

COMPARATIVE STUDY OF MODERN ARCHERS AND TRADITIONAL ARCHERS ON SELECTED PHYSIOLOGICAL VARIABLE ON VERY HIGH-ALTITUDE TRANS HIMALAYAN REGION OF LADAKH INDIA

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Abstract

The aim of the study was to compare the selected physiological variable among modern and traditional archery Players on very high altitude of Ladakh region. The sport of archery whether it is Traditional or Modern is a game where players need to be highly concentrative and focussed. Thus, athletes to control their heart beat while aiming to release or pull the trigger while shooting an arrow to the target. For the purpose of the study, the total sample of 40 athletes was taken. They were broadly categorised into two groups. In each group, 20 samples were distributed from GDC, Zanskar, one of the constituent colleges of University of Ladakh. In simple language we can say that 20 samples from Modern archery team and 20 from traditional archery team were taken for the study. The mean \pm SD of the samples was ranging from 22.9 \pm 3years of age. The questionnaires were used in order to assess the sports motivation and mental toughness among the psychological variables. The variables which had been tested include vital capacity (VC) and peak expiratory flow rate (PEFR). Moreover, (t) test was applied to compare the significance between the two groups in terms of motivation, mental toughness, negative breath holds capacity and heart rate between the modern archers and traditional archers.

Keywords: Modern and Traditional Archers, Pulse Rate, Negative Breath, High Altitude

INTRODUCTION

Ladakh, India, renowned for its breathtaking landscapes and towering Himalayan peaks, presents a unique setting for studying the physiological responses of archers, both modern and traditional, at very high altitudes [1], [2]. At altitudes exceeding 3,000 meters above sea level, the Trans Himalayan region of Ladakh imposes significant physiological challenges due to decreased oxygen availability, extreme temperatures, and rugged terrain [3], [4]. These environmental factors can profoundly influence an individual's physical performance and may manifest differently in modern archers equipped with advanced gear compared to traditional archers who rely on ancient techniques and equipment [5]–[7].

One of the primary concerns in such a study is understanding how altitude affects the cardiovascular and respiratory systems of archers [8], [9]. At higher altitudes, the partial pressure of oxygen decreases, leading to hypoxia, which can impair oxygen delivery to tissues and organs [10]–[13]. This can result in increased heart rate, respiratory rate, and blood pressure as the body strives to compensate for the reduced oxygen availability. The impact of these physiological changes on the performance and endurance of archers, particularly when drawing a bow and

maintaining steady aim, is of particular interest in both modern and traditional archery [14]–[16].

Furthermore, examining the differences in physiological adaptations between modern and traditional archers in Ladakh's high-altitude environment can provide valuable insights into the effectiveness of equipment and training methods. Modern archers often utilize advanced bows, materials, and training techniques optimized for performance, whereas traditional archers rely on skill, experience, and archaic equipment [17]–[19]. Understanding how these contrasting approaches interact with the physiological challenges of high altitude can inform the development of training regimens and equipment designs tailored to specific environmental conditions. Additionally, such research can contribute to the preservation and promotion of traditional archery practices in regions like Ladakh, where ancient cultural heritage intersects with modern sporting trends.

The history of archery went back to the beginning of the human settlement on earth. We came to know about numerous mythical heroes and even in the past people were shown in cave paintings with holding bow or arch in hand and the arrows rested on their back pointing towards animals. So, it could be assumed that people used hunting for the purpose of food as well as for recreation. Thus, we can say that, with the passage of time it has been developed in the form of game which came to be known as Archery. Now a days Archery has become mere a recreational sport which in the past used to be one of the important arts of military warfare. Moreover, prior to the invention of modern weapons or arms, the stability of the Empire highly depends upon the strength of the archery.

Archery has been a part of human society right from the beginning of Human Civilization. The early humans used bows and arrow to hunt animals. In Ladakh, archery is known by different names in regional language such as *Dah-fangs* and *Dar-tses* [20], [21]. It is worthwhile to mention here that it didn't get vanished with the introduction of modern games but it is still practiced here (Ladakh) and Gilgit-Baltistan especially during spring season with great vigour and enthusiasm.

Dr. Sonam Wangchuk, the President of IALS and Secretary of Himalayan Cultural Heritage Foundation, has traced the origin of archery in Ladakh to prehistoric times. In support of his argument, he said that in Ladakh, there are many petroglyphs in Ladakh which depicts people hunt animals with bows and arrows [22], [23]. First of all, Archery must have started with hunting but later on it was used as war weapon and finally culminates in the form of game. Thus, it became part of the Culture because as we all are well aware to this fact that the Ladakh is a mountainous region where other sports are less feasible.

Traditional Archery Festival

The social events in the mountainous region of Ladakh are centred on archery with complex rules and customs. According to Kacho Isfandyar Khan, Archery festival in the entire region of Ladakh is not simply a sporting event but in real sense it also has deep social meaning. Archery festivals usually took place with the onset of spring season or before the arrival of sowing season. For instance, Shaktar-Chigtana, a famous and well-known village of Kargil district is known for Archery festival where every person of the village took part in competition [24], [25]. Here it is known by a local name called *Dah-fangs*. In this competition, two teams were formed. It is notable to mention here that elders or influential members of the village are appointed as the

leaders. Moreover, each team used to invite and host arrow commander of the opposite team for dinner. So, we can say that game of Archery in the village is played in the atmosphere of great sportsmanship. Kacho Isfandyar further added that both participating teams pay homage to the family of deceased if any and then invite entire family to participate in the archery Festival. The visit and invitation for such a festival was so important that the family of deceased would stop mourning thereafter. Thus, we can say that social gathering due to this game plays its part in the process of socialisation of the people.

Similarly, Marup Namgyal described some customs of Leh which includes archers mark their arrows with special feathers which helps them to identify their arrows easily. The target area (ben) is made with sand with the purpose to ensure that the arrow does not break. In the past, people would put soil and animal feed around the target which itself is made up of sand and covered it with black yak skin along with bulls-eye or *tsagey* in the middle of the archery field [26], [27].

Modren Versus Traditional Archery

So far as traditional archery is concerned, it is imbued with socio-cultural meaning and competitive archery requires modern equipment's and rules and regulations. Many archery enthusiasts believe that the use of modern equipment should not be used at the cost of traditional ones. In this regard, Sadiq Shalti, a national archer who used to be the part of Indian National team in 1980's has set an example so far as traditional archery is concerned. He believes that the credit for his achievement goes to traditional archery. He further recalls his experience, in 1987, the Sports Authority of India (SAI) organised trail in Leh for Archers of this region in which 25 archers were in the fray [28], [29]. It is necessary to point out here that only five players were selected for training at the National Sports Academy (NSA).

Moreover, participating players when asked Sadiq Shalti about modern equipment in the tournament, he replied that there is no harm in using modern equipment but it restricts the participation of players due to its high price which every archery player couldn't afford. As a result, people with traditional bow get a negative complex that they cannot compete with those who use modern equipment. Now a day's player wears traditional attire but the essence of the game is missing because they out rightly left the use traditional equipment. In this regard I would like to say that we should have separate pools for both traditional and modern archery so that ancestral game won't be over shadowed by the modern one [30], [31]. Similarly, Nawang Rinchen laid emphasis to maintain balance between traditional and modern archery. At the same time one of the foremost concern or drawback with the use of traditional archery with primitive equipment cannot cover the distance with the same precision as the target has been changed from 25 m to 30 m. Thus, need of the hour is that we should promote both traditional and modern archery in relationship to the current situation of archery in Ladakh. In professional archery tournament, it becomes difficult to hit the traditional target with the modern equipment and vice versa of it.

After the occurrence of Industrial revolution, the game of archery also witnessed tremendous progress in terms of equipment such as bows started to emerge modified with the application of aerodynamics and physics and evolution in design and materials. Moreover, in the sixties of the 21st century, tremendous progress was made in the equipment of bow. It now featured with a camera clicker sight, stabilizer and many more. Imagine if you compare traditional bow with its modern brother, the

former will simply give you the impression of handmade and latter will simply give the impression of machine.

The sophistication of recurve bow or modern archery can be realised by its technological advancement in every sphere. In this regard, a very popular example is the Olympic Recurve Bow featured with the sight clicker and the stabilizer. Therefore, we can say that modern archery is the only recreational and occasional sport where we use bow with more power, easy to use and accurate. Moreover, modern compound bows are convenient to carry because one can fold them into pieces.

The traditional recurve bows are not that powerful because they are stripped of modern equipment's. These Modern recurve bows are made up of modern materials accessories. In Olympic recurve bow, the arrow released from it will hit the target far and hard. Due to the presence of clicker will help the archer to make shooting easier with a lighter draw weight in the modern bow. The presence of sight in the modern bow will facilitate the archer to aim the target with more accuracy than that marks in the traditional one. Stabilizer, another notable feature help the archer to make balance before realising the arrow. But sophisticated bows used for modern recreational archery is equipped with modern equipment and accessories which only increases the consistency and accuracy of an archer. But it should be noted here that long time experience gained through spent time and achieved skill would enable the archer to gain real power. Another type of bow is commonly known as long bow. It is also called by many people as D-shape bow. This type of bow was used in ancient times by early humans for hunting and self-defence. It is one of the simplest types of bows to make and to be used by all. The limbs in this type of bow bend toward the archer and limbs of the long bow never came in contact or touch with the string.

In archery, heart rate variability also plays its part in the performance of the players. The heart rate variability (decreased heart rate) is associated to higher parasympathetic activity and better balances of parasympathetic and sympathetic are beneficial to archers' performance with experience to contribute to increased accuracy [32]–[34]. It is conducted that performance out come and heart platform can be assessed during training to determine optimal arousal and action timing. Heart rate declaration can be used as a psychological marker of modification induced by mental rehearsal and skill simulation [35]–[38]. As we all are well aware to this fact that sports throughout world remain one of the most recognised activities that bring citizens of different nations together across the globe. In the world of sports, the success and failure of athletes in the games or tournaments highly rests on their level of motivation which serves as an essential tool for them to achieve a set goal (Samah, 2021, Barnett, 1979). Thus, we can that if athletes really want to make best use of the potential, then one need to train him mentally as well as physically. Moreover, it is right to say that performance of athletes would be below par as per their potentialities if they play games devoid of right head set and mental strategies.

METHODOLOGY

All samples were given through explanation of the procedure and a written informed consent was obtained before participating in the study. In this regard, twenty male modern archer and twenty male traditional archer players were selected for the study from Zanskar, high altitude area a sub division of Kargil district in the Union Territory

of Ladakh. The mean \pm Standard Deviation of the sample ranges between the age group of 22.9 ± 3 years. For the purpose of sample collection, an open competition was organised between modern and traditional archery players of Zanskar region in order to have practical experience of the game for proposed study. They were tested on the basis of selected psychological and physiological variable. And the Sport Motivation Scale of Pelletier, Luc G. and Mental Toughness questionnaire of A. Goldberg was used in order to assess the psychological variables. Moreover, Nose Clip was used for positive and negative breath hold capacity.

Statistical analysis:

Before Testing, the purpose of the present study was elaborated to the participants. In order to examine the hypothesis of the study descriptive statistical tools such as mean and standard deviation was used. In order to compare the difference between the two i.e. Traditional Archery and Modern Archery, independent test was employed and the level significance was set at 0.05. The Statistical Package for Social Sciences (SPSS) was used for the purpose of statistical calculation.

RESULTS

The means of Traditional and Modern Archers are as follows (155.10 and 141.70) in the Sport Motivation, (17.45 and 21.30) in the mental Toughness, (65.40 and 64.75) in positive breath hold, (40.70 and 33.65) in negative breath hold, and (54.25 and 53.65) in resting heart rate.

Variables	Groups	N	Mean	Standard Deviation
Sports Motivation Scale	Traditional	20	155.10	18.18
	Modern	20	141.70	18.99
Mental Toughness	Traditional	20	17.45	5.02
	Modern	20	21.30	3.84
Positive Breath Hold	Traditional	20	65.40	14.33
	Modern	20	64.75	10.43
Negative Breath Hold	Traditional	20	40.70	8.51
	Modern	20	33.65	5.38
Resting Heart Rate	Traditional	20	54.25	2.67
	Modern	20	53.65	3.15

Table 2: Two sample t test and Levene’s test between the Traditional and Modern Archers

Variable	t	df	P-value (2- Tailed)	Mean Difference	Standard Error Difference
Sports Motivation scale	2.25	38	.02*	13.40	5.88
Mental toughness	2.70	38	.01*	-3.85	1.41
Positive breath hold	0.15	38	.87	.65	3.96
Negative breath hold	3.13	38	0.0*	7.05	2.25
Resting hearth rate	0.64	38	.52	.60	.92

The results in the table 2 shows the significant difference between the two groups in the sports motivation scale (0.2*), mental toughness (0.1*) negative breath hold (.00*). And there is insignificance difference in the Positive Breath Hold and Resting Heart Rate and their scores are (.87) and (.52)

DISCUSSION

The present investigation reveals significant difference and altitude effect between the Modern Archer and Traditional Archer in the selected psychological variables which includes sports motivation, mental toughness and physiological variables such as negative breath hold. The study further clarifies that Modern Archer and Traditional Archer requires lot of concentration, focus, confidence and right judgement to increase the accuracy of the target. At the same time, it is important to mention here that Modern Archers are more motivated and trained in friendly outdoor environment to hit the target more accurate because of modern Equipment than those of Traditional Archers who lacked such motivation, equipment and training and exposure [39]–[41]. The Traditional archer with primitive equipment needs lot of strength on upper arm, shoulder and upper back, while pulling the string of bow and this group of muscle are the utmost significant reasons contributing to successful archery in comparison to the Modern Archer who possess sophisticated equipment such as the sight clicker and the stabilizer and many more [42]–[44]. The modern archery equipment provides better accuracy and power compound to the old bows [45]–[47]. It does not increase the skill level of the archer by any means. It just helps in providing the stability to the bow. Thus, it only increases the chance of hitting the target more accurately.

The study will compare the effect of physical activity of modern archers and traditional archers on selected physiological variables in the very high trans Himalayan region of Ladakh, India. In this context, the physical activity involved in bow pulling and aiming in archery will be the focus of research [48]–[50]. Modern archers tend to use bows and more sophisticated equipment, which may require different physical strength in use, while traditional archers use more classical techniques and equipment. These differences can affect physiological responses such as heart rate, blood pressure, and muscle strength required to perform archery activities at very high altitudes in Ladakh. Therefore, through this comparison, it will be understood how different physical activities in these two groups of archers contribute to the physiological variability observed in physically challenging environments such as Ladakh.

CONCLUSION

The modern archer and traditional archer must need to adopt a positive approach in order to enhance their performance. So, we can say that they should either repeat or improve their good performance with great motivation, zeal and vigour. Simultaneously these players of the game should not only be mentally strong but also the fitness of their heart and lung is also utmost important. By and large all these aspects of the game are crucial for success in both modern archery and traditional archery. In modern times archery is regarded as fun sport but in the past, it was necessity for their survival in terms of killing animals to acquire food during prehistoric times. In addition to it, with the development of human civilization, archery became one of the important components of army in empire building. The take ways for traditional archers require devotion and presence of mind to become an expert in sharp shooting of the target and vice versa consideration also applies on modern archers. It is also true that with the advancement of technological sophistication, modern knowledge, skill and training made it easier for modern archers to become sharp shooters but there requires expertise at both levels.

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