

# Free Radical Production In Relation To Regular Different Types of Exercise

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**Abstract**—Thiobarbuturic acid reactive substance (TBARS) is an effective indirect measurement for free radicals in the human body. Inconclusive results were observed in the effect of different types of exercise and TBARS. **Aim**- To investigate the effect of different types of exercise on plasma TBARS. **Methods**- Total 15 male age, height, weight body mass index (BMI) matched football, athletics, weight training, yogasana and control subjects, (three from each group) were volunteered in this study. All the exercise groups engaged 1-4 hours/day, 6 days/week a controlled regular training programme under qualified supervision for university competition. TBARS assay were made to evaluate free radicals level. **Results**- plasma TBARS level was found in football group 4.89+/-0.06nmol/mg; athletics group 5.5+/-0.5nmol/mg; yogasana group 4.31+/- 0.2 nmol/mg; weight training group 4.33+/-0.3nmol/mg; and control group 4.48+/-nmol/mg. Conclusion: weight training and yogasana group were observed lower TBARS level than the football and athletics groups.

**Key words:** Exercise, free radical, TBARS

## INTRODUCTION

An elevated metabolic rate as a result of physical exercise can dramatically increase oxygen consumption by the whole body and the locomotive muscle. Exercise can increase oxygen utilization from 12-20 times over the resting state. This relatively increases the generation of free radicals. Free radicals are atoms or groups of unstable atoms with odd electron and are formed when oxygen interacts with certain molecules. Ones formed this highly reactive radical can start a chain reactions. The chief danger comes from the damage they can do when they react with important cellular component such as DNA or the cell membrane. It is not possible to directly measure the free radical in the human body. Scientists have approached by measuring the bi-products such as lipid per oxidation. The most widely used techniques (Priscilla et al. 2000) to evaluate lipid per oxidation is the level of TBARS (Sentruk et al 2001). Where as concentration of TBARS decreased

significantly at the end of a comprehensive yoga based lifestyle modification programme (yadev et al. 2005). Different types of exercise effects on plasma TBARS is inconclusive. The aim of the present study was to investigate the effect of exercise on plasma TBARS level.

## METHODS:

### Subjects:

Total 15 male age, height, body weight and BMI matched healthy subjects from football, athletics, weight-training; yoga & control (three from each group) were participated in this study. The entire exercise group engaged in a controlled training programme under the qualified supervision. The control subjects were free from familiar or personal history of any metabolic, hepatic and blood related disease. None of the subject was taken any drug and the subjects took no special diet. Institutional board of studies approval and informed consent was collected before test. The detail description of the subjects are presented below.

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**Group, Age, Number of subjects, Practice Hour of the subjects:**

| Group  | Age         | No of sub | Practice Hour |
|--------|-------------|-----------|---------------|
| F.BALL | 20-23 yrs.  | 03        | 3-4hours      |
| ATH    | 20-23 Yrs   | 03        | 3-4 hours     |
| YOGA   | 20-23 yrs.. | 03        | 1-2 hours     |
| WT. TR | 20-23 yrs.  | 03        | 1-2 hours     |
| CON    | 20-23 yrs.  | 03        | Non regular   |

**Blood sample collection: -**

After 12h over night fasting, all subjects blood sample were drawn in the morning from the anti cubical vein and were collected into tube wit anti -coagulant.

**Biochemical measurements:-****Principle**

This TBA method is based on the acid catalyzed decomposition of lipid peroxidase to malandialdehyde (MDA) which reacts with thiobarbiturie acid (TBA) to form a red aromagan. This is quite sensitive method.

**Protocol**

Place TBA reagent \*1 (2 ml) and sample (1 ml) in a tube (10 ml) with cap.

Heat at 100°C in a water bath for 15 min.

Cool in ice-cold water

Centrifuge at 300 rpm for 10 min

Measure the absorbance of supernatant at 535 nm.

**Calculation**

Calculate the hydro peroxide concentration using the molar absorption

coefficient =  $1.56 \times 10^5 \text{ m}^{-1} \text{ Cm}^{-1}$  at 535 nm .

**\*TBA reagent:**

TBA reagent is prepared by dissolving TCA (15 g) in water and adding TBA (0.375 gm), HCl (1m, 25 ml), [and a solution at 2,6. di-tret-bufyl-4-methylphenol (40 mg) in ethanol (22 ml)] The solution is finally distilled to 100 ml distilled water. Because the sample is treated with TBA reagent at high temperature for 15 min, it is advisable to add on antioxidant to minimize the formation of hydro peroxides during analysis.

**Ref:** Buege et al (1978)

**Statistical Procedure:**

For statistical analysis standard procedures had been adopted. Mean and SD were first calculated and Mann-Whitney tests (U test) was conducted to determined the degree of differences between two means.

**RESULTS:**

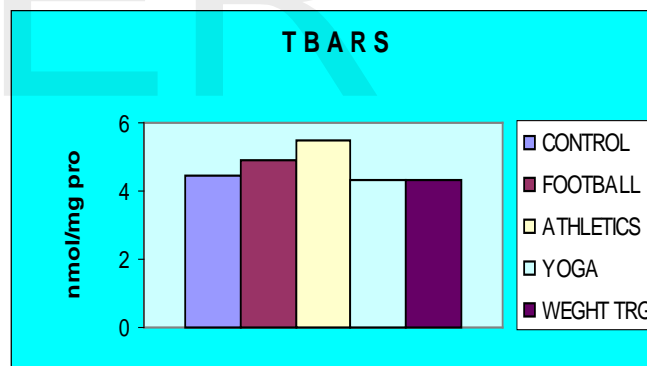
The general character tics (age, height, body weight and body mass index) of all group were presented in table no 1

**Table No-1 :** MEAN AGE, HEIGHT, BODY WEIGHT AND BODY MASS INDEX OF DIFFERENT EXERCISE GROUPS

|            | CON    | F.BALL | ATH    | YOGA  | WT.TR  |
|------------|--------|--------|--------|-------|--------|
| AGE(YRS)   | 22.22  | 21.4   | 21.1   | 22.37 | 21.46  |
| HEIGHT(CM) | 169.33 | 174.33 | 167.67 | 169   | 173.33 |
| WEIGHT(KG) | 58.17  | 62.83  | 60.5   | 61.83 | 61     |
| BMI        | 20.27  | 20.67  | 21.56  | 21.5  | 20.15  |

The plasma TBARS level of different groups was presented in the figure and table no -2

**Figure & Table No-2:** THE PLASMA TBARS LEVEL OF DIFFERENT TYPES EXERCISE AND CONTROL GROUPS



|         | CON  | F.BALL | ATH  | YOGA | WT.TR |
|---------|------|--------|------|------|-------|
| MEAN    | 4.33 | 4.48   | 4.89 | 4.31 | 5.5   |
| SD      | 0.02 | 0.01   | 0.06 | 0.02 | 0.05  |
| P VALUE | .18  | .48    | .23  | .62  | .42   |

**DISCUSSION:**

The present research showed that plasma TBARS level was found higher in the football and athletic group where as yoga and weight training groups were observed lower then the control group.

Physical exercise may be associated with many fold increase in whole body oxygen uptake and free radical production. The rise in oxygen utilization during physical exercise may lead to increase in metabolic leakage of free radicals from the mitochondria in to the cytosol resulting in the formation of lipid peroxide (Davies et al 1982, Dillard et al 1978, Lowili et al 1987, Princemail et al 1990, Ristow et al 2009). Several studies reported that single bout of exercise increase TBARS level (Davies et al 1982, Hartmann et al 1995, Koska et al 2000, Miyazaki et al 200). Kontar et al (1998) reported, increase in plasma TBARS (>70%) following an extreme endurance event (50 KM run) in professional athlete. Similarly Child et al (1999) found increase in TBARS of approximately 40% immediately after half marathon.

On the other hand Niess et.al.(1999) measured plasma TBARS in trained and untrained individual at rest, before and after exhaustive bout of exercise. They found no significant increase in TBARS in either group following treadmill test to exhaustion or at 15 min or 24 hour post exercise. In moderately trained subjects who ran for 2.5 hour on a treadmill showed no change in plasma TBARS (Davies et al 1982, kanter et al 1998), There were no documented change in plasma TBARS in athlete at rest, before and after 4 weeks of high intensity training (Derbach et al 1993). Alessio et al (2000) found no change of TBARS after repeated isometric exercise. Vincerit et al (2002) observed that resistance type of exercise can reduce lipid peroxidation, provide protection against oxidization agents and also provide cross protection against the oxidative stress generated by aerobic exercise. Steinberg et al (2002) reported that physical exercise can favorable increase antioxidant potential and prevent lipid peroxidation in healthy subjects.

In conclusion the data of this study suggested that regular weight training and yoga asana practice may reduce oxidative stress measured by TBARS. Future studies would be recommended to clearly the association between different types of regular exercise and free radical production

## RECOMMENDATION

An interested researcher may find enough scope for further study from the findings of present research hence recommended for further study. The study may be conducted on a large sample and same experimental study may be conducted on female subjects

1. Other assay for measuring the free radial may be conducted for general exercising population in

future.

2. Antioxidant parameters may be studied in future along with free radical parameter in regular general exercising population.

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