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Original Research

Effect of Advanced Yogasanas on Psycho-Biochemical Parameters in Adults: A Prospective Non-Randomized Single Arm Trial

Chanchal Vijay, Khushbu Jain*

Department of Allied Sciences, Morarji Desai National Institute of Yoga, Ministry of Ayush, Govt. of India, Delhi, India

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Abstract

In the research investigation exploring the effects of Advanced Yogasanas on psycho-biochemical parameters, a cohort of 67 adult yoga practitioners, spanning ages 20 to 54 (with a mean age of 28.94±6.95), actively engaged in an extensive one-month training program facilitated by certified yoga instructors. The sessions were conducted during evening hours, specifically from 4 to 7 pm, ensuring a consistent and structured learning environment. To evaluate the psychological impact, participants underwent assessments employing The Mindful Attention Awareness Scale (MAAS) for Attention and the Self-Efficacy Scale for Self-efficacy. The outcomes revealed remarkable improvements in Attention scores ($p<0.01$**) and Self-efficacy scores ($p<0.01$**), highlighting the positive influence of advanced yogasanas on these crucial psychological parameters. Turning to the realm of biochemical parameters, the gathered data indicated non-significant alterations in total cholesterol (md=1.65); while there was a notable decrease in triglycerides (md=0.917). Additionally, high-density lipoprotein exhibited an increase (md=1.636), accompanied by reductions in both low-density lipoprotein (md=0.858) and very low-density lipoprotein (md=0.358) between the pre- and post-assessment periods. These findings collectively underscore the beneficial impact of a one-month regimen of yogasanas on a spectrum of psychological and biochemical parameters. By emphasizing the holistic advantages, the study advocates for the integration of advanced yogasanas practice, into the daily routines of adults, showcasing the potential for a comprehensive approach to well-being through the incorporation of these advanced yoga practices.

Keywords: Yoga; Advance yoga practices; Attention; Self-efficacy; Lipid profile

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*Corresponding Author: Khushbu Jain
Department of Allied Sciences, Morarji Desai National Institute of Yoga, Ministry of Ayush, Govt. of India, Delhi, India
Email: Khushbu.nano@gmail.com, asstport-bchem@yogamdniy.nic.in

Introduction

Yoga, an ancient Indian philosophical and religious tradition, is experiencing a remarkable resurgence as a prominent branch of complementary and alternative medicine. It stands as the science of simple living, illuminating every facet of life – physical, mental, emotional, psychic, and spiritual [1]. Yoga emerges as a foundational discipline, placing paramount focus on enhancing both the physical and mental well-being of the individual. It seamlessly weaves together all the essential elements crucial for self-realization and the attainment of a more vibrant and wholesome lifestyle [2]. In contemporary wellness practices, yoga has become an integral component of mind/body strategies aimed at fostering optimal health. These strategies encompass an array of techniques, such as relaxation methods, hypnosis, visualization, feedback, Qigong, Tai Chi, meditation, autogenic, cognitive-behavioural therapy, group therapy, and spirituality. Rooted in extensive research on the interconnectedness of the nervous, immune, and endocrine systems—fundamental elements of psychoneuroimmunology—these mind/body approaches have proven efficacy across various ailments. Their popularity continues to surge, sought after eagerly by the general public [3-7]. Through the dedicated practice of Asana, Pranayama, Mudra, Bandha, Shuddhi kriyas, and Meditation, Yoga becomes a transformative force, facilitating the delicate balance and harmonization of the body, mind, and emotions. It is a pathway to enlightenment, guiding individuals towards a state of profound well-being and unity within themselves [1,4].

Asanas, integral to traditional yoga practices, are a series of exercises distinguished by the intentional adoption and sustained holding of specific postures. These postures encompass a range of movements, including bending, standing, twisting, and balancing the body. The overarching goal is to enhance both flexibility and strength, fostering a harmonious integration of the physical and mental aspects of well-being [1,6]. "Advanced Yogasanas" encapsulate the more demanding and intricate physical postures or poses within the yoga discipline, each intentionally sustained for a specific duration [8]. These postures demand an elevated level of strength, flexibility, balance, and concentration, surpassing the requirements of basic or intermediate yoga poses.

A scientific research, led by Dr. Binod Chowdhary, has delved into the impact of advanced yogasana on psycho-biochemical parameters in adults, revealing profound effects on both the mind and body. In cardiovascular health, advanced yoga practices are gaining attention for their potential impact on crucial lipid profiles, including Total Cholesterol (TC), triglycerides (TG), Low Density Lipoprotein (LDL)-cholesterol, and High-Density Lipoprotein (HDL)-cholesterol [9]. A recent 45-day study involving yoga-asanas and pranayama showed significant improvements in lipid profiles. Notable decreases in total cholesterol, triglycerides, LDL, and very low-density lipoprotein (VLDL) were observed, along with a substantial increase in HDL levels. These findings suggest a positive influence of yoga practices on lipid metabolism and overall cardiovascular health [10]. Further support comes from Prof. Savita Singh's study, revealing enhancements in lipid profiles and positive effects on psycho-neuro-endocrine-immune parameters. This underscores the holistic benefits of integrating yoga into lifestyle approaches, highlighting its potential role in addressing both physiological and psychological aspects of health [11].

Moreover, a study proposes yoga practices, including advanced asanas, hold the potential to positively impact cognitive function and emotional modulation. Regular engagement in yoga has been associated with reported enhancements in attention, memory, and executive function, demonstrating cognitive benefits that extend to practitioners.

Beyond cognitive effects, these practices emphasize the intricate connection between the mind and body [1]. By incorporating focused attention and mindfulness, individuals may achieve heightened self-awareness and an enhanced sense of well-being. This integrated approach underscores the multifaceted benefits of yoga, enriching both mental and physical dimensions [13-15].

Research efforts have explored the impact of yogic practices, with a particular emphasis on psychological factors such as attention and self-efficacy, as well as biochemical dimensions like the lipid profile. Numerous studies have investigated the effects of various yoga protocols on physiological, psychological, and biochemical aspects in adults. However, studies specifically addressing the effects of advanced yogasana on psycho-biochemical parameters in adults are relatively scarce. The primary objective of this study is to fill this gap by systematically examining the effects of advanced yogasanas on psycho-biochemical parameters in adults.

Materials and Methods

Ethical Consideration

The research proposal was approved by the Institutional Ethics Committee at the Morarji Desai National Institute of Yoga, New Delhi (IEC letter no. MDNIY/202-21/RES/IR/EC/001/A07). The trial spanned one month in duration. Prior to enrolment, all participants provided informed consent. Comprehensive information detailing the procedure, potential risks (if applicable), and pertinent study specifics were transparently conveyed to each participant. Participants

were explicitly informed of their right to withdraw from the study at any point. Additionally, strict measures were implemented to ensure the confidentiality of all shared information.

Study Design

This study was a prospective, single-arm, interventional investigation conducted at the Morarji Desai National Institute of Yoga (MDNIY) in New Delhi, India.

Study Population

The study included healthy male and female participants aged 20 to 54 (mean age 28.94±6.95) who practiced yoga regularly. Eligibility screening was conducted, and volunteers had to give informed consent before participating in any study-related procedures. Inclusion criteria required participants to be healthy with a consistent daily yoga practice and regular involvement in sports or other activities. Exclusion criteria encompassed individuals with pathological conditions, psychiatric illness, a history of drug abuse, ongoing use of drugs affecting the central nervous system, use of steroid hormones or analogues, and no prior experience with yoga or similar practices.

Intervention

Qualified yoga instructors at MDNIY imparted an extensive series of advanced yoga asanas to the participants for 120 minutes each day, five days a week, over four weeks. The participants were trained and instructed to adhere to the study intervention once daily in the evening. Practical sessions included all Advance asanas as prescribed by MDNIY, New Delhi. The sequence includes: Surya Namaskar, Standing Asana- Utthita Parsvakonasana (Extended Side Angle Pose), Virabhadrasana II (Warrior II Pose), Utthita Hasta Padangusthasana (Extended Hand-to-Big-Toe Pose), Vrksasana (Tree Pose), Garudasana (Eagle Pose), Natarajasana (Lord of the Dance Pose). Twisting Asanas include: Parivrtta Trikonasana (Revolved Triangle Pose), Parivrtta Parsvakonasana (Revolved Side Angle Pose), Ardha Matsyendrasana (Half Lord of the Fishes Pose). Hand Balancing Asanas: Bakasana (Crow Pose), Pincha Mayurasana (Forearm Stand), Sirsasana (Headstand), Adho Mukha Vrksasana (Handstand), Astavakrasana (Eight-Angle Pose), Tittibhasana (Firefly Pose). Inversions: Sarvangasana (Shoulder Stand), Halasana (Plow Pose), Salamba Sirsasana (Supported Headstand), Viparita Karani (Legs-Up-The-Wall Pose), Pincha Mayurasana (Forearm Stand), Vrischikasana (Scorpion Pose).

Outcome measures

Psychological questionnaire

The Mindful Attention Awareness Scale (MAAS): MAAS is a 15-item tool designed to gauge dispositional mindfulness, reflecting a receptive awareness of the present moment [3]. Respondents use a 6-point Likert scale (1 = almost always to 6 = almost never) to rate statements like "It seems I am 'running on automatic,' without much awareness of what I'm doing" and "I could be experiencing some emotion and not be conscious of it until sometime later." Higher scores indicate heightened mindful awareness. The MAAS exhibits robust psychometric properties, showing good ($\alpha = 0.84$) to very good ($\alpha = 0.91$) internal consistency across diverse age groups and countries. Numerous studies highlight the MAAS's ability to measure a unique consciousness quality associated with enhanced self-awareness and various well-being constructs. In the present study, the MAAS maintained good internal consistency, as indicated by Cronbach alpha values of 0.84 for the first administration and 0.81 for the second administration.

General Self-Efficacy scale: The Hindi version of General Self-Efficacy Scale (GSES), developed by Shonali Sud, Ralf Schwarzer & Matthias Jerusalem, 1998 is validated, self-administered instrument featuring 10 items, strategically crafted to evaluate self-efficacy—defined as the belief in one's capability to successfully navigate challenging life demands [26]. Scores for each item are aggregated to yield a total SES score within the range of 10–40. Elevated scores on this scale signify a heightened conviction in one's self-efficacy.

Biochemical investigations

Biochemical investigations were conducted at the biochemistry Laboratory of the institute, involving blood drawn from an antecubital vein. On the designated day for blood collection, participants were instructed to refrain from engaging in yoga practice. Lipid profile assessments, encompassing TC, TG, HDL, LDL, and VLDL, were requisitioned and evaluated both before and after the study period through the kits (Erba diagnostics Mannheim GmbH (Germany)), protocol was used from kits manual and for assessment semi-auto-analyser (Transasia Biomedical ltd.) was used.

Statistical analysis

The collected data underwent entry and verification in Excel. Bivariate analysis was employed, presenting continuous data as mean (with standard deviation), degree of freedom, and 95% confidence interval of mean difference. A significance level of $p < 0.05$ was considered in all statistical analyses. All reported p values are two-tailed. Statistical analysis was conducted using Graphpad Instat, a Windows-based software based in San Diego, CA, USA.

Results

In this study, 81 enrolled yoga practitioners were

initially considered, and eventually, 67 participants completed the one-month intervention. The participants, aged between 20 and 54 years, comprised 67 individuals, with a gender distribution of 40.3% male and 59.7% female. Among the enrolled participants, the majority identified as vegetarians (82%), 95.45% reported no health problems, and 95.31% were not on active medication (Table 1).

Table 2 presents the pre- and post-intervention scores of the questionnaires. The Mindful Attention Awareness Scale for Attention (MAAS-A) demonstrated a significant increase in scores from 70.42±9.47 to 72.39±9.59 ($p<0.01$), indicating an enhancement in attention. Similarly, the GSES exhibited a significant increase from 33.48±4.89 to 35.66±6.10 ($p<0.01$), indicating improved general self-efficacy. However, Biochemical Parameters showed a non-significant positive trend before and after the yogic practices. The lipid profile, encompassing TC, TG, HDL, LDL, and VLDL, did not show any significant changes, although a trend of improvement was noted.

Table 1. Socio-Demographic details

	Yoga Group(n=67)
Age, mean(SD)	28.94 (6.95)
Male %	40.30%
Female%	59.70%
Vegetarians %	82.00%
Non-Vegetarians %	18.00%
No health problems	95.45%
No active medication	95.31%

Discussion

The present study was designed to determine the impact of advanced yogasanas on psychological (Attention, Self-Efficacy) and biochemical parameters (TC, TG, HDL, LDL, and VLDL) in adults. The outcomes prominently showcase a substantial shift in the attention levels (p value<0.01**), and improving the GSES levels (p value<0.01**). Although the results were not statistically significant, there was a noticeable improvement trend in the biochemical parameters i.e. there was an increase in the mean difference of the TC (p=0.629, md=1.65), and HDL (p=0.123, md=1.636), but a decrease trend in mean difference was shown in the levels of TG (p=0.762, md=0.917), LDL (p=0.339, md=0.858), and VLDL (p=0.567, md=0.358) between the pre- and post-data. The study focused on a cohort of 67 yoga practitioners, aged between 20 and 54 years, who completed a one-month intervention. The participants demonstrated diverse characteristics, with a majority identifying as vegetarians and reporting no significant health issues or active medication.

One of the primary objectives of the study was to evaluate the psychological effects of advanced yogasanas. Moreover, investigations have shown the beneficial effects of yoga on cognition [12,13]. The cognitive benefits associated with yoga may be due to mechanisms including activation of the parasympathetic

Table 2. Pre- and post-data of psychological (attention and self-efficacy) and biochemical (lipid profile) scores of the yoga group

	Yoga Group (N=67)					
	Average Scores		Mean difference (md)	df	T-score	p-value
	Pre-Yoga mean(SD)	Post-Yoga mean(SD)				
	Psychological parameters					
MAAS-A	70.42 (9.47)	72.39 (9.59)	1.97	66	4.609	0.01**
SE SCALE	33.48 (4.89)	35.66 (6.10)	2.18	66	5.839	0.01**
	Biochemical parameters					
TC	174.3 (39.03)	175.97 (36.82)	1.65	66	0.484	0.629
TG	96.89 (45.18)	95.98 (38.17)	0.917	66	0.302	0.762
HDL	50.94 (9.97)	52.58 (10.42)	1.636	66	1.562	0.123
LDL	80.74 (28.88)	79.89 (27.19)	0.858	66	0.962	0.339
VLDL	19.37 (8.95)	19.01 (8.02)	0.358	66	0.574	0.567

MAAS-A -Mindful Attention Awareness Scale-Attention, SE- Self-Efficacy Scale, TC- Total Cholesterol, TG- Triglycerides, HDL- High Density Lipoprotien, LDL- Low Density Lipoprotien, VLDL- Very Low Density Lipoprotien, SD- Standard Deviation, df- degree of freedom, **Significant at $p \leq 0.01$

nervous system, increased body perception, stronger functional connectivity within the basal ganglia, or increased activation of grey matter volume and amygdala with regional enlargement. [1,7,13]. The assessment of attention using the MAAS-A revealed a statistically significant improvement in scores post-intervention ($p<0.01$**). This suggests that advanced yogasana positively influences attention levels, enhancing mindful awareness among participants. A study has been shown that yoga practice enhances the subject's attention on breathing and specific body muscles, referring to a general improvement in attentional capacity [14]. Also, another study showed that yoga and similar practices are strongly related to increased levels of attention, as well as an improved ability to direct attention [15,16].

Additionally, the observed increase in the GSES ($p<0.01$**) score further emphasizes the potential psychological benefits of engaging in advanced yoga practices. Self-efficacy is defined as a belief about one's ability to perform a specific behaviour or "the conviction that one can successfully execute the behaviour required to produce (certain outcomes)" [17]. Additionally, a study delves into the effects of yoga on positive psychological outcomes, encompassing aspects such as self-efficacy, which offers a comprehensive overview of various studies that have probed into the broader impact of yoga on mental well-being. A study conducted among practitioners and instructors suggests that yoga practice offers advantages across cognitive and affective psychological functions, potentially improving memory while reducing emotional tension, depression, anxiety, and irritability [17]. Moreover, within different postures and categories, variations in posture self-efficacy ratings were observed [18].

Addition to the psychological results, there was a pattern of improvement observed in the examined biochemical parameters. Specifically, the lipid profile, including TC, and HDL showed an increase in the values but a decrease in values of TG, LDL, and VLDL, displayed an improvement trend, though it did not reach statistical significance. This suggests that advanced yogasanas may have a positive impact on psychological and biochemical parameters. Yoga practices have been shown to have anti-inflammatory effects, which could contribute to positive changes in lipid profiles. Some studies suggest that yoga practices may enhance insulin sensitivity, potentially influencing lipid metabolism and contributing to improved lipid profiles. This study may be in the same line. The results of a comprehensive six-week yoga therapy training program reveal significant impacts on pre- and post-menopausal diabetic patients, leading to improvements in reaction time, blood glucose levels, and lipid profiles, with implications extending to the prevention and management of diabetes mellitus and showing promise in reducing cardiovascular complications and enhancing patient lipid profiles [9,10,19,22,25]. Additionally, a study exploring the effects of yoga on hypertensive subjects and normal individuals practicing yoga and meditation reveals a decrease in TC and TG levels, although statistically insignificant [20,21,24]. Furthermore, another study observes a substantial decrease in all components of the lipid profile after yoga, except for HDL, which sees a significant elevation. This implies that moderate physical activity, exemplified by yoga postures equivalent to moderate exercise, can contribute to reducing LDL cholesterol [23].

Comparisons with existing literature provide additional context to the findings. Previous studies have reported positive associations between regular yoga practice and improved psychological (attention and self-efficacy) and biochemical well-being. The present study aligns with this body of evidence, supporting the notion that advanced yogasana practices contributes to holistic well-being.

Limitations

The study confined to small population and with small sample size. A larger sample size can help in better assessment and generalizability of results. For better biochemical assessments the duration of intervention can be increased.

Strength

This is one of few studies assessing large number of parameters including psychological and biochemical after practising intensely the advance level of yogasanas.

Conclusion

In conclusion, the findings of this research contribute to the growing body of knowledge on the multifaceted benefits of yoga practices. The observed enhancements in attention and self-efficacy suggest that advanced yogasanas holds promise as a valuable tool for enhancing psychological well-being in adults. The absence of significant changes in the examined biochemical parameters indicates the necessity for further exploration with a larger sample size and an extended time frame. This underscores the importance of conducting longitudinal studies to comprehensively grasp the potential impacts of advanced yoga practices on biochemical dimensions. This study serves as a stepping stone for future research endeavors aimed at elucidating the intricate interplay between advanced yogasana and holistic well-being.

Conflict of Interests

The authors declare no actual or potential conflict of interest.

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