

INTERVENTION OF YOGA ON HANDGRIP STRENGTH AMONG MALE ADOLESCENT RECURVE ARCHERS

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Abstract

The purpose of the research was to investigate the intervention of yoga on handgrip strength among male adolescent recurve archers. Both the experimental group and the control group were investigated. A total of twenty archery players were separated into two groups: the experimental group received ten participants, while the control group received other ten participants. The ages of the participants ranged from 14 to 17 years. Only participants in the experimental group were given the yoga intervention, and hand grip strength was measured before and after the yoga intervention. The handgrip was analyzed with the use of qingfeng hand dynamometer, which has been regarded as a trustworthy instrument and test for determining the relevant parameter. The gathered information was subjected to statistical examination using analysis of covariance. The results revealed that sixteen weeks of yoga practice considerably improved handgrip strength among male adolescent recurve archers.

Keywords: Yoga, Archers, Handgrip, strength, Adolescents, Physical, Sports

Introduction

“Archery is a sport, activity, or skill that involves shooting arrows with a bow” (Paterson, 1985). Archery has historically been used for hunting and fighting. A person who practices archery is known as an archer or a Bowman, while a person who enjoys or is master at archery is known as a toxophile or a marksman (Oxford English Dictionary, 1989). Archery is suitable for all ages (Mishra, 2022). Archery is one of the oldest skills that are still practiced. Evidence of ancient archery has been discovered all over the world. Archery was first documented in the late Palaeolithic period, about 10,000 BC when the Egyptian and nearby Nubian societies used arrows and bows for hunting and warfare. The Archery Association of India was founded in Delhi to organize, encourage, promote, and regulate archery in India. The Archery Association of India is affiliated with the World Archery Federation (WA), World Archery Asia (WAA), South Asian Archery Federation, and the Indian Olympic Association (Archery association of India, updated: March 2022). The Archery Association of India (AAI) organizes India’s national archery competition in accordance with World Archery Federation (FITA) regulations and standards, which were revised in 2014. Performance is described as “comprehensive competition ability” established by individuals and teams in and out of the competition field. Physical, mechanical, physiological, and psychological aspects, all influence athletes’ performance (Herfiantoro, 2019). It has been noted that in order to win the sport, athletes must have a high degree of physical fitness and motor ability (Musa et al., 2016). Physical fitness factors in the form of muscular strength give a considerable input to archery practitioner in enabling performance, specifically in arms. According to Landers et al. (1991), archery requires stamina and muscular strength to cope with the sports physical demands because competition involves

constant shooting and moving back and forth. “Muscle strength and endurance are the ability of muscle groups to develop contractions at their maximum intensity and continually for particular time, long enough to exhaust the muscles, or the capacity of muscles to maintain their maximum intensity for longer period” (Schoenfeld et al., 2021). Handgrip strength is an important aspect of archery, as the strength of the archer's grip can impact their ability to hold the bow steady and release the arrow accurately. It has also been suggested that archers’ strength, balance, and handgrip help them to sustain the sports for a longer period of time. “Hand grip strength is defined as the force applied by the hand to hold on, to pull on, or to suspend objects in the hand. It is a reliable measurement that can be easily used to evaluate the functional integrity of the hand” (Walankar et al., 2016). For the archers, the upper back and shoulder is used to draw the bow, the upper and lower shoulder muscles is used to control the draw arm, the arm muscles is to extend the bow arm, and the finger muscles to hold the bowstring. Therefore, it is important for archers to develop and maintain good handgrip strength (Sezer, 2017). There are several exercises that can help improve handgrip strength for archery, including grip strengthening exercises using hand grippers, wrist curls, and forearm curls. These exercises can help build the muscles in the hand, wrist, and forearm, which are essential for maintaining a strong grip while shooting. It is important for archers to not overexert themselves or cause injury when training for handgrip strength. It is recommended to start with lower weights or resistance and gradually increases over time to avoid injury. The parasympathetic nervous system activity has a significant impact on the performance of archers (Aggarwala & Dhingra, 2017; Carrillo et al., 2011). Yoga has been found to promote various health benefits. It helps to improve vagal modulation (Streeter et al. 2012) and decrease the sympathetic activity of the autonomic nervous system, which helps to regulate the heart rate and reduce sympathetic activity (Kimoto et al., 2021).

Yoga statistics shows that there are over 300 million people in the world are practicing yoga (The Economic Times, Jan 2019). Moreover, almost 50 percent of all yoga practitioners are from India, but the younger generations appear to be less enthusiastic about the practice (Alexksandar hrubenja, 2022). Among Indians, the practice of yoga among adults is only 40% (Jeff Diamant, 2021). Young adults benefit greatly from yoga because it helps them become more responsible, patient, focused, and disciplined. According to the findings of the study, yoga aids in breathing, flexibility, strength, confidence, energy level, balance, concentration, endurance, injury prevention, and quick recovery from strenuous exercise. Most archery-specific studies looked at the relationship between anthropometry and muscle strength (Lau et al., 2020), the effects of acupuncture (Tsai et al., 2021), taichi (Li et al., 2019), and psychological training (Wu et al., 2021) on shooting score, as well as identifying the essential physical variables, psychological variables, cardio- respiratory variables, and impact of postural control in archery performance (Musa et al., 2019; Taha, 2018; Eswaramoorthi et al., 2018; Jose, 2018; Suppiah et al., 2017; Musa et al, 2016). Consistent yoga practice increases physical performance and well-being by enhancing flexibility, balance, psychological and cardiovascular health (Bintari et al., 2021; Karthika & Selvalakshmi¹, 2020; Karthika², 2020; Akhtar et al., 2013). Additionally, many researchers proved that there may be a direct link between yoga and an improvement in the fundamentals of athletic performance (Harrelson and Swann, 2003). Broad, (2012) stated that yoga can complement or even replace more conventional forms of practices as part of a well-rounded training schedule. Regular yoga practice improves flexibility by moderate elongating of the

muscles, connective tissue nearby bones and joints. As a highly structurally active and involved practice, yoga also has deep effects on equilibrium, muscular strength, endurance, and coordination (Carrico, 1997). Yoga plays major role on increasing the range of motion and decreasing their risk of injury by improving body posture. Static asana that put the necessary muscle groups under tension help to keep the breath steady and regular. During such asana, the entire body undergoes transformation as a result of the interaction between the breathing mechanism and the tight musculoskeletal system (Coulter, 2010). The consistent practice of yoga improves many different aspects of fitness such as placement, range of motion, and muscle fibre formation by raising flexibility and decreasing muscle tension, allowing for novel actions to occur and facilitating the free movement of joints (Clark and Powers, 2012). As a result, athletes become better at their games. Athletes need to be flexible and balanced to hold their guns for longer periods of time without them bouncing. The foregoing suggests that yoga can aid in the development of strong connective tissue and the refinement of some of the extremely fine muscles that contribute to equilibrium and composure. To the best of the researchers' awareness, just three research articles have examined the effect of Yoga practice on archery performance. Yoga may not directly improve handgrip strength for archery; it can indirectly benefit the archer's grip strength and overall performance by improving overall body strength and flexibility, reducing stress and tension, and promoting good posture and alignment. Vinyasa yoga can be a great way for archers to improve their overall strength, flexibility, and balance, which can indirectly improve their grip strength. But none of the research explored the intervention of yoga on handgrip strength (HGS) among archers, this study focused on intervention of yoga on handgrip strength among male adolescent recurve archers.

Purpose of the Study

The purpose of this study was to find out the intervention of yoga on handgrip strength among male adolescent recurve archers.

Hypothesis

It was hypothesized that sixteen weeks yoga intervention would have a significant effect on handgrip strength among male adolescent recurve archers.

Methodology

The reason of this research was to examine the intervention of sixteen weeks yoga on handgrip strength among male adolescent recurve archers. Twenty individuals were chosen from various archery clubs across Chennai. Athletes were prompted to submit information about them, including their gender, age, level of competitiveness in archery, and amount of previous competitive experience, etc. The experimental group and the control group were the focus of this specific research attempt. Both the experimental and the control groups consisted of ten archery players each. Only experimental group subjects participated in the yoga intervention for four days in a week for the duration of four months. The length of the yogic practices was an hour long, and they consisted of various asana, pranayama, and nyasa sequences. The control group did not take part in any of these activities.

Table I- Yoga Intervention Program

S. No	Vinyasa yoga Sequence	Rounds	Practice methods
1	Prayer	-	-
2	Conscious breathing	6	-
3	Tadasanam	6	Dyn
4	Virabhadrasanam and Parsvauddhanasanam sequence	3 /Each side	Dyn
5	Jumping sequence (Vasistasanam)	6	Stay- 1br
6	Utkatasanam-ardha uttanasanam-uttanasanam sequence	6	Dyn
	Rest (Free In and Free Ex)	-	-
7	Dvipadapitham	6	stay 1, 2, & 3br- each 2t
8	Sarvangasanam	2	Stay-6 br
	Rest	-	-
9	Jatara parivrtti- Parivrtti bheda	2	Stay- 4 br
10	Apanasanam	4	Dyn
	Rest (Free In and Free Ex)	-	-
11	Urdhva dhanurasanam	2	* stay 6 br
	Rest (Free In and Free Ex)	-	-
12	Apanasanam to Urdhva prasrta padasanam	6	Dyn
	Rest (Free In and Free Ex)	-	-
13	Ardha matsyendrasanam	2	*stay- 6 br
	Rest (Free In and Free Ex)	-	-
14	Navasanam	2	*stay-4br
	Rest (Free In and Free Ex)	-	-
15	Pascimatanasanam	6	Dyn
16	Vajrasanam forward bend sequence	6	Dyn
	Rest (Free In and Free Ex)	-	-
17	Sitali	6	IN-H-EX-H
18	Nadi suddhi	6	IN-H-EX-H
	Rest	-	-
19	Nyasam with mantra	4	-
	Rest	-	-
20	Closing Prayer	-	-

The individuals' handgrip strength was monitored in this study. It was determined that qingfeng hand dynamometer was considered as the most exact for monitoring the relevant parameters. The evaluations were carried out on a total of three separate times, and the highest possible score was selected. The readings were obtained both before and after the sessions for the pre- and post-tests. The analysis of covariance was used to do statistical analysis on the data that were obtained.

Results and Discussion

Table – II Results of Analysis of Covariance on Right Hand grip strength

Test	EXP. Gr	CG	SV	SS	df	MS	F
Pre test	36.73	36.93	Between	0.30	1	0.300	0.02
			Within	343.87	28	12.28	
Post test	40.47	38.80	Between	20.83	1	20.83	1.68
			Within	348.13	28	12.43	
Adjusted	40.56	38.70	Between	25.98	1	25.98	34.26
			Within	20.471	27	0.76	

Table F ratio of 4.20 with (1, 28) degrees of freedom

*Significant at 0.05 level

Adjusted post-test means $F = 34.26$, which is larger than the required $F = 4.20$ at the 0.05 level of significance. Statistical testing using ANCOVA showed a notable difference in right hand grip strength between the two groups.

Figure –1 showing the mean values of Right Handgrip strength

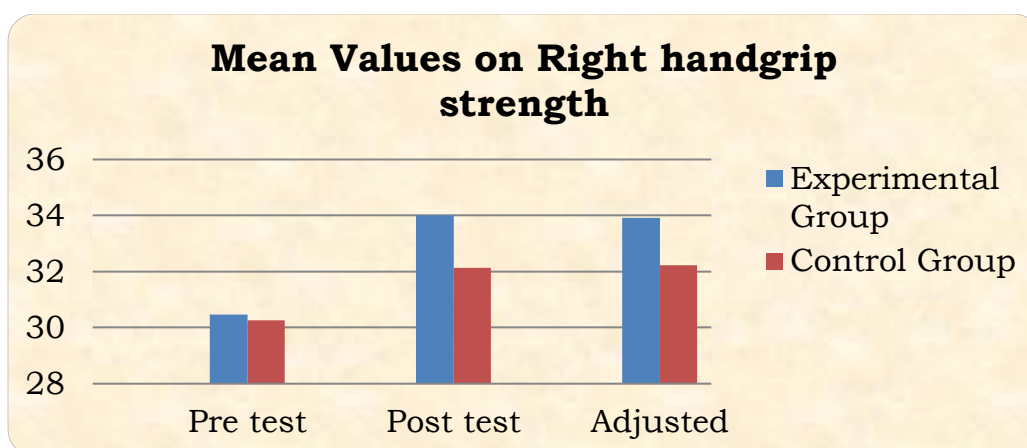


Table – III Results of Analysis of Covariance on left Hand grip strength

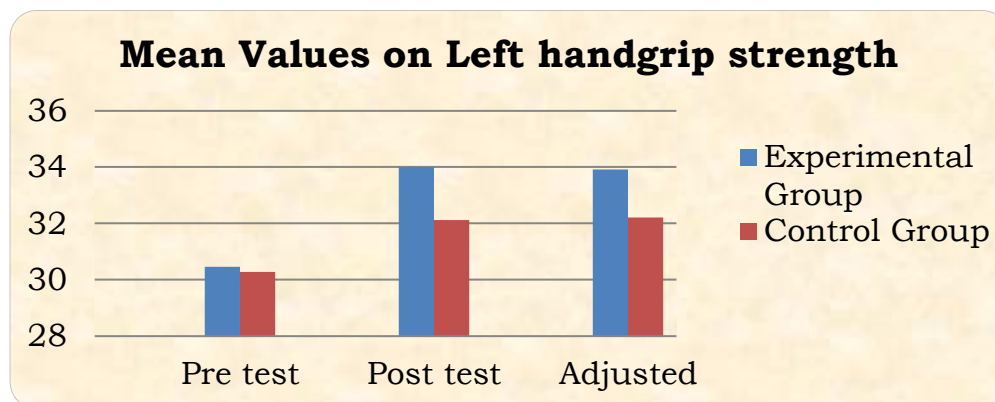
Test	EXP. Gr	CG	SV	SS	df	MS	F
Pre test	30.47	30.27	Between	0.30	1	0.300	0.10
			Within	82.67	28	2.95	
Post test	34.00	32.13	Between	26.13	1	26.13	9.66
			Within	75.73	28	2.70	
Adjusted	33.91	32.22	Between	21.50	1	21.50	37.05
			Within	15.666	27	0.58	

Table F ratio of 4.20 with (1, 28) degrees of freedom

*Significant at 0.05 level

Adjusted post-test means $F = 37.05$, which is larger than the required $F = 4.20$ at the 0.05 level of significance. Statistical testing using ANCOVA showed a notable difference in left handgrip strength between the two groups.

Figure –2 showing the mean values of left Hand grip strength



Grip strength is a vital component of an athlete's overall fitness on sports performance. The primary objective of this research was to assess if yoga had any added impact on the grip strength of archery players in addition to their normal training. Both groups Archers engaged in their usual routines. Routine preparation sessions consisted of physical activity, sport-specific skill training, and regular participation for their sports. Only the yoga group received extra yoga intervention. Hand grip strength improved considerably following 16 weeks of yoga training in the current research. The increase in hand-grip strength in the yoga group is similar with the findings of Madanmohan et al. (2003), who found that eight weeks of hatha yoga training significantly increased isokinetic muscular strength and isometric muscular endurance. Rathod and Jiwtode (2016) found that four months of yoga increases children's handgrip strength and handgrip endurance. According to Raghuraj et al. (1997), pranayama training significantly increases the HGS of both hands. According to Raju et al., (1997) yoga training leads in a large increase in maximum work production and a considerable decrease in oxygen consumption per unit of effort.

Both groups (yoga and control) exhibited an increase in grip strength as a result of regular physical activity; sport-specific abilities, especially archery practice, may induce grip strength (Bilajac et al., 2020). Several yoga positions, such as bhujangasanam, shalabhasanam, chaduranga dandasanam, and urdhva dhanurasanam may strengthen the shoulder, chest, and arm muscular strength. Incorporating vinyasa yoga could helped archers improve their overall strength and flexibility, which can indirectly improve their grip strength. In addition, it was hypothesized that regular yoga practice enhance handgrip strength (Rathod & Jiwtode, 2016; Madanmohan et al., 2003), and this research demonstrated that the added yoga intervention increased handgrip strength in the experimental group. The control group, however, did not show any improvement. Again, the intervention of yoga was shown by substantially greater handgrip strength in the yoga group compared to the control group.

This research proved that the addition of yoga to conventional training had a good impact on handgrip strength within a shorter amount of time (16 weeks).The researcher confidently concluded, based on the above-mentioned literatures and consultations with many

others, that the archers who participated in the yoga session had greater hand grip strength than the other group who only participated in regular training; therefore, it would be advantageous if a professional yoga expert were included in the instruction to offer systematic training to progress the overall performance of archery players. In addition, this research paved the way for future research to overcome the limitations (period and sample size) identified in this effort. Our research population consisted mostly of adolescents. If it had been able to include skilled and mature archers, the outcome would have been different. In addition, more study may be conducted by addition of more week's yoga intervention, as well as other result variables and measuring methodologies, to strengthen the proof.

Conclusion

Sixteen weeks Yogic intervention had an impact on improving handgrip strength among male adolescent recurve archers.

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