



The Effects of Participating in Recreational Games on Health Markers and Reaction Time in Middle-aged Tribal Women

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Authors' contributions

This work was carried out in collaboration between both authors. Author MKM designed the study, performed the statistical analysis and wrote the protocol. Author GCS wrote the first draft of the manuscript, managed the analyses of the study and managed the literature search. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Taking part in recreational activities, especially outdoors, can greatly improve physical health. People, who take part in park activities such as walking, hiking, or skiing, schedule fewer office visits, maintain lower body fat percentages, and have lower blood pressure and cholesterol levels. Although recreational games was proven to be a useful physical activity to stimulate some health benefits, we do not know if there are significant benefits of recreational games played on a smaller area with fewer players in the middle-age population. Because exercise is known to increase blood flow and oxygen to the skeletal muscles and the brain, it was inferred that exercise would also affect an individual's reaction time.

Aims: The present study aimed to investigate whether recreational games could improve health and reaction time of middle-aged tribal women after 16 weeks of training. To determine this, twenty subjects gave baseline blood pressure, heart rate, and simple reaction time measurements.

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Methodology: Twenty healthy middle-aged tribal women aged 50–55 were randomized in a group to involve in recreational games training (n = 20; age: 52.4 ± 2.48 years). The participants performed 3 training sessions of 40 min per week.

Results: Results from a repeated measure ANOVA indicated a time interaction (pre training, mid training and post training) for Blood Pressure (Systolic), Blood Pressure (Diastolic), Resting Heart Rate and Reaction Time (Audio) in favor of the participants. The results concluded that Recreational games can be an effective training modality to stimulate a decrease in resting HR and reaction time with small improvements in systolic and diastolic Blood Pressure.

Conclusion: To participate in Recreational games only three times per week shows helpful health-related adaptations and decreased reaction time, means there was significant improvement in health markers and reaction time abilities, which may be an affirmative impact to the reduction of the risk of developing lifestyle diseases and is beneficial to people in their daily live.

Keywords: Recreational games; tribal women; reaction time; health markers.

1. INTRODUCTION

Regular physical activity in adults can reduce the risk of hypertension, cardiovascular disease, osteoporosis, type 2 diabetes mellitus, obesity, anxiety, and depression [1]. Wen et al. stated that 90 min per week or 15 min per day of moderate-intensity physical exercise might benefit individuals with the risk of cardiovascular disease. However, various barriers exist that prevent adults from fulfilling this physical activity recommendation (e.g., lack of time or uncertainty about the amount of exercise required to benefit health) [2]. Nevertheless, staying physically and mentally fit is one of the essential properties in middle-aged adults' life [3]. Playing basketball small-sided games in recreational settings utilizes anaerobic and aerobic metabolism pathways, leading to significant improvements in musculoskeletal and cardiovascular fitness [4]. Worldwide, obesity is considered to be the epidemic of twenty-first century, and is related to the development of insulin resistance and diabetes, as well as to the predisposition to increases in serum levels of cholesterol and systolic blood pressure (SBP) and diastolic blood pressure, which are risk factors for cardiovascular disease (CVD) [5].

Recreational games can be considered a useful, low intensity, enjoyable exercise intervention with a broad range of health and fitness benefits in middle age women but also for the general population. Moreover, considering the popularity of Recreational games worldwide, training studies using this sport as a health and physical fitness enhancing intervention are warranted. Participating in such recreational activities at early ages boosted the odds of continuing such activities later in life [6].

Health is not only about fighting disease, but also a phenomenon that aims to protect the individual, the family, and society to improve the general health of human beings, including their social and professional lives. Traditionally, continuous exercise-based physical activities such as brisk walking, running, and cycling have been used as health-promoting activities [7,8]. The systolic blood pressure (SBP) increases directly proportional to the increase on the cardiac debt. The diastolic blood pressure reflects the efficiency of the local vasodilator mechanism of the muscles in activity, which is as high as the local capillary density [9,10]. Some studies have shown that heart rate (HR) is higher during small-sided games formats with fewer players [11,12,13]. Several studies have shown positive health effects of participation in recreational football for untrained adults [14,15,16,17].

Difficulties in the integration of perceptual information into motor action may result in inadequate solutions to daily motor problems. Intellectual disability relates to inability to integrate visual inputs and hand movements [18]. Reaction time, defined as being the time between the application of a stimulus and the beginning of an organism's response to it, has been shown to be a valid indicator of the central nervous system's ability to receive and synchronize movement expressed through the peripheral nervous system [19]. There are multiple stimuli and multiple responses and the reaction must correspond to the correct stimulus [20].

The hypothesis for this study is that participants' reaction times will improve following recreational games training; therefore, supporting the idea that exercise is beneficial and can improve an

individual's simple reaction time abilities as well as heart rate and blood pressure also.

2. MATERIALS AND METHODS

2.1 Subjects

Twenty healthy middle-aged tribal women aged 50–55 years took part in the Experimental study. All the participants had some previous experience with recreational games and were recruited with the help of orientation program. The participants did not take medication and had not been involved in any type of organized physical training for at least two years. The subjects were matched and randomly assigned to experimental group ($n = 20$; age: 52.4 ± 2.48 years). The participants carried out a 16 week recreational games training program. In the study, the participant's heart rate, blood pressure, and reaction time were measured before, during and after the completion recreational games training program. Prior to exercise, participant's heart rate, blood pressure, and reaction time were taken respectively, and were measured to have baseline statistics in the mid of the training session (after eight weeks) and also at end of the training session (after sixteen weeks). These measurements were compared to values taken after exercising.

2.2 Procedures

Subjects were familiarized with all test procedures. Prior to exercise, resting heart rate and blood pressure were determined from 7 to 9 a.m. under standardized conditions after an overnight fast. Blood pressure was measured by Sphygmomanometer (blood pressure cuff), and an average value was calculated. The participant's baseline heart rate was measured using the Pulse Ox (heart rate monitor). The heart rate monitor was placed on the participant's non-dominant index finger. Before recording the resting heart rate, the subjects were instructed to remain lying on their bed. The Subjects were tested on psychomotor variables namely reaction time. The selected criterion variable auditory reaction time was tested with Modified chronoscope.

2.3 Intervention Program

The participants in middle age tribal women performed recreational games and received

guidance in experimental protocol, during 16 weeks, with 48 sessions of 40 minutes each. Each session comprised 5 minutes of stretching, 30 minutes of recreational activities on the basis of low to moderate (different types of recreational game), and 5 minutes recovery time. Different types of recreational game includes Walking relay, Ball roll relay, Snatch ball, Move down or up, All up relay, Waist catch, Arm roll relay, Target pass, Tunnel ball relay, Ball bounce relay etc. and was used in simple to complex manner.

Recreational games were planned with the help of experts in recreation activities and the subjects were monitored by an experienced physical education teacher and the researcher himself to ensure that the participants would be active throughout the period doing activities at a low to moderate for maintaining progressive of load.

2.4 Statistical Analysis

The entire initial (Before training), mid (After eight weeks of recreational games training) and post-test measurements (after sixteen weeks recreational games training) were taken. The level of confidence was fixed at 0.05. A repeated measure ANOVA with Least significant difference post hoc tests was computed to test for interactions and main effects for time (pre-test vs. mid-test, mid-test vs. post-test and pre-test vs. post-test) on the criterion variables.

3. RESULTS AND DISCUSSION

According to researcher's knowledge, this may be the first study examining the effect of recreational games on health markers and reaction time in middle-aged tribal women. We found that 16 weeks of recreational games decreased some risk factors, resting HR, systolic BP and diastolic BP compared to the initial stage. Moreover, subjects showed better results in health markers and reaction time compared to the preliminary condition. These findings partially confirmed the study hypothesis with positive effects on health markers and reaction time.

Several studies have exposed that team-sport activities such as recreational football, volleyball, basketball, and handball effectively decrease blood pressure [21,22]. Additionally, one study exposed that only eight sessions of high-intensity

interval training and moderate-intensity continuous training programs improved systolic blood pressure [23]. In this study, systolic blood pressure was lowered after training in the participants. This finding indicates that regular practice of recreational games positively affected the cardiovascular system of the participants. Resting HR has been suggested as a non-invasive, powerful, and independent predictor of cardiovascular diseases [24,25].

The practice of physical exercises, promoted perceptible effect on the reduction of the blood pressure levels [26]. Blood pressure has

increased with acute exercise and can therefore be concluded that exercise helped the brain react to stimuli faster. By binding to beta-2 receptors on the vessels, epinephrine causes dilation to occur and a decreased total peripheral resistance. Both of these changes allowed for an increase blood flow to all areas of the body. A study concluded that more blood flow allowed the brain to have better cognitive functioning [27].

The importance of this experiment can be related to many individuals in improving their everyday life and their health, specifically related to middle age tribal women.

Table 1. Summary of ANOVA experiment with repeated measure for the data pre-test vs. mid-test; mid-test vs. post-test and pre-test vs. post-test of the criterion variables: Blood pressure (systolic), blood pressure (diastolic), resting heart rate and reaction time (audio)

Variables	Sources	Sum of squares	DF	Mean square	F
Blood Pressure (Systolic)	Contrast	17.03	2	8.52	9.44*
	Error	34.30	38	0.903	
Blood Pressure (Diastolic)	Contrast	11.23	2	5.62	6.65*
	Error	32.10	38	0.845	
Resting Heart Rate	Contrast	19.90	2	9.95	29.62*
	Error	12.77	38	0.336	
Reaction Time (Audio)	Contrast	0.16	2	0.08	68.41*
	Error	0.05	38	0.001	

Table F ratio at 0.05 level of confidence for df 2, 38 was 3.20
*indicates significance at 0.05 level

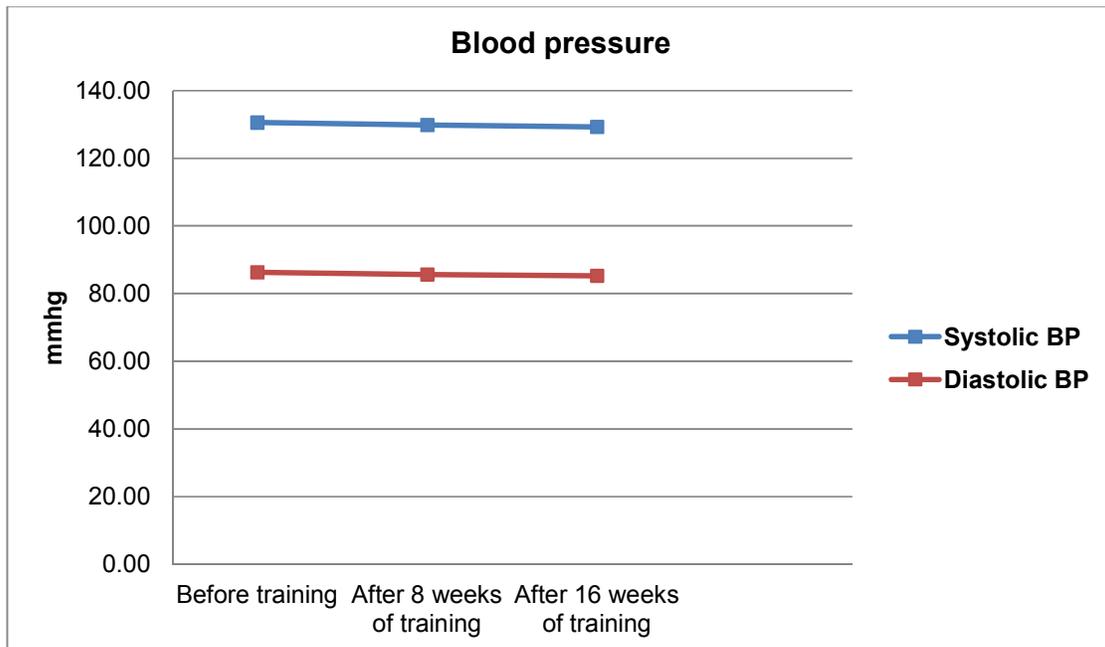


Fig. 1. Comparison of mean scores of systolic and diastolic bp in different phases of recreational games training

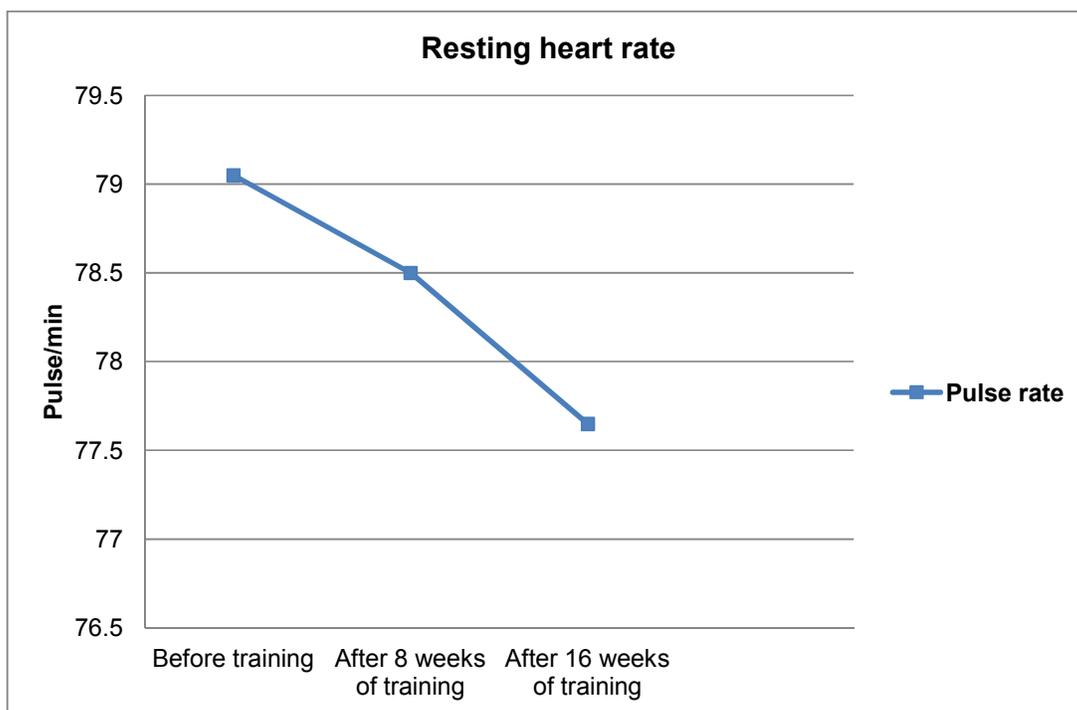


Fig. 2. Comparison of mean scores of resting heart rate in different phases of recreational games training

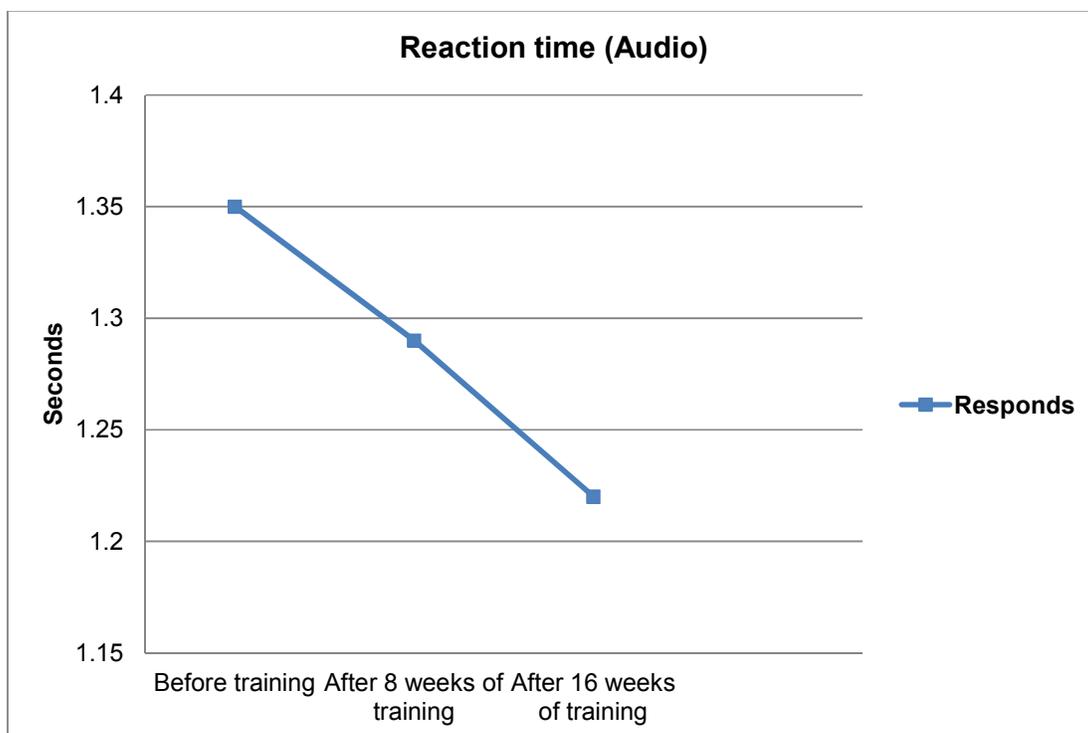


Fig. 3. Comparison of mean scores of reaction time (audio) in different phases of recreational games training

Table 2. Post hoc (LSD) comparison of the group means difference of the data pre-test vs. mid-test; mid-test vs. post-test and pre-test vs. post-test of the criterion variables: Blood pressure (systolic), blood pressure (diastolic), resting heart rate and reaction time (audio)

Variables	Pre test	Mid test	Post test	Mean difference	Confidence interval
Blood Pressure (Systolic)	130.55	129.80	-	0.75	0.96
	130.55	-	129.25	1.3*	
	-	129.80	129.25	0.55	
Blood Pressure (Diastolic)	86.30	85.65	-	0.65	0.93
	86.30	-	85.25	1.05*	
	-	85.65	85.25	0.4	
Resting Heart Rate	79.05	78.50	-	0.55	0.58
	79.05	-	77.65	1.40*	
	-	78.50	77.65	0.85*	
Reaction Time (Audio)	1.35	1.29	-	0.06*	0.03
	1.35	-	1.22	0.13*	
	-	1.29	1.22	0.07*	

*Significant at 0.05 level of confidence

4. CONCLUSION

Since the experiment was conducted on participants ranging from 50-55 years old, as mentioned above, establishing an exercises schedule early in life could help improve overall health later in life therefore, live a longer life. Recreational games can be an effective training modality to stimulate decrease in health risk factors and resting HR. However, it was also beneficial in improving blood pressure and it can also improve one's reaction time. However, this study shows that recreational games sessions per week can give meaningful benefits to the participants. This is of great importance considering that people with limited leisure time can practice recreational games three times per week and improves overall health.

CONSENT

For the purpose of data collection, informed consent was obtained from the study participants before administering the Test and Training Protocol and objectives of the study was explained to the participants by the data collectors.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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