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Effect of Bhastrika pranayama and Kapalbhati Kriya on vital capacity of junior cricket players

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Abstract

Background: This study was intended to evaluate the effect of Bhastrika pranayama and Kapalbhati kriya on the vital capacity of junior cricket players.

Methods and Materials: A total of 21 junior cricket players were selected from the cricket academy of L.N.I.P.E. and were split into 3 groups (2 experimental and 1 control group). The age of the participants ranged from 10 to 14 years. Experimental group 1 and 2 was subjected to Bhastrika pranayama and Kapalbhati Kriya for 6 weeks respectively. The participants were assessed for vital capacity using a win spirometer.

Results: The mean and SD of vital Capacity of the Kapalbhati group (2.47 ± 0.25) Bhastrika group (2.61 ± 0.24) and control group (2.46 ± 0.18). The experimental and control groups' means of vital capacity showed an extensive treatment impact. The ANCOVA, F statistics of the effect of training group .010 is significant ($p < 0.05$) as it is Less than 0.05. So, the Bhastrika Pranayama group had considerably better vital capacity than the Kapalbhati and control groups.

Conclusions: The Bhastrika Pranayama group's vital capacity is considerably larger than that of the Kapalbhati and control groups, based on the results. This means that in comparison to Kapalbhati and the control group, the Bhastrika pranayama intervention was more successful in enhancing the essential capacity.

Keywords: Bhastrika pranayama, Kapalbhati Kriya, vital capacity, yoga, yogic breathing exercise, junior cricket players

Introduction

Cricket is one of the most famous sports in Commonwealth nations and one of the sports with the greatest popularity worldwide (Kumar, P. *et al.*, (2013) ^[1]). The reason for the players' constant enhancement in performance is continuous high-intensity training, which helps them to perform effectively. Records are being broken, new ones created, and scores have increased to new heights.

Because of the development of one-day and T-20 cricket formats, the game of cricket has evolved dramatically in terms of physical intensity. To become an excellent cricketer, one must not only have superior talent and technique but also be physically fit (Noakes, T. D. *et al.*, (2000) ^[2]). Physical wellness is now one of the most significant considerations in achieving optimal performance (Cureton, 1956) ^[3], (Draper, N., 2014) ^[4], (Eime, R. M. *et al.*, 2013) ^[5]. As a result, more efforts have been taken to promote cricket-specific physical fitness in three major departments: batting, bowling, and fielding, (Petersen, C. J. *et al.*, 2010) ^[6], (Bartlett, *et al.*, 1996) ^[7], (Houghton, *et al.*, 2011) ^[8]. These various professions are all distinct, having their own physiological and biomechanical requirements (Webster, *et al.*, 2018) ^[9], (McNamara, *et al.*, 2017) ^[10], (Hulin, *et al.*, 2014) ^[11], (Petersen, *et al.*, 2011) ^[12] but one thing is common which is stamina and endurance. Fast bowlers travel the most distance with their frequent sprints among the three disciplines (2). For one-day matches and T20s, a batter covers 1.4 km and 1.7 km, respectively (Webster, *et al.*, 2018) ^[9], (Petersen, *et al.*, 2011) ^[12], (Sholto-Douglas, *et al.*, 2020) ^[13]. Fielders' demands have been increasingly recognized in recent years and a fielder needs to cover greater distance at faster rates in order to control the amount of runs made by the other side (MacDonald, *et al.*, 2013) ^[14].

According to studies, physical traits such as strength, speed, stamina, and endurance allow a cricketer to bat with power for long period of time, bowl quicker and with higher precision and field athletically (Wagh, *et al.*, 2022) ^[15], (Mukandi, *et al.*, 2014) ^[16]. So, vital capacity is significant in cricket since it allows players to keep up stamina and endurance throughout matches and training sessions (Christie, *et al.*, 2020) ^[13].

Yogic exercises have been shown to improve overall performance as well as work efficiency (Woodyard, C. (2011) ^[18]. Yoga appears to improve stress, anxiety, and health condition in many ways (Smith, *et al.*, 2007) ^[19]. Yogic practices work as a psychophysiological stimulus to boost endogenous melatonin release, which is responsible for better feelings of well-being (Harinath, *et al.*, 2004) ^[20], (Panjwani, *et al.*, 2021) ^[21]. To achieve the ultimate aim of yoga, four classical paths are presented. It is said that Ashtanga yoga, particularly 'Pranayama,' enhances both physical and spiritual wellness.

Pranayama is a Yogic method in which breathing is actively regulated. Many physiological factors have been affected by pranayama practice. Evidences shows that it has a favourable effect on the cardiorespiratory system (Kjellgren, *et al.*, 2007) ^[22], (Nivethitha, *et al.*, 2016) ^[23], (Telles, *et al.*, 2019) ^[24], where slowed breathing results in a lower heart rate and lower systolic and diastolic blood pressure (Zaccaro, *et al.*, 2018) ^[25], while rapid breathing causes a less vigorous but constant rise in heart rate (Pal, *et al.*, 2004) ^[26], (Pramanik, *et al.*, 2009) ^[27], (Nagarajan, 2014) ^[28].

There are many types of pranayama out of which Bhastrika is one of them. The forceful, continuous inhaling and expiration of breath is known as Bhastrika. Whereas, Kapalbhati is a kriya but it is more like Pranayama. The word Kapalbhati is origin from two Sanskrit words "Kapal" which means forehead and "Bhati" which means kanti (shining). It is a form of breathing exercise in which inhalation is slow but the process of exhalation is vigorous.

Despite the mounting evidence that yoga has positive impacts on cricket players on stress (Kumar, *et al.*, 2017) ^[29], muscle strength, flexibility, core strength, static and dynamic balance (Rao, *et al.*, 2021) ^[30] only a few researches have particularly looked if pranayama effects on the vital capacity of cricket player and in this also very few studies have done on Kapalbhati and Bhastrika effecting on the vital capacity of junior players of cricket which is very important as they are going to be the future of Cricket. This is a significant gap in the literature since junior players of cricket are a special population who may experience particular difficulties in maintaining stamina and endurance while playing cricket matches for a longer time.

Aims and Objectives

- The objective of this study is to look into how Bhastrika pranayama and Kapalbhati kriya effect on the vital capacity of junior cricket players.
- The aim of this study is to evaluate the effect of Bhastrika pranayama and Kapalbhati kriya on the Vital capacity of junior cricket players.

Methodology

In this chapter, the selection of subjects, selection of variables, criterion measures, administration of tests, collection of data and statistical technique will be described. 21 Students were selected as subjects for this study. The age of the participants ranged from 10 to 14 years. The subjects

were randomly selected from LNIPE, Gwalior from cricket nursery players of L.N.I.P.E. academy Gwalior and randomly divided into 3 groups (7 each) two experimental and one control group. For the purpose of the study, the following variable were selected Vital Capacity. Vital capacity was measured by a win spirometer. It was measured in litre. The subjects were taken into the laboratory and instructed for the vital capacity test in the win spirometry machine. First demonstration and instruction was given to the subjects to perform vital capacity in the win spirometry. Then the age, height, weight values were feed in the software and instructed for the test as demonstrated. The vital capacity was taken by forceful exhalation through the inhaler after a maximum inhalation. Data were recorded immediately after the test. Best of 3 trials were taken. The subjects of both experimental and control group were tested before and after the 6 weeks of training programme with the respective test administration.

Training Protocol

1st Experimental Group

Bhastrika Prannayama (Low Pace)

S. No.	Main Practices	1 ST to 2 nd Week	3 rd to 4 th Week	5 th to 6 th Week
1	Left nostril bhastrika	2 mins	3 mins	4 mins
2	Right nostril bhastrika	2 mins	3 mins	4 mins
3	Both nostril bhastrika	2 mins	3 mins	4 mins
Total		6 mins	9 mins	12 mins

Bhastrika Pranayama (High Pace)

S. No	Main practices	1 st to 2 nd Week	3 rd to 4 th Week	5 th to 6 th Week
1	Left nostril bhastrika	2 mins	3 mins	4 mins
2	Right nostril bhastrika	2 mins	3 mins	4 mins
3	Both nostril bhastrika	2 mins	3 mins	4 mins
Total		6 mins	9 mins	12 mins

2nd Experimental Group

Kapalbhati Kriya (Low Pace)

S. No	Main practice	1 st to 2 nd Week	3 rd to 4 th Week	5 th to 6 th Week
1	Left nostril kapalbhati	2 mins	3 mins	4 mins
2	Right nostril kapalbhati	2 mins	3 mins	4 mins
3	Both nostril kapalbhati	2 mins	3 mins	4 mins
Total		6 min	9 min	12 min

Kapalbhati Kriya (High Pace)

S. No	Main Practice	1 st to 2 nd Week	3 rd to 4 th Week	5 th to 6 th Week
1	Left nostril kapalbhati	2 mins	3 mins	4 mins
2	Right nostril kapalbhati	2 mins	3 mins	4 mins
3	Both nostril kapalbhati	2 mins	3 mins	4 mins
Total		6 min	9 min	12 min

The ANCOVA test was used at a 5% level of significance to figure out whether there was a significant difference in the means of vital capacity, breath holding capacity, and force vital capacity between the experimental and control groups. The control and experimental groups were evaluated prior to as well as after training.

Result

The statistical analysis SPSS software was used. For showing the results following are the tables results on Vital capacity.

Results on Vital Capacity

Table 1: Descriptive Statistics of vital capacity

Dependent Variable: POSTVC			
Treatment group	Mean	Std. Deviation	N
Kapalbhati	2.4743	.25488	7
Bhastrika	2.6100	.24474	7
Control	2.4629	.17670	7
Total	2.5157	.22697	21

Table 1. Shows the mean and SD of vital Capacity of the Kapalbhati group (2.47±0.25) Bhastrika group (2.61±0.24) and control group (2.46±0.18).

Table 2: ANCOVA Table of between Subject Effect on vital capacity

Dependent Variable: POSTVC					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1.017 ^a	3	.339	431.424	.000
Intercept	4.547E-005	1	4.547E-005	.058	.813
PRE_TEST	.923	1	.923	1174.894	.000
GROUP	.010	2	.005	6.074	.010
Error	.013	17	.001		
Total	133.935	21			
Corrected Total	1.030	20			

a. R Squared =.987 (Adjusted R Squared =.985)

Table 2. Shows the ANCOVA table with F statistics. Here, p-value related to F statistics of effect of training group.010 is significant ($p < 0.05$) as it is Less than 0.05. So, null hypothesis of no difference between the experimental and control group

is rejected at 0.05. It can be interpreted that there is significant effect of pranayama training on Vital Capacity. As the test is significant further pair-wise comparison would be done.

Table 3: Pairwise Comparisons between experimental and control group of VC

(I) treatment group	(j) treatment group	Mean difference (i-j)	Std. Error	Sig. ^b	95% confidence interval for difference ^b	
					Lower Bound	Upper Bound
Kapalbhati	Bhastrika	-.046*	.015	.008	-.078	-.014
	Control	-.044*	.015	.009	-.076	-.013
Bhastrika	Kapalbhati	.046*	.015	.008	.014	.078
	Control	.002	.016	.914	-.031	.035
Control	Kapalbhati	.044*	.015	.009	.013	.076
	BHASTRIKA	-.002	.016	.914	-.035	.031

Based on estimated marginal means
*.The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 3. Shows a pairwise comparison of the experimental and control groups' mean vital capacities, indicating an important treatment impact. Compared to Kapalbhati and the control group, VC increased considerably in the Bhastrika group. The Kapalbhati group's vital capacity grew significantly faster than that of the control group. Therefore, it may be concluded that Bhastrika pranayama is a more effective method than Kapalbhati kriya for raising vital capacity.

Discussion on Findings

The Bhastrika Pranayama group's vital capacity was significantly greater than that of the Kapalbhati and control groups, according to the results. This suggests that compared to Kapalbhati and the control group, the Bhastrika pranayama intervention was more successful in raising the essential capacity. The fact that Bhastrika practice requires the forceful involvement and contribution of the respiratory muscles and tissue may have an impact on these results.

A person's optimum capacity for air exhalation and maximal inspiration force are indicated by their vital capacity. Pranayama is a forcefully dynamic movement; therefore, the

rapid expansion and contraction of the ribcage during the exercise must have affected the thoracic cavity's dimensions. As a result, an important rise in vital capacity was noted following the six-week experimental period (Chowdhary, 2018) [31]. Vital capacity had been significantly affected by the pranayama training session. In regard to this, such training may be recommended to improve performance in relation to physical fitness. (Bal, 2010) [32].

The Bhastrika Pranayama group's vital capacity is significantly higher than that of the Kapalbhati and control groups, according to the results. This suggests that in comparison to Kapalbhati and the control group, the Bhastrika pranayama intervention was more effective in increasing the essential capacity.

Conclusions

The Bhastrika Pranayama group's vital capacity is considerably larger than that of the Kapalbhati kriya and control groups, based on the results. This means that in comparison to Kapalbhati kriya and the control group, the Bhastrika pranayama intervention was more successful in enhancing the essential capacity.

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