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A STUDY OF AEROBIC AND ANAEROBIC TRAINING TOWARDS KHO-KHO WOMEN PLAYERS

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ABSTRACT

Traditional Indian sport known as kho-kho calls on quickness, dexterity, and stamina. There are two teams involved, and the objective is for each squad to tag as many members of the rival team as they can. Players of Kho-Kho, especially women, must be in good aerobic and anaerobic shape due to the physical demands of the sport. The purpose of this study is to assess how aerobic and anaerobic training affects female Kho-Kho players.This study can help physical educators and coaches prescribe a thorough concurrent aerobic and anaerobic training routine. This study has significant implications for coaches of part-time sports teams. This study will provide answers to questions like how much physical fitness components can improve when concurrent aerobic and anaerobic training is used. This study's findings may help physical education teachers and coaches better cater concurrent aerobic and anaerobic training plans for enhancing sports performance to the specific needs of their pupils. After 12 weeks of mixed aerobic and anaerobic training, this study will show how drastically different physical fitness measurements would be. Such an endeavour would motivate academics to delve deeper into the myriad aspects of combining aerobic and anaerobic training. The number of "fitness hopefuls" is increasing, and there is a growing need for advice on efficient concurrent training.

KEYWORDS: researchers, physical education, physical fitness, and applications all at one

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INTRODUCTION

An athlete keeps a constant pace for a considerable amount of time during aerobic exercises. Oxygen is required to supply energy to muscles and to metabolise substrates from energy storage. On the other hand, anaerobic exercises are high intensity activities like sprinting where the body must rely on non-oxygen sources of energy. Waste chemicals produced by anaerobic metabolism in cells might hinder muscular contractions and contribute to weariness. Exercises that are aerobic are intended to improve stamina and endurance. Setting a steady tempo that can be kept up for a long time is crucial when organising an aerobic workout. Workouts that mimic the activity or event the athlete is preparing for can increase cardiovascular endurance. A training programme that incorporates both aerobic and anaerobic exercise can greatly raise cardiorespiratory fitness.

The body is put under stress during an anaerobic conditioning programme in order to increase speed, strength, and endurance. Interval training drives the body while preventing complete recovery by alternating between brief bursts of high intensity exercises like sprinting and brief cool down periods of lower intensity exercises like jogging. This kind of exercise regimen can enhance an athlete's capacity to withstand and utilise the elevated lactic acid concentrations that result from anaerobic activity. A great training regimen is tailored to the specific requirements of each athlete. However, athletes can increase their endurance, stamina, strength, and power by incorporating aerobic and anaerobic exercises into a single training regimen. In general, sports performance conditioning needs to be tailored to the demands of the particular sport. It's vital to remember that things aren't quite so straightforward in reality, so it's best not to get too caught up in the "specificity" concept. The value of aerobic fitness for intermittent sports is sometimes overlooked. The reasoning for this is that while these activities are anaerobic, conditioning should primarily be anaerobic in nature. The energy used during short sprinting bursts comes from anaerobic metabolism, namely ATP/CP. However, CP is recovered and hydrogen ions are eliminated via aerobic metabolic activities. Ineffectiveness in this area will cause tiredness to build up and lower performance during repeated sprints.

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Athletes competing in short track events must use a combination of aerobic and anaerobic routes, as opposed to longer endurance track events, which rely on sub maximum aerobic pathways (Neumann, 1992).

Both athletes aiming to perform better and the general population seeking health benefits find improvements to muscular strength and cardiovascular fitness to be desirable adaptations. Concurrent training refers to the integration of resistance and aerobic exercise into a single programme with the goal of achieving adaptations unique to each. Strength, hypertrophy, and power have all been shown to decrease with concurrent training compared to resistance training alone (Hakkinenet al. 2003; Hennessy & Watson 1994; Hunter, Demment, and Miller 1987; Leveritt & Abernethy 1999). However, other research (Balabinis, et al. 2003; McCarthy, et al. 1995; McCarthy, et al. 2002) reported minimal to no reductions in strength training benefits with the addition of endurance training.

All three energy systems are stressed during simultaneous aerobic and anaerobic exercise. The phosphagen (PCr) pathway, the glycolytic pathway, and the oxidative pathway were the three energy systems. These energy systems are employed during exercise, which can range from brief periods of anaerobic activity to lengthy periods of aerobic activity. Depending on the amount and duration of exercise, as well as each person's level of fitness, their respective contributions to overall energy provision will vary. Competence in each of the three energy routes is necessary for the development of true total fitness (Glassman, 2010). The length, level of difficulty, and exercises planned for each workout of the day regulate the utilisation of all three energy systems. Running, swimming, rowing, speed skating, and/or cross-country skiing are examples of activities that are considered to be metabolic conditioning (Glassman, 2010). According to Glassman (2010), these exercises should be done for varying amounts of time and intensity (both anaerobic and aerobic), though he does advise doing more anaerobic exercise than aerobic.

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Skeletal muscle tissue can adapt favourably to certain demands by taking use of the human neuromuscular system's high level of plasticity. According to the Specific Adaptations to Imposed Demands (SAID) principle, the type of adaptation a physiological system experiences as a result of training is specific, limited to the systems used, and determined by the degree of overload encountered (Baechle & Earle, 2008; Folland & Williams, 2007). Numerous variables, such as sex, baseline fitness level, exercise intensity, duration, frequency, mode, and nutritional status, influence adaptive responses. In the end, a combination of these variables affects how the system physically and biochemically adapts in accordance with the overload principle (Baechle & Earle, 2008).

Skeletal muscle changes its fatigue resistance, aerobic/anaerobic enzyme concentrations, maximal contraction velocity, and myosin fibre remodelling in response to exertion-based cellular stress (Coffey & Hawley, 2007; Folland & Williams, 2007). Exercise-related stress can typically be divided into three categories: aerobic/endurance, anaerobic/interval, or resistance training. Traditional aerobic/endurance exercise entails massive muscular contractions that are completed continuously for longer than 20 minutes at submaximal levels. Increased a-v O2 difference, stroke volume (SV), mitochondrial content (Coffey & Hawley, 2007), capillarity (Blomqvist & Saltin, 1983), oxidative enzyme activity (Spina, et al., 1996; Holloszy & Coyle, 1984), decreases in total muscle size and cross sectional area, as well as fibre type transitions (IIx? IIa and II?I) are all adaptation Repeated endurance training thus results in a greater ability to load, transfer, and use oxygen (Coffey & Hawley, 2007; Wilmore et al., 2001; Jones & Carter, 2000).

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High Intensity Interval Training (HIIT) is a type of aerobic exercise that alternates periods of activity performed at intensities close to or above maximum (> 90% V02max) with intervals of low to moderate intensity exercise or full rest. There is an inverse relationship between time and intensity for HIIT regimens, with intervals lasting anything from a few seconds to several minutes. In the past ten years, studies have shown that HIIT is just as effective as and frequently even more efficient than endurance training at increasing VO2max, lactate threshold (LT) velocity, and time trial performance (Gibala, et al., 2006; Gibala& McGee, 2008; Burgomaster, et al., 2008; Esfarjani&Laursen, 2007; Edge, et al., 2005). This more pronounced improvement could be the result of peripheral adaptations that are more prominent after HIIT (Helgerud et al., 2007). According to research by Burgomaster et al. (2008), HIIT has also been demonstrated to boost oxidative enzyme activity, indicators of whole-body lipid oxidation, and reduce glycogen and phosphocreatine depletion. Over the past few years, emphasis has increased on Sprint Interval Training (SIT), a particular form of HIIT characterised by supramaximal exercise intensity and extremely brief work intervals. SIT has been shown to be a successful strategy for enhancing aerobic fitness in a small fraction of the time needed with standard endurance training (Gibala, et al., 2006; Burgomaster, et al., 2008; Hazell, et al., 2010). Long-term breathing and heart-rate-increasing activities are involved. Running, jogging, cycling, and swimming are among examples. The body's capacity to use oxygen effectively is enhanced by aerobic exercise, which increases endurance. When playing Kho-Kho, cardiovascular exercise can help players maintain their performance for longer stretches of time without getting too tired.

Anaerobic exercise: Anaerobic exercise concentrates on quick, high-intensity activities. It focuses mostly on the muscles' capacity to generate large amounts of power quickly and efficiently. Sprinting, weightlifting, and explosive motions are some examples. Strength, power, and speed—which are essential in Kho-Kho when players must conduct fast bursts of running, tagging opponents, and escaping the opposition—are developed through anaerobic training.

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Development of Organized Sports

The way that people participate in sports has undergone significant change as a result of organised sports. Sports are being used by parents as a means of reinforcing their authority over their kids and providing them with valuable experiences. Sports today incorporate more private organisations, place a greater emphasis on moral behaviour, and employ specialists from a variety of sports sciences to develop high-performance training methods.

Only by looking at the society in which they are played and how sports have evolved can we understand and interpret the state of modern sports (Brown, 2007) and issues that are common in them. The majority of individuals in our society are affected by sports in some manner, whether it is through participating in or watching them, getting caught up in the excitement of a game, or giving them financial support. The indigenous sports cultures and societies have emerged in both emerging and developed nations. Asian nations appear to be only beginning to create sports cultures. Both contemporary and traditional sports are rising in India and carving out distinct niches for themselves in the global sports community.

Development of Sports in India

It seems that today's athletes, coaches, and athletic trainers are under increasing pressure to succeed in their sport. Athletes are increasing their practise and conditioning efforts in response to this demand in order to get in the best possible shape for competition. Advances in sports research, sports sciences, and related fields are going hand in hand with these rising needs. Athletes at the highest levels have also developed a greater level of expertise in their particular sports. Athletes can potentially improve their chances of winning and performing at higher levels by utilising the latest developments in sports and the specialisation of athletes in today's sporting environment.

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The recent accomplishments from the recent Olympics demonstrate the improvement in Indian athletes' sporting abilities. Because of improved and more scientific training facilities, superior nutrition, and cutting-edge medical services, athletes are performing at a higher level. A few specific sports, including cricket, tennis, golf, and badminton, to name a few, are flourishing in India. However, the government has been giving money to the recognised National Sports Federations (NSFs) through the "Assistance to National Sports Federations" programme in order to boost girls' and women's exposure, training, and participation at the national and international levels. The government gave its approval to the Khelo India - National Programme for Development of Sports Central Sector Scheme in April 2016. In terms of games with Indian roots, the picture appears to be deteriorating. It is very known that foreigners consistently surpass Indians in Indian games. Indian hockey is a prime example of how the sport is dwindling, how industrialised countries have outperformed Indians, and what scientific methodology and cutting-edge research can do to improve any game. Indian sports like hockey, kabaddi, kho-kho, and mallakhamb must undoubtedly examine themselves to see how science and study in these fields would result in the required modifications in Indian sports' athletic performance. In India, the sport of Kabaddi has a long history and is still played today. India won the gold medal at the Asian Games quite early on and was never bitten by any other nation. However, the arrival of pro-Kabaddi helped the sport's true popularity soar to unprecedented heights. In India, Pro Kabaddi has completely altered the game's landscape. The Pro Kabaddi League has served as a feeder league for Indian Kabaddi since its start in 2014, providing a stage for some of the greatest players in the nation to demonstrate their skills and even launch successful careers. 2018 (Ghosh & SenSarma) The Kho-Kho fraternity is attempting to add sports to the Olympic programme. At the Asian and SAF championships, India has so far dominated the Kho-Kho discipline. This game is being played as the main sport in nations like England, Canada, Sri Lanka, Bangladesh, Pakistan, Sri Lanka, Nepal, Japan, and Thailand; these nations have more scientific backing and advancements. The Indian Kho-Kho community must understand the need for the game's scientific growth if it hopes to compete in the Olympics.

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Importance of Sports Performance Profiling

Every sport places a high value on performance analysis, which provides a solid foundation for applying these scientific approaches to every sport. The ability of an athlete to perform is not determined by their level of competition success. High levels of skill and fitness do not give a full picture of one's performance capabilities. Prepare systematic and scientific data at the world level when preparing for important tournaments. Accurate assessments of skill levels, physical fitness, physiological factors, psychological characteristics, and socioeconomic circumstances are all part of this data. These qualities are essential for great performance.

Experienced trainers use the data gathered in this way to create training plans that improve fitness while also guaranteeing success in competition performance. The entire process must improve methods for finding, attracting, and keeping professional athletes. (2000) (Garret, W.E. Jr. (Marques, 2009) stated in his study that in order to create player-specific training regimens, sports science and fitness professionals must take into account the athletes' anthropometric and physical features.

The conventional methods of finding new talent focus on a particular level of physical preparedness and distinctive physiological traits of players in individual sports. The understanding of anticipated performance skills in team sports, however, is insufficient. (Tan, 2009) analysed and investigated volleyball players' performance profiles by connecting them to their on-court actions and performance. Based on some playing positions, volleyball players from both sexes demonstrated different anthropometric traits. Only a few positions revealed variations in speed and agility. On a few anthropometric and physiological measures, the top players differed from the others.

Numerous studies have examined the physiology, psychology, anthropometry, and fitness characteristics of the top athletes in a variety of sports.

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These studies shed insight on the needs for particular positions in sports like handball, tennis, soccer, rowing, basketball, etc. It has been discovered that athletes in various sports and roles have unique physical and physiological profiles. One of the main causes of the game's performance standard's ongoing rise is player profiling. However, it appears that only elite athletes and a small number of sports have received this backing in India. According to their games, Indian players' anthropometric and physical characteristics have been the subject of certain research (Sodhi, H. S., 1984; Naik, 2009; Pawar, V., 2012; Kalidasan, R., 2011).

Development of Kho- Kho

It is exceedingly challenging to research the origins of the game Kho-Kho. Although there is no documented history or proof of its existence, the game Kho-Kho may have its roots in the Mahabharata, which may also have influenced its methods and tactics. The Sanskrit word SYU, which means get up and run, is where the word kho originated. It is stated that Saints Reishtha Tukaram and Saint Eknath mentioned this match. The very soil of Maharashtra is where the game of Kho- Kho first appeared. Children may be asked to sit facing each other in the opposite way and generate a barking noise at a specified distance as a result.

This could be the start of the children running away from the farm's security. Such justifications were provided by eminent statistician Kai Ramesh Varalikar in his book, Kho-Kho.

For many years, Maharashtrans have enjoyed playing the game kho kho. However, the game is undeniably quite ancient. This game gained popularity under Sayajirao Gaikwad of Gaikwad Sansthan, Baroda, and championships were held at Jumma Dada Gymnasium.

According to experts, the erstwhile Mumbai VidyutKridaMandal won the competition and took home a beautiful prize. The Kho- Kho game originated in Baroda, and during the following 100 years, it has also been played in Pune, Mumbai, Nagpur, Kolhapur, Amravati, and Dhule. Despite the fact that the game is played well throughout Vidarbha, Kolhapur, Karnataka, and certain southern states, Maharashtra is regarded as the game's main supporter and spreader.

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Prior to independence, when playing kho-kho, the number of defenders for defence was not predetermined, wooden poles may be replaced with any object or person, the ground measures were not predetermined, and an attack error resulted in a point deduction. Since there were no specific rules for this game—which was performed at entertainment, festivals, and celebrations—it was simply regarded as a catch or Shiva Shivi game.

At the same time, indigenous sports acquired importance in accordance with the self-sufficient ideas established by LokmanyaTilak, and this time the Deccan Gymkhana Pune was established. The field's limits were established by some regulations that were created in 1914, but new rules were added to replace the old ones. The ground length was extended by 17 yards, or 44, in 1919. Kho-Kho sport received a new twist in the year 192324 thanks to the establishment of an inter-school sports association. The Vijayhind Baroda norms were changed in 1924, and the All India Board of Physical Education was founded in 1928. In cooperation with experts in the Kho- Kho game, Abasaheb Natu, Pune, MahabalGurujiNashik, Karmarkar, Vaidya, and Dr. MirajkarMiraj devised a course on the game's rules.

Concurrent Strength and Aerobic Endurance Training

In contrast to the adaptations brought about by either strength training or endurance training alone, Hickson (1980) examined how people respond to a combination of the two. There were three exercise groups: an endurance group (E) that exercised for 40 minutes per day, six days per week, and a S and E group that followed the same daily exercise schedules as the S and E groups. The strength group (S) exercised for 30 to 40 minutes each day. After 10 weeks of training, both the E and S and E groups experienced a rise in VO2max of about 25% during exercise on a bicycle and 20% during exercise on a treadmill. In the S group, no VO2max gain was seen. Throughout the training, the legstrength of the S group increased at a steady rate, whereas there were no discernible strength gains in the E group. For the first seven weeks of training, the S and E group's rate of strength improvement was comparable to that of the S group, but it then levelled off and decreased during the ninth and tenth weeks. Their research

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showed that training for both S and E at the same time will diminish your ability to gain strength but have no effect on how much your VO2max increases.

Twenty-two male and female subjects trained for 7 weeks for either endurance (group E), strength (group IS), or both strength and endurance (group C). Udley and Djamil (1985) evaluated the impact of concurrent performance of both modes of training on the in vivo force-velocity relationship of human muscle and on aerobic power. On the cycle ergometer, five 5-minute sessions were performed three times per week with a workload that was close to the subject's peak CE VO2 (peak cycle ergometer oxygen consumption). Two 30-second sets of maximal knee extensions were done three times a week on an isokinetic dynamometer at a speed of 4.19 rad X s-1 as part of the strength training regimen. Group C exercised in the same manner as groups IS and E, switching between strength and endurance workouts on different days. The subjects (groups C and IS) underwent pre- and posttraining tests to determine their maximum knee-extension torque at seven different rotational velocities (0, 0.84, 1.68, 2.81, 3.35, 4.19, and 5.03 rad X s-1) and a specified joint angle (0.52 rad below horizontal). Peak CE VO2 was measured in Groups C and E pretraining, at 14-day intervals, and posttraining. At speeds up to and including the training speed (4.19 rad X s-1), group IS demonstrated statistically significant increases in angle-specific maximum torque. Only at velocities of 0, 0.84, and 1.68 rad X s-1 did Group C exhibit increases (P 0.05). Peak CE VO2 rose (P 0.05) by almost 18% for both groups E and C, whether expressed in relative or absolute terms. Many doctors and trainers share the opinion that it is ineffective to exercise hard for both cardiovascular endurance and muscle strength at the same time. 14 healthy, untrained males were trained for 20 weeks, four days a week, on a bicycle ergometer for endurance (END Group, n = 4), an isokinetic device for greater torque generation (ITP Group, n = 5), or both devices (COMBO Group, n = 5). Nelson et al. (1990) tested this hypothesis. Throughout the trial, the torque improvements for the ITP and COMBO groups were equal (234 +/- 45 and 232 +/- 23 N.m, respectively). Both the END and COMBO groups experienced comparable increases in maximum oxygen consumption (VO2max) (measured in millilitres per kilogramme

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of body weight per minute) after 11 weeks. The END Group, however, experienced a significant increase in VO2max (p less than.05) of 4.7 +/- 1.2 mL.kg-1.min-1 during the second half of the study, whereas the COMBO Group experienced a nonsignificant increase (p larger than.05) of 1.8 +/- 0.6 mL.kg-1.min-1. Citrate synthase activity was significantly higher in the END Group (15.5 +/- 7.9 mumol.g-1.min-1) compared to the COMBO Group, which is consistent with this conclusion (p less than.05). They came to the conclusion that simultaneous training might prevent either training program's typical adaption when done separately. The type and intensity of each individual training programme will likely have an impact on how much interference occurs.

CONCLUSION

Thirty (30) female Khokho players were enlisted as study subjects in order to accomplish the study's goals. Participants ranged in age from 18 to 20 years old. All participants were made aware of the study's purpose and given the go-ahead to cooperate throughout the entire investigation. A licenced doctor assessed the chosen candidates and confirmed that they were physically and medically fit enough to participate in the concurrent aerobic and anaerobic training programme. The chosen individuals were divided into two groups of 15 each at random. Group-I served as the control group, whereas Group-II received simultaneous aerobic and anaerobic training.

The concurrent aerobic and anaerobic training was the only independent variable allowed in this study. The criterion variables limited to this study were selected physical fitness elements (maximum speed, cardiorespiratory endurance, agility, arm-shoulder strength endurance, abdominal strength endurance, leg explosive power, and flexibility) that were evaluated using conventional tests and procedures, both before and right after the training regimen.

For twelve weeks, the experimental group trained twice daily, four days a week, which was deemed sufficient to affect changes in a few chosen dependent variables. While the control

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group underwent no specialised training over the study's duration. Aerobic exercise was given in the morning, while anaerobic exercise was added in the evening.

The experimental design used for the study was a random group design, and dependent 't' tests were used to statistically examine the data collected before and after the experimental period of twelve weeks from both the control and experimental groups for differences between pretest and posttest scores on particular physical fitness components for the experimental group. The data gathered from both groups before and after the experiment were statistically analysed to find out if there was any significant difference using the analysis of covariance (ANCOVA). This was done to compare the level of efficiency of concurrent aerobic and anaerobic training with that of the control group on selected physical fitness components. As covariate data, the pretest means for each dependent variable were used. In every instance, P 0.05 was recognised as the criterion of significance.

The results clearly show that both aerobic and anaerobic training have unique advantages for Kho-Kho women players. Players can play for longer periods of time because to aerobic training, which increases cardiovascular endurance and stamina. Anaerobic exercise improves players' speed, power, and agility, enabling them to make the fast movements needed for the game. Women's Kho-Kho players should combine both aerobic and anaerobic training into their training programme in order to maximise performance.

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