International Journal of Environmental Sciences
ISSN: 2229-359
Vol. 11 No.12s,2025
https://theaspd.com/index.php

Effect Of Indian Club Exercise On Bat Swing Velocity, Shoulder Strength And Respiratory Efficiency In District Level Cricketers Of Bhavnagar

Dr. Twinkleraj B. Kangad[1], Dr Nikita Parmar[2], Dr Chinmay Shah[3]
[1]Resident Doctor, Government Medical College, Bhavnagar, Gujarat, India
[3]Senior Resident Doctor, Government Medical College, Bhavnagar, Gujarat, India
[3]Professor and Head, Department of Physiology, Government Medical College, Bhavnagar, Gujarat, India

Abstract
Background: Indian clubs are traditional exercise tools engaging the shoulder girdle, upper back, and intercostal muscles. We hypothesized that incorporating Indian club exercises with resistance training improves bat swing velocity, respiratory efficiency, and shoulder strength more than resistance training alone.
Aim: To assess the effects of Indian club exercises on bat swing velocity, respiratory efficiency, and 1 repetition maximum (1RM) shoulder strength.
Material and Methods: An interventional study was conducted in 2022 at Government Medical College Bhavnagar with 22 male cricketers (>18 years, NSCA intermediate fitness level, injury-free >6 months). Participants were divided into two groups (n=11 each): resistance training only (R) and resistance training plus Indian club exercises (RC). Respiratory efficiency was evaluated by pulmonary function tests, breath-holding time, and 40 mm breath endurance. Bat swing velocity was measured using a stance beam. Shoulder strength was assessed by 1RM per NSCA guidelines. Both groups trained four weeks with two upper and two lower body sessions weekly; RC group included club swings.
Results: Group R showed significant improvement in 1RM shoulder strength, breath-holding time, and lung function (FVC, FEV1), but not bat swing velocity. Group RC improved significantly in 1RM shoulder strength, bat swing velocity, and breath-holding time, with no significant change in 40 mm endurance.
Conclusion: Adding Indian club swings significantly enhances bat swing velocity. Shoulder strength improved in both groups, while respiratory efficiency improved only with resistance training alone.
Key Words: *Indian club exercise, respiratory efficiency test, 1-RM shoulder strength, Bat swing velocity, resistance training*

INTRODUCTION

Indian clubs (a.k.a. mudgals, meels, mace) are exercise equipment made of wooden or metal objects with a shaft/handle at top and a rounded cylindrical heavier bottom. Pictures from the 5-7th century of a person using equipment shaped like clubs can be seen in Moghalmari village in district Medinipur of West Bengal.1 Persian wrestlers from the 19th century can also be seen using similar equipment for their training. There are various movement patterns to use the clubs based on which the muscles are strained in varying degrees, but for the majority of movement patterns the principal muscles involved are shoulder girdle muscle and upper back muscles.[1] As we study the effect of Indian clubs on parameters like bat swing velocity, the movement pattern involved in bat swing velocity also includes those muscles utilized in club exercises.[2] Bat swing additionally also involves force generated from ground via lower body and hip muscles which is transferred via torso to upper limb and the bat at last.[3] Indian club exercise (ICE) biomechanics involve movement of shoulder in frontal and sagittal plane along with movement of torso in transverse plane for core body strength and stability which mimics biomechanics of bat swing activity.[2] Haruna et al. also found positive correlation between the bat swing velocity and improving strength of upper back muscles in his study. Shoulder muscles like deltoid & rotator cuff are also used during the Indian club exercise whose strength can be improved by resistance training.[2] However reliable data of Indian club exercise effect on shoulder strength wasn't easily available so we decided to test it. As accessory respiratory muscles like intercostal muscles are also utilized in this exercise, we also decided to check the effect on respiratory parameters like pulmonary function test & breath holding test.[4-5] We hypothesized that adding Indian club exercise to routine resistance training programs could improve performance parameters like bat swing velocity and 1 RM shoulder strength and also improve respiratory efficiency.

Aim & Objective: Aim of study is to assess the effects of Indian club exercise on Bat swing velocity, respiratory efficiency and 1RM shoulder strength with Objective to compare the pretest and post-test effect of Indian club exercise between resistance training only (R) group and resistance training + Indian club exercise (RC) group on Bat swing velocity, respiratory efficiency and 1RM shoulder strength

MATERIAL AND METHODS

An interventional study was carried out by the Department of Physiology, at Anjaneya Gym Government Medical college Bhavnagar in October-November 2022. Total of 22 Male District level cricketers of Bhavnagar from the local cricket club, age >18 years old, belonging to NSCA (National Strength & Conditioning Association), intermediate level of fitness, injury free for >6 months, were included in the study. Participants were divided into two groups of 11 subjects each, first Group RC (Resistance training + club exercise) and second Group R (resistance training only) did not use clubs and only did resistance training. Both groups were Age & BMI matched and consisted of participants only playing a single sport (cricket). Three parameters were tested in all participants. Respiratory efficiency was tested via Pulmonary function test done by Spiro- excel software, breath Holding test and 40 mm breath endurance test.[4]

Bat swing velocity (BSV) was measured by a device Stance beam tracker mounted on a bat weighing 1.25kg. The best value out of 5 trials was recorded. 1 Repetition Maximum Shoulder strength was tested in Gym as per standard guidelines by NSCA.6-[5]

Training program was allotted to both groups for 4 weeks. Group R did resistance training 4 times a week for 4 weeks which included 2 days upper body and 2 days lower body routine. In group RC, Indian club swing exercise was included in which they performed 100 swings per session on upper body workout day. To match the total volume of workout per session group RC excluded lat- pulldowns to accommodate club swing exercise.

RESULTS

Paired T-test was applied within the same group to see pre and post test changes in the studied parameters. To compare the pre to post test difference in both the groups, an independent T-test was applied. In group R significant improvement is seen in 1 RM shoulder strength, breath holding time, FVC and FEV1 parameters. Although bat swing velocity improved by 1.46% the result was not statistically significant.

In group RC, significant improvement was seen in 1 RM shoulder strength by 6%, in bat swing velocity by 7.62% and breath holding time improved by 16.69%. 40 mm endurance improved by 11.37% but it was not significant.

When difference scores in both the groups were compared, in group RC BSV change showed significantly more improvement, which suggests that if the cricketers are looking to improve their bat swing velocity then adding club exercise to their routine would be beneficial.

Traditional dumbbell and machine exercise does not mimic the biomechanics of a bat swing activity. So multiple exercises are performed in various combinations to train and improve bat swing ability and improve strength and achieve optimum mobility. But when we compare resistance exercise to club swing exercise, club swings improve strength but also improves flexibility without performing any additional exercise in a time efficient and cost-effective way.

Table 1: Baseline characteristics of Group R and Group RC

Variables	R	RC	P value
AGE	20.31 ± 2.25	19.63 ± 0.67	0.313
WEIGHT	66.36 ± 8.93	64.63 ± 13.00	0.720
HEIGHT	173.3 ± 7.00	173.45 ± 5.85	0.948

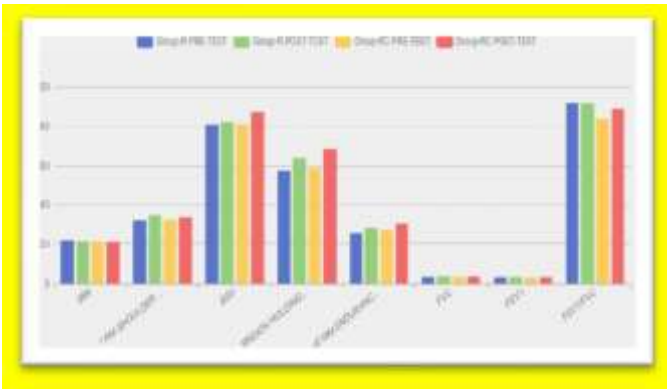
Table 2: Paired samples t-test group-R

	PRE- TEST	POST- TEST	P VALUE	% change
BMI	22.06 ±	21.57 ±	0.096	-2.19 %

	2.46	2.10		
1 RM SHOULDER PRESS	31.93 ± 6.00	34.89 ± 5.74	0.006	9.29%
BSV	80.91 ± 2.30	82.09 ± 2.77	0.291	1.46%
BREATH HOLDING TIME	57.45 ± 5.46	63.73 ± 10.16	0.031	10.92%
40 MM ENDURANCE TEST	25.64 ± 3.07	28.27 ± 4.27	0.101	10.28%
FVC	3.29 ± 0.54	3.56 ± 0.50	0.009	8.38%
FEV1	3.03 ± 0.82	3.28 ± 0.59	0.015	8.38%
FEV1/FVC	91.95 ± 14.33	91.71 ± 7.68	0.923	-0.26%

Table 3: Paired samples t-test group-RC

	PRE- TEST	POST- TEST	P VALUE	% change
BMI	21.38 ± 3.46	21.36 ± 3.12	0.924	-0.01 %
1 rm shoulder Press	32.12 ± 9.63	34.05 ± 10.07	0.001	6.00%
Bsv	81.09 ± 4.76	87.27 ± 6.21	< .001	7.62%
Breath Holding time	58.82 ± 4.56	68.64 ± 10.57	0.005	16.69%
40 mm Endurance test	27.18 ± 4.54	30.27 ± 8.86	0.154	11.37%
Fvc	3.42 ± 0.41	3.49 ± 0.47	0.372	2.02%
Fev1	2.94 ± 1.008	3.11 ± 0.723	0.404	5.60%
Fev1/fvc	83.91 ± 24.22	88.77 ± 17.67	0.522	5.79%



Graph 1: clustered combo chart comparing pre- test and post-test results for group-r and group- rc

Table 4: independent samples t-test between difference score of group r and rc

Variables	Group r post-pre score mean diff	Group rc post- pre score mean diff	P Value	Cohen's d
Bmi	0.48	0.01	0.159	-0.6239
1 rm shoulder Press	2.96	1.93	0.295	0.4588
Bsv	1.18	6.18	0.007	-1.2840
Breath Holding test	6.27	9.82	0.350	-0.4078
40 mm Endurance test	2.64	3.09	0.857	-0.0781
Fvc	0.28	0.07	0.083	0.7769
Fev1	0.25	0.16	0.673	0.1828

DISCUSSION

Our study aimed to assess the effects of indian club exercises (ice) on bat swing velocity (bsv), shoulder strength, and respiratory efficiency in district-level cricketers. The results indicate that integrating ice into resistance training programs can enhance bsv and shoulder strength, while also improving certain respiratory parameters. In comparison, szymanski et al. (2007) investigated the impact of torso rotational strength on bat velocities in high school baseball players. Their study found that additional rotational and full-body medicine ball exercises led to significant improvements in bat-end velocity (6.4%) and angular shoulder velocity (8.8%) after 12 weeks of training.[7] these findings highlight the importance of rotational strength in enhancing bat swing performance. Our study aligns with these results, demonstrating a 7.62% improvement in bsv in the rc group, suggesting that ice, which emphasizes rotational movements, can similarly benefit bat swing performance in cricket players.

Furthermore, walter et al. (2019) examined the effects of an 8-week indian clubbell strengthening program on shoulder muscle strength and range of motion in handball players. The study reported significant improvements in shoulder internal rotator strength and internal rotation range of motion, indicating that ice can effectively enhance shoulder function.[8] our study corroborates these findings, with the rc group showing a 6% improvement in 1rm shoulder strength, underscoring the efficacy of ice in strengthening shoulder muscles in cricketers.

Additionally, while previous studies have primarily focused on strength and performance outcomes, our research also assessed respiratory efficiency parameters. The rc group exhibited a 16.69% improvement in breath-holding time, suggesting that ice may contribute to enhanced respiratory efficiency, a dimension less explored in existing literature.

CONCLUSION

In conclusion, including indian club exercise to daily routine can improve performance as well as physiological parameters. Being an important characteristic of a good batsman, bat swing velocity significantly improves by adding club swings in the exercise program. 1 rm shoulder strength improvement is seen in both groups; however, it improves by only 6% in group rc compared to 9.29% in group r. Respiratory efficiency parameters improves significantly in group r whereas it does not improve significantly in group rc. So based on our results we suggest that those players who are looking to improve their bat swing velocity can incorporate indian club swing exercise in their routine exercise program.

Acknowledgment: the author(s) appreciates all those who participated in the study and helped to facilitate the research process.

REFERENCES

1. Elizabeth Fee 1 TMB. The Indian club exercise. 2003 May [cited 2025 Jun 11];5(93):723–4. Available from: doi: 10.2105/ajph.93.5.723. PMID: 12721132; PMCID: PMC1447827
2. Haruna R, Doi T, Habu D, Yasumoto S, Hongu N. Strength and Conditioning Programs to Increase Bat Swing Velocity for Collegiate Baseball Players. Sports. 2023 Oct 1;11(10).
3. Schoenfeld BJ, Ratamess NA, Peterson MD, Contreras B, Tiryaki-Sonmez G. INFLUENCE OF RESISTANCE TRAINING FREQUENCY ON MUSCULAR ADAPTATIONS IN WELL- TRAINED MEN [Internet]. Available from: www.nsca.com
4. Kumar Mehrotra P, Varma N, Tiwari S, Kumart P. PULMONARY FUNCTIONS IN INDIAN SPORTSMEN PLAYING DIFFERENT SPORTS. Vol. 42, Indian J Physiol Pharmacol. 1998.
5. Cheng YJ, Macera CA, Addy CL, Sy FS, Wieland D, Blair SN, et al. Effects of physical activity on exercise tests and respiratory function [Internet]. Available from: www.bjsportmed.com
6. Grgic J, Lazinica B, Schoenfeld BJ, Pedisic Z. Test–Retest Reliability of the One- Repetition Maximum (1RM) Strength Assessment: a Systematic Review. Vol. 6, Sports Medicine - Open. Springer; 2020.
7. Szymanski DJ, McIntyre JS, Szymanski JM, Jason Bradford T, Schade RL, Madsen NH, et al. Effect of torso rotational strength on angular hip, angular shoulder, and linear bat velocities of high school baseball players. J Strength Cond Res. 2007 Nov;21(4):1117– 25.
8. Walter S, Petersen C, Basu A. Effect of an 8- week Indian clubbell strengthening programme on Handball players' shoulder muscle strength and range of motion. J Sci Med Sport. 2019 Oct;22:S113.
9. Corresponding author: Dr. Twinkleraj B. Kangad, Resident Doctor, Government Medical College, Bhavnagar, Gujarat, India
10. Conflict of interest: No! Conflict of interest is found elsewhere considering this work.
11. Source of Funding: There was no financial support concerning this work