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A Comparative Status on Selected Physiological and Motor Variables of Different Level Women Kho-Kho Players in West Bengal

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Abstract

Background of the study: Kho-Kho, a traditional Indian tag sport, has evolved into a structured competitive discipline played at district, state, and national levels. The physiological and motor demands of the sport, such as cardiovascular endurance, agility, and explosive power, are critical for performance, especially at higher competition levels. However, limited scientific studies have investigated how these fitness variables differ across performance levels among female Kho-Kho players. This study aimed to evaluate and compare selected physiological (Resting Heart Rate and Vital Capacity) and motor fitness variables (Flexibility, Agility, and Explosive Power) among women players from the Burdwan district of West Bengal across three levels: district, state, and national.

Materials and Methods: Sixty female Kho-Kho players aged 18–25 years were purposively selected and equally divided into three groups (n=20 per group) based on their competitive levels—district, state, and national. Anthropometric data (age, height, weight, and BMI) were recorded to control confounding factors. The physiological variables assessed were Resting Heart Rate (using the radial pulse method) and Vital Capacity (using a spirometer). Motor fitness variables included Flexibility (measured by Sit and Reach Test), Agility (measured using Shuttle Run Test), and Explosive Power (measured by Standing Broad Jump). A static group comparison design was adopted. Data analysis was performed using one-way Analysis of Variance (ANOVA) via Jamovi 2.5.6 software to determine statistically significant differences among groups.

Results: Significant differences were observed across all five physiological and motor fitness variables among the three groups ($p < 0.05$). National-level players demonstrated significantly lower Resting Heart Rate and higher Vital Capacity, indicating superior cardiovascular efficiency. They also showed better flexibility, greater agility, and stronger explosive power, reflecting advanced neuromuscular coordination and athletic conditioning. State-level players ranked second in most parameters, followed by district-level athletes. These differences are attributed to higher levels of training intensity, structured coaching, access to facilities, and competitive experience at the national level.

Conclusion: The study concludes that the level of competition significantly influences physiological and motor fitness attributes in female Kho-Kho players. National-level players exhibit superior performance metrics, emphasizing the importance of scientifically guided training and support systems. The results support the development of tailored fitness programs, early talent identification, and increased resource

allocation at lower competitive levels. Limitations of the study include a small sample size, exclusion of male athletes, and lack of control over nutritional, psychological, and environmental variables. Future research should include longitudinal designs, larger samples, and more diverse regions to validate and expand these findings.

Keywords: Kho-Kho, female athletes, sports science

INTRODUCTION

"Physical education, as understood, is such a cultivation of the power and capabilities of a student that it will enable him to maintain his bodily condition in the best working order, providing at the same time the greater efficiency of his intellectual and spiritual life.1"

- Edward Hitch Cock

Modern Sports, Games, and Play

Proof of participating in physical activities, games, sports, exercise, dance, etc. Archaeological remains, literary works, and artworks dating back to ancient times may provide evidence of this. The latest times. These activities were both fun hobbies and simple recreational pastimes—impromptu competitions and matches. Times have developed unique traditions and customs. Times appear to have organized their actions with varying intentions or goals in mind, depending on what was perceived as the most critical requirements. As society progressed, they evolved and have been utilized to fulfill socio-nationalistic requirements and more recently to meet the demand for personal and societal improvement. Different kinds of physical activities have been practiced in many different ways and utilized by civilizations worldwide since ancient times to the present. Surviving in today's society requires individuals to compete for rewards based on their fitness at both individual and social levels growth, and such.

Almost every country nowadays has a strong enthusiasm for sports and games due to the many benefits they bring to personal and societal advancement. Sports and games are now available in a variety of forms and hold considerable importance in the lives of individuals today. Sports and games are seen as creations of the culture of all societies. Sports and games are a reflection of a society's culture. Sports and culture have a powerful, mutually influential relationship. Sports have become an essential part of contemporary societies, with people from diverse backgrounds taking part for various reasons. Physical activities in early societies were primarily centered around ensuring survival, challenging the community, engaging in competitions for rewards, enjoying recreation, and maintaining fitness and health. Some physical activities that gained popularity eventually evolved into sports and games. Millions of individuals from all societies and cultures actively engage in a wide range of sports and games.

Due to the various benefits that games and sports bring to people, as well as the existence of similar activities, individuals in various fields have attempted to define and explain their Equivalents.

This field is based on four fundamental terms: play, games, sport, and physical activity. Defining each term separately or as a distinct cluster is difficult at best, but when considering how most people understand these concepts, some key elements start to become clear.

Sport is a human activity with a structured organization and a set of rules that determine the goal and boundaries of human behavior; it includes competition and/or challenge and a clear result mainly based on physical abilities.

Games are activities that have a set structure in terms of time, space, and rules that guide human behavior to achieve a specific outcome of determining a winner and a loser through scoring points or successes.

Play is a pleasurable activity that comes from actions initiated by oneself based on personal goals or expressive urges; it accommodates varied levels of physical abilities; its guidelines are impromptu; it follows a specific timeline with no set conclusion; it leads to concrete results, triumph, or gratification.

In today's society, people are more informed about the necessity, benefits, and significance of sports. In contemporary society, sports have become an integral aspect of daily life. In today's competitive world, sports are viewed as a respected platform where individuals can showcase their competitive nature and strive for excellence and superiority. Community. The impulse and instinct to break and set new records has become a driving force. In today's materialistic world, sports have gained significant importance. Athletes all around the globe are highly respected.

In the modern world, every advanced society considers sports to be as important as other areas of education for the development of individuals and society as a whole. Spots emphasize the importance of health, recreation, balanced personality development, human interactions, moral character growth, individual and social progress, democratic lifestyle, cultural integration on national and international levels, and promoting individual and social values, as well as educating the masses effectively. They also assist nations in striving to outperform and demonstrate dominance over other nations. Sports in modern society are widely observed and serve as a way to gain recognition and respect.

Nowadays, nearly every country around the globe places a lot of importance on advancing sports to enhance the health of the nation and ensure the well-being of future generations. Some countries such as the USA and Russia attempt to demonstrate the dominance of their political beliefs and societal structures through participation in sports. India, classified as a developing nation, is making efforts to excel in sports and has seen success in cricket, Hockey, Kabaddi, Badminton, and Kho-Kho, among others. India has notably performed well in Kho-Kho. (*49591_ch03_mclean.Pdf*, n.d.)

1.2 STATEMENT OF THE RESEARCH PROBLEM:

The problem of the present investigation is precisely stated as:

"A COMPARATIVE STATUS ON SELECTED PHYSIOLOGICAL AND MOTOR VARIABLES OF DIFFERENT LEVEL WOMEN KHO-KHO PLAYERS IN WEST BENGAL"

1.3 OBJECTIVES OF STUDY:

The present study was conducted based on the following objectives:

- To find out the Physiological variables i.e., Resting Heart Rate (RHR) and Vital Capacity (VC) level among selected different levels. Kho-Kho women players from Burdwan district, W.B.
- To find out the Motor Fitness levels among selected different levels. Kho-Kho women players from Burdwan district, W.B.

1.6 INCLUSIONS CRITERIA:

- Only women Kho-Kho players aged between 18-25 years at Burdwan district, in West Bengal were selected for this study.
- Only district, state, and national level Kho-Kho players are included in this study.
- Only 60 women Kho-Kho players were considered for this study.
- Only physiological variables i.e., (Resting heart rate & Vital capacity) and motor variables i.e., (Flexibility, Agility, and Explosive power).

1.7 EXCLUSIONS CRITERIA:

- Disease persons were not considered.
- Less than district level and above national level women Kho-Kho players were not considered for this study.
- Psychological and other variables were not considered.
- Climatic conditions were not under the control of the researcher.

1.8 HYPOTHESES:

Based on the literature review, experts' opinion opinions, and researchers' understanding it was Hypothesized that:

H_1: It is hypothesized that there will be a significant difference in RHR and vital capacity among selected levels of Kho-Kho women players from Burdwan district, W.B.

H_2: It is hypothesized that there will be significant differences in motor fitness among selected different levels of Kho-Kho women players from Burdwan district, W.B.

1.9 PURPOSE OF THE STUDY:

The present study was conducted to serve the field of Physical Education and sports in the following ways To find out the difference in selected motor fitness variables and physiological variables of different levels of women Kho-Kho players from Burdwan district, West Bengal.

1.10 SIGNIFICANCE OF THE STUDY:

The study was justified as worthwhile on the following grounds:

- The present study might be a step towards an important contribution to the field of Physical Education, sports science, and social science. The present researcher expects this would throw some light on the different levels of women Kho-Kho players' motor fitness as well as physiological fitness status.
- Further the study may be helpful to know their performance level too.

REVIEW OF RELATED LITERATURE

Prasanna BK &Tousif Ahammed (2024)[13]. The study was conceptualized to analyze A Force vital capacity of Kho-Kho Players of Tumkur District has also been analyzed from the Present Academic year 2019-2020, To analyze Taluk, rural & urban, and urban age-wise of the Force vital capacity level among selected Degree College level Kho-Kho players of Tumkur District. This study is delimited to selected six Taluk of Tumkur District Degree colleges Kho-Kho players. This study was delimited to the men's section. The study was delimited to the academic year 2019-20. It was hypothesized that there not be a positive difference in Force vital capacity scores among the selected degree college level Kho- Kho players of Tumkur District.

Mousumi Mahato & Uma Dutta (2023)[15]. The main purpose of the study was to compare the selected Physical Fitness components (Agility, Flexibility, and Muscular Endurance) between state-level Kho-Kho players and professional Chau Dancers. Methodology: To accomplish this study total of 70 female subjects (35 Kho-Kho players & 35 Chhan Dancers) were randomly selected for this study. Kho-Kho players who participated in state-level competitions from different districts of West Bengal were selected for this study as subjects. Chhan Dancers were selected as subjects from the Purulia District and they were 5-year practitioners. The ages of the subjects were ranged between 18 to 25 years. Selected Physical Fitness

components (Agility, Flexibility, and Muscular Endurance) were the criterion measured for this study. All Selected criteria were measured through different standard tests. Descriptive statistics (mean and standard divination) and independent t-tests were used for data analysis and interpretation. Significant differences were considered at > 0.05 level of confidence. Results: Statistical calculation of the gathered data showed that there were no significant differences between State Level Kho-Kho Players and Professional Chau Dancers regarding Agility, Flexibility, and Muscular Endurance at 0.05 level of significance. Conclusions: It was concluded that in respect of Agility and Flexibility Chhan Dancers were better compared to Kho-Kho players. But in the case of Muscular Endurance Kho-Kho players were better Than Chhan Dancers,

V. Vallimurugan & M. Muthamilselvi (2023)[11]. The design of the study was to find out the result of Kabaddi and Kho-Kho on the flexibility, and speed of college-level players. To achieve the idea of the study 20 Kabaddi and 20 Kho-Kho players were selected from the Coimbatore district. The subjects were the flexibility and speed level of Kabaddi and Kho-Kho players. The age group of subjects ranged from 21-25 years. The study was delimited to the following variables achievement flexibility and speed between Kabaddi and Kho-Kho players. To perform this analysis, the researcher used an independent 't' test to find out the significant difference between the flexibility and speed levels of Kabaddi and Kho-Kho players. In this case, to test the significance 0.05 level of confidence was utilized. It was found that there was significant flexibility and speed between Kabaddi and Kho-Kho players.

Prasenjit Kapas & Asish Paul (2022)[7]. In India, Kho-Kho is one of the oldest and most well-known tag games. The purpose of the study was to compare the physical fitness parameters and anthropometric parameters among the three age groups of Kho-Kho players as physical fitness and anthropometric parameters are the most important factors in executing performance in competitive situation situations. To accomplish the purpose of the study BMI, Arm length, Foot length, speed, agility, and speed endurance were taken as the variables. To conduct the study total of 45 girls 'subjects were selected from three different age groups of Kho-Kho. The mean and S.D. of scores of each variable were computed, thereafter 'F' test was computed to find out the significance of differences among the scores of each variable of physical fitness and anthropometric parameters among three groups of Kho-Kho players and LSD was computed to find out the significant difference among three groups. There was a gradual increase in height and body weight with age. The BMI of the junior group (18.03 ± 2.55 kg/m²) was the lowest and the most senior group (20.02 ± 1.57 kg/m²) was the highest. The speed of the middle age group (7.69 ± 0.34sec) was best. The agility of the junior group (10.97±3.07sec.) was better than the other groups. The speed endurance of the middle group (81.13± 7.15sec) was better than the other two groups. The average foot length of junior most groups (21.86 ± 1.24cm) was the lowest and the middle-aged group (22.86 1.12cm) was the highest. The average arm length of the junior most group (62.80± 4.17cm) lowest and the senior most group (69.53 4.85cm) was the highest. It may be concluded that the characteristics of anthropometric parameters and physical fitness variables vary with the different ages but no such specific direction of increase or decrease of such variables is drawn.

Dnyaneshwar Shridharrao Ghodke & Shubhangi S. Robade (2021)[9]. The basic purpose of physical education is to develop students' skill sets, knowledge bases, and mental outlooks via the medium of human movement. In most countries, students at the secondary and higher school levels are required to take some kind of physical education. The players' ages varied from 18 to 20, making up the bulk of the team. Performance physical fitness components include the 50-meter sprint, standing broad jump, bent-knee sit-ups, 600-yard dash, reaction time test, speed endurance, 300-meter run, agility (10x4- shuttle run), and flexibility (Wrist and Ankle Flexibility). The current research evaluated the psychological well-being

of Kho-Kho athletes to their performance on the field. A total of 80 male Kho-Kho players were used in the study: 20 from the national team (average age: 25:72 years), 20 from the state team (average age: 23.12 years), and 20 from the district team (average age: 20.66 years). Positive mental health, which is correlated with a high degree of mental organization and integration, was shown to be a differentiating factor in Kho-Kho's athletic success. This data reveals a negative correlation between a player's Kho-Kho playing ability and his or her agility, speed, Reaction Ability, Speed Endurance, and ankle flexibility.

Manju (2021)[1]. The present study was undertaken to determine the comparison physiological variables between Kabaddi and Kho-Kho inter-university female players of Bijnor. For the study age group of the subjects was between 18 to 25 years. Physiological variables selected for the study were SpO2, respiratory rate, heart rate, blood pressure, and hemoglobin. For the analysis of the data mean and SD were calculated and to examine the significant difference between the group mean of different physiological variables, the independent samples 't' test was applied and the level of confidence was set at 0.05 level. The result indicated that there was a significant difference between Kabaddi and Kho-Kho players in SpO2. Whereas no significant difference was found in heart rate, respiratory rate, blood pressure, and hemoglobin. Results found that Kabaddi players have shown they are superior in SpO2 compared to Kho-Kho players.

Smt. Bhavya & Hanumanthayya (2021)[6]. The purpose of the study was to Compare the selected Physical fitness and Physiological variables between Kabaddi and Kho-Kho players. Thirty female players of Kabaddi and Kho-Kho who represented their school/taluk in the district-level tournament during 2019-2020 from Mandya district were selected as subjects, their ages ranged from 14 to 17 years. The study was experimental research, the selected physical fitness and physiological variables such as flexibility, endurance, agility, explosive strength, heart rate, vital capacity, and cardiovascular endurance were measured. Analysis of Data, the 't' test was applied to check the significant difference between the groups. There was a significant difference between physical i.e. flexibility and explosive strength & physiological variables and there was no significant difference between physical variables i.e. Endurance and agility. Conclusion: it was concluded that there was a significant difference in some selected physical & physiological variables i.e. flexibility, explosive strength & endurance, and agility and this type of study needs to be replicated in a variety of players, both male and female or different levels of age group, and higher level like national level, taking a large number of subjects.

Yallappa M (2020)[12]. A Kabaddi and Kho-Kho game requires specific fitness concerning vital capacity, strength, speed, flexibility, and coordination. Fitness training equips the sportsperson to face the physical and physiological challenges that come his way in his competitive sports career. Specific physiological and physical fitness characteristics enable the player to perform the unusual movements required by the concerned sport. Physiological and physical fitness characteristics measurement plays an important role in the successful Kabaddi and Kho-Kho performances. These parameters further help to predict the talents and finances of the potentially best athletes for each sport. The main purpose of this study is to compare selected physical and physiological variables of inter-collegiate Kabaddi and Kho-Kho players. The sample consisted of fifty male inter-collegiate Kabaddi and Kho-Kho players from Bangalore University by simple random sampling method. The selected physical fitness variables are agility, strength, and flexibility and physiological variables are systolic and diastolic pressure, hemoglobin (Hb %), and resting pulse rate. The results of the t-ratio showed significant differences in some physical fitness and physiological parameters of inter-collegiate Kabaddi and Kho-Kho players. In physiological parameters, diastolic pressure showed a significant difference between Kabaddi and Kho-Kho players. The diastolic pressure of inter-collegiate Kho-Kho players is higher than Kabaddi inter-collegiate players, which may

be due to the nature of the game and movement which demand more blood volume with greater diastolic pressure but systolic pressure, hemoglobin (Hb%) and resting pulse rate expressed insignificant difference between inter-collegiate Kabaddi and Kho-Kho players. The research findings of some physical fitness parameters indicated significant differences between inter-collegiate Kabaddi and Kho-Kho players. The agility and explosive strength expressed significant differences. The agility of inter-collegiate Kabaddi players more than Kho-Kho players, due to quick movement in catching and raiding. The explosive strength of inter-collegiate Kho-Kho players is higher than Kabaddi players but Flexibility showed an insignificant difference between Kabaddi and Kho-Kho players.

Amit Kumar (2020)[2]. The purpose of the study was to compare the variability in fitness of male athletes from Kho-Kho and Kabaddi. Two randomly selected groups of 20 subjects each age group aged 18-21 participated in the study. All the players are from different colleges in Meerut district. Details were collected during their university camp. To compare physical fitness a sample method was used to achieve the research objectives. All subjects, after being informed of the purpose and protocol of the study, gave their consent and volunteered to participate in the study. The 't' test was used to determine the significant differences between the male players of Kho-Kho and Kabaddi. To test the hypothesis, the significance level was set at 0.05.

Hartej Singh (2018)[8]. The purpose of the study was to compare the physical fitness of Kabaddi and Kho-Kho players of district Gander Bal. The data was collected through the administration of a standard AAPHER youth fitness test on selected variables. There were 50 subjects selected randomly out of which 25 were Kabaddi players and the remaining 25 were Kho-Kho players chosen from the different colleges of district Gander Bal. The data was collected from these subjects by conducting a standard AAPHER youth fitness test and later on the data was analyzed statically by using the t-test for comparison and its exact analysis. The variables used for this study for both groups of players were cardiovascular endurance, speed, Strength, coordination ability, muscular strength, and power. All six variables were included in the AAPHER youth fitness test and all were measured by conducting the test to both the groups. The level of significance was kept at 0.05 level the result of this study indicated that there are not any significant variables of cardiovascular Endurance, Speed, Strength, Muscular Strength, Coordination ability, and Power.

J. Samuel Jesuudoss (2018)[16]. The purpose of this study was to compare the physical fitness variables between Kho-Kho and Kabaddi players of higher secondary school girls. To achieve the purpose of the study, selected 15 Kho-Kho players and 15 Kabaddi players from P.S.G.G. Kanya Gurukulam Higher Secondary School, Peelamedu, Coimbatore. Who did not participate in any of the special training or coaching programs? However, they were allowed to participate in their regular physical education classes in the college as per their curriculum. The subjects were aged between 20 and 25. For the study, the physical fitness variables selected were Endurance and Flexibility. To find out whether there was any significant difference between Kho-Kho and Kabaddi players, the dependent ratio was used. The result of the study showed that there was a significant difference in Endurance and Flexibility between Kho-Kho and Kabaddi players of Higher Secondary School girls.

Bipin Babu Singh (2017)[14]. In the 21st century, sports and physical movement have earned incredible significance in society. With this upgraded mindfulness, physical, specialized, and mental enhancements have moved toward becoming a priority in-game groups benefitting benefit as much as possible from the competitor's possibility. In such a manner, the referred to wear sciences, for example, physiology, biochemistry, medicine, biomechanics, anthropometry, humanism, and brain science have been enhanced,

inquired about, and connected in a focused game. Kho-Kho positions as a standout amongst the most well-known traditional sports in India. Kho is an amazingly complicated and strategic game. The Mallakhamb is an art. Mallakhamb is a game that limits different exercise that enhances flexibility, strength, coordination, and agility. Alongside neuromuscular development, the zone of individual character, control, and self-motivation will be unequivocally improved. The length of the staff is generally 1.68 meters (five and a half feet). The size of the staff is identified with the stature of the silambam player. The purpose of the study was to research the impact of mallakhamb practices and Silambam practices on speed and flexibility among u-19 female Kho-Kho players to accomplish the purpose of the study 45 female region-level Kho-Kho players were chosen randomly and were similarly isolated into three groups of 15 each as experimental group-l, experimental group-ll, and control group.

Biswajit Garai and Dr. Sudarsan Biswas (2017)[10]. To prepare and compare the fitness Profile of West Bengal University Level Kho-Kho Players. Selection of the subject: One Hundred Five Male Kho-Kho players were selected for the subject of the present study. Study area: Seven Universities in West Bengal Kho-Kho Players were selected. Their age range was 18-27 years. Speed, Explosive Strength, VO2 Max, Agility, and Flexibility were measured to prepare the fitness profile for West Bengal University Kho-Kho Players. Statistic: Descriptive statistics were applied for the Present study. Mean value of Speed (sec.), Explosive Strength (m), VO2 Max (ml./kg. /min.), Agility (sec.) and Flexibility (cm.) were found (6.88 ±.22 sec.), (2.40 ±.11 more.), and (48.71 ± 2.59 ml./kg. /min.), (10.28 ±.82sec.), (17.20 ± 6.22 cm.).After completing this study, I found that the North Bengal University, Kalyani University, and Vidyasagar University Kho-Kho players have better physical fitness, due to their selection procedure, during endurance of coaching camp, Training, practice procedure, food habits, and weather conditions very well. So, their team gets better results in the Inter-University Competition.

Suparna Paul, Sudip Sundar Das (2016)[18]. The purpose of the study was to find out the relationship between selected physiological variables and the playing ability of level national-level Kho-Kho Players. For the present study, researcher fifty (N=50) elite Kho-Kho players were randomly selected as subjects from the different districts of West Bengal. All the subjects were in regular training schedule. The selected physiological measurements were taken with the help of different methods. Resting heart rate was measured by pulse rate, blood pressure was measured by Sphygmomanometer, force vital capacity was measured by peak flow meter, and Vo2max was measured by Queens College step test. The performance of the subjects was measured by the judges 'rating scale during the match. The product moment method for inter-correlation was applied for the analysis of data. Resting heart rate, Systolic Blood Pressure, and Force vital capacity were significant with the performance in 0.05 levels. Diastolic blood pressure and Vo2 max are significant with the performance in 0.01 levels. It can be concluded from the findings of the present study that heart rate, Systolic blood Pressure, Force vital capacity, Diastolic blood Pressure, and Vo2 max measurements contribute significantly to Kho-Kho performance.

Manikandan S (2016)[19]. The purpose of this study was to compare the physiological variable namely vital capacity between men and women Kabaddi and Kho-Kho players. To achieve the purpose of this study one hundred and twenty players of Kabaddi and Kho-Kho games studying in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, Chidambaram, Cuddalore District, Tamil Nadu and India were randomly selected as subjects. Among them, sixty male players (thirty men Kabaddi and thirty men Kho-Kho players) and sixty women players (thirty women Kabaddi and thirty women Kho-Kho players) with an age of the subjects ranging between 18 to 24 years were selected as subjects. Vital capacity was assessed by using a standardized test item Spirometer and it

was statistically analyzed by using 2 x 2 factorial ANOVA. Whenever the obtained "F" ratio value for the interaction effect was found to be significant, the simple effect test was applied as a follow-up test. In all cases, the 05 level of confidence was fixed to test the level of significance which was considered appropriate. There was a significant difference between men and women players on selected physiological variables namely vital capacity irrespective of their games (Kabaddi and Kho-Kho). Among them, men Kho-Kho players had better vital capacity than other categories of players.

Rinku Tiwari (2015)[20] The purpose of the present study was to create a Reaction ability test for female Kho-Kho players. 60 female Kho-Kho players who participated in the National Dimension tournament from various schools were chosen as subjects for the present study. The ages of the subjects ranged from 18 to multi-year. The response-ability of the players was estimated as far as the least time taken to finish the test. The Playing ability was surveyed by a panel of three specialists, who fit the bill for the Kho-Kho game. The master surveyed the players on 10 points. The examination of information was finished with the assistance of SPSS. The dimension of essentialness picked was at 0.05 dimension. The relationship coefficient between playing ability and Reaction ability test was observed to be 0.90, reliability was observed to be 0.91. End: It was reasoned that the test built to evaluate response-ability is substantial and dependable for Female Kho- Kho players.

Vishwajit Thakare (2015)[25] - The purpose of this study was to examine the effect of Mallakhamb on the Vital limit and Cardiovascular capacity of High School Students. For this study, 40 subjects were chosen randomly from J.S.P.M. High School Itawa ward Pusad Dist. Yavatmal. (M.S.). The subject was classified into two equivalent groups, one experimental (Group A n1 = 20) and one control group (Bn2=20). It was likewise guaranteed that all of them were medicinally fit and was intrigued to do the Mallakhamb to experience the preparation for research venture. Group A got Mallakhamb practice while Group B was treated as control. The structure of the experiment has been arranged in three stages; All the subjects of the experimental group were presented with a multi-month (multi-week) preparation of mallakhamb practice for one hour day by day at night. The variable Vital limit was estimated by a wet Spiro meter and cardiovascular effectiveness was estimated by Cooper's 12-minute run and walk test. The preparation of Mallakhamb delighted that there was a critical improvement in vital limit and cardiovascular productivity. Mallakhamb, vital limit.

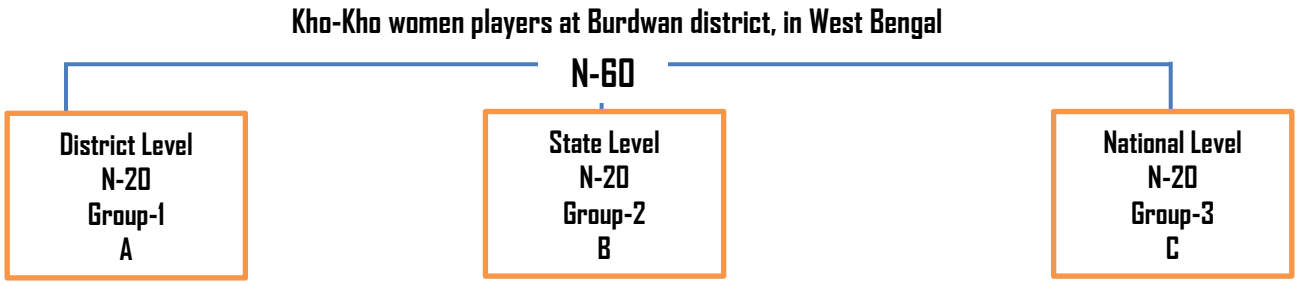
Amandeep Singh (2014)[30] The purpose of this study was to look at respiratory files among male Indigenous game players. The present study was directed at an example of forty-five (N=45) male Indigenous game players aged from 18 to 25 years, which incorporates fifteen each kho-kho, kabaddi, and mallakhamb players, who participated in between school rivalries of Guru Nanak Dev University, Amritsar, India. Every one of the participants was educated about the targets and approach of the study and they consented to participate in this study. Respiratory records for example vital limit forced vital limit and inspiratory limit were estimated with "MedSpiror" an
automated spirometer. Single direction Analysis of Variance (ANOVA) was connected to discover the significance of contrasts concerning chosen respiratory lists among Indigenous games for example kho-kho, kabaddi, and mallakhamb players. Scheffe's post hoc test (SPHT) was connected to see the bearing and essentialness of contrasts where 'Value found factually huge. The dimension of centrality was set at 0.05. Results uncovered critical contrasts between school-level male Indigenous game (kho-kho, kabaddi, mallakhamb) players as to vital limit (p? 0.05), forced vital limit (p? 0.05), and inspiratory limit (p? 0.05). While contrasting the methods, it uncovered that kho-kho players would be advised to vital limit, forced vital limit, and inspiratory limit than their counterparts; kabaddi and mallakhamb players.

METHODOLOGY

3.1 SELECTION OF SUBJECTS

To conduct the study total of 60 women Kho-Kho players from different levels i.e. District, State, and National levels of Burdwan district, West Bengal were selected for this study. The subject age ranged between 18 to 25 years. All the subjects were equally divided into three groups. Each group possessed 20 players and the groups were namely District level, State level, and National level from Burdwan district, West Bengal.

Flow Chart of



A total of 75 subjects were tested for the research proposal, out of which 60 subjects were chosen, who had a high rate of performance as compared to the other subject's total of 15 subjects were excluded from this study.

3.2 SELECTION OF VARIABLES:

Based on experts' opinions, reviewing the literature, scholars' understanding of the problem, and considering especially from the point of view of the availability of equipment, the following anthropometric characteristics, and physiological and motor variables were selected for the study.

1. **Anthropometric Characteristics:**
- Age
- Standing Height
- Body Weight
- BMI
2. **Physiological variables:**
- Restring Heart Rate
- Vital Capacity
3. **Motor variables:**
- Flexibility
- Agility
- Explosive Strength

3.3 CRITERION MEASURES:

3.3.1 PERSONAL DATA	CRITERION MEASURES	UNIT
Age	Birth Certificate	Years
Standing Height	Stadiometer	Centimeters
Body Weight	Weighing Machine	Kilogram

BMI	Weight in kg/ Height in meter2	Rating Scale

3.3.2 PHYSIOLOGICAL VARIABLES

VARIABLES	CRITERION MEASURES	UNIT
Resting Heart Rate	Pulpatory Method	Numbers
Vital Capacity	Spirometer	Lt

3.3.3 MOTOR VARIABLES

VARIABLES	CRITERION MEASURES	UNIT
Flexibility	Sit & Reach Test	cm
Agility	Shuttle Run (10 x 4) mt	sec
Explosive Strength	Standing Broad Jump	Mt

3.4 Design of the Study:

All the anthropometric measurements were taken such as height, weight, for BMI. After that physiological variables, VC (Vital Capacity) and RHR (Resting Heart Rate) were measured with variable measures, and lastly, motor fitness variables i.e., flexibility, agility, and explosive power were conducted to measure for this present study Static Group Comparison method were used.

3.5 Instrument Used:

To collect relevant information for the investigation following instruments were used-

- Weighing machine (Libra) for measuring the body weight in Kg.
- Stadiometer for measuring the standing height in Cm.
- Spirometer for measuring the Vital Capacity in ml/kg/min
- Sit & Reach Test for measuring Flexibility in Cm.
- Stopwatch & Measuring Tap for measuring Agility & Standing Broad Jump in Sec & Mt.

3.6 Procedure for Collection Data:

The first criterion for the selection of subjects is the normality of the subjects. There is a normal obligation both on the part of the authority and on the part of any individual subjects not to allow participation of one who, because of some defect in his or her health or unsuitability of his or her condition, might become more seriously ill or may more easily suffer an injury. It is unquestionable that the ability of an individual to participate effectively and with enjoyment depends on his or her physical capacity to participate. Therefore, the dynamic physical examination is a combination of thorough knowledge of the particular requirement of test in general to determine the suitable activities and also the suitable subjects.

3.6.1 Measurements of Personal Characteristics:

3.6.1.2 Age:

Age of the subject was measured by the verification of subject's Birth certificate and age was recorded in year.

3.6.1.3 Standing Height:

Purpose: To measure the standing height.

Equipment: Stadiometer

Procedure: The subject was asked to stand erect, barefooted on a plane horizontal surface against a wall with heels back, the shoulders and head touching the scale. The Stadiometer was kept in the back of the subject and the crossbar adjusted the lower edge to highest point of the head. The reading of the scale was taken in centimeters.

3.6.1.4 Body Weight:

Purpose: To measure the weight.

Equipment: standard weighing machine.

Procedure: weight of the subject was taken with the help of a standard and calibrated weighing machine in kilograms. Subjects were asked to come on the weighing machine with barefooted.

They were asked to stand still keeping the body erect. The scores were recorded in kilograms.

3.6.1.5 BMI:

Purpose: To measure the overall health status.

Equipment: Stadiometer & Weighing machine.

Procedure: Multiply your height in meters by itself to get your height squared (m^2). Divide your weight in kilograms by your height squared (BMI = weight in kg / (height in meters) ^2). Alternatively, you can use online BMI calculators or mobile apps that allow you to input your weight and height, and they will calculate your BMI for you.

3.6.1.6 Resting Heart Rate:

Purpose: To measure the resting heart rate

Equipment: palpatory method radial artery.

Procedure: Sit or lie down comfortably and relax for a few minutes. Try to remain calm and avoid any strenuous activity or stress. You can measure your pulse at several locations, but the most common is on the wrist. Place the index and middle fingers of one hand on the opposite wrist, just below the base of the thumb. You should feel a slight pulsation. Using a timer or a watch with a second hand, count the number of beats you feel in 60 seconds. Alternatively, you can count the beats for 15 seconds and then multiply by 4 to get the beats per minute. Note down the number of beats per minute (BPM) as your resting heart rate.

3.6.1.7 Vital capacity:

Purpose: To measure the vital capacity

Equipment: Spirometer

Method of using spirometer instrument

- Hold the mouth flow device by the handle.
- Before each use, make sure the spirometer is reset to the starting value.
- Subject is asked to sit straight, their mouth should be empty, ensuring normal breathing condition.
- Subject should put the mouthpiece in the mouth and seal the lips and teeth lightly around the mouthpiece.
- The lab technician should close the nasal breathing with the help of a nose clip.
- Subject should take three normal inhalation and exhalation. Following this process, they should take a deep inhalation and forceful exhalation.

- We should blow out as hard as we can, Remember a “deep breath” or ‘fast breath’. Fast is better than a “slow blow”.
- Note the reading values when the flow of breathing is maximum.
- Record the best readings on a vital graph sheet.

3.6.1.8 Flexibility:

Purpose: To measure Flexibility

Equipment: Sit & Reach Test.

Procedure: This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. With the palms facing downwards, and the hands-on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at least one to two seconds while the distance is recorded. Make sure there are no jerky movements. See also video demonstrations of the Sit and Reach Test.

3.6.1.9 Agility:

Purpose: To measure Agility

Equipment: Stopwatch, Measuring Tape, Cone, Starting Block.

Procedure: Mark two lines 10 meters apart using marking tape or cones. The two blocks are placed on the line opposite the line they are going to start at. On the signal "ready", the participant places their front foot behind the starting line. On the signal, "Go!" the participant sprints to the opposite line, picks up a block of wood, runs back, and places it on or beyond the starting line. Then turning without a rest, they run back to retrieve the second block and carry it back across the finish line. A total of 40m is covered. Two trials are performed.

3.6.1.10 Explosive Power:

Purpose: To measure Explosive power.

Equipment: Measuring Tape, White Powder.

Procedure: The player stands behind a line marked on the ground with feet slightly apart. A two-foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing on both feet without falling backward.

3.7 RELIABILITY OF DATA:

For scientific work, the collected data must be reliable. In the present study reliability of data was ascertained by confirming the reliability of the tester and instruments used. Vital capacity measurement was taken by the Doctor of Burdwan Medical College, the Department of chest medicine and other mentioned physiological variables & Motor Variable; personal data was taken by the investigator himself. The reliability of the investigator was tested by computing ANOVA among his measurements and the measurement of the expert. For further testing for the significance between the groups, investigator utilized Post Hoc Test (LSD). The reliability of instruments was tested by computing Jamovi 2.5.6 following the test and retest method.

3.8 STUDY AREA AND ETHICAL CONSIDERATION:

This investigation was conducted on the different levels of Women Kho-Kho Players from Bardhaman

District in West Bengal.
All participants signed are Bonafide subjects under different colleges from the University of Burdwan, Purba Bardhaman district in West Bengal. Ethical clearance guidelines and approved verbal consent that indicated they understood the purpose of the study. The participants were assured of confidentiality and anonymity as they were told that their names would not be mentioned in the study. The participants were healthy enough to perform various physical activities and were willing to participate in the investigation procedure.

3.9 Conditions for Data Collection:

- **Competency of the Testers.**
- **Reliability of the Instruments.**
- **Reliability and validity of the tests.**
- **Environmental Condition.**
- **Competency of the testers:** All the data of this study were collected by the investigator himself with the assistance of some students and Physical Education teachers of The University of Burdwan, Bardhaman, West Bengal. Before collecting the data properly, the investigator with his investigating team had to practice the administration of all the tests and recording of all relevant data under the guidance of the supervisor. The observed testers of compete 23 to 26 years of age group were chosen at random and measurements were taken on them in all the parameters both by the investigator and the experts, under identical conditions. The reliability coefficient of the correlation has been completed.
- **Reliability of the Instruments:** The reliability of collected data depends upon the reliability of the instruments that have been used for collecting the data. The instruments used in this study were taken from the laboratory of the Physiology and Physical Education Department, The University of Burdwan, Purba Bardhaman, West Bengal. The instruments were of standard one and supplied by standard companies. Their efficiency accuracy and reliability were generally accepted. The stopwatch, Stadiometer, weighing machine, Spirometer, and Sit & Reach Test were used in this study and were availed from Dept. of Physical Education, The University of Burdwan, West Bengal. The instruments were purchased from reliable and standardized companies and were considered accurate enough for the study.

- **Reliability and validity of the tests:** The tests and measurements conducted in this study are widely accepted, used, reliable, and valid tests. Through the test-retest method, the reliability of tests was established. The tests were all standard tests and references in this regard have already been mentioned and are all considered valid tests.
- **Environmental Condition:** The climate was generally hot and humid when the data were collected. The tests and measurements of the study were conducted during May. As it remained more or less the same, it could be accepted that environmental conditions did not affect all the measurements of the subjects on that day. The temperature recorded in the last ranged from 26°C-40°C during the time of the tests. The humidity was found average.

3.10 STATISTICAL PROCEDURE:

After collecting data, the results of the study were obtained by following the statistical procedure as mentioned here under Jamovi 2.5.6 (Current Latest Features), (Latest PASW Statistics, http://www.jamovi.org), was used for the statistical analysis. Descriptive statistics for each variable were calculated for the total sample (n=60). Values are presented as mean values and SD. Analysis of variance **ANOVA & LSD Post HOC Test** were used to assess the result. At first Mean, SD, ANOVA, and LSD post hoc tests of all the scores were calculated by the following formula:

- **Mean** $=\overline{(x)}\frac{\sum_{i=1}^{n} xi}{n}$
- **Standard Deviation**$=\sqrt{\frac{\sum(X-X)^2}{n-1}}$
- **ANOVA = F = MST/MSE**
  Where MST = SST/ p-1 and MSE = SSE/N-p.
- **LSD** $=tv,.05\sqrt{MS_{S(A)\frac{2}{n}}}$

3.11 LEVEL OF SIGNIFICANCE:

The mean and SD of scores of each variable were computed, thereafter 'F" test was computed to find out the difference among the scores of each variable of physiological and motor fitness variable among three groups of Kho-Kho players, the LSD was computed to find out the significant difference among three groups. The level of significance was set at 0.05 level (P<0.05).

ANALYSIS AND INTERPRETATION OF DATA

In this chapter, the data of the present study has been presented. The analysis of data by using appropriate procedures and results has also been given here.

4.1 ANALYSIS OF DATA

After obtaining data from field tests were tabulated and analyzed by JAMOVI 2.5.6 software. Descriptive statistics such as mean and SD were used to analyze age, height, weight, and BMI and in addition to this F, the test was used to compare them. The results are presented in the following.

The study focused on Female subjects aged between 23 to 26 years, with 60 individuals selected using a simple random sampling method. 60 Female subjects were categorized into three equal groups of 20 each one group classified as the district, state, or national level player.

4.2 RESULTS:

Table No. 1 DESCRIPTIVE STATISTICS ON PERSONAL VARIABLES OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

Sl No.	Variables	N	District Level Player		State Level Player		National Level Player	
			Mean	SD	Mean	SD	Mean	SD
01	Age	60	20.30	±1.03	22.15	±0.74	23.60	±0.59
02	Height	60	158.5	±1.59	162.55	±1.23	165.65	±1.13
03	Weight	60	51.70	±1.17	55.6	±0.998	57.45	±0.60
04	BMI	60	20.38	±0.72	21.5	±0.429	23.1	±0.78

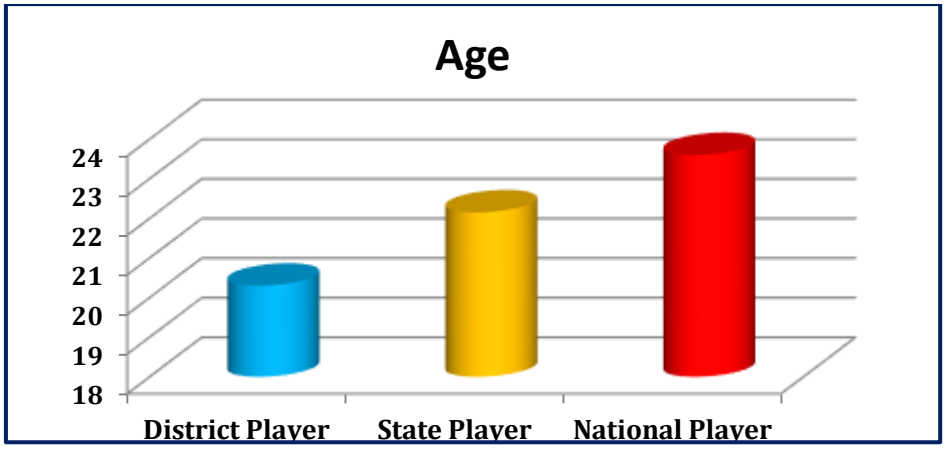


Fig. No. 10 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON AGE OF THE DISTRICT, STATE, AND NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 01 **Age** for the District level women kho-kho players Mean & SD are 20.30 & ±1.03, State level women kho-kho players Mean & SD are 22.15 & ±0.745 and National level women kho-kho players Mean & SD are 23.60 & ±0.598 respectively.

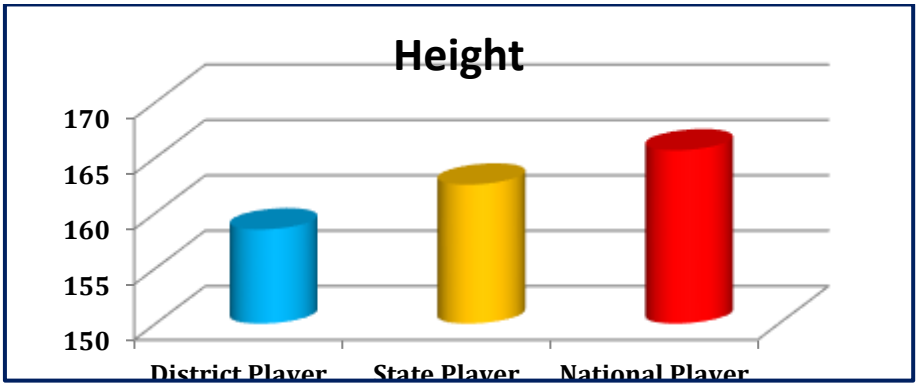


Fig. No. 11 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON HEIGHT OF THE DISTRICT, STATE, AND NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 01 **Height** for the District level women's kho-kho players Mean & SD are 159.15 & ±1.59, State level women's kho-kho players Mean & SD are 162.55 & ±1.23 and National level women's kho-kho players Mean & SD are 164.65 & ±1.13 respectively.

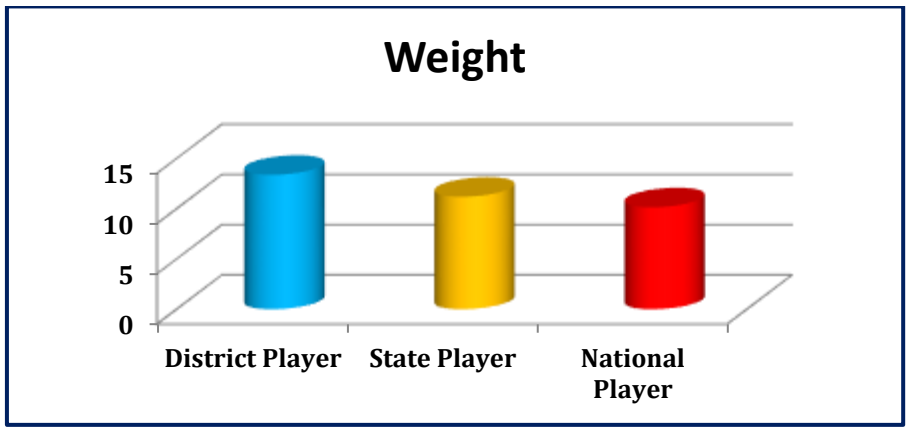


Fig. No. 12 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON WEIGHT OF THE DISTRICT, STATE, AND NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 01 **Weight** for the District level women kho-kho players Mean & SD are 51.70 & ±1.17, State level women kho-kho players' Mean & SD are 55.05 & ±0.998, and National level women kho-kho players' Mean & SD are 57.45 & ±0.604 respectively.

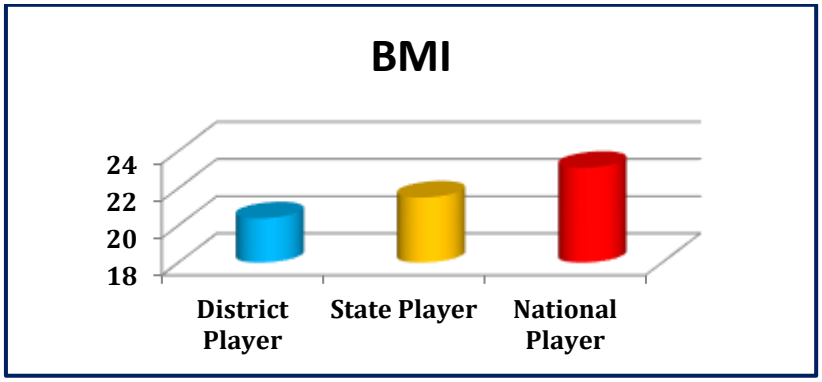


Fig. No. 13 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON BMI OF THE DISTRICT, STATE, AND NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 01 BMI for the District level women kho-kho players Mean & SD are 20.38 & ±0.723State level women kho-kho players Mean & SD are 21.5 & ±0.429 and National level women kho-kho players Mean & SD are 23.1 & ±0.78 respectively.

Table No. 2 DESCRIPTIVE STATISTICS ON PHYSIOLOGICAL VARIABLES OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

Sl No.	Variables	N	District Level Player		State Level Player		National Level Player	
			Mean	SD	Mean	SD	Mean	SD
01	Heart Rate	60	70.95	±1.46	67.20	±1.36	61.25	±0.966
02	Vital Capacity	60	2.89	±0.117	3.19	±0.0887	3.45	±0.0573

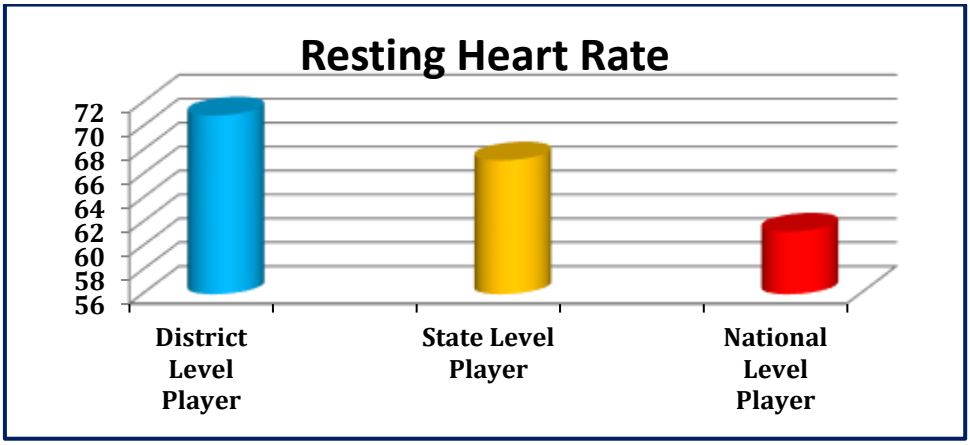


Fig. No. 14 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON HEART RATE OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 02 **Heart Rate** for the District level women Kho-Kho players Mean & SD are 70.95 & ±1.46, State level women Kho-Kho players Mean & SD are 67.20 & ±1.39 and National level women Kho-Kho players Mean & SD are 61.25 & ±0.966 respectively.

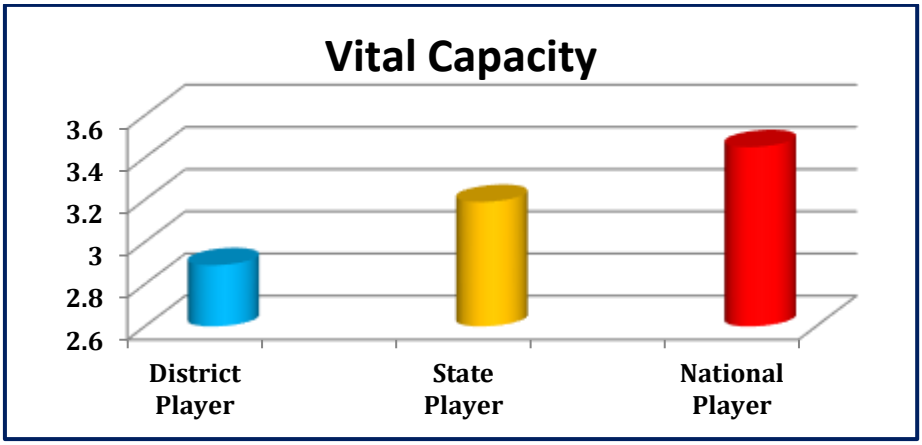


Fig. No. 15 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON VITAL CAPACITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 02 Vital **Capacity** for the District level women Kho-Kho players Mean & SD are 2.89 & ±0.117, State level women Kho-Kho players Mean & SD are 3.19 & ±0.0887 and National level women Kho-Kho players Mean & SD are 3.45 & ±0.0573 respectively.

Table No. 3 DESCRIPTIVE STATISTICS ON MOTOR VARIABLES OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

Sl No.	Variables	N	District Level Player		State Level Player		National Level Player	
			Mean	SD	Mean	SD	Mean	SD
01	Flexibility	60	27.70	±1.45	34.20	±1.54	38.88	±1.19
02	Agility	60	12.38	±0.167	11.2	±0.559	10.15	±0.252
03	Explosive Power	60	1.87	±0.0733	2.12	±0.0768	2.55	±0.1504

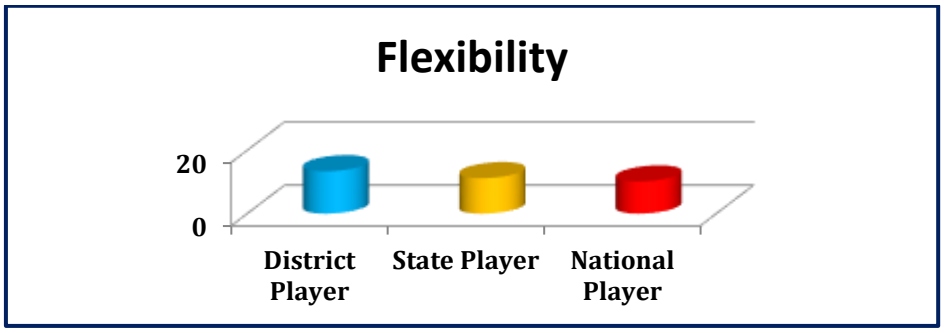


Fig. No. 16 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON FLEXIBILITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 03 **Flexibility** for the District level women Kho-Kho players Mean & SD are 27.70 & ±1.45, State level women Kho-Kho players Mean & SD are 34.20 & ±1.54 and National level women Kho-Kho players Mean & SD are 38.88 & ±1.19 respectively.

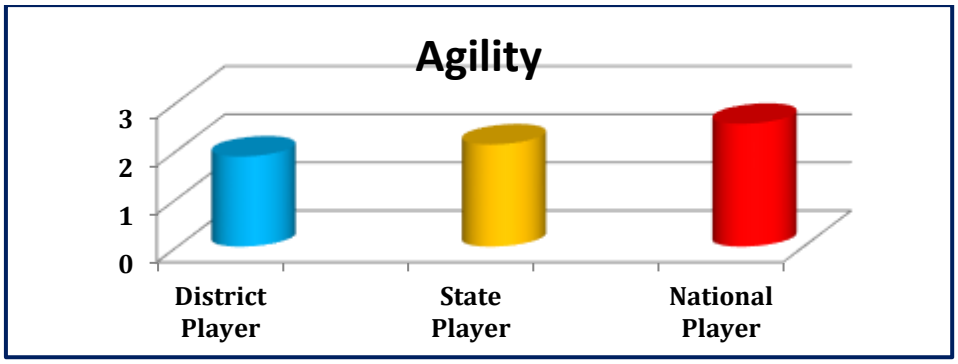


Fig. No. 17 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON AGILITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL

The investigator revealed that from TABLE NO: 03 **Agility** for the District level women Kho-Kho players Mean & SD are 12.38 & ±0.167, State level women Kho-Kho players Mean & SD are 11.2 & ±0.559 and National level women Kho-Kho players Mean & SD are 10.15 & ±0.252 respectively.

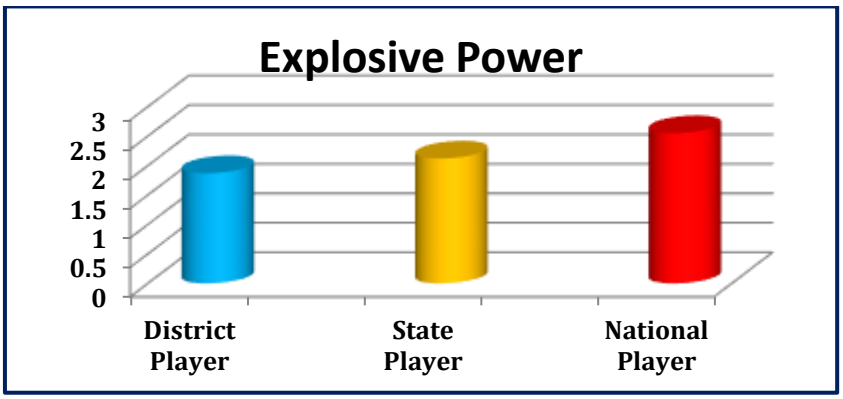


Fig. No. 18 GRAPHICAL PRESENTATION OF THE MEAN VALUE ON EXPLOSIVE POWER OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 03 **Explosive Power** for the District level women Kho-Kho players Mean & SD are 1.87 & ±0.0733, State level women Kho-Kho players Mean & SD are 2.12 & ±0.0768 and National level women Kho-Kho players Mean & SD are 2.55 & ±0.1504 respectively.

Table No- 4 ANALYSIS OF VARIANCE AMONG THE DIFFERENT LEVEL OF WOMEN KHO-KHO PLAYERS ON VITAL CAPACITY.

Source	Sum of Square	d.f.	Mean Squares variance	F Ratio
Between Groups	3.230	2	1.61488	195*
Within Group	0.472	57	0.00829	
Total	3.702	59		

Level of Significance at 0.05 Level (D.f-57) Table Value is-3.12

It was clear that there was significant difference existed among the groups as the calculated value **195*** was much greater than the table value i.e., 3.12 at the significance level of 0.05. Hence to find the significant difference definitely exists between the groups and to understand the difference between groups the LSD post hoc test was applied.

Table No. 5 Post Hoc Test (LSD), MULTIPLE COMPARISONS ON VITAL CAPACITY.

Group	Mean Differences	Std.Error	d.f.	Sig	95% Confidence Interval	
					Lower Bound	Upper Bound
Gr. A & B	-0.310	0.0288	57.0	-10.77*	0.2407	0.3793
Gr. A & C	-0.568	0.0288	57.0	-19.71*	0.4982	0.6368
Gr. B & C	-0.258	0.0288	57.0	-8.94*	0.3268	0.3268

Table No: 5 demonstrates the ordered weighted mean difference in Scheffe's post hoc test values on the vital capacity of the District, State, and National women Kho-Kho players at Burdwan District, in West Bengal. The mean difference in vital capacity is significant at 0.05 level of confidence. The difference in methods between A & B and A & C and B & C results are significant.

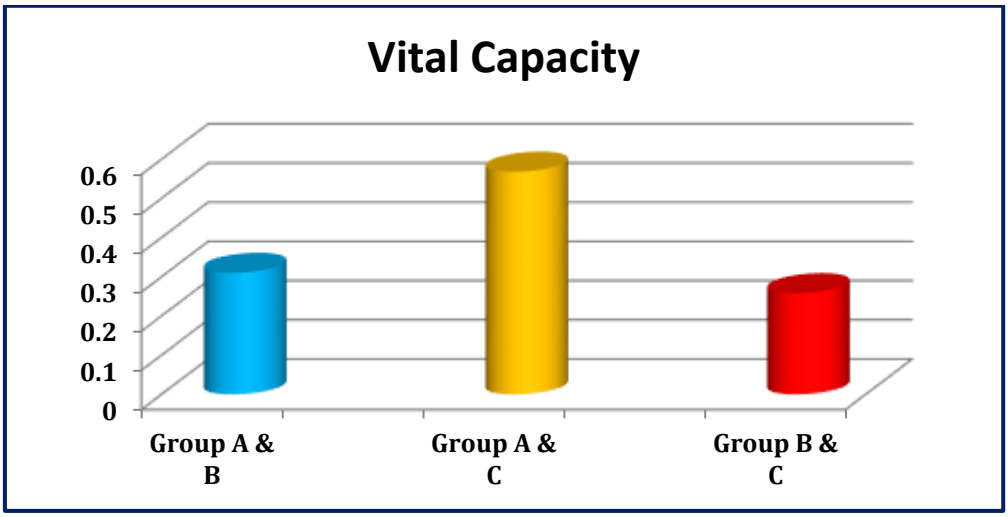


Fig. No. 19 GRAPHICAL PRESENTATION OF THE MEAN DIFFERENCE VALUE ON VITAL CAPACITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 05 **Vital Capacity** for the District, State, and National level women Kho-Kho players Mean Difference are Group A & B -0.310, Group A & C -0.568, and Group B & C -0.258 respectively.

Table No- 6 ANALYSIS OF VARIANCE AMONG THE DIFFERENT LEVEL OF WOMEN KHO-KHO PLAYERS ON RESTRING HEART RATE.

Source	Sum of Square	df	Mean Squares variance	F Ratio
Between Groups	473.23	2	236.62	93.8*
Within Group	143.75	57	2.52	
Total	616.98	59		

Level of Significance at 0.05 Level (D.f-57) Table Value is-3.12

It was clear that there was significant difference existed among the groups as the calculated value **93.8*** was much greater than the table value i.e., 3.12 at the significance level of 0.05. Hence to find the significant difference definitely exists between the groups and to understand the difference between groups the LSD post hoc test was applied.

Table No. 7 Post Hoc Test (LSD), MULTIPLE COMPARISONS ON RESTRING HEART RATE.

Group	Mean Differences	Std.Error	d.f.	Sig	95% Confidence Interval	
					Lower Bound	Upper Bound

Gr. A & B	1.80	0.502	57.0	3.58*	-3.0085	-0.5915
Gr. A & C	6.65	0.502	57.0	13.24*	-7.8585	-5.4415
Gr. B & C	4.85	0.502	57.0	9.66*	-6.0585	-3.6415

Table No: 7 demonstrates the ordered weighted mean difference in Scheffe's post hoc test values on the resting heart rate of the district, state, and national women Kho-Kho players at Burdwan district, in West Bengal. The mean difference in resting heart rate is significant at 0.05 level of confidence. The difference in methods between A & B and A & C and B & C all the results are significant.

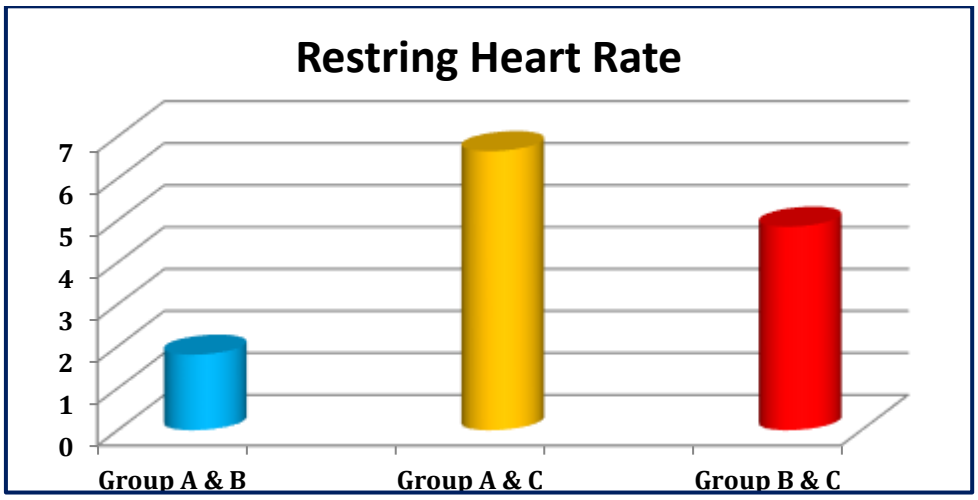


Fig. No. 20 GRAPHICAL PRESENTATION OF THE MEAN DIFFERENCE VALUE ON RESTRING HEART RATE OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 07 **Restring Heart Rate** for the District, State, and National level women Kho-Kho players Mean Difference are Group A & B 1.80, Group A & C 6.65 and Group B & C 4.85 respectively.

Table No. 8 ANALYSIS OF VARIANCE AMONG THE DIFFERENT LEVEL OF WOMEN KHO-KHO PLAYERS ON FLEXIBILITY.

Source	Sum of Square	df	Mean Squares variance	F Ratio
Between Groups	199.1	2	99.95	47.57*
Within Group	119.75	57	2.10	
Total	318.85	59		

Level of Significance at 0.05 Level (D.f-57) Table Value is-3.12

It was clear that there was significant difference existed among the groups as the calculated value **47.57*** was much greater than the table value i.e., 3.12 at the significance level of 0.05. Hence to find the significant difference definitely exists between the groups and to understand the difference between groups the LSD post hoc test was applied.

Table No. 9 Post Hoc Test (LSD), MULTIPLE COMPARISONS ON FLEXIBILITY.

Group	Mean Differences	Std.Error	d.f.	Sig	95% Confidence Interval	
					Lower Bound	Upper Bound
Gr. A & B	-2.60	0.427	57.0	-5.67*	1.497	3.703
Gr. A & C	-4.45	0.427	57.0	-9.71*	3.347	5.553
Gr. B & C	-1.85	0.427	57.0	-4.04*	0.747	2.953

Table No: 9 demonstrates the ordered weighted mean difference in Scheffe's post hoc test values on the flexibility of the District, State, and National women Kho-Kho players at Burdwan district, in West Bengal. The mean difference in flexibility is significant at 0.05 level of confidence. The difference in methods between A & B and A & C and B & C results are significant.

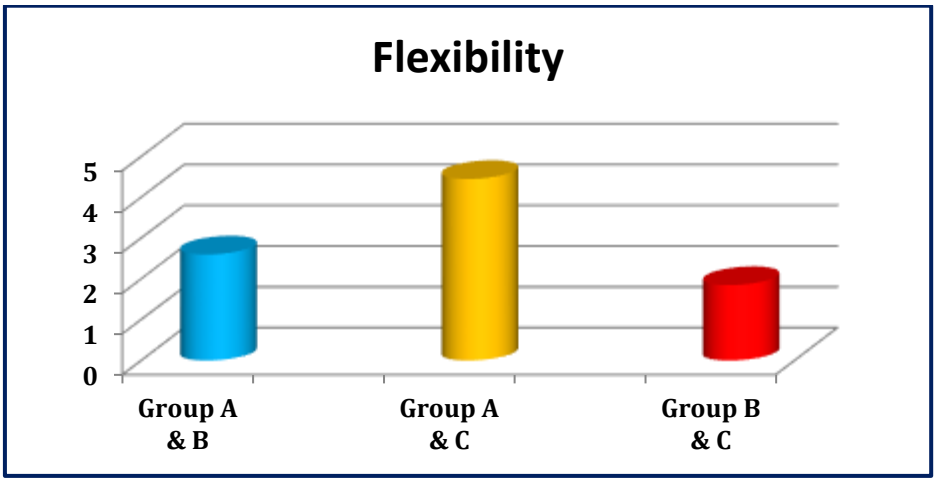


Fig. No. 21 GRAPHICAL PRESENTATION OF THE MEAN DIFFERENCE VALUE ON FLEXIBILITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 09 **Flexibility** for the District, State, and National level women Kho-Kho players Mean Difference are Group A & B -2.60, Group A & C -4.45, and Group B & C -1.85 respectively.

Table No. 10 ANALYSIS OF VARIANCE AMONG THE DIFFERENT LEVEL OF WOMEN KHO-KHO PLAYERS ON AGILITY.

Source	Sum of Square	df	Mean Squares variance	F Ratio
Between Groups	24.90	2	12.45	73.32*
Within Group	9.68	57	0.169	
Total	34.58	59		

Level of Significance at 0.05 Level (D.f-57) Table Value is-3.12

It was clear that there was significant difference existed among the groups as the calculated value **73.32*** was much greater than the table value i.e., 3.12 at the significance level of 0.05. Hence to find the

significant difference definitely exists between the groups and to understand the difference between groups the LSD post hoc test was applied.

Table No. 11 Post Hoc Test (LSD), MULTIPLE COMPARISONS ON AGILTY.

Group	Mean Differences	Std.Error	d.f.	Sig	95% Confidence Interval	
					Lower Bound	Upper Bound
Gr. A & B	1.15	0.130	57.0	8.82*	-1.4636	0.8364
Gr. A & C	1.511	0.130	57.0	11.59*	-1.8246	-1.1974
Gr. B & C	0.361	0.130	57.0	2.77*	-0.6746	-0.0474

Table No: 11 demonstrates the ordered weighted mean difference in Scheffe's post hoc test values on the agility of the District, State, and National women Kho-Kho players at Burdwan District, in West Bengal. The mean difference in agility is significant at 0.05 level of confidence. The difference in methods between A & B and A & C and B & C results are significant.

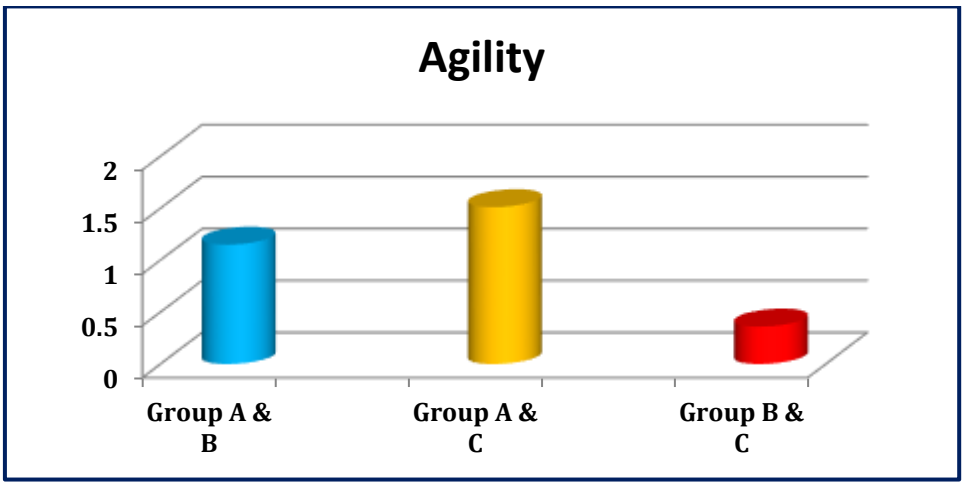


Fig. No. 22 GRAPHICAL PRESENTATION OF THE MEAN DIFFERENCE VALUE ON FLEXIBILITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

The investigator revealed that from TABLE NO: 11 **Agility** for the District, State, and National level women Kho-Kho players Mean Difference are Group A & B 1.15, Group A & C 1.51 and Group B & C 0.361 respectively.

Table No- 12 ANALYSIS OF VARIANCE AMONG THE DIFFERENT LEVEL OF WOMEN KHO-KHO PLAYERS ON EXPLOSIVE POWER.

Source	Sum of Square	df	Mean Squares variance	F Ratio
Between Groups	2.977	2	1.4885	135.31*
Within Group	0.627	57	0.011	
Total	3.604	59		

Level of Significance at 0.05 Level (D.f-57) Table Value is-3.12

It was clear that there was significant difference existed among the groups as the calculated value **135.31*** was much greater than the table value i.e., 3.12 at the significance level of 0.05. Hence to find the significant difference definitely exists between the groups and to understand the difference between groups the LSD post hoc test was applied.

Table No. 13 Post Hoc Test (LSD), MULTIPLE COMPARISONS ON EXPLOSIVE POWER.

Group	Mean Differences	St. Error	d.f.	Sig	95% Confidence Interval	
					Lower Bound	Upper Bound
Gr. A & B	0.295	0.0332	57.0	-8.89*	0.2152	0.3748
Gr. A & C	0.545	0.0332	57.0	-16.43*	0.4652	0.6248
Gr. B & C	0.250	0.0332	57.0	7.54*	0.1702	0.3298

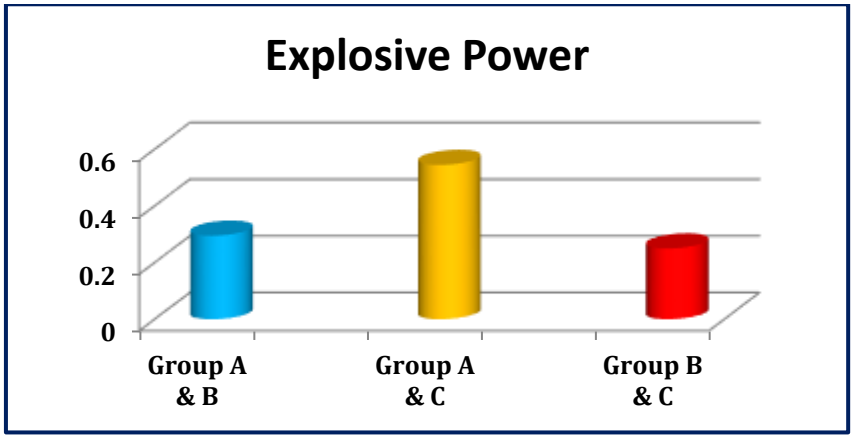


Fig. No. 23 GRAPHICAL PRESENTATION OF THE MEAN DIFFERENCE VALUE ON FLEXIBILITY OF THE DISTRICT, STATE, NATIONAL LEVEL WOMEN KHO-KHO PLAYERS AT BURDWAN DISTRICT IN WEST BENGAL.

Table No: 13 demonstrates the ordered weighted mean difference in Scheffe's post hoc test values on the explosive power of the District, State, and National women Kho-Kho players at Burdwan district, in West Bengal. The mean difference in explosive power is significant at 0.05 level of confidence. The difference in methods between A & B and A & C and B & C results are significant. The investigator revealed that from TABLE NO: 13 **Explosive Power** for the District, State, and National level women Kho-Kho players Mean Difference are Group A & B 0.295, Group A & C 0.545 and Group B & C 0.250 respectively.

4.3 DISCUSSION OF THE RESULTS:

It was observed from the above result analysis of a positive correlation between the groups A and B, A and C, and B and C of competition and vital capacity among Kho-Kho players. Several factors contribute to this trend: -

Training intensity and duration higher level players undergo more rigorous and prolonged training sessions, enhancing their cardiovascular and respiratory efficiency.

From this study easily we can understand that state-level Kho-Kho players have less mean value in vital capacity than state and national-level players. On the other hand, state and national-level players' mean

values are very close to each other.

Physical conditioning of state-level players typically engages in comprehensive physical conditioning. Program including endurance training which significantly improves lung function and vital capacity. (Ghosh & Kundu, n.d.).[5]

On the point of experience and age senior or national level players at the age of 18-25 yrs. Generally, possess better-developed respiratory systems due to prolonged exposure to high-intensity training and competitive play.

Needless to say, Kho-Kho players at higher competitive levels often have access to better nutritional guidance and healthcare support, contributing to overall physical and respiratory health.

There is a similarly critical need to raise societal awareness of the broad range of health, social, and financial benefits of physical movement, socioeconomic status, and all-round structured game projects.

From the above table of ANOVA, it is clear that there was a significant difference in the case of agility among those three groups. We know that agility is a component that is a combination of speed and quick turning ability. These two factors among stimulated by leg explosive power and the muscle which indicate that the maturity of muscle growth is very important. Here in this study researchers were considered aged 18-25 yrs. In this age group, the anatomical structure almost became matured and the Physiological functioning became maximum. As the participants were from the village area so naturally, they were habituated enough to high-intensity movement considering their daily lifestyle. Hence considering the said different factors it is clear that, in said specific age range there was a little possibility to differ in case of a combined effect of speed in a very short distance and turning ability as also they are mainly stimulated by genetic factors.(Ph.D. Scholar (SRF), Department of Physical Education, Jadavpur University. et al., 2022) [7]

In another study in the area of agility Sahu D. P., (2019) observed that national-level Kho-Kho players exhibit better agility performance in comparison to state-level Kho-Kho players. (“Comparative Study on Selected Motor Fitness Component between Different Levels of Kho-Kho Players,” n.d.) [4]

4.4 TESTING OF HYPOTHESES:

The investigator had formulated the following hypotheses earlier.

In the first hypothesis, it was hypothesized that there would be significant differences in RHR and Vital Capacity among selected levels of women Kho-Kho players at Burdwan district, in West Bengal. The result of the study revealed that there was a difference in the above-mentioned variables. Hence, the investigator accepted the H1 hypothesis at 0.05 level of confidence.

Second, it was hypothesized that there would be significant differences in Flexibility, Agility, and Leg Explosive Power among selected levels of women Kho-Kho players at Burdwan district, in West Bengal. The result of the study revealed that there was a significant difference in the above-mentioned variables. Hence, the investigator accepted the H2 hypothesis at 0.05 level of confidence.

CONCLUSIONS & RECOMMENDATIONS

5.1 CONCLUSIONS:

Within the limits and limitations of the study, it is concluded that there is statistical significance between Physiological variables (RHR & Vital Capacity for women Kho-Kho Players) and Motor variables (Flexibility, Agility & Explosive Power for women Kho-Kho Players). Based on the discussion of the result in the 4th chapter the following conclusions were made-

- Based on the results obtained it has been concluded that there was a significant increase of agility and

flexibility for National level players than the other two groups.

- In Vital Capacity and Resting Heart Rate, it has been concluded that there was a significant increase of National level players than their counterparts.
- Finally, the present study concludes that this specific age is characterized by some specific fitness variables. This study provides reference values of anthropometric characteristics, motor fitness, and physiological variables at different levels for women Kho-Kho players which may be informative for coaches to frame and control the training process to enhance talent identification in Kho-Kho as well as player's performance level.
- A notable conclusion indicated that the distinction in motor fitness and physiological variables between national level vs district A+C level women kho-kho players and also state level vs district A+B level women kho-kho players is considerably higher compared to the same between national and state level women kho-kho players C+B.

5.2 RECOMMENDATIONS:

Based on conclusions the following recommendations were proposed for future investigation.

- Male Kho-Kho players may be considered.
- International level of Kho-Kho players may be considered.
- Other district in West Bengal Kho-Kho players may be considered.
- Other Psychological and physiological variables that are essential to playing the Kho-Kho game may be considered.
- Some anthropometric characteristics may be considered which are very influential factors for the Kho-Kho game i.e., (leg length, hand length, etc.)
- More subjects may be utilized to get better results.

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