Exercise of gym exercisers (p<0.000)

Table No. 3 One-Sample Test TMT-A

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
TMT A/ Trail Making Test A	36.127	49	0.000	30.68000	28.4041	32.9559
TMT B/ Trail Making Test B	40.844	49	0.000	33.60000	31.3954	35.8046

Table 3 shows that there is a significant difference in the mean value of Trail Making Test A of gym exercisers (p<0.000) & there is a significant difference in the mean value of Trail Making Test B of gym exercisers (p<0.000).

Table No. 4 One-Sample Test ART & VRT

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
ART/ Audio Reaction Time	53.450	49	0.000	4.40600	4.1851	4.6269
VRT/ Video Reaction Time	43.413	49	0.000	3.30600	3.1019	3.5101

Table 4 shows there is a significant difference in the mean value of Audio Reaction Time of gym exercisers (p<0.000) & there is a significant difference in the mean value of Video Reaction Time of gym exercisers (p<0.000).

Table No. 5 One-Sample Test hand grip non-dominant & hand grip dominant

	Test Value = 0					
	T	Df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
HGND/ Non Dominant Hand Grip	21.234	49	0.000	44.08000	38.5168	49.6432
HGD/ Dominant Hand Grip	24.131	49	0.000	55.20000	49.0696	61.3304

Table 5 shows that, there is a significant difference in the mean value of Non Dominant Hand Grip Exercise of yoga/meditation exercisers (p<0.000) & there is a significant difference in the mean value of Dominant Hand Grip Exercise of yoga & meditation exercisers (p<0.000).

Table No. 6 One-Sample Test TMT-A & TMT-B

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
TMT - A/ Trail Making Test A	21.062	49	0.000	44.76000	39.0646	50.4554
TMT - B/ Trail Making Test B	21.072	49	0.000	45.50000	39.7134	51.2866

Table 6 shows that there is a significant difference in the mean value of Trail Making Test A of yoga & meditation exercisers (p<0.000) & there is a significant Difference in the mean value of Trail Making Test B of yoga & meditation exercisers (p<0.000).

Table 7: One-Sample Test ART & VRT

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	99% Confidence Interval of the Difference	
					Lower	Upper
ART/ Audio Reaction Time	25.719	49	0.000	4.54600	4.0723	5.0197
VRT/ Video Reaction Time	22.992	49	0.000	3.68200	3.2528	4.1112

Table 7 shows that there is a significant difference in the mean value of Audio Reaction Time of yoga & meditation exercisers (p<0.000) & there is a significant difference in the mean value of Video Reaction Time of yoga & meditation exercisers (p<0.000).

Discussion

Due to the recent Covid pandemic, people have now clearly understood the essence of exercise, diet and sleep in their life and now the paradigm has shifted towards attaining a healthy lifestyle through gym exercises and yoga & meditation, and people have started adopting them as a preventive measure rather as a curative measure. In this study the overall population taken into consideration was ranging from 18 years to 50 years, with overall distribution of percentage of subjects being 18 to 25 years– 16%, 26 to 33 years–53%, 34 to 41 years–14% and 42 to 50 years–17%. (Among the total of 100 subjects, 50 subjects were taken doing Gym exercises while 50 subjects were taken doing yoga & meditation. [11] Out of these 100 subjects 20% were female and 80% were male.

Comparing the hand grip strength of dominant hand and also of non-dominant hand by using Hand Grip Dynamometer it was found that the people who do gym exercise have a slightly better hand grip strength, though the difference is not much significant but is similar to the results of Sneade M, & Furnham A [12] and Haynes E, and DeBeliso M. [12] The study conducted by Sneade M, & Furnham A [13] showed similar result and concluded that good hand grip has a correlation with good fitness levels, whereas the study conducted by Haynes E, and DeBeliso M [14] concluded that the people who are actually fit and have been doing cross fit training for more than 03 months exhibit a good hand grip strength. The reason behind the better hand grip strength of gym exercisers could be that they are much well accustomed to lifting heavy weights and as a result the hand muscles tend to develop which resulted in better grip strength. To compare the mental performance of these subjects, Audio Reaction Time was estimated and compared by using appropriate statistical analysis and it was found to be fractionally better for gym exercisers than yoga & meditation doers. Aditya Jain *et al*., [15] concluded a similar finding in their study where they found that Medical students who were involved in physical activities had better reaction time than compared to those who had sedentary habits. Similarly Visual Reaction Time was lower for subjects doing gym exercises than subjects doing yoga & meditation. According to Madanmohan [16] also yoga if practiced for more than 12 weeks has shown to reduce reaction time, but the results of this study contradicts our finding. Although the difference in audio-visual reaction time was in favor of gym exercisers as compared to yoga & meditation doers but this fractional better performance in gym exercisers could be due to because of lower mean age of gym exercisers than yoga & meditation doers. As the age advances due to cognitive decline the reaction time duration increases and that could be the reason behind it. Liye Zou [17] concluded through their study that mind body exercises have a beneficial effect over cognitive functioning and positively impacts the attention span of those people suffering from

dementia, and recommended that such mind body exercises should be considered a preventive measure to prevent settlement of dementia. These findings were contradictory to our findings in which upon drawing comparison of trail making test A & B between yoga doers and gym exercisers, we found that the performance of gym subjects was much better since the total time taken to complete both the tasks was much lower than yoga & meditation subjects. Since yoga & meditation is considered to be mind body exercise rather than gym exercises.

Conclusion

In our study there is not much difference in the physical performance of the subjects doing gym exercise with the subjects doing yoga & meditation. The reason could be the similar effect which both of these forms of activities put on human body, both upon the body musculature and physiological functioning, so much that the impact is almost similar. There is not much difference in the mental performance of the subjects doing gym exercise with the subjects doing yoga & meditation. Our study revealed that although there was not much difference in the mental performance of both the groups, but still the minimal amount of reaction time difference is quite significant. The reason behind this minor difference and slight better performance among gym exercisers could be attributable to the difference between the mean age, which was less in the case of gym exercisers as compared to those doing yoga & meditation. The possible reason could be an age related decline in the cognitive functioning which usually occurs as the age progresses.

Key Messages

Since there was not much difference among the subjects doing gym exercise in comparison with yoga & meditation, so whatever may be the form of activity one persuade, must follow it with utmost sincerity. In general maximum people should be encouraged to achieve a healthy lifestyle, and to any form of activity should be inculcated in it as a daily routine.

References

1. Callahan D. The WHO definition of "health." Stud Hastings Cent [Internet]. 1973;1(3):77. Available from: http://dx.doi.org/10.2307/3527467
2. Gonzalez K, Fuentes J, Marquez JL. Physical Inactivity, Sedentary Behavior and Chronic Diseases. Korean journal of family medicine. 2017;38(3):111-115. https://doi.org/10.4082/kjfm.2017.38.3.111
3. Nelson ME, Rejeski WJ, Blair SN, Duncan PW, Judge JO, King AC, *et al*. Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. Circulation [Internet]. 2007;116(9):1094-105. Available from: http://dx.doi.org/10.1161/CIRCULATIONAHA.107.185650
4. Tanasescu M, Leitzmann MF, Rimm EB, Hu FB. Physical activity in relation to cardiovascular disease and total mortality among men with type 2 diabetes. Circulation [Internet]. 2003;107(19):2435-9.
5. Piastra G, Perasso L, Lucarini S, Monacelli F, Bisio A, Ferrando V, *et al*. Effects of two types of 9-month adapted physical activity program on muscle mass, muscle strength, and balance in moderate sarcopenic older women. Biomed Res Int [Internet]. 2018;2018:5095673. Available from: http://dx.doi.org/10.1155/2018/5095673
6. López-Torres Hidalgo J, DEP-EXERCISE Group. Effectiveness of physical exercise in the treatment of depression in older adults as an alternative to antidepressant drugs in primary care. BMC Psychiatry [Internet]. 2019;19(1):21. Available from: http://dx.doi.org/10.1186/s12888-018-1982-6
7. Daimiel L, Martínez-González MA, Corella D, Salas-Salvadó J, Schröder H, Vioque J, *et al*. Physical fitness and physical activity association with cognitive function and quality of life: baseline cross-sectional analysis of the PREDIMED- Plus trial. Sci Rep [Internet]. 2020;10(1). Available from: http://dx.doi.org/10.1038/s41598-020-59458-6
8. Fan J-T, Chen K-M. Using silver yoga exercises to promote physical and mental health of elders with dementia in long-term care facilities. Int Psychogeriatr [Internet]. 2011;23(8):1222-30. Available from: http://dx.doi.org/10.1017/S1041610211000287
9. Büssing A, Michalsen A, Khalsa SBS, Telles S, Sherman KJ. Effects of yoga on mental and physical health: a short summary of reviews. Evid Based Complement Alternat Med [Internet]. 2012;2012:165410. Available from: http://dx.doi.org/10.1155/2012/165410
10. Riley KE, Park CL, Wilson A, Sabo A, Antoni MH, Braun TD, *et al*. Improving physical and mental health in frontline mental health care providers: Yoga-based stress management versus cognitive behavioral stress management. J Workplace Behav Health [Internet]. 2017;32(1):26-48. Available from: http://dx.doi.org/10.1080/15555240.2016.1261254.
11. Anjana RM, Pradeepa R, Das AK, Deepa M, Bhansali A, Joshi SR, *et al*. Physical activity and inactivity patterns in India–results from the ICMR-INDIAB study (Phase-)[ICMR- INDIAB-5]. International Journal of Behavioral Nutrition and Physical Activity. 2014 Dec;11(1):1-1.
12. Sneade M, Furnham A. Hand grip strength and self-perceptions of physical attractiveness and psychological well-being. Evolutionary Psychological Science. 2016 Jun;2(2):123-8.
13. Haynes E, DeBeliso M. The relationship between CrossFit performance and grip strength. Turkish Journal of Kinesiology. 2019;5(1):15-21.
14. Domaradzki J, Koźlenia D, Popowczak M. Sex Moderated Mediation of the Musculoskeletal Fitness in Relationship between High-Intensive Interval Training Performing during Physical Education Classes and Cardiorespiratory Fitness in Healthy Boys and Girls. BioMed Research International. 2022 Jan 17;2022.
15. Jain A, Bansal R, Kumar A, Singh KD. A comparative study of visual and auditory reaction times on the basis of gender and physical activity levels of medical first year students. International Journal of Applied and Basic Medical Research. 2015 May;5(2):124.
16. Nambinarayanan T, Thakur SA, Krishnamurthy N, Chandrabose A. Effect of yoga training on reaction

time, respiratory endurance and muscle strength. Indian J Physiol Pharmacol. 1992;36(4):229-33.
17. Zou L, Loprinzi PD, Yeung AS, Zeng N, Huang T. The beneficial effects of mind-body exercises for people with mild cognitive impairment: a systematic review with meta-analysis. Archives of physical medicine and rehabilitation. 2019 Aug 1;100(8):1556-73.