



EFFECT OF CIRCUIT TRAINING ON SELECTED PHYSICAL FITNESS VARIABLES AMONG INTERCOLLEGIATE LEVEL KHO-KHO PLAYERS

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ABSTRACT

The present study aims to assess the effect of circuit training on selected physical fitness variables among intercollegiate level kho-kho players. To achieve the purpose of the study thirty intercollegiate male kho-kho players were selected from colleges affiliated with Bharathiar University, Coimbatore Tamilnadu. The age of the subjects was ranged from 18 to 25 years. The subjects were further classified at random into two equal groups of 15 subjects, Group- I underwent circuit training (CTG) and group-II acted Control Group (CG). Training period limited with three days in a week for six weeks of training. The selected criterion variables muscular strength, muscular endurance and flexibility were assessed by push up test, sit-ups test and sit and reach test before and after the training period. The collected data were statistically analyzed by using dependent 't' test. From the results of the study, it was found that there was a significant enhancement on muscular strength, muscular endurance and flexibility among intercollegiate level kho-kho players.

KEYWORDS: Circuit Training, Kho-Kho, Muscular Strength, Muscular Endurance and Flexibility.

INTRODUCTION

Physical fitness plays a very important role in the performance of any sportsperson. It helps athletes to perform their skills effectively and also reduces the risk of injuries. In traditional Indian games like Kho-Kho, players require a high level of physical fitness to perform quick movements, sudden direction changes, and continuous running. Kho-Kho is a fast-paced game that demands speed, agility, muscular strength, muscular endurance, and flexibility. Without these fitness components, it is difficult for players to maintain their performance throughout the game. Muscular strength is essential for Kho-Kho players to generate power during chasing and dodging actions. It helps them push off quickly, change direction rapidly, and maintain body control. Muscular endurance is equally important because the game involves continuous activity over a period of time. Players need to sustain repeated movements such as running, squatting, and diving without getting tired. Flexibility is another key component that allows players to move their body freely and efficiently. It helps in avoiding injuries and improves overall movement performance during the game. To improve these physical fitness components, different training methods are used in sports. One of the most effective methods is circuit training. Circuit training is a type of training that includes a series of exercises performed one after another with minimal rest in between. It combines both strength and endurance exercises, making it highly beneficial for overall fitness development. This type of training can be easily modified according to the needs of the players and the specific demands of the sport.

Circuit training is widely used because it improves multiple fitness components at the same time. It helps in developing muscular strength by using resistance exercises, while also improving muscular endurance through continuous repetitions. Additionally, certain exercises in circuit training can enhance flexibility by involving a full range of motion. Since Kho-Kho players require all these components together, circuit training can be considered an effective training method for them. In recent years, there has been an increasing interest in scientific training methods to improve sports performance. Coaches and trainers are focusing more on structured training programs instead of traditional methods. However, there is still a need to study the effectiveness of different training methods specifically for Kho-Kho players at the intercollegiate level. The present study aims to examine the effect of circuit training on selected physical fitness variables such as muscular endurance, muscular strength, and flexibility among intercollegiate level Kho-Kho players. The results of this study will help coaches, physical education teachers, and players to understand the importance of circuit training and how it can be used to improve performance in Kho-Kho.

STATEMENT OF THE PROBLEM

The purpose of this study was to find out the effect of circuit training on selected physical fitness variables among intercollegiate level kho-kho players.



CRITERION MEASURES ON SELECTED VARIABLES

S.NO	VARIABLES	TEST ITEMS	UNIT OF MEASURES
1.	Muscular strength	Push-up test	Counts
2.	Muscular endurance	Sit-up test	Seconds
3.	Flexibility	Sit and reach test	Centimetres

METHODS

EXPERIMENTAL DESIGN

The study was formulated as pre-test and post-test randomized groups design from the players initially for the study, based on the voluntary response to participate in thirty intercollegiate men Kho Kho players were selected from Bharathiar University affiliated colleges further process in which thirty Kho Kho players were randomly selected. The age ranged from 18 to 25 years, and they were divided into two group's namely core training group and control group. The selected subject (N=30) was divided into two groups (N=15) which group 1 underwent circuit training and group II was consider as control group (CG). The circuit training group underwent the specific training in the evening session for a period of 6 weeks. Group I was not treated with any special training had they were doing their regular activity.

TRAINING PROGRAM

The total duration of circuit training was 60 minutes. The load was increased one in two physical fitness training progress and lasted for 60 minutes. During the training period the subject were treated with circuit training for three alternative days (Monday Wednesday Friday) per week.

PHASE I

During the 1 to 2 weeks of circuit training, the subjects were treated with stretching for 5 minutes. Followed by circuit

training namely Push-up, Squats, Plank, Sit-up, Standing toe touch, Burpees, Lunges, Skipping practice followed by underwent different 12 repetitions with 3 set. Further the session ended with warm down.

PHASE II

During the 3 to 4 weeks, circuit training, the subjects were treated with stretching for 5 minutes. Followed by circuit training namely Lunges, Burpees, Skipping, Squats, Sit-up, Push-up, Standing toe touch, Plank practice followed by underwent different 15 repetitions with 3 sets. Further the session ended with warm down.

PHASE III

During the 5 to 6 weeks, circuit training, the subjects were treated with stretching for 5 minutes. Followed by circuit training namely Plank, Standing toe touch, Skipping, Squats, Burpees, Sit-up, Push-up, Lunges practice followed by underwent different 20 repetitions with 4 sets. Further the session ended with warm down.

STATISTICAL TECHNIQUE

The collected data on muscular strength, muscular endurance and flexibility due to the effects of circuit training was analyzed by computing mean and standard deviation. In order to find out the significant improve if any 't' test was applied 0.05 level of confidence was fixed to test the level of significance.

RESULT

TABLE: 1
COMPUTATION OF 't' RATIO BETWEEN PRE AND POST MEANS OF EXPERIMENTAL GROUP ON SELECTED PHYSICAL FITNESS VARIABLES

VARIABLES	Group	Mean	Standard Deviation	Standard Error Mean	t-Ratio
MUSCULAR STRENGTH	Pre-test	39.26	18.34	0.27	10.47*
	Post- test	42.14	18.36		
MUSCULAR ENDURANCE	Pre-test	43.06	5.61	0.15	10.98*
	Post- test	44.73	5.40		
FLEXIBILITY	Pre-test	26.53	7.77	0.16	11.83*
	Post- test	28.53	7.63		

*Significant at 0.05 level of confidence (2.145), 1 & 14.

Table 1 reveals that the Computation of 't' ratio between pre and post-test means of experimental group on selected physical fitness variables. The 't' ratio on muscular strength, muscular endurance and flexibility are 10.47, 11.83 and 11.83 respectively.

The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were greater than the table value, it was found statistically significant.

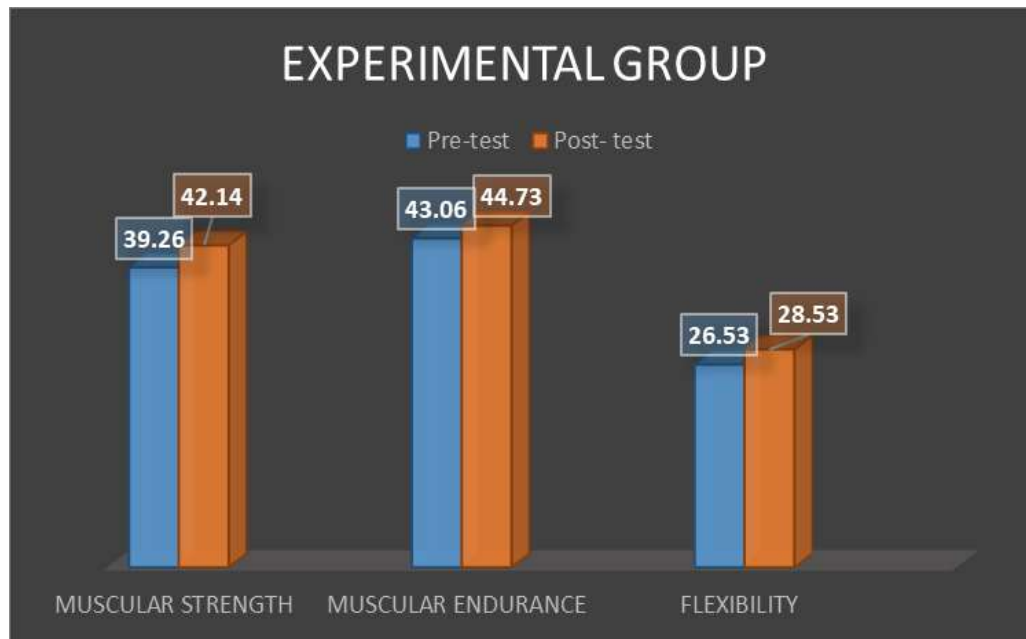


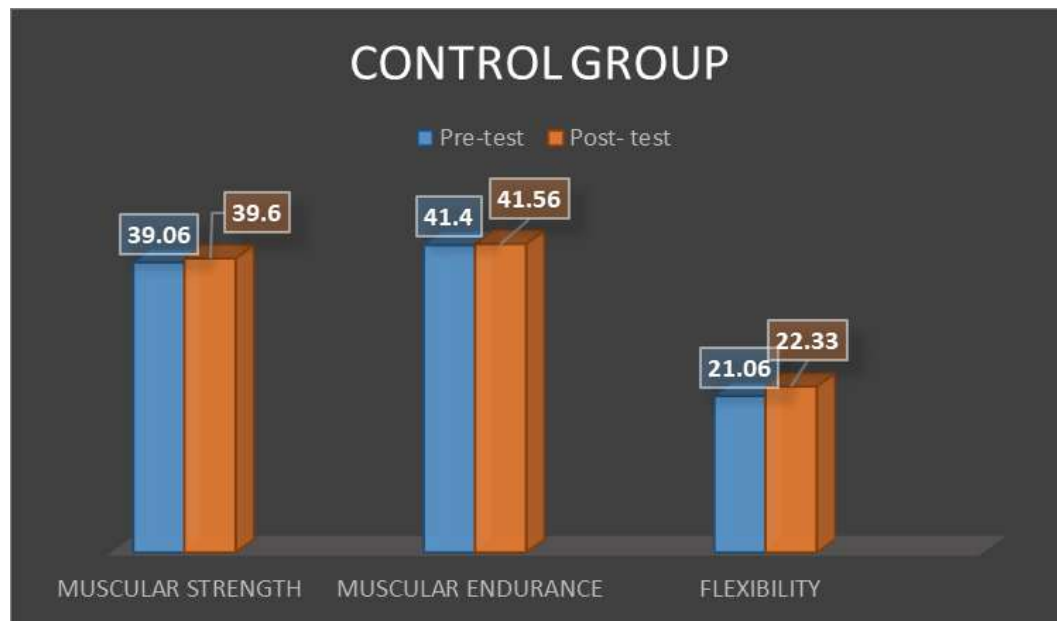
TABLE 2
COMPUTATION OF 't' RATIO BETWEEN PRE AND POST MEANS OF CONTROL GROUP ON ON SELECTED PHYSICAL FITNESS VARIABLES

Variables	Group	Mean	Standard Deviation	Standard Error Mean	t-Ratio
Muscular Strength	Pre-test	39.06	4.99	0.27	1.94
	Post- test	39.6	4.68		
Muscular Endurance	Pre-test	41.40	4.70	0.07	2.09
	Post- test	41.56	4..58		
Flexibility	Pre-test	21.06	4.02	0.89	1.41
	Post- test	22.33	5.43		

Significant at 0.05 level of confidence (2.145), 1 & 14.

Table 2 reveals that the Computation of 't' ratio between pre and post-test means of Control group on selected physical fitness variables. The 't' ratio on muscular strength, muscular endurance and speed are 1.94,1.41and 1.41 respectively. The

required table value was 2.14 for the degrees of freedoms 14 at 0.05 level of significance. Since the obtained 't' ratio values were lower than the table value. It was found statistically insignificant.



DISCUSSION ON FINDINGS

The purpose of the present study was to examine the effect of circuit training on selected physical fitness variables, namely muscular strength, muscular endurance, and flexibility among intercollegiate level Kho-Kho players. The findings of the study revealed a significant improvement in all the selected variables in the experimental group, whereas the control group did not show any significant changes.

The results indicated a significant improvement in muscular strength following the circuit training program. This improvement may be attributed to the nature of circuit training, which involves a combination of resistance and functional exercises performed in a sequence with minimal rest. Such training enhances neuromuscular coordination and promotes muscle fiber recruitment, leading to increased strength levels. These findings are consistent with the work of William J. Kraemer and Steven J. Fleck (2004), who reported that structured resistance-based training methods significantly improve muscular strength through progressive overload and systematic training.

The study also demonstrated a significant improvement in muscular endurance among the experimental group. Circuit training typically involves moderate intensity exercises performed continuously, which improves the muscles' ability to sustain repeated contractions over time. This type of training enhances both aerobic and anaerobic energy systems, thereby delaying fatigue. The findings are supported by Gregory G. Haff and N. Travis Triplett (2016), who emphasized that circuit-based resistance training improves muscular endurance by increasing metabolic efficiency and work capacity.

The results revealed a notable improvement in flexibility among the experimental group. Circuit training often incorporates

dynamic movements and stretching exercises, which contribute to increased range of motion and joint mobility. Improved flexibility is essential for Kho-Kho players, as the sport requires quick directional changes, bending, and stretching movements. This finding is in agreement with the research of Edward L. Fox and Donald K. Mathews (1981), who highlighted that regular physical training, including dynamic and flexibility exercises, enhances joint mobility and reduces the risk of injury.

The control group did not exhibit any significant improvement in muscular strength, muscular endurance, or flexibility. This indicates that without a structured circuit training program, the development of these physical fitness components is limited. This observation aligns with previous studies that stress the importance of systematic and planned training for improving athletic performance.

The findings of the study clearly demonstrate that circuit training is an effective method for improving muscular strength, muscular endurance, and flexibility among intercollegiate level Kho-Kho players. These results support the inclusion of circuit training in regular training programs to enhance physical fitness and performance in Kho-Kho.

CONCLUSIONS

Based on the findings of the study and within the limitations, the following conclusions were drawn:

1. Circuit training produced a statistically significant improvement in muscular strength among intercollegiate level Kho-Kho players.
2. Circuit training resulted in a statistically significant improvement in muscular endurance among intercollegiate level Kho-Kho players.
3. Circuit training led to a significant improvement in flexibility among intercollegiate level Kho-Kho players.



4. The control group did not show any significant improvement in muscular strength, muscular endurance and flexibility during the study period.
5. The results clearly indicate that circuit training is more effective to improving selected physical fitness variables.
6. It is concluded that a systematic and well-planned circuit training program can be effectively incorporated into regular training schedules to enhance the overall physical fitness and performance of Kho-Kho players.

REFERENCE

1. Ullah, I., Gul, R., Muhammad, A., & Usman, K. (2022). *Effect Of Circuit Training Upon Flexibility Among Non-Athletes of College Students*. *Al-Qantara*, 8(2), 227-241.
2. Sata, N., Auvichayapat, P., Punjaruk, W., Leelayuwat, N., Wannapan, A., Sunsorn, N., & Tunkamnerdthai, O. (2023). *Effects Of Circuit Training with and Without Inspiratory Muscle Training on Exercise Capacity and Flexibility in the Elderly*. *Journal Of Exercise Physiology Online*, 26(4).
3. Faisal, S., Wadiat, F., & Abbasi, M. M. (2024). *Effect Of Circuit Training on Muscular Strength and Flexibility in Cricket Players*. *Sports Sciences and Physical Education Review*, 3(2), Lxxii-Lxxxiv.
4. Al Furqan, M., Subagio, I., Widodo, A., Nurhasan, N., Kartiko, D. C., Albaitomi, M. A., ... & Pranoto, A. (2025). *The Effect of Bodyweight Circuit Training on Flexibility and Strength Endurance in Male Tennis Players*. *Pedagogy Of Physical Culture and Sports*, 29(1), 30-36.
5. Uzor, T. N. (2020). *Effects Of Circuit Training Exercise on Trunk Flexibility and Muscular Endurance of Female Secondary School Teachers in Anambra State*. *International Journal of Innovative Science and Research Technology*.
6. Maniazhagu, D., Alexander, C. R., & Sha, S. (2011). *Effects Of Aerobic Training and Circuit Training on Muscular Strength and Muscular Endurance*. *International Journal of Physical Education*, 4(2), 132-134.
7. Mayorga-Vega, D., Viciano, J., & Cocca, A. (2013). *Effects Of a Circuit Training Program on Muscular and Cardiovascular Endurance and Their Maintenance in Schoolchildren*. *Journal Of Human Kinetics*, 37, 153.
8. Vadivel, D. G., & Maniazhagu, D. D. (2022). *Effects Of Circuit Training and Circuit Weight Training on Muscular Strength Endurance*. *Journal Of Advances in Sports and Physical Education*, 5(3), 38-42.
9. Stojanovic, N., Stupar, D., Marković, M., Trajković, N., Aleksić, D., Pašić, G., ... & Stojanović, T. (2023). *School-Based Circuit Training Intervention Improves Local Muscular Endurance in Primary School Students: A Randomized Controlled Trial*. *Children*, 10(4), 726.
10. Chtara, M., Chaouachi, A., Levin, G. T., Chaouachi, M., Chamari, K., Amri, M., & Laursen, P. B. (2008). *Effect Of Concurrent Endurance and Circuit Resistance Training Sequence on Muscular Strength and Power Development*. *The Journal of Strength & Conditioning Research*, 22(4), 1037-1045.