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Role Of Navratri Upvasa In Modulating Oxidative Stress: An Interventional Study

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Abstract :

Background

Ayurveda recommends fasting as a Langhana therapy, which promotes lightness in the body. Oxidative stress occurs due to an imbalance between reactive oxygen species (ROS) and antioxidants, leading to cellular damage, chronic diseases, and aging. Studies suggest that fasting reduces oxidative stress, enhances metabolism, and extends lifespan. Religious fasting, commonly observed during seasonal transitions and is believed to detoxify and rejuvenate the body. To evaluate the impact of Navratri fasting on oxidative stress, an interventional study was conducted by assessing Superoxide Dismutase (SOD) and Malondialdehyde (MDA) levels, along with Stress Index (SI) and Protective Index (PI).

Methods

A randomized controlled trial included healthy participants divided into two groups: Navratri Upvasa and Control. Oxidative stress was evaluated using MDA levels, while antioxidant defense was measured via SOD activity. Additionally, Stress Index (SI) and Protective Index (PI) were calculated. F-tests were used to analyze pre- and post-intervention differences.

Results

The fasting group showed a significant reduction in MDA levels, indicating lower oxidative stress. SOD activity increased, reflecting enhanced antioxidant defense. Additionally, the fasting group exhibited greater reductions in SI and increases in PI compared to the control group, confirming the efficacy of Navratri fasting.

Conclusion

Navratri Upvasa effectively reduces oxidative stress and enhances antioxidant defenses, supporting its role in seasonal detoxification and overall health improvement.

Inroduction:

The primary goal of Ayurveda is to maintain health and prevent diseases[1]. It believes that

imbalances in dosha, dhatu, and mala cause illness[2] Langhana therapy, including upvasa, helps restore balance through detoxification and pacification[3]. *Acharya Charak* has mentioned *upvasa* a type of ten methods of *langhana* [4]. *Upvasa*, also termed *vrata* in Dharmashastra, is practiced on religious days and improves digestion, reduces toxins, and enhances clarity.

Oxidative stress is the state where an imbalance occurs between reactive oxygen species and the anti oxidants in the body due to an increase in oxidative stress radicals. Oxidative free radicals are the metabolic by-products. There increase in number is harmful for many cellular structures causing a variety of human diseases, and even increasing the physiological ageing process. . Fasting reduces oxidative stress, slows aging, and improves health markers[5].

A study on Daniel fasting shows positive results in improving blood pressure, lipids, and biomarkers of oxidative stress[6]. In India, fasting during seasonal transitions, like *Navratri* in *Sharad Rutu*, detoxifies and rejuvenates the body[7]. Scientific studies support its benefits, including improved metabolism and reduced oxidative damage.

PICO Format:

Population: Healthy individuals without any systemic disorder & not taking any type of medication since last 3 months, aged 20-40 years, of both sexes

Intervention: *Navratri upvasa*

Outcome: Reduction in Stress Index and increase in Protective index

Study Plan:

Study Design: Randomized two -arm single-blind interventional study.

Study Duration: Two years.

Study Location: Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (H), Wardha.

Ethical Considerations

The study has ethical approval (MGACHRC/IEC/Oct-2022/607) and adheres to guidelines ensuring participant safety and informed consent.

Inclusion Criteria: This study includes healthy individuals aged 20 to 40 years from both sexes. Participants must be fasting during *Navratri*. To ensure the validity of the study results, only those without systemic disorders or a history of medication use in the past three months will be included. These criteria are designed to select a homogenous group of participants with optimal health conditions.

Exclusion Criteria: Individuals with existing diseases, children, older adults above 40 years, and pregnant or menstruating females are excluded from the study to avoid confounding variables. Moreover, individuals addicted to smoking, alcohol, or tobacco is not eligible, as these habits may interfere with the outcomes of the interventions. These criteria aim to maintain the integrity of the study and minimize potential health risks to participants.

Withdrawal Criteria: Participants experiencing adverse effects, such as diarrhea or weakness, will be withdrawn and treated free of cost.

Methodology

All enrolled healthy volunteers will be randomly assigned to tow groups:

- Group A: Participants will observe *Navratri upvasa* .
- Group B: Non-interventional control group, where participants will not undergo any specific therapies.

Objective parameters, specifically SOD (Superoxide Dismutase) and MDA (Malondialdehyde), will be assessed for all volunteers in the central research laboratory of Datta Meghe Institute of Higher Education And Research at Sawangi, Wardha

Variables

The variables are Superoxide Dismutase (SOD), Malondialdehyde (MDA), Stress Index, and Protective Index, which serve as measurable indicators of oxidative stress, antioxidant status, and overall protective mechanisms. These dependent variables will reflect the effects of the interventions based on the independent variables.

Grouping and Intervention:

Table 1: Grouping: 2 groups

Groups	No of Healthy volunteers	Age	Sex	Intervention	Duration
Group A of *Navratri upvasa*	30	20 yrs to 40 yrs	Both	Healthy volunteers who fasts in *Navratri* in *Sharad Rutu*	11 days
Group B Non-interventional control group	30	20yrs to 40 yrs	Both	Non interventional group	11days

Group A: *Navratri Upvasa* group

Group B: Non-interventional control group

Intervention: Fasting for a total of 9 days duration during *Navratri*, with whole day fasting

Dietary allowance: Tea or milk or fresh fruit juice with two soaked almonds, two cashews, two-three munakkas, or two bananas in the morning; 1 apple or 1 banana with milk in the evening

Procedure:

Table 2: Procedure of *Navratri upvasa* and Non-interventional group

Group	**Duration**	**Procedure**	**Dose**
Navratri upvasa	0^{th} day	Pre sample collection	
	1-9 days	Upvasa	Whole day upvasa. To maintain energy level

			can take fruits, juice, tea or milk
	11th day	Post sample collection	
Non-interventional group	0th day	Pre sample collection	
	11th day	Post sample collection	

The specific markers of oxidative stress[8]:

1) Estimation of Malondialdehyde (MDA) in serum

Principle: Thio-barbituric acid reacts with malonaldehyde, one of the aldehyde products of lipid peroxidation to give a colored product which is extracted in butanol and absorbance measured spectrophotometrically at 530 nm.

Thiobarbituric acid reaction :

Standard solution : Malonaldehyde bis (diethyl-acetal) procured from Merck Schuchardt OHG 85662 Hohenbrum, Germany, was dissolved in 0.05M Sulphuric acid to prepare 10 uM solution. This 10uM solution was further diluted to obtain standard MDA of different concentration like 1 nmole/ml, 2 nmole/ml, 3 nmole/ml, and 4nmole/ml ---------- upto 10 nmole/ml. Before starting with the samples a standard graph of concentration against absorbance was plotted. A straight line graph indicates persistency and accuracy of the procedure.

Table – 3 Addition of reagents for estimation of MDA:

	ard (ml.)	ml.)
ard sol.		
le		
(20%)		
(0.67%)		

2.00 ml of TCA was added to each test tube, (0.200) ml of standard or sample was added to standard and test tubes respectively. 0.800ml of TBA (0.67%) was also was added to each test tube. It was mixed well and then kept in boiling water bath for 30 min. After30 min. the test tubes were cooled under tap water. 4.00ml of n-Butyl alcohol was added to each test tube. All the tubes were centrifuged at 3000 rpm for 10 min. The absorbance of supernatant was read at 530nM using n-Butyl alcohol as blank. Calculations: MDA Conc. (nMol/ml) test = Abs. of test/Abs. of std. X Conc of std. (nMol).

Estimation of Superoxide dismutase (SOD).

(Marklund S & Marklund : 1974) Principle : This method utilizes the inhibition of autoxidation of pyrogallol by Superoxide dismutase enzyme. Procedure: The assay mixture in a 3.00 ml volume consisted of 300 ul of Pyrogallol (0.2mM),

Table – 4 Addition of reagents for estimation of SOD.

ents	rol (ml)	lard (ml)	(ml)
uffer			
ard/Haemolysate	----		
ing Pyrogallol			
volume			

The reaction mixture prepared in three sets of test tubes according to table: a) Control – Neither test nor standard was added to assay mixture to obtain uninhibited auto oxidation of pyrogallol. b) Standard – Known amount of SOD units in different concentrations were added to assay mixture to achieve inhibition of pyrogallol auto-oxidation c) Test – The haemolysate of individual samples were added in place of standard SOD units. Pyrogallol was added after the addition of all other reagents to reaction. Initial 90 sec. period was considered as induction period of enzyme. So after 90 sec. change in absorbance at 420 nm at 20 sec. interval was recorded for a period of 270 sec (4.5 min.). Change in absorbance per min. was calculated and percentage of inhibition in standard and test was calculated using the formula:

$$\% \text{ of inhibition} = 100 - \frac{\text{Diff. Blank - Diff. STD/ Diff. Sample}}{\text{Diff. Blank}} \times 100$$

For standard graph in place of sample different concentrations of standard were added and absorbance was read at 420nM. Before starting with the samples a standard graph of concentration against absorbance was plotted. A straight line graph indicates persistency and accuracy of the procedure[9].

OBSERVATION AND RESULT OF CLINICAL TRIAL

Total of 66 volunteers were enrolled in the study. Out of 66 volunteers, total 6 were left out from the Non-interventional group. Hence there were data of 60 patients (30 in each group). Volunteers were selected and divided in two equal groups.

Demographic Data:

The age-wise distribution of volunteers across the groups—Control and *Navratri Upvasa*—showed significant differences in mean age. Each group consisted of 30 participants, with a combined sample size of 60. The mean age in the Control group was 28.17 years (±4.86) and in the *Navratri Upvasa* group was 26.37 years (±6.47). The overall mean age was 26.34 years (±5.29). The F-test value of 3.84 and a p-value of 0.025 indicated a statistically significant difference in age distribution across the groups.

RESULT:

Table 5: Comparative Analysis: Group A vs. Group B

F-Test Results (Variance Analysis)

Parameter	F-value	p-value	Interpretation
SOD Pre	0.043	0.837	No significant difference in variances
SOD Post	19.43	0.000046 ($p < 0.05$)	Significant difference in variances

MDA Pre	0.83	0.366	No significant difference in variances
MDA Post	5.16	0.027 ($p < 0.05$)	Significant difference in variances
Stress Index Pre	1.65	0.204	No significant difference in variances
Stress Index Post	27.92	0.00000199 ($p < 0.05$)	Significant difference in variances
Protective Index Pre	0.009	0.923	No significant difference in variances
Protective Index Post	44.25	0.0000000112 ($p < 0.05$)	Significant difference in variances

Key Findings

1. No significant difference in variances for SOD Pre, MDA Pre, Stress Index Pre, and Protective Index Pre.
2. Significant differences in variances for SOD Post, MDA Post, Stress Index Post, and Protective Index Post, meaning the Navratri and Control groups responded differently.

Table 6: Comparison of *Navratri upvasa* and Non-Interventional Control Groups:

Parameter	**Group**	**Pre(Average)**	**Post(Average)**	**Change**
(SOD) Levels	Navratri upvasa Group	1.51	2.33	↑ Significant Increase
	Control Group	1.48	1.58	↑ Slight Increase (+54.30%)
(MDA) Levels	Navratri upvasa Group	1.15	0.77	↓ Significant Decrease
	Control Group	1	1.02	↑ Slight Increase
Stress Index (MDA/SOD)	Navratri upvasa Group	0.89	0.34	↓ Significant Decrease
	Control Group	0.72	0.71	≈ No Significant Change
Protective Index (SOD/MDA)	Navratri upvasa Group	1.66	3.36	↑ Strong Improvement
	Control Group	1.68	1.74	≈ Minimal Improvement

Table 7: Analysis on outcome of variables on these comparative group

	Control				**Navratri upvasa**						
	Pre	Post	Difference in mean	% change	Pre	Post	Difference in mean	% change	Difference in Percentage for Improvement	Lower	Upper

SI Index	0.721 9	0.711 3	0.011	1.47	0.8859	0.2386	0.647	73.07	71.60	55.50	87.70
PI index	1.6804	1.7428	0.062	3.71	1.6584	3.3594	1.701	102.57	98.86	96.10	99.02

Key Findings:

1. *Navratri upvasa* Group showed a significant increase (+54.30%) in SOD levels, while the Control Group had only a slight increase(+6.76%).
2. MDA levels significantly decreased (-33.04%) in the *Navratri upvasa* Group, whereas the Control Group showed a slight increase (+2.00%).
3. Stress Index decreased notably (-73.07%) in the *Navratri upvasa* Group, indicating reduced oxidative stress, while the Control Group saw little change (-1.47%).
4. Protective Index improved greatly (+102.57%) in the *Navratri upvasa* Group, suggesting enhanced antioxidant defense, while the Control Group showed minimal improvement (+3.71%).

   This shows that the *Navratri upvasa* group experienced much more significant improvements in oxidative stress markers compared to the control group

Discussion:

Navratri Upvasa is a form of *Shamana Chikitsa* (palliative therapy) that involves *upvasa* during the nine days of *Navratri,* a practice believed to pacify aggravated *doshas* and promote detoxification. *Upvasa* has been scientifically documented to reduce oxidative stress by lowering reactive oxygen species (ROS) and enhancing antioxidant enzyme activity. *Sharad Rutu* is also seen as a conductive period for *upvasa*, as it aligns with the natural rhythms of detoxification and rejuvenation in the body. The reduction in oxidative stress during *upvasa* is attributed to decreased production of ROS, increased activity of antioxidant enzymes, and improved repair mechanisms for oxidized macromolecules. The alignment of *upvasa* with the seasonal transition of *Sharad Rutu* may further potentiate these effects, as the body is naturally inclined towards purification during this time.

Conclusion:

This project investigates the effects of *Navratri upvasa* on oxidative stress in healthy individuals. The study is conducted during the *Sharad Rutu* (early autumn), a season associated with the aggravation of the *Pitta dosha*, which is linked to increased oxidative processes in the body. The primary aim is to assess the efficacy of these interventions in reducing oxidative stress markers, specifically Superoxide Dismutase (SOD) and Malondialdehyde (MDA). Findings suggest potential efficacy of *Navratri upvasa* in reducing oxidative stress, as evidenced by changes in SOD and MDA levels, stress levels and protective index.

Compliance with ethical standards:

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Disclosure of conflict of interest:

None conflict of interest in this review article

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