Quality in Primary Care
ISSN: 1479-1064

Open access Research Article

Survey on Joint Range of Motion of Hockey and Archery Players in Punjab: A Observational Study

Swapna Rout*, Sinha A.G.K

Department of Physiotherapy, Punjabi University, Patiala, India

ABSTRACT

Background: Range of motion around the joint is the flexibility, which is considered as an fitness component. It is important for general health, sports performance and injury prevention. Normative data are the data which are obtained from a reference population that establishes the baseline distribution for a measurement against which the assessed measurement can be compared. Normative joint ROM data can serve as a very useful reference to quantify an individual's performance quality. However studies on normative joint range of motion in India are not widely available.

Objective: To obtain the normative data of shoulder and elbow joint range of motion in archery and hockey players of age groups 11 yrs-40 yrs of Punjab and to observe the correlation between the age and joint range of motion of players.

Method: A sample of 402 sports players consisting 210 hockey (92 males and 118 females) and 190 archery (102 males and 90 females) through convenient sampling using snow ball technique. Shoulder and elbow joint range of motion measurement was done using universal goniometer.

Result: The normative data of shoulder joint range of motion of hockey players for flexion, extension, abduction, internal rotation and external rotation are (177-178), (76-77), (176-177), (73) and (84-85) in degrees respectively. The corresponding values for archery players are (175-177), (74-75), (174-175), (68-86) and (86-87) in degrees respectively.

Conclusion: The archery players demonstrating slightly larger shoulder ROM in comparison to hockey players. The hockey players demonstrating higher elbow ROM in comparison to archery players.

Keywords: Duodenal paraganglioma; Pancreas-sparing duodenectomy; Laparoscopy; Adolescent

INTRODUCTION

Joint Range of Motion (ROM) refers to the motion available at different joints in the body. Range of motion around the joint is considered as flexibility, which is an important component of physical fitness. Joint ROM is very important physical aspect for the sports persons during their performances. The ROM of different joints greatly influences the capability of a sports person to execute various skills and techniques in the field [1].

There are many factors that affects joint ROM, which includes internal as well as external factors. Some of internal factors that affect joint ROM are types of joint, elasticity of muscle tissue, ligaments, tendons and length of musculature [2]. Some external factors such as height, weight and body mass index have also been shown to affect the range of motion available in a joint [3].

Among these factors age, gender, injury, side of dominance and

Received:	29-October-2021	**Manuscript No:**	IPQPC-21-11336
Editor assigned:	03-November-2021	**PreQC No:**	IPQPC-21-11336 (PQ)
Reviewed:	17-November-2021	**QC No:**	IPQPC-21-11336
Revised:	09-November-2022	**QI No:**	IPQPC-21-11336
		Manuscript No:	IPQPC-21-11336 (R)
Published:	07-December-2022	**DOI:**	10.36648/1479-1064.22.30.82

Corresponding author Swapna Rout, Department of Physiotherapy, Punjabi University, Patiala, India, Tel: 9861461371; E-mail: swapnarout23@gmail.com

Citation Rout S (2022) Survey on Joint Range of Motion of Hockey and Archery Players in Punjab: A Observational Study. Qual Prim Care. 30:82.

Copyright © Rout S. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

© Under License of Creative Commons Attribution 4.0 License
This article is available in: https://www.primescholars.com/journal-pharmacy-and-pharmaceutical-research.html

the activity pattern of the individual stand predominantly. The time of day, different sports techniques, race and cultural habits also influence the joint ROM [4].

Range of motion quantifies joint flexibility which greatly affects the physical capabilities and performances of the sport persons [5].

Normative data are the data which are obtained from a reference population that establishes the baseline distribution for a measurement against which the assessed measurement can be compared. Normative joint ROM data can serve as a very useful reference to quantify an individual's performance quality [6].

However, to our knowledge no study exists based on normative data of range of motion of shoulder and elbow joint in different game such as archery and hockey is still rare in Indian literatures. Thus a study in Indian context in the northern region (Punjab) will help as a reference of shoulder and elbow joint range of motion in archery and hockey players in Punjab [7].

MATERIALS AND METHODS

Design

The design of the study is survey using questionnaire and clinical examination. The Research Proposal of the study was approved by Institutional Clinical Ethical Committee (I.C.E.C) of Punjabi university Patiala vide letter no IEC/01-2018/015.

Sampling

The nature of sampling for the present study is convenient sampling using snow ball technique with intension to include as many players as possible. The sample consisted 402 sports players 210 hockey (92 males and 118 females) and 190 archery (102 males and 90 females) [8].

Questionnaire

The demographic and training profile of hockey and archery players were obtained using a questionnaire consisting of (Name, age, gender, contact no., email I'd, game, year of entry to game) questions focusing on types of playing equipment (type of bow used by archery players), their training schedule (how many days a week they practice their regular game), their level of play (district, state, national and international players), playing position (in hockey forward players, defenders and goal keepers) were analysed [9].

Measurement of Joint Range of Motion

Universal goniometer: The universal goniometer was used for the measurement of shoulder and elbow joint range of motion.

Statistical Analysis

Mean, standard deviation, standard error and percentage were used to prepare summary statistics. Student t-test and Pearson correlation coefficient test of correlation were the tools of data analysis [10]. Data was analysed using Microsoft excel and SPSS version 20.

RESULTS

Normative Data for Shoulder Joint Range of Motion

The normative joint range of motion of Hockey players for left shoulder joint flexion, extension, abduction, internal rotation and external rotation were 177.80 ± 4.47, 76.63 ± 9.88, 176.90 ± 3.66, 73.13 ± 8.87 and 84.59 ± 7.39 degrees respectively. The corresponding value for archery players are 175.52 ± 7.26, 74.53 ± 11.04, 174.77 ± 4.56, 68.79 ± 10.38 and 86.08 ± 6.14 degrees respectively. Shoulder flexion, abduction and internal rotation showed statistical significance with less ($p<0.001$) in both hockey and archery players [11].

The range of motion of female hockey players for right shoulder flexion, extension abduction, internal rotation and external rotation are 179.22 ± 3.801, 80.08 ± 7.728, 177.95 ± 3.279, 75.48 ± 7.687 and 87.20 ± 6.489 degrees respectively. The corresponding values for male hockey players are 177.59 ± 5.62, 74.49 ± 10.708, 177.60 ± 4.393, 71.14 ± 9.202 and 83.83 ± 7.192 degrees respectively. Shoulder flexion, extension, internal rotation and external rotation showed statistical significance with less ($p<0.001$) for both males and females **(Table 1)**.

The range of motion of female hockey players for left shoulder flexion, extension abduction, internal rotation and external rotation are 178.42 ± 3.43, 79.24 ± 7.64, 176.78 ± 3.23, 74.93 ± 8.48 and 86.19 ± 6.93 degrees respectively. The corresponding values for male hockey players are 177.0 ± 5.44, 73.28 ± 11.36, 177.0 ± 4.16, 70.82 ± 8.87 and 82.53 ± 7.50 degrees respectively. Shoulder flexion, extension, internal rotation and external rotation showed statistical significance with less ($p<0.001$) in both males and females.

The range of motion of female archery players for right shoulder flexion, extension, abduction, internal rotation and external rotation are 178.91 ± 6.64, 78.02 ± 9.90, 176.67 ± 5.13, 72.98 ± 9.79 and 87.45 ± 5.35 in degrees respectively. The corresponding values for male archery players are 175.66 ± 6.37, 72.89 ± 10.41, 173.87 ± 5.10, 68.62 ± 10.01 and 85.41 ± 6.77 in degrees respectively [12]. Shoulder flexion, extension, abduction, internal rotation and external rotation showed statistical significance with less ($p<0.05$) in both males and females [13].

The range of motion of female archery players for left shoulder flexion, extension abduction, internal rotation and external rotation are 176.94 ± 7.76, 77.53 ± 10.61, 175.84 ± 4.48, 69.74 ± 10.57 and 86.24 ± 6.40 degrees respectively. The corresponding values for male archery players are 174.29 ± 6.60, 71.94 ± 10.80, 173.84 ± 4.44, 67.96 ± 10.20 and 85.95 ± 5.93 degrees respectively. Shoulder flexion, extension and abduction showed statistical significance with less ($p<0.01$) in both males and females **(Table 2)**.

Normative Data for Elbow Joint Range of Motion

The range of motion of hockey players for right elbow flexion is 129.49 ± 7.76 degrees. The corresponding value for archery players is 131 ± 7.19 degrees. The hockey players demonstrated statistical significance of ($p<0.001$) with higher ROM in comparison to archery players **(Table 3)**.

The range of motion of hockey players for left elbow flexion is 128.44 ± 7.58 degrees. The corresponding values for archery players 127.87 ± 7.69 degrees **(Table 4)**.

Table 1: Comparison of ROM (in degree) of right shoulder between hockey and archery players.

Range of motion (shoulder)	Hockey N=210	Archery N=198	t	Mean diff.	CI
Flexion	178.50 ± 4.74	177.17 ± 6.68	2.32*	1.33	0.20-2.46
Extension	77.63 ± 9.54	75.27 ± 10.47	2.36	2.36	0.40-4.32
Abduction	177.80 ± 3.80	175.17 ± 5.29	5.74***	2.62	1.72-3.52
Internal rotation	73.58 ± 8.63	70.64 ± 10.12	3.14***	2.94	1.10-4.78
External rotation	85.72 ± 6.99	86.35 ± 6.22	0.95	0.63	1.93-0.67

Table 2: Comparison of ROM (in degree) of left shoulder between hockey and archery players.

Range of motion (shoulder)	Hockey N=210	Archery N=198	t	Mean diff.	CI
Flexion	177.80 ± 4.47	175.52 ± 7.26	3.81***	2.27	1.10-3.44
Extension	76.63 ± 9.88	74.53 ± 11.04	2	2.09	.045-4.15
Abduction	176.90 ± 3.66	174.77 ± 4.56	5.18***	2.13	1.32-2.94
Internal rotation	73.13 ± 8.87	68.79 ± 10.38	4.51***	4.34	2.45-6.23
External rotation	84.59 ± 7.39	86.08 ± 6.14	2.19	1.49	2.83-0.157

Table 3: Comparison of ROM (in degree) of right elbow between hockey and archery players.

Range of motion (Elbow)	Hockey N=210	Archery N=198	t	Mean diff.	CI
Flexion	129.49 ± 7.76	131.56 ± 7.193	2.76***	2.07	3.54-0.60
Extension	2.31 ± 1.40	3.53 ± 1.66	2.26*	1.21	2.31-0.12

Table 4: Comparison of ROM (in degree) of left elbow between hockey and archery players.

Range of motion (Elbow)	Hockey N=210	Archery N=198	t	Mean diff.	CI
Flexion	128.44 ± 7.58	127.87 ± 7.69	0.751	0.57	0.92-2.07
Extension	3.44 ± 1.50	3.41 ± 2.57	0.03	0.02	1.48-1.53

The range of motion of female hockey players for right elbow flexion is 132.82 ± 4.66 degrees. The corresponding values for male hockey players 125.30 ± 8.81 degrees. Elbow flexion showed statistical significance with less ($p<0.001$) in both males and females [14].

The range of motion of female hockey players for left elbow flexion is 131.35 ± 4.69 degrees. The corresponding values for male hockey players 124.78 ± 8.87 degrees [15]. Elbow flexion showed statistical significance with less ($p<0.001$) in both males and females [16].

The range of motion of female archery players for right elbow flexion is 134.72 ± 7.36 degrees. Corresponding values for male archery players is 128.87 ± 35.82 in degrees. Elbow flexion showed statistical significance with less ($p<0.001$) in both males and females [17].

The range of motion of female archery players for left elbow flexion is 130.34 ± 6.941 degrees. Corresponding values for male archery players is 125.74 ± 7.70 degrees. Elbow flexion showed statistical significance with less ($p<0.001$) in both males and females [18].

The range of motion of hockey players for right elbow extension is 2.31 ± 1.40 degrees. The corresponding values for archery players are 3.53 ± 1.66 degrees. Elbow extension showed statistical significance with less p<(0.05) in both archery and hockey players [19].

The range of motion of hockey players for left elbow extension is 3.44 ± 1.50 degrees. The corresponding values for archery players are 3.41 ± 2.57 degrees [20].

DISCUSSION

The normative data emerged from this study for shoulder joint ROM of hockey player's flexion, extension, abduction, internal rotation and external rotation were 178.50, 77.63, 177.80, 73.58, 85.72 in degrees respectively. Where the respective values of shoulder ROM of archery players were 177.17, 75.27, 175.17, 70.64 and 86.35 in degrees respectively. The shoulder range of motion values of hockey players are found significantly greater than the archery players [21-24].

They reported ROM measures in elite junior tennis player's external rotation, internal rotation and total rotation are 103, 45 and 149 in degrees and respective values for baseball pitchers are 103, 42 and 145 in degrees. Although did not evaluate the shoulder flexion, extension and the abduction ROM, summing the measures of internal rotation and external rotation, greater external rotation 103° and a lesser internal rotation 42°-45° which is similar to the present study findings [25-27].

Findings of the present study with greater external rotation and lesser internal rotation is similar who reported the ROM values of internal rotation and external rotation to be 70° and 90° respectively. In this study we observe the range of elbow flexion to be 129°-131° which lesser than that reported. They reported the elbow flexion ROM 146°, however reported the elbow flexion ROM (130°) in their cross-sectional study on elbow range of motion in professional baseball pitchers which is similar to the findings of the present study. This investigated 33 professional pitchers for elbow ROM during spring training preseason and measured the elbow joint ROM of flexion, extension, supination and pronation [28-30].

The findings of the present study contradicts the results of these studies. In their study found no significant differences between the left and right side values. Also reported that the amplitudes of joint motion of both left and right were similar. However in the present study a statistically significant difference has been observed between the left and right side shoulder ROM. In general right side demonstrated greater joint ROM values in comparison to left side [31].

Findings the present study observed the shoulder range of motion of male players for flexion, extension, abduction, internal rotation and external rotation were (175-177), (73-74), (177-178), (70-71) and (82-83) in degrees respectively which is significantly lesser than the corresponding values of females. Greater female joint ROM can be attributed to structural differences that are different musculature at different joints in comparison to male and developmental changes in ligaments for more stability requiring increase in collagen fibers and reduction in elastin fibers in females [32].

In contrast reported no significant difference between male and female elbow joint ROM. However they did not report shoulder joint ROM. This makes it difficult to compare the findings. It reported that males had greater values of lumbar extension ranges as compare to the females.

CONCLUSION

In comparison between male and female, female were having a greater joint ROM than the male counterparts. Correlation between the age and shoulder and elbow joint ROM shows a positive relationship, with growing age there is increase in shoulder and elbow joint ROM values.

DISCUSSION

The normative data emerged from this study for shoulder joint ROM of hockey player's flexion, extension, abduction, internal rotation and external rotation were 178.50, 77.63, 177.80, 73.58, 85.72 in degrees respectively. Where the respective values of shoulder ROM of archery players were 177.17, 75.27, 175.17, 70.64 and 86.35 in degrees respectively. The shoulder range of motion values of hockey players are found significantly greater than the archery players.

REFERENCES

1. Bradley PS, Portas MD (2007) The relationship between preseason range of motion and muscle strain injury in elite soccer players. J Strength Cond Res. 21(4):p.1155.
2. Daneshmandi H, Rahmaninia F, Shahrokhi H, Rahmani P, Esmaeili S (2010) Shoulder joint flexibility in top athletes. J Biomed Sci Engineer. 3(8):p.811-5.
3. Ellenbecker TS, Roetert EP, Bailie DS, Davies GJ, Brown SW (2002) Glenohumeral joint total rotation range of motion in elite tennis players and baseball pitchers. Med Sci Sports Exerc. 34(12):p.2052-6.
4. Ellenbecker TS, Roetert EP, Piorkowski PA, Schulz DA (1996) Glenohumeral joint internal and external rotation range of motion in elite junior tennis players. J Orthop Sports Phys Ther. 24(6):p.336-41.
5. Hallaceli H, Uruc V, Uysal HH, Ozden R, Hallaceli C, et al. (2014) Normal hip, knee and ankle range of motion in the Turkish population. Turk Orthope Traumatologi. 48(1):p.37-42.
6. Kumar S, Sharma R, Gulati D, Dhammı I, Aggarwal A (2011) Normal range of motion of hip and ankle in Indian population. Turk Orthope Traumatologi. 45(6):p.421-4.
7. Park W, Ramachandran J, Weisman P, Jung ES (2010) Obesity effect on male active joint range of motion. Ergonomics. 53(1):p.102-8.
8. Sawale S, Bisen R (2015) Normative values for active lumbar range of motion in children and confounding factors that affects the active lumbar range of motion. J Nov Physiother Phys Rehabil. 2(2):p.62-8.
9. Sengupta P, De S, Pal A, Maity P, Banerjee M, et al. (2012) Variation of range of joint motion in Bengalee (Indian) healthy adult subjects. J Life Sci. 4(2):p.123-33.
10. Singh A, Raghav S, Tyagi GP, Shukla AK (2017) Effect of aging on range of motion and function of dominant shoulder joint in healthy geriatric population. Int J Physiother Res. 5(5):p.2301-5.
11. Soucie JM, Wang C, Forsyth A, Funk S, Denny M, et al. (2011) Range of motion measurements: Reference values and a database for comparison studies. Haemophilia. 17(3):p.500-7.
12. Sueyoshi T, Nakatani T, Tsuruta T, Emoto G (2017) Upper extremity range of motion and pitching profile of baseball pitchers in Japan. Orthopaed J Sports Med. 5(7).
13. Sundaram B, Bhargava SKN, Karuppannan S (2012) Glenohumeral rotational range of motion differences between fast bowlers and spin bowlers in elite cricketers. Int J Sports Phys Ther. 7(6):p.576.
14. Thakur D, Motimath B (2014) Flexibility and agility among children and adolescent Athletes: An observational Study. Int J Physiother Res. 2(4):p.653-6.
15. Vairo GL, Duffey ML, Owens BD, Cameron KL (2012) Clinical descriptive measures of shoulder range of motion for a healthy, young and physically active cohort. Sports Med Arthrosc Rehabil Ther Technol. 4(1):p.1-7.
16. Waldrop-Valverde D, Ownby RL, Jones DL, Sharma S, Nehra R, et al. (2015) Neuropsychological test performance among healthy persons in northern India: Development of normative data. J Neurovirol. 21(4):p.433-8.
17. Varangaonkar VC, Ganesan S, Kumar VV (2015) Normative values for active lumbar range of motion using the Back Range-of-Motion measurement (BROM) device in school age children: A cross-sectional study. Int Neuropsychiatr Dis J. 3(2):p.59-68.
18. Barad JH, Kim RS, Ebramzadeh E, Silva M (2013) Range

of motion of the healthy pediatric elbow: Cross-sectional study of a large population. J Pediatr Orthop. 22(2):p.117-22.

19. Wright RW, Steger-May K, Wasserlauf BL, O'Neal ME, Weinberg BW, et al. (2006) Elbow range of motion in professional baseball pitchers. Am J Sports Med. 34(2):p.190-3.
20. Baskova ES, Kostrjukova MA, Vlasova OV, Kharitonova SA, Levitskiy A, et al. (2008) Proteins and Peptides of the Salivary Gland Secretion of Medicinal Leeches Hirudo verbana, H. medicinalis, and H. orientalis. Biochemistry (Mosc). 73:315-20.
21. Karti Kay P, Shahzaib A, Dinesh G, Vijay K (2021) Targetting Cathepsins-A potential link between Covid-19 associated neurological manifestations. Heliyon.11:25-28.
22. Yuyang Lei, Jiao Zhang, Cara R Schiavon, Ming He, Lili Chen, et al. (2020) The novel coronavirus' spike protein plays additional key role in illness Publication Research 10:1-3.
23. Jitendra KC, Rohitash Y, Pankaj KC, Anurag M, Rakesh Roshan, et al. (2021) Host Cell and SARS-CoV-2-Associated Molecular Structures and Factors as Potential Therapeutic Targets. Cells. 10: 2427.
24. David Goodsell. Molecule of the Month: Hemagglutinin Protein Data Bank. (2015) The Scripps Research Institute and the RCSB PDB.
25. Vladislav V, Babenko, Oleg P, Valentin AM, Artem SK, et al. (2020) Draft genome sequences of Hirudo medicinalis and transcriptome of three closely related medicinal leeches. BMC Genomics 21:331.
26. Gary Thomas (2002) Furin At The Cutting Edge: From Protein Traffic to Embryogenesis and Disease Nat Rev Mol Cell Biol 3: 753–766.
27. Xin Hu, Jonathan H S, Hui G, Miao X, Catherine ZC (2021) Discovery of TMPRSS2 from virtual screening Version Nat Commun 12:1726 .
28. Caio PG, Danilo EF, Fernanda C, Gustavo F, Michelle TP, et al. (2020) Cathepsin L in COVID-19: From pharmacological evidences to genetics.front cell infect microbiol ; 10: 589505.
29. Paolo V, Claudio C, Antonio S, Fabio A (2020) The pivotal link between ACE2 deficiency and SARS-CoV-2 infection. Eur J Intern Med 76:14-20.
30. Konstantin S (2008) Clinical Hirudotherapy: Practical guide general hirudotherapy ISBN-13: 978-1-9833-4587-6
31. Xuhua X, Kenneth L (2021) Domains and functions of spike protein in SARS-Cov-2 in the Context of Vaccine Design. Viruses 13:109.
32. Bindu SM, Jillian AL, Arden TW, Katherine A, Alphonse EL, et al. (2021) The role of Neuropilin-1 in COVID. PLoS Pathog 17:e1009153.