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Comparative study of VO_2 Max among indigenous and non-indigenous game players

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Abstract
The purpose of the study is to compare VO_2 Max of indigenous and non-indigenous game players.
Material and Methods: This study was carried out on 100 indigenous and 100 non-indigenous game players in the age group between 16 to 25 years. The VO_2 Max was recorded with the multi-stage 20-m shuttle run test (MSRT). Its measurement unit is mL/kg/min. independent t-test was used as a statistical test. Further ANOVA followed by post-hoc were used to compare each game players. $p< 0.05$ was considered statistically significant.
Result: The mean VO_2 Max value of indigenous and non-indigenous game players were 44.20 43.13 respectively. It shows insignificant difference of VO_2 Max among both players. Further the mean value of VO_2 Max of Kho-Kho, Kabaddi, Handball and Basketball was 45.07, 43.33, 42.40 and 43.82 respectively. It shows significance difference among Kho-Kho and Handball Players.
Conclusion: It concludes, both Indigenous and Non-indigenous game players require same amount of maximal oxygen uptake. The result demonstrates that insignificant difference in VO_2 Max among Indigenous and Non-indigenous game Players.

Keywords: Indigenous game, non-indigenous game, VO_2 max

Introduction
Indigenous sports are a part of the indigenous people's symbolic patrimony. The Latin word "indigena," which meaning "native," is the source of the English word "indigenous." Indigenous really refers to a particular, possibly small geographic area. Games and sports have a long history in India and were very important to the culture of the nation in the past. While some of the old games are being played in the country today, others have either vanished from rural and urban life. Kabaddi, kho-kho, wrestling, archery, and other native and traditional games with Indian roots have become well-known and widespread (Dhanjal, 2022) [4].
One of the most well-liked traditional sports in India is kho-kho. It is a very strategic and difficult sport (Jaiswal, 2014) [8] and Kabaddi is properly referred to as the "Games of The Masses" due to its popularity, straightforward, understandable rules, and appeal to the general people (P. Singh, 2013) [14]. Both are popular indigenous games of india and both players requires some similar anthropometric and physical variables (P. Singh, 2013) [14] (Dr. S Muniraju & Santhosha C, 2019) [6] (Dr. Baldev Singh, 2017) [5]. Anthropometric and physical variables depend on aerobic capacity and higher the aerobic capacity causes better performance in kabaddi and kho-kho (Majlesi *et al*., 2012) [9] (More, Shirish Vijay, 2021) [13]
Sports and recreational activity that were not initially indigenous to India but have been adopted and are popular throughout the nation are referred to as Indian non-indigenous games. These games were imported from abroad and have grown in appeal among Indians. Sports like handball, basketball, cricket, football (Soccer), hockey, and badminton are popular non-indigenous games in India.
One of the team sports with the highest demands on endurance is team handball, which is exemplified by unique moves including jumping, shooting under pressure, faking against tough defense players, and attempting fast breakouts despite extreme exhaustion (Bilge, 2013) [2] and Basketball has been characterized as an intermittent sport that is extremely physically demanding and requires players to continuously alternate between sprinting, shuffling, and jumping with jogging, walking (Masanovic, 2018) [10].

Both handball and basketball games are non-indigenous and both are required almost same type of physical, anthropometric variables and high aerobic ability to reach high performance (Bayios *et al*., 2006) [1] (Talekar, 2018) [22], and high aerobic fitness is important for improved performance (P.O & U.G, 2016) [15]. (Michalsik *et al*., 2015) [11]

Maximum oxygen uptake (VO_2 Max) relates to the intensity of aerobic processes and really denotes an organism's capacity to use the maximum amount of oxygen at a specific time (Ranković *et al*., 2010) [17]. Maximum oxygen uptake is often measured in absolute terms and represented in liters or milliliters per minute (Shete *et al*., 2014) [19]. It is an indicator of aerobic energy. It establishes how rapidly the energy expended during the aerobic process will refuel (Iztok Kavcic *et al*., 2012) [7]. It is depend on physical activity (Ponorac Nenad *et al*., 2005) [16]. High level of aerobic capacity is indispensable for achieving success in many sports; therefore, the determination of VO_2 max is of special importance as it plays the key role in professional sports (Ranković *et al*., 2010) [10].

Many previous studies have evaluated physiological variables of soccer, handball, basketball, hockey, cricket, volleyball, canoeing, kayaking, kabaddi and kho-Kho players (Yadav & Yadav, 2017) [23] (Shashikant Pardeshi & Sunil B Dhonda, n.d.) (Mishra *et al*., n.d.) (P.O & U.G, 2016) [15]. But there is not a single study has been done on physiological variables of indigenous and non-indigenous game players.

Hence, the purpose of this study was to describe VO_2 Max of indigenous and non-indigenous game players.

Objective of the study

- To compare VO_2 Max of indigenous and non-indigenous game players.
- To compare VO_2 Max of Kho-Kho, Kabaddi, Handball and Basketball game players.

Materials and Methods

Selection of subjects

Total two hundred male players acted as subjects in this study (100 indigenous game players and 100 non-indigenous game players) from north part of Karnataka. Indigenous games were kabaddi and kho-kho whereas handball and basketball games were taken as non-indigenous games. 50 players were taken from each game. The subjects were ranged from 16 to 25 years. All the players of different sports were engaged either in the preparation of inter-varsity competition or in regular practice under different sports academies for various tournaments.

Selection of variables and materials

The Physiological variable on which data collected was VO_2 Max. The multi-stage 20-m shuttle run test (MSRT) was used to record VO_2 Max. Its measurement unit is mL/kg/min

Data Analysis

Statistical Analysis: For data analysis responses were expressed as mean and standard deviation. Independent‘t’ test was performed for comparison between indigenous and non-indigenous game players. ANOVA test followed by LSD post-hoc test were performed for comparison of Kho-Kho, Kabaddi, Handball and Basketball. $p<0.05$ was considered statistically significant. Data analysis was performed using SPSS 26 software under windows.

Result

Table 1: Comparison of VO_2 Max between indigenous and non-indigenous game players.

variable	game	N	mean	s.d	T value	sig
VO_2 Max	Indigenous	100	44.2049	6.61397	1.250	.213
	Non-indigenous	99	43.1365	5.36983		

$p<0.05$

The VO_2 Max of indigenous and non-indigenous game players is shown in table-1.1. The VO_2 Max of indigenous and non-indigenous game players are graphically presented in fig.1.1. The mean value of VO_2 Max of indigenous and non-indigenous game players were 44.20 and 43.13 mL/kg/min respectively. There was no significant difference in VO_2 Max between indigenous and non-indigenous game players.

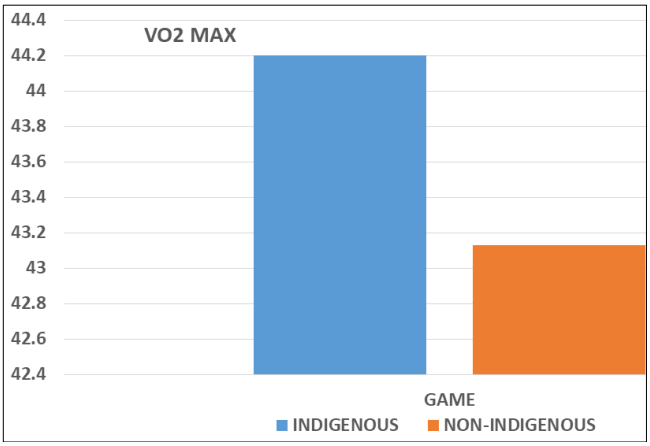

Fig 1: Mean VO_2 Max of indigenous and non-indigenous game players

Table 2: Comparison of VO_2 Max between kho-kho, kabaddi, handball and basketball players.

variable	game	N	mean	S.D	F value	sig
VO_2 Max	Kho-kho	50	45.0767	6.93699	1.725	.163
	kabaddi	50	43.3331	6.22165		
	handball	50	42.4062	4.63770		
	basketball	50	43.8280	5.93346		

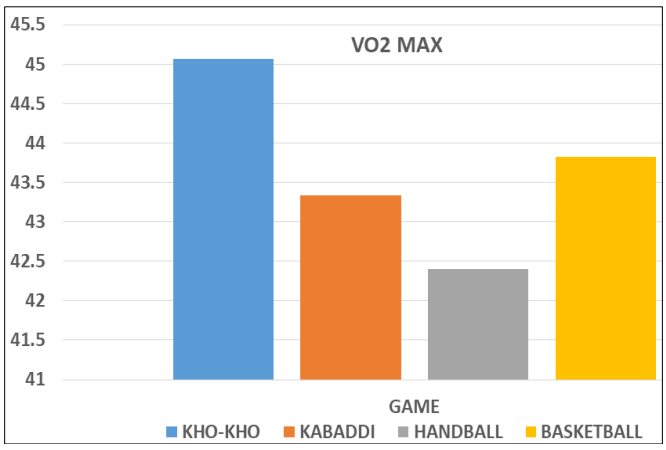

Fig 2: Mean VO_2 Max t of Kho-Kho, Kabaddi, Handball and Basketball players

Table 3: LSD post hoc values of different game players with respect to their VO_2 Max

Variable	Mean difference					
	Kho-kho Vs kabaddi	Kho-kho Vs handabll	Kho-kho Vs basketball	Kabaddi Vs handball	Kabaddi Vs basketball	Handball Vs basketball
VO_2 Max	1.74366	2.67052*	1.24870	.92686	-.49497	-1.42183

The VO_2 Max of different indigenous and non-indigenous game players are given in table-1.2 and fig-1.2.the LSD post-hoc values presented in the table 1.3. There was a significance difference between Kho-Kho and Handball.

Discussion

The result of the study revealed insignificant difference between the mean scores of indigenous and non-indigenous game players in relation to VO_2 Max. VO_2 Max is the primary indicator of aerobic fitness, cardiovascular health, and endurance performance. Both indigenous (Kho-Kho, Kabaddi) and non-indigenous game (Handball, Basketball) players have more or less same aerobic fitness, cardiovascular health and endurance. It may be because distance covered and duration of play during game is same in indigenous (Kho-kho, Kabaddi) and non-indigenous (Handball, Basketball) game. Both distance covered and duration of play directly relate to VO_2 Max (P.O & U.G, 2016) [15]. Both game players undergo high intensity interval training during game, HIT involves performing short- to long-duration bouts of moderately intense exercise separated by rest intervals. HIT significantly effects VO_2 Max (Buchheit & Laursen, 2013) [3]. A study conducted by (D. Singh & Patel, 2014) supports current study result. In this study it shows that Basketball, hockey and sprinter VO_2 Max is more or less same.

Among different games of indigenous and non-indigenous games it shows insignificance difference among all groups except Kho-Kho and Handball. Kho-Kho and Handball players shows significance difference among us. Kho-Kho players shows more VO_2 Max than Handball players. It may be because their level of training. A study conducted by (Nayek & Kaibarta, 2014) [14] contrast to current study result. In this study it shows that Handball players have more VO_2 Max than Kho-Kho players.

Conclusion

It concludes, both Indigenous and Non-indigenous game players require same amount of maximal oxygen uptake. The present study compared VO_2 Max among Indigenous and Non-indigenous game players. The result demonstrates that insignificant difference in VO_2 Max among Indigenous and Non-indigenous game Players. Further it shows significance difference in VO_2 Max between Kho-Kho and Handball Players.

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