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EFFECT OF DIETARY NITRATE SUPPLEMENTATION ON PEAK EXPIRATORY FLOW RATE OF TRAINED MALE ATHLETES

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ABSTRACT

The purpose of the study was to find out the effect of dietary nitrate supplementation on Peak Expiratory Flow Rate of trained male athletes. Fifteen trained male athletes; 18 to 28 years of age were selected for the study. Experimental and control groups were made consisting of male players. In this study beetroot supplementation was considered as independent variables and athletes' Peak Expiratory Flow Rate was considered as dependent variable. The subject was asked to take a deep breath, then place the peak flow meter mouthpiece in his mouth and close the lips tightly around the outside of the mouthpiece. Then the subject was asked to breathe out as hard and as fast as possible. The value on the gauge was recorded. In order to find out the effect of beetroot supplementation on a Peak Expiratory Flow Rate, descriptive statistics and analysis of covariance (ANCOVA) was used. The level of significance was set at 0.05 levels. In this study, dietary nitrate supplementation in a form of beetroot juice (250 ml/day for two weeks) was given to the subjects of experimental group only in afternoon. The result of the study showed that there was no significant effect of dietary nitrate supplementation on Peak Expiratory Flow Rate of trained male athletes.

KEYWORDS : Peak Expiratory , descriptive statistics and analysis of covariance.

INTRODUCTION

Nutrition is science of consuming and utilizing food as per requirement of the body, it deals with metabolic and physiological response of the body to food, which also include role of specific nutrient. Nutrition has become much focused and now is concerned with biochemical sequence through which various food articles are transferred from complicated form to simple form.

Rich vegetable diet has many benefits. All vegetables contain nitrate and it is found in large amount in beetroot and green leafy vegetables. Nitrate found in vegetables lower blood pressure. Consumption of vegetables has been thought to help in protection against various diseases like cardiovascular disease. The Beetroot juice which contains nitrate has been reported to increased plasma nitrate concentration, which leads to decrease blood pressure, inhibits platelet aggregation and prevent endothelial dysfunction.

Dietary Nitrate supplementation, usually in the form of beetroot juice, has been heralded as a possible new ergogenic aid for sport and exercise performance. Rich vegetable diet has many benefits. All vegetables contain nitrate and it is found in large amount in beetroot and green leafy vegetables. Nitrate found in vegetables lower blood pressure. Consumption of vegetables has been thought to help in protection against various diseases like cardiovascular disease.

Beetroot juice helps lungs to work more efficiently, when consumed; beetroot juice has two marked physiological effects. Firstly, it widens blood vessels, reducing blood pressure and allowing more blood flow. Secondly, it affects muscle tissue, reducing the amount of oxygen needed by muscles during activity.

The Beetroot juice which contains nitrate has been reported to increased plasma nitrate concentration, which leads to decrease blood pressure, inhibits platelet aggregation and prevent endothelial dysfunction. Research have found that beetroot contain nitrate and dietary nitrate (NO_3^-) which might serve to maintain or improve blood flow to the skeletal muscles and leads to increased oxygen supply to skeletal muscles and many other physiological benefits which improves cardiovascular efficiency.

Beetroot supplementation has shown physiological effects and it has assumed that it can also lead to increased athletic performance by supporting cardio vascular system. Physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition. Nutritional requirements should be take care by athlete and there should be appropriate selection of food and fluids, timing of intake, and supplement choices for optimal health and exercise performance. Training programs should also includes assessment of body composition, strategies for weight change, athletes' nutrient and fluid needs, special nutrient needs, the use of supplements and nutritional ergogenic aids. During times of high physical activity, energy and macronutrient needs have to be taken care of. Evidence is also emerging that Supplementation with beetroot juice prior to exercise can enhance exercise capacity and sports performance.

Beetroot contains high quantities of nitrate. Dietary nitrate supplementation has shown to improve efficiency of energy production per unit oxygen, by limiting proton leakage in the respiratory chain, thus improving the mitochondrial respiration. Dietary nitrate from beetroot juice is reduced to nitrite (NO_2^-) by facultative bacteria in the oral cavity, followed by nitric oxide (NO) formation by the acidic stomach environment. Hypoxemia and acidosis facilitate the $NO_3^- – NO_2^- –$NO pathway, thereby complementing the classical pathway, during exercise. Ingestion of NO_3^- rich vegetable will, therefore, contribute to an increased NO_3^- and NO_2^- concentration in the bloodstream. The scholar strives to study the effects of beetroot supplementation on Peak Expiratory Flow Rate of trained male athletes.

METHODOLOGY

Selection of the subjects

Fifteen male athletes of 18 to 28 years of age were selected for the present study. One experimental and one control groups were made consisting of males. Details of subjects are given below:

Gender	Group	No. of Subjects
Males	**Experimental Group**	**08**
	Control Group	**07**

Administration of Programme

Experimental group was administered 250 ml beetroot juice/day for 15 days. All the subjects were

involved in regular athletics training program.

1. Peak Expiratory Flow Rate (PEFR)

Objective: To measure the lung capacity of the subjects.

Equipment: Peak Flow Meter.

Units of measurement: Liters per minute.

Methodology: Subject was asked to sit on a chair. The pointer on the gauge of the peak flow meter keeps at 0. The mouthpiece was attached to the peak flow meter. The subject was asked to take a deep breath, then place the peak flow meter mouthpiece in his mouth and close the lips tightly around the outside of the mouthpiece. Then the subject was asked to breathe out as hard and as fast as possible. The value on the gauge was recorded before moving the pointer on the gauge back to 0. Three attempts were given. The highest value of three attempts was recorded.

Research Design

Group	**Pre -Test**	**15 Days Training Programme**	**Post –Test**
Experimental Group (08 Subjects)	Peak Expiratory Flow Rate	Beetroot Supplementation (250 ml/day at 2 pm) and regular training programme (Morning and evening session)	Peak Expiratory Flow Rate
Control Group (07 Subjects)	Peak Expiratory Flow Rate	Regular training programme (Morning and evening session) without any Supplementation.	Peak Expiratory Flow Rate

Statistical Procedure

In order to find out the effects of Beetroot Supplementation on Peak Expiratory Flow Rate of trained male athletes, descriptive statistics and analysis of covariance (ANCOVA) was used. The level of significance was set at 0.05 levels.

Analysis of the Data and Results of the Study

The analysis of the data of the dependent variables i.e. Peak Expiratory Flow Rate of Experimental and Control groups were computed by applying Descriptive statistics and the Analysis of Covariance (ANCOVA) to find out the significant improvement using SPSS Software version-16. The level of significance was set at 0.05 levels.

Findings

Table – 1

Descriptive Statistics of Peak Expiratory Flow Rate of Experimental Group and Control Group in Pre-Test and Post-Test of Male

Descriptive Statistics	Different Groups			
	Experimental Group		Control Group	
	Pre test	Post test	Pre test	Post test
Mean	527.50	546.25	570.00	601.43
Std. Error of Mean	23.661	22.514	22.572	20.287
Std. Deviation	66.922	66.681	59.721	53.675
Variance	447.90	405.50	356.73	288.13
Skewness	-.084	1.225	.039	-.273
Std. Error of Skewness	.752	.752	.794	.794
Kurtosis	.405	3.029	-.233	-1.114
Std. Error of Kurtosis	1.481	1.481	1.587	1.587
Range	210	220	180	150
Minimum	430	460	480	520
Maximum	640	680	660	670
N	8	8	7	7

Table – 2

Analysis of Variance of Comparison of Means of Experimental Group and Control Group of Male in relation to Peak Expiratory Flow Rate

		Sum of Squares	*df*	Mean Square	*f*	Sig.
Pre Test	Between Groups	6743.333	1	6743.333	1.662	.220
	Within Groups	52750.000	13	4057.692		
Post Test	Between Groups	11366.786	1	11366.786	3.235	.095
	Within Groups	45673.214	13	3513.324		

Insignificant at .05 levels

f value required to be significant at 1, 13 *df* = 4.67

In relation to pre test, table 2 revealed that the obtained '*f*' value of 1.662 was found to be insignificant at 0.05 level, since this value was found lower than the tabulated value 4.67 at 1, 13 *df*.

In relation to post test, insignificant difference was found among experimental and control group pertaining to ***Peak Expiratory Flow Rate***, since *f* value of 3.235 was found insignificant at .05 level.

Table – 3
Adjusted Post Test Means of Experimental Group and Control Group of Male in relation to Peak Expiratory Flow Rate

Treatment Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	563.42[a]	8.280	545.364	581.445
Control	581.82[a]	8.887	562.460	601.187

a. Covariates appearing in the model are evaluated at the following values: pretest =547.3333.

Adjusted means and standard error for the data on ***Peak Expiratory Flow Rate*** of Experimental and Control Groups in Male during post testing had been shown in Table–3 and Fig–1. This indicated that the initial differences in the scores were compensated in the post-testing or the effect of covariate was eliminated in comparing the effectiveness of the treatment groups during post-testing.

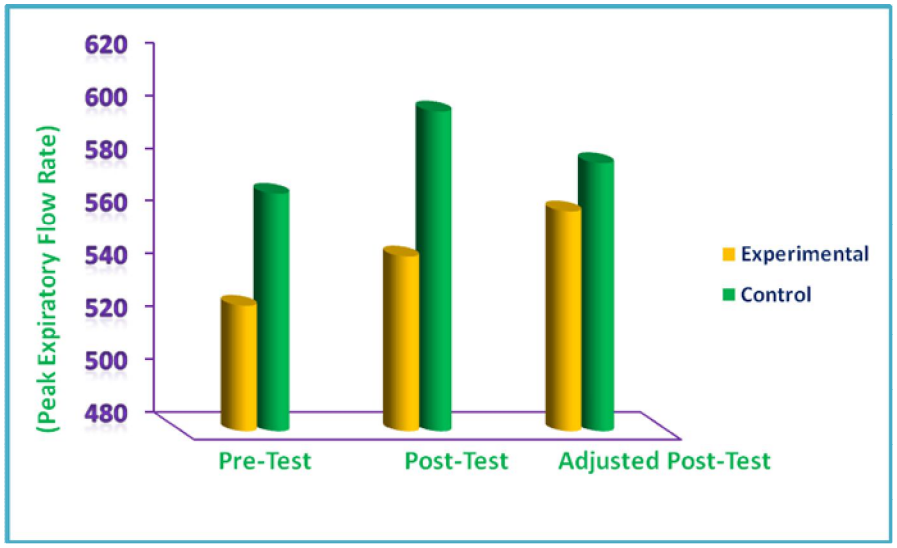

Fig 1: Graphical representation of *Peak Expiratory Flow Rate* between pre and post test means among the Experimental and Control Groups of Male

Table – 4
Analysis of Covariance of Comparison of Adjusted Post Test Means of Experimental Group and Control Group of Male in relation to Peak Expiratory Flow Rate

Source	Sum of Squares	*df*	Mean Square	*f*	Sig.
Contrast	1123.020	1	1123.020	2.170	.166
Error	6210.833	12	517.569		

Insignificant at .05 levels
f value required to be significant at 1, 12 *df* = 4.75

Table 4 revealed that the obtained '*f*' value of 2.170 was found to be insignificant at 0.05 level, since this value was found lower than the tabulated value 4.75 at 1, 12 *df*.

RESULT OF THE STUDY

The result of the present study showed no change in the Peak Expiratory Flow Rate of trained male athletes after they were given 250 ml beetroot juice/day for 15 days. There was no significant difference found between the control and experimental group.

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