

**Impact of Aerobic and Anaerobic Training on Force Vital capacity among Soccer Players
with Special Reference to *Prakriti* (Psycho-Somatic Constitution)**

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(Received 11 January 2018-Accepted & Published 25 January 2018)

Abstract

Background: Game is a part of our life. Regular physical activity is one of the most important things for maintaining good health of sports person. Cardio respiratory fitness helps in the improvement of playing performance. In respiration, Force Vital capacity is the amount of air which can be forcibly exhaled from the lungs after taking the deepest breath possible. The various muscles are involved in Force Vital capacity. Present scenario of soccer is totally different to old. Aerobic and anaerobic training with ball is more important in present Soccer training. Higher level of performance depends upon higher level of physical fitness and specific positional game's techniques and tactics.

Method: Total 107 male Soccer Players were registered for this study from Varanasi District, aged mean 15.60 ± 0.960 years. They were randomly divided into three groups namely Aerobic Group (N=36), Anaerobic Group (N=36) and Control Group (N=35) and farther divided in three sub group according their *Prakriti*; *Vataj*, *Pittaj* and *Khaphaj*. Moreover, to analysis the effect of aerobic and anaerobic training on different type of *prakriti*. Out of 107, 17 players dropped out from the study. Further 90 Soccer Players participated in study [Aerobic Group (N=30), Anaerobic Group (N=30) and Control Group (N=30)]. On alternate days, training was given accordingly to Aerobic and anaerobic group. Control group did not participate in training they continued their regular training.

Result: The mean value of Force Vital capacity in Aerobic Group from pre to post intervention was 3.07 and 3.35 respectively, which was found statistically insignificant ($p=0.091$). Although, in anaerobic group, the Mean value was increased from pre to post intervention, 2.99 & 3.21 respectively, which was found statistically significant ($p=0.044$). Further applying ANCOVA, pair wise group comparison result showed statistically significant difference between aerobic v/s control group ($P=0.000$) and Anaerobic v/s control group ($p=0.001$). In *Prakriti* wise Comparison of Aerobic group, pre to post intervention, statistically insignificant difference was found.

Conclusion: It is concluded that both Aerobic and Anaerobic group procedures bring positive effect on Force Vital capacity. In anaerobic group, training shows more improvement in comparison to aerobic group.

Key word: Aerobic , Anaerobic , *Kapahaj prakriti*, *Vataj Prakriti* and *Pittaj prakriti*.

INTRODUCTION:

Game is an important part of our life to maintain health. Soccer is one of the most popular games in the world. It is the new form of exercise, as many type of exercise are involved in Soccer. During a Soccer match, players perform different type of exercise such as running,

kicking, jumping and tackling etc. It is played regardless of such factors as age, sex, race, fitness level or sports performance. Soccer requires the repetition of runs alternated with short to long periods of recovery, which could be active or passive. Intensity of running periods can be alternative at any time according to demands of the match. (Gregory dupont et.al, 2012). It also depends upon number of factors such as technical and tactical skills, mental readiness and physiological factors .Therefore, the development and high level of physical capacity cannot be the only single indicator of a successful player, but represent the fundamental prerequisite of game performance (Chamari et al., 2004).

Efficacy of respiratory and pulmonary functions has a direct relationship with general health. Furthermore, regular physical activity is much important for good health of people, especially young people. Since cardio-respiratory endurance is a key component of physical fitness and physical activity can lead to physical fitness, so it can improve cardio-respiratory endurance.(Maryam Khosravi et.al.,2012)

According to *Ayurveda* every individual is unique due to their *Prakriti*. The word *Prakriti* is a feminine term which maximally represents “the nature of an individual”. In vedic literature, (*Brahman and Upnishad Granth*) *Prakriti* is used for meaning like *Swabhava*, *Sharir* and *Utpatti* etc. Each individual has different Size and shape. Their physiological and psychological characters are different. *Prakriti* is such factor, which affects the physical activity of sports person. Depending on the predominance of *Dosha*, they are categorized as; *Vata*, *Pitta*, and *Kapha Prakriti*.

Although, all factors of *Prakriti* influence the Force Vital capacity, Aerobic and Anaerobic type of training in Soccer. Force Vital capacity is the maximum amount of air, a person can expel from lung after a maximum inhalation. *Force Vital capacity*= $Irv+Tv+Erv$. In soccer, present demand is short and long distance running, with or without football.

Aerobic training is performed at moderate level of intensity over a relatively long period of time in the presence of adequate amount of oxygen. Aerobic capacity is the maximum amount of oxygen which can be consumed by the working muscles in one minute (Vo_2 max). (V. sundermoorty 2008) **Anaerobic training** is performed at moderate level of intensity over a relatively short period of time in absence/deficient oxygen level.

PROCEDURE AND METHODOLOGY

Selection of Subject: Total 107 male Soccer Players were registered for this study from Varanasi District, aged between 15 to 18 years. They were randomly divided into three groups namely Aerobic Group (N=36), Anaerobic Group (N=36) and Control Group (N=35). Out of 107, 17 players dropped out from the study. Further 90 Soccer Players continued/participated in study [Aerobic Group (N=30), Anaerobic Group (N=30) and Control Group (N=30)]. and farther divided in three sub group *Vataj* ,*Pittaj* and *Khaphaj*, Moreover , to analysis the effect of aerobic and anaerobic training on different type of prakriti. Training was given in the DLW stadium. In the beginning, before taking pre test, rules, pros and cons regarding this research work were explained to the soccer players. The study was approved by the research ethical committee of Institute of Medical Science, Banaras Hindu University, Varanasi. Those players, who fulfilled the inclusion criteria, were then requested to give written consent to participate in the study. All the soccer players, who voluntarily willing to participate, were screened for their physical fitness by physician/resident doctor through clinical examination using a predefined Proforma.

Selection of Variables

A: Independent Variable:

Prakriti, Aerobic and Anaerobic training (Soccer Specific)

B: Dependent Variable:

Force Vital capacity

Criterion Measures

S.No.	Tests	Parameters	Units	Equipments
01	Pulmonary faction test (PFT)	Force Vital capacity	Liters	Digital Spirometer, (Computerized software)

Experimental design

For the study, pre- test, post test randomized group deign was used in which the pre-test was taken prior to the Aerobic and Anaerobic training (Soccer specific) and post test was taken after twelve weeks of pre- test .

Administration of Training Programme

Training Schedule

Aerobic Training

Intensity-65-70 %MHR

Duration of effort-40-45 Min

SET-1 Aerobic circuit training Duration -45 Min

SET-2 Aerobic game Duration -45 Min

SET-3 fartlek training Duration -45 Min

SET-4 Slow continuous running with ball and without ball DURATION: 45minute

Anaerobic Training

Intensity -80-90%

Recovery -30-45 seconds

Rest between repetitions 1:10-1:20

Rest between set 6 min (active recovery) □ Acceleration runs for 40-50 meters 5-8 time.

SET-2

□ Progressive acceleration run(with Football).

20 meters→30 meters→40 meters→30 meters→20 meters

□ Salalom run (zig-zag running) with ball and without ball

20 meters→30 meters→40 meters→30 meters→20 meters

SET-3

□ 1 v/s 1 dribble and shooting in the goal post.

Give 5 chances to each player i.e one repetition

□ Reaction training

SET-4

□ shooting in the goal post.

Anaerobic Circuit Training

□ Make 5 stations:

Station: 1- stair high knee→ Station: 2- pushups→ Station: 3- over stepping on the ball→

Station: 4- zig

-zag running→ Station: 5- sit up .

Complete all station in the same manner.

Intensity-90-95% MHR

Recovery -50-60 seconds

Rest between repetition 1:10-1:20 min

Rest between set- 6 min (active recovery)

In each station do activity 30 seconds and change the station.

Complete all station in the same manner.

Administration of Training Programme

All the subjects were assembled at D.L.W Soccer Ground in Varanasi and brief detail was explained on the general objective and requirement of Aerobic and anaerobic training (soccer specific). On alternate days, training was given accordingly to Aerobic and anaerobic group. Control group did not participate in training, they continued their regular training.

Statistical Analysis

The data collected from all the three groups 1.Experimental (group-I - Aerobic), 2.Experimental (group-II -Anaerobic), & 3.Control (group-III), before and after experimentation. Data was statistically analyzed by applying the following tests as per requirement. Paired t-test and ANCOVA were applied. Level of significance was fixed at 0.05.

In ANCOVA statistical technique, post-test as a depended variable, Group as a factors or independent and pre test as a covariate.

RESULT OF THE STUDY

Table No.(01) Demographical Distribution of Subjects

Groups	Prakriti (psycho somatic consitution)			Physical		
	<i>Vataj</i>	<i>Pittaj</i>	<i>Kaphaj</i>	Age Mean±SD	Height (cm) Mean±SD	Weight (Kg) Mean±SD
Aerobic Group (N=30)	5 (16.66%)	17 (55.66%)	8 (26.66%)	15.60±0.960	168.23±1.042	56.76±7.897
Anaerobic group (N=30)	8 (26.66%)	14 (46.66%)	8 (26.66%)	15.60±0.960	163.90±1.240	50.90±7.603
Control group (N=30)	5 (16.66%)	18 (60.00%)	7 (23.33%)	15.60±0.960	165.18±1.110	53.61±7.443
Total No- 90	18 (20.00%)	49 (54.44%)	23 (25.55%)			

Table No. (02) Group Wise Pre and Post Test Comparison of Subjects Showing Effect of Aerobic and Anaerobic Training on Force Vital capacity

Group	Mean ± SD		Within the group comparison Paired t- test
	Pre	Post	
Aerobic Group	3.07 ± 0.601	3.35 ± 0.508	0.283 ± 0.888 t = 1.746 p= 0.091

Anaerobic Group	2.99 ± 0.503	3.21 ± 0.600	0.218 ± 0.570 t = 2.101 p= 0.044*
Control Group	2.64 ± 0.252	2.67 ± 0.241	0.270 ± 0.268 t = 0.552 p= 0.585

Table 2.0 shows, The mean value of Force Vital capacity in Aerobic Group at pre and post intervention was 3.07 and 3.35 respectively. This mean, when tested by paired t – test, was found not statistically significant.

The mean value of Force Vital capacity in anaerobic group at pre and post intervention was 2.99 and 3.21 respectively, and observed value was (0.044), this was statistically significant.

Similarly mean value in control group at pre and post intervention that was 2.64 and 2.67 respectively, it was tested by paired t-test, which was not found statistically significant.

Table No. (03) Pair Wise Group Comparison of Subjects Showing Effect of Aerobic and Anaerobic Training on Force Vital capacity

Groups	Post Force Vital capacity Marginal mean ± standard error	ANCOVA					
		Pre Force Vital capacity : covariate, Group: factor					
		SV	SS	df	MSS	F	P
Aerobic Group	3.337 ± 0.088	Force Vital capacity pre	2.431	1	2.431	10.813	0.001
Anaerobic Group	3.202 ± 0.087						
Control Group	2.703 ± 0.091	Group	5.771	2	2.886	12.835	0.000
Pair wise group comparison	Aerobic v/s Anaerobic P=0.827						
	Aerobic v/s Control P=0.000	Error	19.334	86	.225		
	Anaerobic v/s Control P=0.001	Total	27.536	89			

Table 3.0 shows, between the groups comparison of post Force Vital capacity applying ANCOVA taking pre value as covariate. Showed statistically significant difference between group (F= 12.83), (p= 0.000). In further pair wise group comparison, no statistically significant difference (p=0.827) was found in Aerobic and Anaerobic group but statistically significant difference (p=0.000) was found in Aerobic group and control group and also found statistically significant difference (p=0.001) between Anaerobic group and control group.

Table No. (04) *Prakriti* Wise Comparison of Subjects Showing Effect of Aerobic and Anaerobic Training on Force Vital Capacity

Group	Prakriti	Mean \pm SD		Within the group prakriti comparison paired t- test
		Pre	Post	
Aerobic	Vataj	3.14 \pm 0.364	3.21 \pm 0.222	0.074 \pm 0.550 t = 0.301 p= 0.779
	Pittaj	3.11 \pm 0.681	3.26 \pm 0.438	0.144 \pm 0.777 t = 0.764 p= 0.456
	Kaphaj	2.94 \pm 0.578	3.65 \pm 0.683	0.710 \pm 0.423 t = 1.678 p= 0.137
Anaerobic	Vataj	2.68 \pm 0.363	3.003 \pm 0.620	0.315 \pm 0.725 t = 1.228 p= 0.259
	Pittaj	3.07 \pm 0.505	3.29 \pm 0.675	0.222 \pm 0.574 t = 1.496 p= 0.157
	Kaphaj	3.17 \pm 0.546	3.28 \pm 0.384	0.101 \pm 0.396 t = 0.677 p= 0.524
Control	Vataj	2.62 \pm 0.217	2.69 \pm 0.231	0.074 \pm 0.267 t = 0.618 p= 0.570
	Pittaj	2.62 \pm 0.283	2.66 \pm 0.285	0.038 \pm 0.311 t = 0.523 p= 0.608
	Kaphaj	2.70 \pm 0.209	2.66 \pm 0.143	0.036 \pm 0.135 t = 0.697 p = 0.512

Table 4.0 shows, In Force Vital capacity, no statistically significant difference was found in any groups and all sub-groups of *prakriti*.

DISCUSSION

The finding of the present study reflected that the Force Vital capacity under pre and post test intervention for experimental aerobic, anaerobic and control group, in which anaerobic group

were statistically significant. Whereas change in Aerobic and control group was statistically not significant, indicating the value of aerobic group ($p=0.091$), anaerobic group ($p=0.044$) and control group ($p=0.585$).

Further, for group wise comparison, ANCOVA technique has been applied. Difference in aerobic v/s anaerobic group ($p=0.827$), aerobic v/s control group ($p=0.00$) and anaerobic v/s control group ($p=0.001$) was found in pair wise group comparison. Which indicate significant difference between aerobic v/s control group and anaerobic v/s Control group.

The region is behind that various muscles are involved in respiration in both inspiration and expiration, which require changes in the pressure within the thoracic cavity. The principal muscles are the diaphragm, the external inter costal and the interchondral part of the internal intercostal muscles. Both the external intercostal muscles and the intercondral elevate the ribs, thus increasing the width of the thoracic cavity, while the diaphragm contracts to increase the vertical dimensions of the thoracic cavity, and also aids in the elevation of the lower ribs. It shows that Force Vital capacity is increased significantly due to Aerobic as well as in Anaerobic group also, Whereas change in the mean value of aerobic group was found better.

In accordance with our study, recently, Dunham C., Harms C.A., suggested that both whole-body exercise training and High Intensity Training were effective in increasing inspiratory muscle strength, with High Intensity Training offering a time-efficient alternative to Endurance Training in improving aerobic capacity and performance.

Badaam Khaled M., Munibuddin A., Khan S.T., Choudhari S.P., and Doiphode R. (2013) concluded that, their study Sprint Interval Training could improve lung functions and Physical Fitness Index. Both these outcomes had been earlier proven to be beneficial in maintenance of health and that they were also related to longevity.

In accordance with our study Badaam Khaled M., Munibuddin A., Khan S.T., Choudhari S.P., and Doiphode R. (2013) examined the Effect of Traditional Aerobic Exercises Versus Sprint Interval Training on Pulmonary Function Tests In Young Sedentary Males: A Randomised Controlled Trial. They showed significant increase in Sprint Interval training group, better improvement found in Forced Force Vital capacity compression Traditional Aerobic Exercises.

Dunham C., Harms C.A., in 2012, suggested that both whole-body exercise training and High Intensity Training were effective in increasing inspiratory muscle strength, with High Intensity Training offering a time-efficient alternative to Endurance Training in improving aerobic capacity and performance.

In further, *Prakriti* wise comparison, Change between pre to post data was observed and improvement in FVC was seen among all three *Prakriti* sub-groups of Aerobic group as well as anaerobic group, which was not statistically significant. In Aerobic group change was comparatively higher then Anaerobic group, which means that changes in the Force Vital capacity are more prominent in *Kaph Prakriti* person in comparison of Anaerobic group to Aerobic group.

CONCLUSION

In the light of the findings, it is concluded that, significant difference in the Force Vital capacity on soccer players was due to twelve weeks Anaerobic Training. Due to anaerobic training pressure is increase on respiratory muscles diaphragm, external inter costal and interchondral part of the internal intercostal muscles as well as difference in the Force Vital capacity on soccer players in different type of *prakriti* was due to the training but found

insignificant. Changes in the Force Vital capacity are more prominent in *Kaphaj Prakriti* person in comparison of Anaerobic group to Aerobic group.

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