



COMPARISON OF EFFECTS OF YOGA, AEROBIC TRAINING AND RESISTANCE TRAINING EXERCISES ON MINDFULNESS IN SEDENTARY PEOPLE USING MINDFUL ATTENTION AWARENESS SCALE

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Abstract: Mindfulness is a state of active, open attention to the present. It is evident that doing daily exercises helps in improving one's focus and awareness. But, various types of exercises have different effects on physiology of the body and thus benefits of the each of them show variations. This study will try and find the type of exercises which are more beneficial for the mental focus and awareness of the individual thus, specifying the exercise protocol that need to be followed based on the priorities of the individual.

Method: Ethical approval had taken. People having sedentary lifestyles due to their professions were taken for the study. 60 subjects were finalized for the study by convenience sampling method. The consent form is signed by the subjects. Three groups were formed and given 6 weeks protocol of Yoga, Resistance Training, and Aerobic training respectively. Pre MAAS scores of all the candidates were noted. All three group members then performed 6 weeks protocol. After the completion of protocol MAAS score were noted. Pre and post MAAS scores was analyzed by appropriate statistical test for the conclusion.

Results: 1. There is no significant difference in the mean difference in pre-test and post-test MAAS score in Aerobics Training group and Resistant training group ($p = 0.313$).

2. There is no significant difference in the mean difference in pre-test and post-test MAAS score in Aerobics Training group and Yoga group ($p = 0.148$).

3. A significant difference in the mean difference in pre-test and post-test MAAS score was observed in Resistance Training group and Yoga Training group ($p=0.004$)

Conclusion: Yoga Training proves to be most beneficial in improving Mindfulness than both aerobic and resistance training.

Index words: Mindfulness, Resistance training, Aerobic training, Yoga training

I. INTRODUCTION

Mental function in itself is vague term and hard to define. It consist of any cognitive process or activity such as thinking, sensing or reasoning.

Assessing one's mental ability does not specifically focus on one aspect, but is a combined measurement of all the aspects that contributes to cognitive abilities.

Mindfulness-Trait mindfulness, also referred to in some literature as day-to-day mindfulness or dispositional mindfulness, is defined by Brown and Ryan (2003) as an inherent state of consciousness varying between and within humans that is characterized by the presence or absence of attention or awareness of what is occurring in present experience ^[1].

Being mindful is necessary as it improves one's focus on the work in hand and not getting distracted by the thoughts, improves productivity. As of today's world, stress and hectic schedule have become the indivisible part of the life of certain populations like students, IT workers and many others where physical demand of work is almost none and mental work is important throughout the working schedule. In this scenario, it's necessary that one remain mentally active and aware throughout the day.

Extensive research have been done till now, on effect of exercises on mood and affect, quality of life, cognitive functioning, etc. and results are found to be positive in case of mood and affect whereas results are somewhat mixed in case of cognitive functioning.

This change is considered to be due to following reasons-

A) Effects of exercise on brain ^[2]

- 1) Increased blood circulation to brain.
- 2) Increased neurotrophic factors such as brain derived neurotrophic factors which exerts protective effect on existing neurons and stimulates formation of new neurons.
- 3) It coordinates activity with other factors such as Insulin-like growth factor 1 and vascular endothelial growth factor.

B) Relationship between exercise and endorphin release ^[2]

- 1) Endorphins are endogenous opioids released from pituitary gland that are believed to mediate analgesia, induce euphoria and play a role in a reward system in the brain.
- 2) Researchers have found a correlation between the vigorous exercise and elevated endorphin levels in blood plasma. Evidence also showing that, endorphins can interfere with release of other neurotransmitters, including norepinephrine, dopamine and acetylcholine, have led to a belief that they work by modulating the presynaptic membranes of synapses other than their own. Many studies that examined the relationship between exercise and endorphin release, indicated a trend of elevated endorphin levels after exercise.

In recent animal studies have also demonstrated that exercise or physical activity produces very specific changes in the brain that are distinct from those produced by learning or novel experience. Environmental enrichment in rodents has been shown to produce structural changes in several distinct regions of cerebellar and cerebral cortex. To date, these methods have demonstrated exercise related change in motor regions such as cerebellum and motor cortex, and in specific regions in hippocampus, which plays a prominent role in learning, memory and navigation ^[3].

Most philosophers and researchers have taken a holistic perspective and viewed the mind and body as two interrelated, inseparable entities. In recent years, controversy has shifted from question of whether there is relationship between two components. In particular, one line of research has focused upon the idea that there is a causal link between the body and the mind such that the body has a beneficial effect on the performance capabilities of the brain^[4].

The fact that physiological changes produced by various forms of exercises vary, and causes the difference in underlying mechanism ultimately leading to difference in their effects. Various forms of exercises that vary greatly in their types, intensities and physiological changes caused are yoga, aerobic training and weight training. These three forms will be considered and compared on basis of effect on mindfulness by them in this study project.

II. METHODOLOGY

Ethical committee clearance was taken and permission from department was granted. Written consent form was taken from the subjects who fulfilled the inclusion criteria and who volunteered to participate in the study. Subjects were divided into three groups A, B and C. MAAS score were recorded for each of the participant. Group A performed Yoga protocol assigned, whereas B and C performed weight training and aerobic training respectively. After the completion of protocols of all the groups, MAAS score of each individual were calculated again. Changes seen in the scores of MAAS of each individual were noted for further analysis.

II.A INCLUSION CRITERIA

- Individual with sedentary work demand.
(7 hours of daily sitting)
- Age criteria: 18 to 35 years.
- No other physical activity in daily routine.

II.B EXCLUSION CRITERIA

Having exercise as a part of their regular routine

II.C OUTCOME MEASURES

Mindful attention awareness scale

Reliability (α): .89-.93^[1]

II.D INTERVENTION PROTOCOL

1) Yoga protocol ^[5]

60 minutes yoga sessions per week, for 6 weeks consecutively.

a) Seated asanas (6 to 9 minutes)

- (1) Spinal twist
- (2) Staff pose
- (3) Head to knee forward bend
- (4) Reclining hand-to-big-toe pose

b) Restorative asanas (6 to 8 minutes)

- | | |
|----------------------|------------------------|
| (1) Cobra pose | (4) Eye to needle pose |
| (2) Child's pose | (5) Legs up the wall |
| (3) Cat and cow pose | |

c) Standing asanas (25 to 27 minutes)

- (1) Mountain pose
- (2) Tree pose
- (3) Warrior II pose
- (4) Extended side angle stretch
- (5) Half moon pose
- (6) Standing forward bend
- (7) Warrior I pose
- (8) Downward facing dog pose

d) Final relaxation (10 minutes)

- (1) Corpse pose.

2) Weight training protocol ^[6]

- Three sessions per week (Each 1 hour)
- Starting with 10 minutes stretching
- Loads used will be 80% of 1 RM
- 6 weeks program

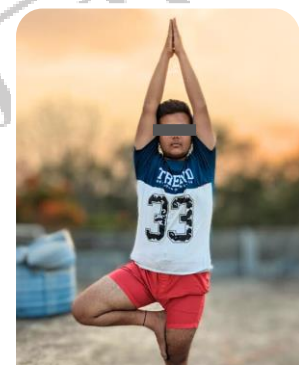
- 1) chest press
- 2) Leg press
- 3) Vertical traction
- 4) Abdominal crunch
- 5) Leg crunch



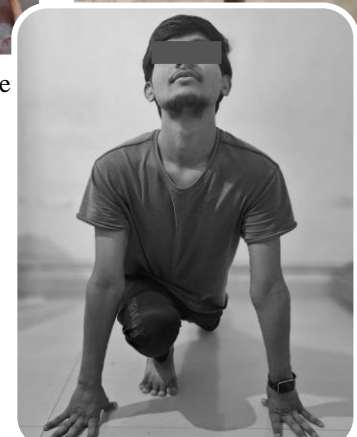
Child's pose



Cobra pose



Leg crunch



Aerobics

6) Lower back

3) Aerobic training protocol [7]

First 2 weeks (45 min session)- 3 times a week

- 5 minutes- Warm up
- 15 minutes- Running
- 10 minutes- Cycling
- 15 minutes- Zumba

Next 4 weeks (60 min session)- 4 times a week

- 5 minutes- Warm up
- 20 minutes- Running
- 15 minutes- Cycling
- 20 minutes- Zumba



Lower back Crunch



Aerobics

III. STATISTICAL ANALYSIS

Data was entered into MS-Excel worksheet and further analysis was done. The qualitative variables were presented as frequency and percentage. The quantitative variables were presented as mean ± SD. Further statistical analysis was performed using statistical techniques such as the paired sample t-test and one way Analysis of Variance (ANOVA).

IV. RESULTS

In Aerobics Training group, the mean pre-test MAAS score was 46.529 (SD=12.481) and the mean post-test MAAS score was 61.588 (SD=15.823). The mean pre-test and post-test MAAS score in Aerobics Training group was compared using paired sample test. The result indicates that there is significant increase in the post-test MAAS score (t=-8.575, p<.001).

In Resistance Training group, the mean pre-test MAAS score was 51.706 (SD=16.676) and the mean post-test MAAS score was 61.588 (SD=15.116). The mean pre-test and post-test MAAS score in Resistance Training group was compared using paired sample test. The result indicates that there is significant increase in the post-test MAAS score (t=-5.059, p<.001).

In Yoga Training group, the mean pre-test MAAS score was 50.47 (SD=14.414) and the mean post-test MAAS score was 72.235 (SD=10.455). The mean pre-test and post-test MAAS score in Resistance Training group was compared using paired sample test. The result indicates that there is significant increase in the post-test MAAS score (t=-6.374, p<.001). (Table 1 and Figure 1)

Within group comparison of Pre-test and Post-test MAAS Score							
Group	MAAS Score	Mean	N	SD	SEM	t-stat	p-value
Aerobics Training	Pre	46.529	17	12.481	3.027	-8.575	<.001**
	Post	61.588	17	15.823	3.838		
Resistance Training	Pre	51.706	17	16.676	4.045	-5.059	<.001**
	Post	61.588	17	15.116	3.666		
Yoga Training	Pre	50.471	17	14.414	3.496	-6.374	<.001**
	Post	72.235	17	10.455	2.536		

** : Significant at 1% level of significance

Table 1

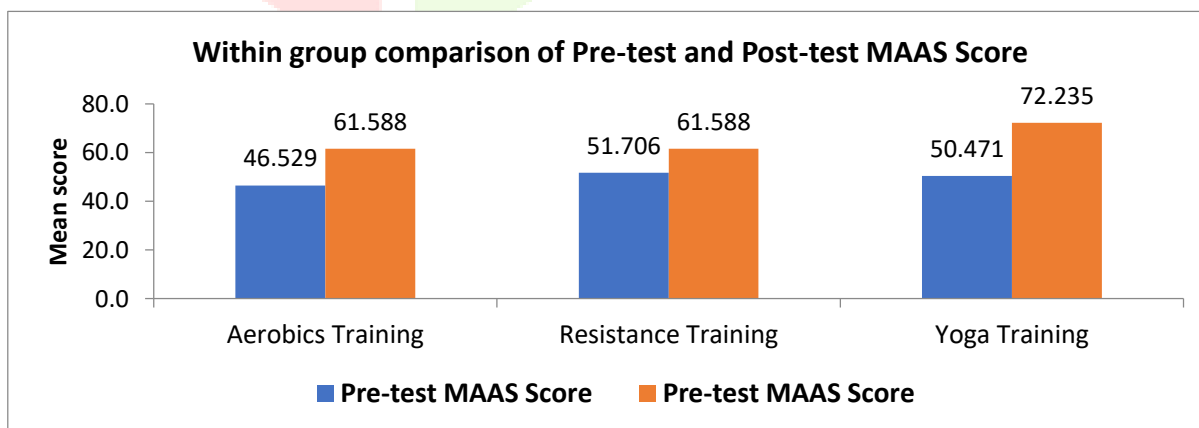


Figure 1

The between group comparison of differences in pre-test and post-test MAAS score was done using one way ANOVA. The result indicates that there is significant difference in the mean pre-test and post-test differences in MAAS score in Aerobics Training group, Resistance Training and Yoga Training (F=5.738, p = 0.006) (Table 2 and Figure 2)

Between group comparison of difference in pre-test and post-test MAAS score								
Group	N	Mean difference	SD	SEM	Min	Max	F-stat	p-value
Aerobics Training	17	15.059	7.241	1.756	4.00	29.00	5.738	0.006**
Resistance Training	17	9.882	8.054	1.953	0.00	32.00		
Yoga Training	17	21.765	14.078	3.414	0.00	45.00		
Total	51	15.569	11.184	1.566	0.00	45.00		

** : Significant at 1% level of significance **Table 2**

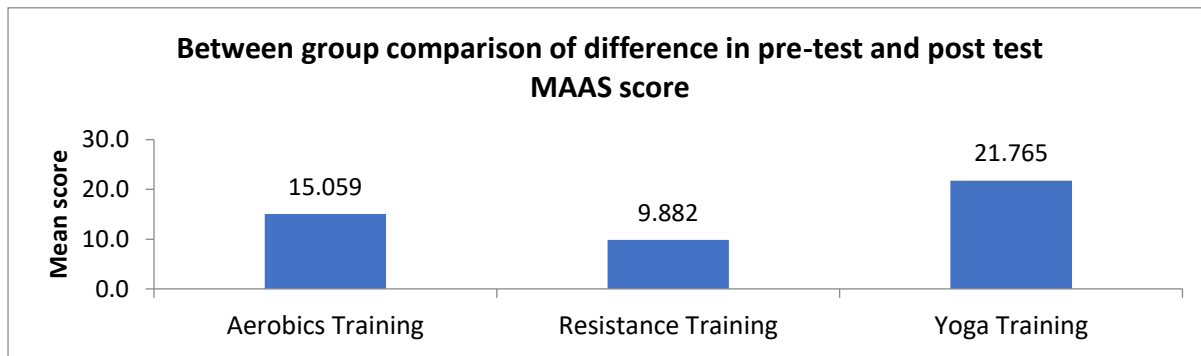


Figure 2

Table 3 and figure 3 indicate POST-HOC comparison difference in of mean pre-test and post-test scores in each group using Tukey’s High Significant Difference test.

POST-HOC comparison using Tukey HSD test						
Group		Mean Diff.	SEM	95% CI for mean diff		p-value
				LL	UL	
Aerobics Training	Resistance Training	5.176	3.517	-3.330	13.683	0.313
	Yoga Training	-6.706	3.517	-15.213	1.801	0.148
Resistance Training	Yoga Training	-11.882	3.517	-20.389	-3.376	0.004

Table 3

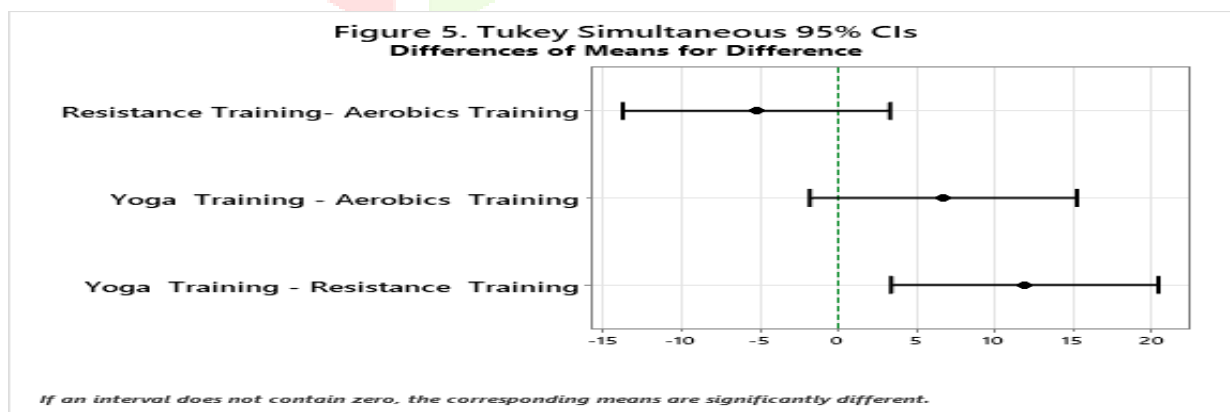


Figure 3

V. DISCUSSION

The present study was aimed at comparing the three forms of exercises namely Yoga training, Resistance training and Aerobic training in their effectiveness on Mindfulness which is a trait of being aware of the present. This trait is highly important for population such as students and IT workers as these population have to be mentally aware and efficient most of the times. Being physically inactive also contributes to the mental tiredness.

This study was designed to know whether these three forms of exercise have different impact on the mental awareness as the physiological changes induced by all these exercises also vary significantly.

The data found that all three forms of exercise show a significant improvement in the mindfulness of the participant subjects. But group comparison demonstrated that Yoga proves to be much significantly beneficial than both aerobic and resistance training in improving mindfulness. Aerobics training also slightly being more beneficial in improving mindfulness of the participant subjects than the resistance training, the difference still remains insignificant.

This study indicates that Yoga proves to be more beneficial in improving mental health along with physical health. Whereas, Aerobic and resistance training are not as effective as Yoga in improving mental health. This can be taken into consideration while thinking of exercises as a means of improving quality of life in psychiatric conditions such as depression and anxiety.

This opens up a possibility that various forms of exercises have specific physiological changes and proves to be more beneficial and efficient in improving certain domains of health than the others, thus giving an significant importance to choosing the exercise form for the individual based on the goals and priorities of the individual.

How the physical exercise helps in improving mental health is not fully known yet and the research regarding the same is still in infancy. As said same goes for Yoga practices, exact mechanism still not being known there are various hypothesis and experiments that to a certain extent gives an idea about the reasons behind the effectiveness of yoga in improving mental health.

The studies discuss about the substantial changes caused by the yoga on neurobiological and psychophysiological alterations. Some studies claim that Yoga practices enhance parasympathetic activity and helps in calming the mind. There is also reported increase in the gray matter of the brain following the Yoga practices. One of the other effects of yoga is that it enhances the resting state activation across multiple cortico-striatal neuronal loops. Other biochemical changes in the brain caused due to yoga practices are decrease in cortisol levels, increase in neurotrophic factors, changes in neurotransmitters such as GABA, Glutamate and Serotonin ^[14].

Morteza Alibakhshi Kenari in his study in 2014 found that compared to non-athletes, athlete student shows significantly better mental health in all aspects such as anxiety, insomnia and depressive symptoms.^[8]

Pasquale Caponnetto and Mirko Casu in 2021, in their study concluded that physical exercise improves cognitive ability and shows results like improved precision and speed of response in information processing task. Children have improvement in executive function, selective attention, and linguistic understanding.^[9]

Devon Brunner and Amital Abramovitch in their study conducted in 2017 concluded that Yoga program incorporating Mindfulness meditation may offer an improvement in working memory, and enhance attentive mindfulness.^[5]

Adam G. Thomas and Andrea Dennis in 2012, in their study stated that effects of exercise on structure of brain are still not completely clear, yet the study demonstrated that aerobic activity is powerful modulator of structural brain plasticity.^[3]

VI. CONCLUSION

Yoga Training proves to be most beneficial in improving Mindfulness than both aerobic and resistance training.

VII. CLINICAL IMPLICATION

Outcome of this study project can be helpful for creating suitable exercise protocol as per individual's need and goals.

The exercise programs can be invented for certain community, which will meet the demands and needs of the individual from the community like students or IT workers.

This will also help to change the perspective of the clinicians towards general exercise, and a thought will be given to the format of exercises before choosing a protocol.

VIII. LIMITATION OF STUDY

- All Factors affecting the mindfulness were not taken into consideration e.g. personal stress, environmental factors and work environment etc.
- Distribution of genders in all three groups was not uniform.
- Breathing control was not taught to the participants while performing the Yoga practices.

IX . RECOMENDATION AND FUTURE SCOPE OF STUDY

- Effectiveness of yoga on various mental health Problems can be explored
- Effects of yoga on other mental health parameters can be explored

X. REFERENCES

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