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EFFECT OF DIETARY NITRATE SUPPLEMENTATION ON RESPIRATORY RATE OF TRAINED FEMALE ATHLETES

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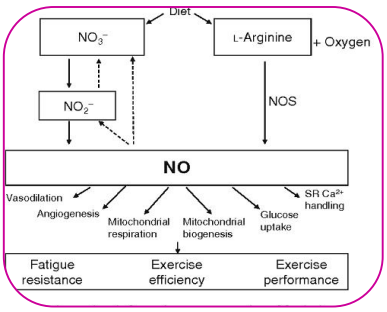
ABSTRACT

The purpose of the study was to find out the effect of dietary nitrate supplementation on respiratory rate of trained female athletes. Fifteen trained female athletes; 18 to 28 years of age were selected for the study. Experimental and control groups were made consisting of female players. In this study beetroot supplementation was considered as independent variables and athletes' respiratory rate was considered as dependent variable. Respiratory rate was measured for two minute by putting the index finger beneath the nostril. Half of the total was recorded. In order to find out the effect of beetroot supplementation on a respiratory 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 respiratory rate of trained female athletes.



KEY WORD: *independent variables and athletes , Respiratory rate.*

INTRODUCTION:-

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.

The changes from beetroot take effect in about 30 minutes, peak after 90 minutes, stay elevated for 6 hours and remain effective for at least 15 days. Taking beetroot juice daily will build up the effect over a 3 – 4 days then plateau. Recent studies have demonstrated that chronic (3 – 15 d) and acute (single dose prior to exercise) protocols of beetroot juice intake are associated with a consistent enhancement of exercise economy (reduced oxygen cost of exercise). 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 respiratory rate of trained female athletes.

METHODOLOGY

Selection of the subjects

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

Gender	Group	No. of Subjects
Females	Experimental Group	07
	Control Group	08

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. Respiratory Rate (RR)

Objective: To measure the respiratory rate of the subjects.
Equipment: Stop watch.
Unit of measurement: Counts per minute.
Methodology: Subject was asked to lie down in supine position. Breathing frequency i.e. exhale was counted for two minute by putting the index finger beneath the nostril. Half of the total was recorded.

Research Design

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

Statistical Procedure

In order to find out the effects of Beetroot Supplementation on Respiratory Rate of trained female 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. Respiratory 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 Respiratory Rate of Experimental Group and Control Group in Pre-Test and Post-Test of Female

Descriptive Statistics	Different Groups			
	Experimental Group		Control Group	
	Pre test	Post test	Pre test	Post test
Mean	21.71	20.43	19.00	19.38
Std. Error of Mean	1.017	.948	.378	.565
Std. Deviation	2.690	2.507	1.069	1.598
Variance	7.238	6.286	1.143	2.554
Skewness	-.151	-.060	.000	.582
Std. Error of Skewness	.794	.794	.752	.752
Kurtosis	-1.692	-1.241	-2.800	-1.269
Std. Error of Kurtosis	1.587	1.587	1.481	1.481
Range	7	7	2	4
Minimum	18	17	18	18
Maximum	25	24	20	22
N	7	7	8	8

Table – 2
Analysis of Variance of Comparison of Means of Experimental Group and Control Group of Female in relation to Respiratory Rate

		Sum of Squares	*df*	Mean Square	*f*	Sig.
Pre Test	Between Groups	27.505	1	27.505	6.953	.021
	Within Groups	51.429	13	3.956		
Post Test	Between Groups	4.144	1	4.144	.969	.343
	Within Groups	55.589	13	4.276		

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 6.953 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 ***Respiratory Rate***, since *f* value of 0.969 was found insignificant at .05 level.

Table – 3
Adjusted Post Test Means of Experimental Group and Control Group of Female in relation to Respiratory Rate

Treatment Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	19.701[a]	.807	17.942	21.460
Control	20.012[a]	.745	18.390	21.634
a. Covariates appearing in the model are evaluated at the following values: pretest =20.2667.				

Adjusted means and standard error for the data on ***Respiratory Rate*** of Experimental and Control Groups in Female 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.

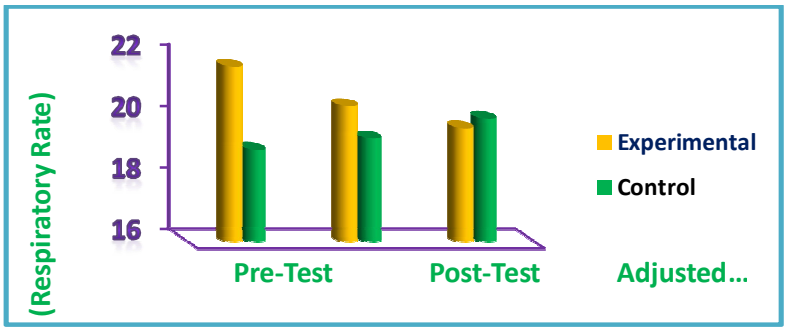


Fig. 1: Graphical representation of *Respiratory Rate* between pre and post test means among the Experimental and Control Groups of Female

Table – 4
Analysis of Covariance of Comparison of Adjusted Post Test Means of Experimental Group and Control Group of Female in relation to Respiratory Rate

Source	Sum of Squares	*df*	Mean Square	*f*	Sig.
Contrast	.235	1	.235	.066	.801
Error	42.589	12	3.549		

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 0.066 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 respiratory rate of trained female 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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