OXIDATIVE STRESS – A CHALLENGE BETWEEN SKY AND EXERCISE

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ABSTRACT

Introduction: This paper is in response to two challenges first with exercise physiologists and secondly with Sudarshankriya yoga (SKY) therapist’s. Both are interested in “Oxygen / Prana” which is both essential & harmful to all life forms. However, the interest of the general scientific community in oxygen- centred radicals has raised awareness of the oxygen paradox & motivated the investigators to question whether exercise-stimulated “over consumption” of oxygen might induce oxidative stress & may develop some risk to biological systems. AIM: The purpose of the study is to provide the short comings of sudarshanakriya yoga practitioners & in individuals who do strenuous exercise. Materials & Methods: The study comprised of three groups of normal individuals of age group 25-35 years of both the sex. Gp1 – includes 45 individuals who are regular SKY practitioners for more than a year. Gp2– includes 45 individuals exercise regularly for 1 hour in GYM for more than a year. Gp3– includes 45 individuals who do not indulge in any of the above said action. Results: There was a statistically significant decrease in MDA levels in individuals who were in practise of SKY & increased in individuals who were in practise of exercise. Whereas blood SOD & GSHpx levels were increased in individuals who were in practise of SKY & decreased in individuals who were in practise of exercise. Discussion: SKY is effective in all the parts of the body and here the practitioner is energized. Since the antioxidant enzymes levels are increased in SKY practitioners, reduce the stress and gives internal stability. Whereas, gym is effective to only specific parts of the body.
KEYWORDS: SudarshanKriya yoga, Melanoldialdehyde, Superoxidedismutase, Glutathioneperoxidase.

INTRODUCTION
Yoga traditionally originated in India. It is a generic term for physical, mental and spiritual practices. It is practiced from the Vedic period. It comprises of exercises (asana) which are responsible for the progress of the body. Yogic breathing is a unique method for balancing the autonomic nervous system and influencing psychological and stress-related disorders.\cite{1} Many studies demonstrate effects of yogic breathing on brain function and physiologic parameters, but the mechanisms have not been clarified.\cite{1,2} SudarshanKriya yoga (SKY), a sequence of specific breathing techniques (ujjayi, bhatrika, and SudarshanKriya) can alleviate anxiety, depression, everyday stress, post-traumatic stress, and stress-related medical illnesses. Mechanisms contributing to a state of calm alertness include increased parasympathetic drive, calming of stress response systems, neuroendocrine release of hormones, and thalamic generators.\cite{1,2}

Our earlier research had shown that practise of SKY lowers the lipid peroxidation & lipid lowering effect and enhances the body’s natural defence mechanism by reducing oxidative stress.\cite{3,4,5}

Gyms are carried out by exercising with heavy weights, such as pull ups, pushups, etc. Gyms instructors are the ones who help to do the exercises in a gym. These exercises result in the formation of sweat, in which the calories, are burnt. These exercises are to be practiced compulsorily and regularly. They are practiced in the fitness clubs, by lifting the free weights which includes, dumbbells, barbells and exercise machines. Gym exercises target only the specific parts of the body. Gym also includes the daily exercises such as the walking, jogging and running.

Exercise increases the generation of oxygen free radicals & lipid peroxidation. Strenuous exercise in an unconditioned individual or someone unaccustomed to exercise will induce oxidative damage and result in muscle injury.\cite{6,7} Diaz et-al\cite{8} observed that hydroxyl radical, a highly reactive oxidant, is generated in fatiguing contractions. Reid et-al\cite{9,10} observed that superoxide’s are produced in intracellular muscle cells & then released to the extracellular medium. Exercise is postulated to generate free radicals by other means, also: 1) increases in epinephrine and other catecholamine’s can produce oxygen radicals. 2) production of lactic
acid which can convert a weakly damaging free radical (superoxide) into a strongly damaging one (hydroxyl), and 3) inflammatory responses to secondary muscle damage incurred with overexertion.\textsuperscript{11}

It is not fully known whether the body’s natural antioxidant defence system is sufficient to counteract the increase in free radicals with exercise or whether additional supplements are needed.\textsuperscript{9, 10}

Are antioxidant supplements necessary for individuals who do exercise Regularly? Should antioxidant supplements be part of the “nutritional game plan” of athletes? These common questions directed to fitness masters & other health professionals who are consulted about the role of antioxidants in a healthy active life style. Similarly, why these revolutions of yoga spreading round the globe as a contagion? Is it just a fashion? Is it just something new replacing physical exercise, gym workouts & acrobatics? The challenges of the new age have transcended the understanding we have today in modern science.

**AIM:** The present article is focussed on the measures used to assess oxidative stress in individuals who do strenuous exercise and SKY practitioners and also discuss the changes observed in markers of antioxidant enzyme status.

**MATERIALS AND METHODS**

The present study was carried out in the Department of Biochemistry Bangalore Medical College, Bangalore. The ethical committee clearance obtained from the appropriate authority appointed by the institution. In this study total 135 subjects of age group 25-35 years of both the sex were included & divided into three groups. Gp1 –includes 45 individuals who were regular SKY practitioners for more than a year. Gp2-includes 45 individuals exercise regularly for 1 hour in GYM for more than a year. Gp3- includes 45 individuals who do not indulge in any of the above said action. For all the groups serum MDA and blood SOD & GSHpx levels were assessed.

**Exclusion criteria:** Subjects on anti-inflammatory drugs, Antidepressant and with history of liver disease, thyroid hormone treatment, cancer, alcohol consumption, smoking, hypertension & diabetes mellitus were excluded from the study and also subjects on hormonal replacement therapy were excluded from the study.
5ml of venous blood was collected after overnight fasting. 2 ml in heparinized tube &
remaining blood collected in sterile plain tube.

The serum separated from the plain blood used for estimation of MDA by thiobarbituric acid
method by using semi auto analyser.[12]

Heparinized blood was used for the estimation of SOD and GSHpx levels by using
RANDOX kits using fully automated analyser.

Statistical analysis was performed by student “t” test & “p” values of <0.05 were considered
significant.

RESULTS

Gp-2 (Exrsc) under control group had significantly higher levels of MDA & lower levels of
Blood SOD &GSHpx activity. We observed a significant increase in the levels of anti-
oxidant enzymes namely Blood SOD & GSHpx, levels in SKY practitioners (Gp-1),whereas
serum  MDA levels were significantly decreased (table-1) & Fig 1,2,3.

Table-1

<table>
<thead>
<tr>
<th></th>
<th>Cont/SKY</th>
<th>P</th>
<th>Cont/Exrsz</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>MDA(nmol/ml)</td>
<td>3.32±0.27</td>
<td>&lt;0.005</td>
<td>3.32±0.27</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>GSHpx(units/L)</td>
<td>257±29</td>
<td>&lt;0.005</td>
<td>257±29</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>SOD(units/ml)</td>
<td>1.5±0.14</td>
<td>&lt;0.005</td>
<td>1.5±0.14</td>
<td>&lt;0.05</td>
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</tbody>
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Figure: 1 Role of MDA in practitioners of SKY and Exercise compared with Control
DISCUSSION

This is one of the preliminary studies where an attempt was made to see the differences between the practise of SKY and Gym and their effect on the body.

Free radical reactions are involved in several biological process such as membrane lipid peroxidation & oxidative LDL cholesterol modification.\textsuperscript{5, 10, 13} Membrane lipid peroxidation is one of the processes determining cell ageing. Present study was undertaken to compare the lipid peroxides (serum MDA level) which is a marker of membrane lipid peroxidation & antioxidant enzyme activities namely blood GSHpx & SOD level in individuals who do strenuous exercise and SKY practitioners.

In this study (Table-1; Fig-1,2,& 3) it was observed that decrease levels of MDA in SKY practitioners and It is also observed that blood SOD & blood GSHpx levels are significantly
increased. Our results showed an inverse relationship between lipid peroxidation & antioxidant enzymes (blood-SOD & blood GSHpx) in both the groups.

Yogic breathing is a unique method for balancing the autonomic nervous system and influencing psychological and stress related disorders (1,2,4,14,15 & 16). SKY is a type of cyclical controlled breathing practice with roots in traditional yoga that provides relaxation and it is taught by the Art of Living Foundation.

SKY is effective in all the parts of the body. SKY gives the internal and external stability to the body. Here the loss of energy is less. Hence after SKY the person is energised. One feels fresh after practicing yoga. Yoga can be practiced by everyone.[17]

Gym is effective only to the specific parts of the body. Exercise gives instant results in formation of muscles and body physique. Here the loss of energy is more and dissipated as heat. One feels tired after practicing at the gym. One can practice at the Gym only after a certain age.

**CONCLUSIONS**
The main difference between yoga and the gym is the effect it has on the body. Yoga is effective to all organs of the body; whereas, gym is effective to only specific parts of the body. The increased expenditure of energy after gym may be correlated to the secretion of “Irisin” in human body. IRISIN is a hormone naturally found in muscle and increases in the body during exercise.[18,19] It also fights against obesity and thought to control blood sugar. The author did not determine the effect of serum irisin in SKY and exercise and this limitation will be assessed in future research.

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