

Original Research Article

Role of yoga and meditation on serum DHEAS level in first year medical students

Kislay Kumar¹, Devesh Kumar^{1*}, Vinay Singh¹, Pooja T. Pandey¹, Divya²

¹Department of Physiology, BRD Medical College, Gorakhpur, India

²Department of Biochemistry, IIMSR, Lucknow, Uttar Pradesh, India

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*Correspondence:

Dr. Devesh Kumar,

E-mail: devkiran.2016@gmail.com

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ABSTRACT

Background: Dehydroepiandrosterone sulfate (DHEAS), secreted by adrenal cortex, acts in the human body as a neurosteroid, cardio-protective, anti-diabetic, anti-obesity and immune-enhancing agent. It is also reported as a youth hormone. But due to various stimulators of stress, and also as an antagonist of cortisol, DHEAS level decreases. Yoga and meditation regulates the level of hormones and neurotransmitters that affect physiological function.

Methods: This study was performed on 1st yr. medical students whose DHEAS level was low due to acute stress. 55 medical students were selected as participants through counseling and were divided into Yoga group (n= 27) and control group (n=28). Their morning serum DHEAS level was assessed and yoga group were instructed to practice Yoga (1hr/day for 12 weeks) under supervision of Yoga instructor. No such instruction was given to control group.

Results: As a marker of youth and immunity, increase in DHEAS level decreases susceptibility to infections, reduces aging process as well as improves other functions. Yoga and meditation is documented to increase DHEAS level in regular practitioners. Statistical analysis has shown an increase in morning S. DHEAS level in yoga practitioners. Pre-study and post study values were 3.5 ± 2.48 and 3.61 ± 1.73 respectively in yoga group (overall 3.1% increase, P Value = 0.025, significant at 0.05) whereas 3.36 ± 1.98 and 2.58 ± 1.49 respectively in control group (23.2% decrease, P Value = 0.84, not significant).

Conclusions: This study concludes that practicing Yoga has significantly raised S. DHEAS level in medical students and improved their immunological status as well as enhances mood and behavior.

Keywords: DHEAS, Medical students, Meditation, Yoga

INTRODUCTION

Dehydroepiandrosterone sulfate (DHEAS), secreted by the adrenal cortex, acts in the human body as a neurosteroid, cardio-protective, antidiabetic, antiobesity, and immunoenhancing agent. It is also reported as youth hormone.

DHEA modulates endothelial function, reduces inflammation, improves insulin sensitivity, blood flow, cellular immunity, body composition, bone metabolism,

sexual function, and physical strength in frailty and provides neuroprotection, improves cognitive function, and memory enhancement. Glucocorticoids are toxic to hippocampal neurons. It is reported that dehydroepiandrosterone protects neurons of primary hippocampal cultures against the toxic effects of corticosterone. Basal level of DHEAS declines with advancing age and is reported as anti-aging hormones. Non-pharmacological replacement of these hormones by natural stimulus like yoga may be a strategy for delaying the onset of aging.¹

Yoga and Meditation may be described as condition of inner tranquility and attaining of a higher state of consciousness. The promoters of meditation and yoga claim that it is easy to learn and that produces great relaxation, heightened awareness and more efficient performance.² Yoga interventions have demonstrated improved immunity and stress outcomes in diverse populations. It has also proved to decrease ageing process in regular practitioners.³ Alpha waves (8.0-13.9Hz) of human brain are connected with relaxation, focus, wakefulness and the production of serotonin, a neurotransmitter in the brain and gut that modulates mood, sleep, sexuality, aggression, and anger. Yoga and meditation practiced for a longer period increases alpha waves which indirectly increases immune-modulators and decrease immune-suppressors.⁴

Psychological stress has been linked empirically with dysregulation of facets of the human immune system, yet these effects are not the same in every situation or population. Previous works demonstrated on stress-immune relation in populations including children exposed to early adversity, older adults, and individuals with clinical diagnoses. Final stage of this study concluded that there was dysregulation of immune-modulation in those subjects who were chronically stressed either due to work-burden or due to their homely relations. Their hospital visits were frequent and costs too high.⁵ Previously evidences of studies based on murine models have stated that dehydroepiandrosterone (DHEA) and its sulfated ester (DHEAS) have been shown to have immunoenhancing properties. DHEA reverses the corticosteroid and stress-induced inhibition of immune function.⁶

Oral administration of DHEAS in old aged individuals have significantly activated immune functions. It might be due to an increase in bioavailable IGF-I, which by virtue of its mitogenic effects on immune cell function, may mediate the DHEA effects. According to Dr. Allie, dehydroepiandrosterone (DHEA) is the most abundant hormone in the body and has a demonstrable anti-cortisol action. It achieves this in part by inhibiting the enzyme 11β -hydroxysteroid-dehydrogenase which converts cortisone into cortisol in the cell. Because of this effect, DHEA has been shown to slow adipocytes proliferation and decrease insulin resistance *in vitro*, both of which are results of high-cortisol. Cortisol and DHEA are like a yin and yang pair, and it's the ratio that is more important than the absolute amounts. The production of both cortisol and DHEA is stimulated by the same pituitary stress hormone, the adrenocorticotropic hormone (ACTH), which is released as a result of psycho-social stress. With prolonged stress, the ability of the adrenals to produce DHEA is diminished while it's ability to produce cortisol remains nearly constant. A natural outcome of this observation is a chronically high cortisol to DHEA ratio which leads to such events as: insulin resistance, low immunity, central obesity, and weakness of the limbs. Because the production of both of these hormones

is dependent on the same factor (ACTH), any decrease in their relative production is likely the result of adrenal insufficiency in the zona reticularis, where DHEA is produced in the greatest amounts. Dehydroepiandrosterone is also produced in the brain and exerts a neuroprotective effect which offsets the stress-induced dissociation caused by high cortisol. It has even been shown in rats to prevent the damaging effects of aluminium (as $AlCl_3$) which causes damage by displacing iron which can produce free radicals through the well-known Fenton reaction.⁷

The effect of Regular Yogic training improved growth hormone and dehydroepiandrosterone sulfate as an endocrine marker of aging, cardio-protective factor and mood stimulator.⁸ Yoga and meditation stimulates DHEA production which functions as an antioxidant and significantly reduces β -amyloid protein in the brains of aluminium-intoxicated rats. Beta-amyloid is characteristic of Alzheimer's disease, and a reduction by DHEA can only be considered beneficial for those valuing their long-term memory. Non-yogic practitioners show much decline in their mood and memory than yogics.⁹ Regular practice of Yogasana and transcendental meditation in youngsters decreases oxidative stress, enhance immunity, reduces stress level, reduces Cortisol level and increases sex hormone level.¹⁰

METHODS

This study was conducted for a period of 12 weeks, where Yoga was practiced 6 days/week. Duration of yoga was 60 mins divided into 10 minutes for meditation, 15 minutes for pranayam and 35 minutes for Asanas. Subjects were selected from 1st yr M.B.B.S. students and are put into two groups, yoga group (n = 27) and control group (n = 28).

Following materials were part of study

- Yoga lab
- Yoga instructor
- Medical students
- Equipped Pathology Lab.
- Lab Technicians.

Inclusion criterion for participants

- Willing to participate and to continue Yoga practice
- Subject should be physically fit
- Normal personal and family health status.

Exclusion criterion for participants

- Previous history of yoga practice
- Any history of major illness like stroke, seizure, vertigo, hypertension, coronary artery disease, congenital heart disease, history of status asthmaticus, peptic ulcer disease, spondylitis, joint pain, prolapsed disc, CSOM, hernia, physical

inability to practice yoga or any other disease condition which may exaggerate discomfort.

- Any addiction.

Informed and written consents were taken before their participation. All first year students were interviewed personally and their personal and family history were taken. Their personal history included their Daily routines, dietary habit, exercise habit etc.

The participants (N = 55, including males and females) were randomized into two groups (Yoga group and control group) by computer generated list of random numbers. Randomization were done by independent assistant with councilment. There were 27 (15 males and 12 females) in yoga group and 28 (20 males and 08 females) in control group.

Biochemical marker for immunity and aging, serum DHEAS were analysed using ELISA technique in pathology lab. Subjects were instructed one night before to stay in fasting, till collection of blood at early morning. Blood is collected at around 8.00 AM from both yoga and control group and sent immediately to lab for further estimation. DHEAS in blood sample is estimated through competitive immunoenzymatic colorimetric method for quantitative analysis. The DHEA-S (antigen) in the sample competes with the antigenic DHEA-S conjugated with horseradish peroxidase (HRP) for binding to the limited number of antibodies anti DHEA-S coated on the microplate (solid phase). After the incubation, the

bound/free separation is performed by a simple solid-phase washing. Then, the enzyme HRP in the bound-fraction reacts with the Substrate (H₂O₂) and the TMB Substrate and develops a blue color that changes into yellow when the Stop Solution (H₂SO₄) is added. The colour intensity is inversely proportional to the DHEA-S concentration of in the sample. DHEA-S concentration in the sample is calculated through a calibration curve. DHEAS kit is supplied by DiaMetra S.R.L., Italy. Evaluation for control and yoga group, pre- and post study analysis of serum DHEAS level have provided biochemical evidence about change in stress level and immunological modulation in subjects.

Yoga instructor instructed Yoga group, a specific yoga module 1hr/day, six days a week, for twelve weeks. Control group was not given any such type of instruction, but was kept in touch with, till twelve weeks for final evaluation.

RESULTS

Both groups (yoga and control) have shown variations in their serum DHEA (s) level after 3 months of study. After practicing yoga for three months with normal daily routine, yoga group have shown marked increase in s. DHEAS level whereas control group have shown overall decrease in hormone level. Table 1 shows change in S. DHEAS level in yoga group (N=27). S. DHEAS level has increased in 63% (n= 17) whereas decreased in 37% (N= 10) participants.

Table 1: Pre- and post study effect of yoga on S. DHEA (S) level.

Yoga group	Pre-study (mean ±SD)	Post study (mean ±SD)	% change
Total sample (N= 27)	3.5±2.48	3.61±1.73	3.1% increase
Increasing pattern (N= 17)	3.81±0.86	4.28±1.06	13% increase
Decreasing pattern (N=10)	3.06±1.08	2.53±1.34	17.3% decrease

Table 2: Pre- and post study S. DHEA (s) level in control group.

Control group	Pre- study (Mean ± SD)	Post- study (Mean ± SD)	% Change
Total sample (N= 28)	3.36±1.98	2.58±1.49	23.2% decrease
Increasing pattern (N=08)	2.48±1.37	4.08±1.26	64.5% increased
Decreasing pattern (N=20)	3.81±1.78	1.92±1.60	50% decrease

Table 3: Relative change in S. DHEAS level in yoga and control group.

	Yoga group	Control group
Sample size	27 participants*	28 participants*
Decreasing pattern	37% participants(N=10)	71.4% participants (N= 20)
Increasing pattern	63% participants (N= 17)	28.6% participants (N= 08)
Overall change in S. DHEAS level	3.1% increase (P Value = 0.0251)	23.2% Decrease (P Value = 0.847)

Table 2 states about the pattern increase and decrease in S. DHEAS level in control group (N=28). 71.4% (N= 20) have reported decrease in their DHEAS level whereas 28.6% (N= 08) have shown increase in their hormone

level. Table 3 shows change in serum DHEAS level in Yoga and control group participants. There were more Participants in yoga group, whose serum DHEAS level has increased whereas lesser participants in control group

whose hormonal level was increased. There was overall decrease in S. DHEAS level in yoga group as compared to control group where it has increased. Study started with 30 participants but 3 in yoga gr. and 2 in control gr. left the study in-between.

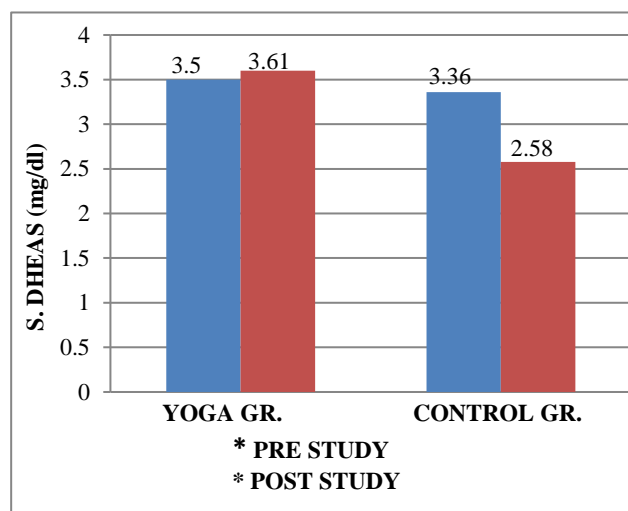


Figure 1: Change in S. DHEAS level in yoga and control group.

Figure 1 shows change in serum DHEAS level in yoga (N=27) and control group (N= 28). There is overall increase in serum DHEAS level in yoga group whereas its decrease in control group.

DISCUSSION

DHEAS or Dehydro-epiandrosterone sulfate is usually praised for its anti-aging properties. It can protect the heart and improve brain function and also act as anti-cortisol hormone. Yoga also improves its circulating level in blood. Pre and post study S. DHEAS in yoga group were 3.5 ± 2.48 and 3.61 ± 1.73 respectively. (P value= 0.0251, 3.1% increase). There were 63% participants in yoga group whose DHEAS level increased from 3.81 ± 0.86 to 4.28 ± 1.06 (13% increase) and 37% participants whose hormone level decreases from 3.06 ± 1.08 to 2.53 ± 1.34 (17.3% decrease).

Whereas control group Pre- and post-study DHEAS level were 3.36 ± 1.98 to 2.58 ± 1.49 (23.2% decrease). 67% participants have shown their decrease in hormone level from 3.81 ± 1.78 to 1.92 ± 1.60 (50% decrease) and 33% participants have shown their increase from 2.48 ± 1.37 to 4.08 ± 1.26 (64.5% increased). Hence from above data, it is very clear that yoga practitioners have more rise in their DHEAS level in comparison to control group participants whose post DHEAS has decreased.

CONCLUSION

Yoga also have shown its direct impact on dehydroepiandrosterone and increases its level in yoga

group participants (P value <0.05). Whereas control group have shown decrease in immunogenic hormone level (P value not significant). Hence yoga can improve immunity, delays aging process and also prevents cardiovascular risk factors.

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