

PHYSIOLOGICAL COMPONENTS DIFFERENTIALS BETWEEN COLLEGE WOMEN KABADDI AND KHO-KHO PLAYERS

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ABSTRACT

The purpose of the study was to compare the resting heart rate and breath holding time between college women kabaddi and Kho-Kho players. To achieve this purpose of the study, sixty women players studying in different Sports academies in Andhra Pradesh, India were selected as subjects at random. Among them, thirty kabaddi players and thirty Kho-Kho players were selected. Among the physiological components, the following variables namely resting heart rate and breath holding time were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using radial pulse and holding the breath for time. The independent 't' ratio was used to analyze the significant difference, if any between groups. The .05 level of confidence was fixed as the level of significance to test the 't' ratio obtained, which was considered as an appropriate. The results of the study showed that there was a significant difference between women kabaddi players and Kho-Kho players on resting heart rate and breath holding time.

Keywords: Resting heart rate, Breath holding time, College Women Kabaddi Players, Kho-Kho Players

INTRODUCTION

Kabaddi and Kho-Kho are two traditional Indian team sports that demand a combination of physical, physiological, motor, and psychological abilities. Although the technical and tactical structures of the two games are different, both involve repeated periods of relatively high-intensity activity interspersed with brief recovery periods. Consequently, the ability of the cardiovascular and respiratory systems to respond to exercise and recover efficiently is important for athletes participating in these sports. In this context, resting heart rate and breath-holding time are useful physiological variables for examining aspects of cardiovascular and respiratory fitness among women Kabaddi and Kho-Kho players.

Resting heart rate refers to the number of heart beats per minute when an individual is in a rested state. It is commonly expressed in beats per minute (bpm) and can be assessed non-invasively through methods such as radial pulse palpation or electronic heart-rate monitoring. Because heart rate reflects the interaction between the autonomic nervous system and cardiovascular function, resting heart rate can provide useful information about the cardiovascular condition and physiological status of an athlete. Regular physical training, particularly aerobic and mixed-intensity training, can produce cardiovascular adaptations that influence resting heart rate and other measures of cardiac function (Petek & Wasfy, 2018).

In trained athletes, a relatively lower resting heart rate is commonly associated with adaptations that enable the cardiovascular system to maintain adequate circulation with fewer heart beats at rest. Exercise training can increase cardiac efficiency through adaptations involving stroke volume, autonomic regulation, and cardiovascular function. However, resting heart rate should not be interpreted in isolation because it is affected by

several factors, including age, training status, hydration, environmental conditions, psychological stress, illness, sleep, medication, and measurement conditions. Thus, standardized measurement procedures are particularly important when resting heart rate is used as a research variable.

The importance of resting heart rate is especially relevant to Kabaddi, because the sport has an intermittent physiological structure. During a Kabaddi match, players repeatedly perform activities such as raiding, defending, sprinting, dodging, tackling, and returning to position. These activities produce substantial cardiovascular and metabolic demands. Khanna et al. (1996), in their investigation of Indian national Kabaddi players, reported an average match heart rate of approximately 146.5 beats per minute, with raiding producing considerably higher heart rates. The investigators concluded that Kabaddi is an intermittent sport in which the raiding phase places substantial anaerobic demands on the athlete.

The intermittent nature of Kabaddi means that players must repeatedly increase cardiovascular output during intense actions and subsequently recover during pauses in play. Therefore, the cardiovascular efficiency reflected partly by resting heart rate may be relevant when examining the physiological status of Kabaddi players. A well-conditioned athlete may demonstrate adaptations that allow the cardiovascular system to function efficiently at rest and respond appropriately to the demands of exercise.

Research involving women Kabaddi players has specifically included resting heart rate among the physiological variables associated with playing ability. Mahaboobjan et al. (2025) examined 100 women Kabaddi players aged 18–25 years and selected resting heart rate, breath-holding time, and blood-pressure variables in relation to Kabaddi playing ability. Resting

heart rate was assessed through the radial-pulse method, while breath-holding time was assessed using a manual nostril-clip procedure. Interestingly, their analysis did not find resting heart rate to be significantly correlated with Kabaddi playing ability, whereas some of the other physiological variables showed significant associations. This finding is important because it demonstrates that although resting heart rate is a meaningful physiological indicator, it should not automatically be assumed to be a direct predictor of sport performance.

This distinction is particularly valuable in research involving women athletes. Recent reviews have emphasized that female athletes have historically been underrepresented in sports-cardiology and exercise-adaptation research. Henley-Martin et al. (2026), in a systematic review of 767 studies involving exercise-induced cardiac adaptation, found that female-only studies constituted only a small proportion of the literature and that females accounted for less than one quarter of participants. Such findings support the need for additional research specifically examining cardiovascular responses and adaptations in women athletes.

The same consideration applies to women Kho-Kho players. Kho-Kho requires repeated acceleration, deceleration, chasing, dodging, turning, sitting, rising, and rapid changes in direction. These activities place repeated demands on the cardiovascular and respiratory systems. Because the game consists of repeated high-intensity actions rather than continuous steady-state exercise, an athlete needs both the capacity to produce intense efforts and the ability to recover between successive efforts. Resting heart rate can therefore be incorporated into a battery of physiological measurements to characterize the cardiovascular status of Kho-Kho players.

The use of heart rate as a training-related indicator is also supported by broader sports-science literature. A systematic review by Borresen and Lambert (2008) identified heart-rate-based measures as useful tools for monitoring training status, while later systematic research has continued to demonstrate associations between heart-rate-based training load and changes in physical-performance characteristics among team-sport athletes. These findings indicate that heart rate can provide valuable information about the internal physiological load imposed by training.

Breath-holding time (BHT) refers to the duration for which an individual can voluntarily suspend breathing following a specified breathing procedure. In physical-education and sports research, it is commonly measured in seconds using a standardized breath-holding protocol. Breath-holding time is influenced by several physiological factors, including lung volume, arterial and tissue gas concentrations, carbon-dioxide accumulation, oxygen availability, metabolic rate, ventilatory response, and the individual's tolerance of respiratory discomfort.

It is important to recognize that breath-holding time is not equivalent to vital capacity or maximal aerobic capacity. A person may have a relatively long breath-holding time because of differences in tolerance to carbon dioxide, metabolic rate, psychological factors, or breathing strategy without necessarily possessing superior aerobic fitness. Cherouveim et al. (2013), for example, investigated maximal breath-hold time in healthy men and women and found that maximal breath-hold duration was influenced by physiological responses occurring during voluntary apnea. Their study found similar maximal breath-hold times between the male and female participants in their sample, demonstrating that sex differences in breath-holding ability are not necessarily straightforward.

Breath-holding time nevertheless has relevance to sports physiology because voluntary apnea produces characteristic cardiovascular and respiratory responses. During breath holding, oxygen consumption continues while ventilation is temporarily interrupted, resulting in progressive changes in oxygen and carbon-dioxide levels. Consequently, the ability to tolerate these changes is partly related to the body's respiratory and metabolic responses.

Recent research has provided further evidence that breath holding can substantially modify cardiovascular responses during exercise. Walsh et al. (2025) investigated the physiological effects of breath holding during high-intensity exercise in 20 participants, including 10 women. Although the participants maintained the same exercise power output under free-breathing and breath-holding conditions, heart rate was higher during the breath-holding condition. The findings demonstrate that voluntary breath holding interacts with cardiovascular responses during intense exercise and should therefore be considered a distinct physiological phenomenon rather than simply a measure of aerobic capacity.

For Kabaddi players, breath-holding ability has particular research relevance because raiding and defensive actions involve short periods of intense muscular activity and tactical control. A raider must control breathing while simultaneously performing rapid movements, evading defenders, maintaining body position, and attempting to return safely to the home court. Although players are not expected to deliberately hold their breath throughout a raid, respiratory control may interact with the physiological demands of these high-intensity activities.

The importance of breath-holding time has been examined specifically among women Kabaddi players. Santhana Selvi and Sridar (2023)

investigated the effects of isolated and combined weight and ladder training on muscular strength endurance and breath-holding time among intercollegiate female Kabaddi players aged 18–25 years. Their study selected breath-holding time as a physiological variable and assessed it using a nostril-clip procedure. The inclusion of BHT in this study demonstrates its continued use as a physiological criterion in research involving women Kabaddi players and training interventions.

Similarly, research examining physiological characteristics associated with women Kabaddi performance has included both resting heart rate and breath-holding time. Mahaboobjan et al. (2025) studied 100 college-level women Kabaddi players and used radial pulse for resting heart rate and a manual nostril-clip method for breath-holding time. Their findings indicated that breath-holding time, along with systolic and diastolic blood pressure, had significant associations with assessed playing ability, while resting heart rate did not show a significant relationship in their sample. These findings illustrate why both variables can be scientifically useful while still representing different physiological dimensions.

METHODOLOGY

The purpose of the study was to compare the resting heart rate and breath holding time between college women kabaddi and Kho-Kho players. To achieve this purpose of the study, sixty women players studying in different Sports academies in Andhra Pradesh, India were selected as subjects at random. Among them, thirty kabaddi players and thirty Kho-Kho players were selected. Among the physiological components, the following variables namely resting heart rate and breath holding time were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using radial pulse and holding the breath for time.



The independent 't' ratio was used to analyze the significant difference, if any between groups. The .05 level of confidence was fixed as the level of significance to test the 't' ratio obtained, which was considered as an appropriate.

ANALYSIS OF THE DATA

Resting heart rate

The mean, standard deviation and 't' ratio values on resting heart rate of women kabaddi players and Kho-Kho players have been analyzed and presented in Table I.

TABLE I

THE MEAN, STANDARD DEVIATION AND ‘t’ RATIO VALUES BETWEEN WOMEN KABADDI AND KHO-KHO PLAYERS ON RESTING HEART RATE

Groups	Mean	Standard Deviation	‘t’ ratio value
Kabaddi Players	71.82	1.15	4.98*
Kho-Kho Players	70.36	1.12	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence with df 58 was 2.002).

The table I shows that the mean values on resting heart rate for women kabaddi players and Kho-Kho players were 71.82 and 70.36 respectively. The obtained ‘t’ ratio value on resting heart rate 4.98 which was greater than the table value required for significance with df 58 was 2.002.

The results of the study showed that there was a significant difference between college women kabaddi players and Kho-Kho players on resting heart rate.

Breath holding time

The mean, standard deviation and ‘t’ ratio values on breath holding time of kabaddi players and Kho-Kho players have been analyzed and presented in Table II.

TABLE II
THE MEAN, STANDARD DEVIATION AND ‘t’ RATIO VALUES BETWEEN
WOMEN KABADDI AND KHO-KHO PLAYERS ON BREATH HOLDING
TIME

Groups	Mean	Standard Deviation	‘t’ ratio value
Kabaddi Players	43.11	1.24	8.75*
Kho-Kho Players	45.89	1.22	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence with df 58 was 2.002).

The table II shows that the mean values on breath holding time for women kabaddi players and Kho-Kho players were 43.11 and 45.89 respectively. The obtained ‘t’ ratio value on breath holding time 8.75 which was greater than the table value required for significance with df 58 was 2.002.

The results of the study showed that there was a significant difference between college women kabaddi players and Kho-Kho players on breath holding time.

CONCLUSIONS

1. There was a significant difference between women kabaddi players and Kho-Kho players on resting heart rate.
2. There was a significant difference between women kabaddi players and Kho-Kho players on breath holding time.

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