

## Effect of Cryotherapy on Proprioception and Throwing Accuracy In the Dominant Shoulder among Female Recreational Players

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Throwing is one of the most complex activities within all athletic activity. The integrity of the receptors responsible for movement and proprioception with neural pathways plays a important role in maximizing the shoulder mobility in throwing skill. After an acute shoulder injury in sport, an athlete may return to practice or competition following a cryotherapy treatment to the injured shoulder. To find the effect of Cryotherapy on proprioception and throwing efficiency of shoulder in recreational players. 10 female basketball players will be selected as per the inclusion and exclusion criteria. The procedures were explained and an informed consent statement was obtained from the participants. Crushed ice with terry towels were employed to all the players included to the study. Treatment duration was 15 minutes, immediately at the end of the treatment, the post-test documentation on throwing efficiency was documented. Throwing performance index was used to assess the Functional ability of the shoulder joint paired t-test was used to compare in mean values of pre-test and post-test. There was a statistically significant changes obtained in the throwing accuracy after 15 minutes of cryotherapy application.

**Keywords:** Cryotherapy, Functional throwing performance index, Female basketball players, recreational athletes.

The shoulder has the greatest mobility functions as compared to any other joint in the body, and it compromises its stability to serve mobility function<sup>1</sup>. Because of the greater mobility function, there is a need for muscular coordination to maintain joint stability<sup>2</sup>. Proprioceptive input is from the peripheral mechanoreceptors to the central nervous system<sup>3,4</sup>.

When the deformation or a simply stretch in the muscle, skin or any other joint tissue activates the Mechanoreceptors and the impulse transmitted from the mechanoreceptors to the afferent neural

impulses to the central nervous system, and are used for proper joint stability and function<sup>5</sup>.

Athletic event results in injury, however the athletes have left shorter time span to return to their routine activity and there is a increasing need for the treatment modality that relieves pain and resolves the injury immediately<sup>6,7</sup> Cryotherapy serves the purpose of relieving the pain and helps the athletes to return back to the event immediately. The mechanism by which the cryotherapy relieves pain faster as compared to other therapeutic modality is by decreasing the tissue temperature



have been shown to decrease nerve conduction velocity, muscle force production, and muscular power<sup>8,9</sup>.

Researchers have highlighted the effects of taping and other foaming bandages in the management of pain around the shoulder joint, but none of the researcher have highlighted the need for returning to athletic performance in the shorter span. Cryotherapy is left without much attention among the researchers, but there are innumerable effects of this cryotherapy modality in targeting the functional performance is left out without much research. Hence the study has been done to emphasize the effects of cryotherapy on throwing accuracy of dominant shoulder among female recreational players

## METHODOLOGY

### Sample Design

Convenient sampling method was employed and informed consent was obtained from each subjects and this study has been approved by the ethical committee and Institutional review board of Ramakrishna College of Physiotherapy-Coimbatore

### Sample Size

Totally 10 Patients are included in the study

### Selection criteria

#### Inclusion Criteria:

- Females.
- Recreational players.
- Age ( 20 – 25 )
- Height 170
- Weight 60-70kg.

#### Exclusion Criteria

- History of fractures
- History of fractures dislocations
- Musculoskeletal injury
- Neurological disorder

### Assessment parameters

Functional Throwing Performance Index  
- FTPI

### Study protocol

10 Female players will be selected as per the inclusion and exclusion criteria. The procedures were explained and an informed consent statement was obtained from them.

### Training protocol:

#### Cryotherapy application

Crushed ice immersed in terry towels was employed as the cryotherapy modality in this study. This particular application is used frequently and is the most functional type of cryotherapy for shoulder<sup>20</sup>. Treatment duration was 15 minutes. Immersion method of cryotherapy application is used by crushing 2000 mL ice into the ice water and terry towels were immersed by making the crushed ice clinging on the towel. The middle of the towel was centered over the acromion. The subjects were tested with their Cloths off to allow maximum skin/towel interface. The subject was instructed to relax during the cryotherapy application to limit muscle activity and minimize any change in tissue temperature. Immediately after the cryotherapy, the posttest assessment was performed.

#### Functional throwing performance index

Functional ability of the shoulder joint was assessed using the functional throwing performance index<sup>19</sup>. The subject stood 4.57m from the target, a 30.48 x 30.48 cm square on the wall at the height of 1.22m from the floor. The object of the test was to throw a rubber playground ball into the target as many times as possible over 30 seconds for pretest and for posttest the subject will be made to throw at the target for one minute and will be repeated rest time of one minute will be given between each trial. The FTPI was calculated as the number of throws within the target divided by the total number of balls thrown.

#### Data analysis

The collected data were tabulated and analyzed used inferential statistics. Mean and Standard Deviation were used to assess all the parameters. Paired t-test was adopted to find the Long term effect of cryotherapy on throwing accuracy of dominant shoulder among male cricketers. A paired t-test was used to compare in mean values of pre-test and post-test.

The statistical value shows the mean, standard, deviation t - test and p – value of effect of cryotherapy in throwing accuracy between pre test and post test. In this table, p- value is less than 0.05 which is highly significant and indicates the increase in the throwing accuracy in the last minute compared to first minute

**Table 1.** Comparison of pre - test and post - test of throwing accuracy.

	Mean	Std. Deviation	Paired Samples Test Paired Differences			t-test value	df	Sig. (2-tailed)
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre Test – PostTest 1	.42006	.16028	.03228	.34541	.50822	11.900	20	.000
Pre Test - Post Test 2	.37852	.19452	.03878	.36442	.46120	9.788	20	.000
Pre Test - Post Test 3	.34841	.17468	.03233	.39935	.46457	11.001	20	.000
Pre Test - Post Test 4	.31241	.15666	.03547	.22343	.41349	9.112	20	.000
Pre Test - Post Test 5	.20068	.15768	.02362	.17657	.32229	7.000	20	.000

P&lt;0.05

## RESULTS

There was a significant change in the throwing accuracy after 10 minutes of cryotherapy application.

## DISCUSSION

The effect of crushed ice application on throwing efficiency were investigated .crushed ice application for ten minutes was determined to Functional Throwing Performance Index . In this study the immediate effects of crushed ice application was examined. The statistical result shows there is a significant change after cryotherapy initially and gradually increases by the 10 mintes of treatment and showing the statistical p value <0.05.

As females show poor performance in motor activity when compared to males in athletic activity were employed in this study. The tissue temperature was well efficient with crushed ice than ice cubes ,hence it was employed in the study. As recreational players are more prone to injuries they must know the importance of cryotherapy and its relation to throwing.

## CONCLUSION

There is a gradual increase in the throwing accuracy and the significant change is found in the tenth minute after application. Further research is needed to rule out the long term effects of cryotherapy.

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