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Impact of Yoga therapy on hormonal imbalance in women with Polycystic Ovarian Disease

Research Article

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Abstract

The current study aims to evaluate the impact of *yoga* therapy on hormonal imbalance in PCOS affected women. An empirical study was conducted on 25 women having been diagnosed with PCOS condition. The study used pre and post design. Before starting allopathic medication participants were explained about *yoga* therapy and participants in the study voluntarily agreed to participate in this study without using medication. Written consent was obtained from the participants. Testosterone, Prolactin, Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH), were selected as dependent variables for this study. Before introducing the *yoga* therapy intervention, baseline hormonal values were collected through blood tests. All the 25 participants practiced *yoga* protocol specially designed for PCOS condition, for a duration of 12 weeks. At the end of 12 weeks the participant took the blood test in the laboratory for hormonal levels of PCOS related hormones selected for this study. Baseline data was compared with Post data. The impact of *yoga* therapy on the hormonal imbalance was statistically analysed through paired t-test. The statistical analysis yielded following t values: Serum Testosterone 21.52 ($P < 0.001$), Serum Prolactin 22.13 ($P<0.001$), Serum LH 30.10 ($P<0.001$), and Serum FSH 14.16 ($P<0.001$). The impact of *yoga* therapy intervention on hormones related to PCOS condition was found to be significantly positive. The results imply that regular *yoga* practice can be an effective therapy for women with PCOS, especially for correcting imbalance in hormone levels related to PCOS.

Key Words: Hormonal imbalance, Yoga Therapy, PCOS, Ovarian Cyst, Follicle Stimulating Hormone, Luteinizing Hormone.

Introduction

Yoga is an age-old method of maintaining good health by fusing the physical and spiritual disciplines that unite the body and mind. It was created more than 5,000 years ago in India. Its guiding ideas emphasise the integration of all physical, mental, and spiritual components of life in order to reach true happiness. As the scientific understanding of the impact of *yoga* is progressing for five decades, *yoga* is being practised to attain self-regulatory benefits; *Yoga* is a practice that stresses the importance of respiration, suppleness, and endurance to enhance mental health. It consists of variety of exercises, practises, and rituals for the body, mind, and spirit. Two primary tenets of *yoga* are posture, breathing.

Indian monks brought *yoga* to the West region in the 1890s. Contemporary *yoga teachings* were tremendously well-liked in Western nations by the nineteen seventys. *Yoga* is a promising therapeutic intervention, but more research is needed to determine exactly how *yoga* practice affects one's health. Numerous non-communicable diseases can be effectively treated with *yoga* treatment (1). *Yoga* therapy can greatly slow down the catabolic process of cell degeneration and maintain the body's flexibility, cleanliness, and lubrication. *Yoga* calms the body and mind, maybe via balancing the sympathetic and parasympathetic nerve systems (2). To identify the new therapeutic solutions consistent research is going on.

Yoga therapy also focuses on psychosomatic problems. It also focuses on gynaecological problems, endocrine illnesses such as PCOS; menstrual problems are a few among these problems. Among the endocrine illnesses PCOS is one of the major problem for women, cystic ovaries, hyperandrogenism, irregular menstruation, and persistent anovulation are the hallmarks of polycystic ovarian syndrome (PCOS) (3). It is the leading cause of infertility in women (4). In India, the prevalence of PCOS estimates are between 8.2% and 22.5% depending on the criteria used (5). Obesity, insulin resistance, hormonal imbalance, lifestyle are some of the causes affecting women of all age groups (6) (7). Clinical features such as reproductive manifestations like reduced fertility, reduced frequency of ovulation, irregular menstrual cycles and elevated levels of male hormones have been linked to an increased risk of developing several

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medical conditions including insulin resistance, type-2 diabetes, and heart disease. (8).

PCOS is an emerging health problem, therefore correct diagnosis, treatment sources, promotion of healthy lifestyles, and early interventions are required to prevent future morbidities (9).

Etiology

The exact cause of PCOS is still unknown factors that affect the PCOS, may be physiological (Metabolic, and reproductive) socio-psychological, environmental, and genetic according to studies. Numerous weak genes have been associated to the disease's development (10). Also, endocrine disorders such as PCOS are brought on by a sedentary lifestyle, dietary changes, a lack of exercise, a high-calorie diet, and severe weight gain.

Increased stress is also one of the causes of PCOS; stress can disrupt the regular menstrual cycle and lead to hormonal changes, such as elevated levels of cortisol, LH, and prolactin, which alter menstruation, which typically resumes once the stress subsides (11).

Hormonal imbalnace

Menstrual cycles are interrupted by hormonal imbalance in PCOS; LH and FSH are the hormones that promote ovulation. The brain's pituitary gland secretes both LH and FSH. LH, a hormone created by the pituitary, and insulin echelons in the blood are typically too high in people with PCOS (12). As a result, the ovaries create too much testosterone, the ovaries typically produce very little testosterone, which is a "man hormone," but with PCOS, they produce more (13). The numerous physical signs of PCOS, including face and body hair growth, acne, and hair loss, are caused by high testosterone levels. According to some data, it may also impair the ovaries' proper operation. Additionally, a woman's body's naturally occurring menstruation and ovulation can be suppressed by even a small rise in testosterone.

A woman's ovaries cannot release eggs from the follicle when she has high levels of androgen hormones like testosterone (14).

A high testosterone environment in women can result in insulin resistance and abdominal weight gain. Because of this, increased androgen contributes to the weight gain linked to polycystic ovarian syndrome (PCOS) (15). Because of diversification in symptoms it requires accurate symptom assessment and strategic management. For this purpose, various interventions are emerging, but making any intervention acceptable requires scientific investigation.

Review of Literature

For the past few years, diagnostic and therapeutic advances have re-ignited researchers' interest in polycystic ovary syndrome. Along with pharmacological interventions, alternative therapies also show efficacy in reducing PCOS symptoms. Alternative therapies such as *Yoga* therapy is one of them, we present pharmacological and yogic intervention related scientific review literature in this section.

Pharmacological drugs play a vital role in reducing hormonal disparity in PCOS conditions; towards distinguishing the impact of the different pharmacological drugs on hormonal imbalance, a study was conducted to compare the impact of two varied drugs on clinical, hormonal imbalances in PCOS patients. The findings observed that using these drugs resulted in an extensive reduction in BMI, Hirsutism (excessive body hair) Luteinizing Hormone levels. Whereas Follicle - stimulating Hormone (FSH) and progesterone increased expressively, no changes were observed in fasting glucose or insulin levels. Another drug resulted in a considerable decline in LH, testosterone, and LH to FSH ratio, and hirsutism was improved. The study concluded that both drugs worked with different mechanisms on divergent symptoms (16). Another study reported that to reduce the hormonal-induced complications of PCOS, pharmacological interventions and Vitamin D have been applied to reverse the hormonal disturbance of PCOS (17).

Hormonal imbalance in PCOS condition interrupts menstrual cycle, to detect the influence of allopathic medicine on menstrual periods a study emphasized on two well-known novel medicinal agents and reported that these are beneficial to reduce the levels of serum testosterone, improve insulin sensitivity, and reinstate normal menstruation. Along with the above studies, some studies emphasize hormonal therapy; Patel et al. reported hormone therapy has been reversing the adverse effects of hormonal imbalance and also stated that lifestyle changes also giving promising results in reducing hormonal imbalance.

Alternative and complementary medicines are promoted in both rural and urban areas of India, a heavily populated nation that spends enormous sums on health issues to ease the financial strain. Integrating traditional and complementary medicine with contemporary medicine as necessary for universal health care can emphasise the value of currently practised traditional and complementary medicine (18). In order to attain UHC, the WHO is also seeking to integrate complementary and alternative medicine into national policies.

Need for the alternative therapies

Based on the above findings, management of PCOS symptoms with allopathic intervention showed positive results, but most of the studies highlighted lifestyle changes which will be a preventive solution for PCOS (19). From past few years lifestyle changes with alternative therapies showing positive results (20). Studies suggest that early identification, better nutritional and lifestyle management, and alternative therapies such as *yoga* therapy may improve the patient's quality of life and speed up their recovery from this disease (21).

The *Patanjali Yoga Sutras*, *Upanishads,* and *Yoga Vasishtha*, three classical texts of *yoga,* emphasise an all-encompassing strategy for managing one's health. The first-line effective treatment for PCOS is lifestyle

changes (22). Many scientific shreds of evidence show that the physiological (Reproductive, Metabolic) and psychological deviations of PCOS are reduced by *yoga* therapy with promising results (23).

Yoga consists of static positions, flexing motions, and breathing methods acting unison to promote overall wellbeing. This will lead to hormone balance and better predictability in the menstrual cycle (24).

Excessive male hormone (testosterone) secretion in women also leads to menstrual irregularities (25). To perceive the hormone imbalance and observe the impact of *yoga* therapy on testosterone hormone and BMI, a randomized experiment research was done on adult women (n=30) aged 20-35 years with PCOS. These women were spilt into two groups; one group follows *yoga* therapy for 8 weeks (60 min, 6 days a week) another group had in rest. Serum testosterone, body mass index (BMI), data was collected upon inclusion and after eight weeks After the experimental period it is established that adult women who received *yoga* therapy showed significant differences in their BMI and Testosterone hormone parameters reduced when compared to the control group (26). The results observed in an experimental study (n=22) , thrice-weekly mindful *yoga* practice for three months significant results were achieved in free testosterone levels and dehydroepiandrosterone (DHPS) levels that trended lower (27).

Yoga is shown to be effective as a supplemental treatment for a variety of medical conditions. It offers lifelong social skill, improves self-efficacy and self-assurance, and is frequently connected with extra beneficial properties. It can be used, at least in part, as a self-care social treatment.

Aim

The specific aim of this study is to investigate the impact of *yoga* practice on changes in hormonal levels related to PCOS condition.

Objectives

The present study attempts to investigate the following objectives:

- Objective -1: To study the impact of three months of integrated *yoga* therapy on the levels of Testosterone hormone in women with PCOS condition.
- Objective – 2: To study the impact of three months of integrated *yoga* therapy on the levels of Prolactin hormone in women with PCOS condition.
- Objective – 3: To study the impact of three months of integrated *yoga* therapy on the levels of Luteinizing Hormone (LH) hormone in women with PCOS condition.
- Objective – 4: To study the impact of three months of integrated *yoga* therapy on the levels of Follicle Stimulating Hormone (FSH) in women with PCOS condition.

Methodology

Research Hypothesis

- H1- It was hypothesized that there will be significant improvement in the imbalance of Testosterone levels in women with PCOS condition after 3 months of *yoga* practice
- H2- It was hypothesized that there will be significant improvement in the imbalance of Prolactin levels in women with PCOS condition after 3 months of *yoga* practice .
- H3- It was hypothesized that there will be significant improvement in the imbalance of Luteinizing Hormone (LH) levels in women with PCOS condition after 3 months of *yoga* practice .
- H4 - It was hypothesized that there will be significant improvement in the imbalance of Follicle Stimulating Hormone (FSH) levels in women with PCOS condition after 3 months of *yoga* practice.

Sample

The following criteria were used in selecting the sample. Subjects were taken from a gynaecological clinic. After the laboratory evaluations, 25 women participants who satisfied the Rotterdam Criteria of PCOS were recruited. The sample was selected using a convenient sampling technique.

Inclusion criteria

Women in the age range of 20-35 years were selected for this *yoga* therapy intervention. Women who were diagnosed as having PCOS only were selected. Women willing to participate in the program as per their choice willing to take *yoga* therapy intervention, only were selected and they were not under any other treatment program.

Exclusion criteria

Women undergoing any other treatment with PCOS were excluded. Women below or above the age range of 20-35 were excluded. Women who were having other comorbidities were excluded from this study.

Written approval was obtained from The Institutional Ethical Committee of GITAM (Deemed to be University) for this study. Signed informed consent was obtained from the participants.

Gears used for the study

Fertility Hormone Blood Test

This test was done in a diagnostic laboratory. The test measures the levels of hormones that are considered as related to PCOS disorder, namely: testosterone, prolactin LH, FSH.

Dependent variables

In this research, the dependent variables investigated include PCOS related hormones namely - Testosterone, Prolactin, Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH) levels.

Independent variables

In order to create the *Hatha yoga* intervention it was designed, taking the guidance of classical texts on *yoga*, *yoga* experts, and allopathic doctors. The therapy program was designed following the researcher's previous experience in *yoga* therapy. The special package of *Hatha Yoga* practices comprises of *Yogic kriyas* (cleansing techniques) (weekly once), *Asanas* (body postures), *Pranayama* (breathing practices), *Bandhas* (energy locks), *Dhyana* (meditation). These *yogic* practices were done regularly based on their sequencing of joining dates for three months by all the subjects included in the group. The *Yoga* session in this study consisted of 60 minutes. These *yoga* sessions were practiced for 5 days per week, it is as follows.

Procedure

After obtaining the written consent from the participants and after venous blood test reports confirmed by the gynaecologist about PCOS condition, pre-testing was done and data were collected on the selected dependent variables. The obtained data was tabulated as baseline data. Before starting the intervention program, an interactive introductory lecture was conducted. In the introductory lecture, the purpose and design of the study was explained to the participants.. A special package of *Hatha Yoga* practices designed for PCOS condition was taught to the participants for one hour daily for five days a week. Attendance was taken regularly by the researcher.

Yoga intervention procedure

1. ***Kriyas*** (cleansing techniques): *Agni sara, JalaNeti* - (2 minute each).
2. **Practice of *Sukshma Vyayama*** (warm up). *Chakki Chalan*, Cycling and Leg Rotation - (4 minutes)
3. **Physical Postures (*Asana*)**:

a) Practice of *Surya Namaskara* (sunsalutation) - (5Minutes)

b) **Standing posture:** *ParvrittaTrikonasa* (Revolved Triangle Pose), *Prasaritha Pada Uthana Asana*, (Spread Leg Intense Stretch) - (1 minute each)

c) **Sitting posture:** *Badhakonasana* (Fixed Angle Pose), *Janusirasana* (Head-Knee-Pose), *Paschimottanasana* (Intense back stretch), *Supta kurmasana* (Tortoise pose) - (1 minute each)

d) **Supine posture:** *Viparithakarani mudra* (Inverted Pose), *Sarvangasana*& *Halasana* (Shoulder stand & Plough Pose) - (1 minute each)

e) **Prone posture:** *Sarpasana* (Snake Pose), *Dhanurasana* (Bow Pose) - (1 minute each)

4. ***Pranayama*** **(**Breathing Technique**):** *Brahmari* (Humming bee sound), *Kapalabhati* (Forceful Exhalation) (2 min each). *Udyana & Moola Bandha* (1 min each).
5. ***Dhyana*** **(**Meditation): 15 min**.**
6. ***Savasana*** (Guided Relaxation): 5 min

After completion of three months of intervention, from their joining in the research study, the blood test reports were collected for second time by the researcher after being confirmed by the gynaecologist and the data was tabulated for statistical procedures.

Results and Discussion

Data analysis

Statistical Package for Social Sciences (SPSS) for Windows version 22.0 was used for statistical analysis.

Table 1: Showing Demographic Details of The Participants

N	25
Age Range (years)	20 – 35
Age Mean	27 (Sd±4.75)

The demographic data related to the participants of the study are presented in Table 1. The sample size was 25. The participants' age range was 20 to 35 years. with an average age of 27 years and Standard Deviation of +/- 4.75.

Table 2: Showing Mean and Standard Deviation Values of Testosterone, Prolactin, Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH) Before and After *Yoga* Therapy Intervention

Variable	*Yoga* Therapy Intervention			
	Pre		Post	
	M	SD	M	SD
Serum Testosterone ng/dl	96.43	8.39	50.47	11.82
Prolactin mg/mL	30.36	3.10	13.30	1.28
LH mlU/mL	15.72	1.12	7.59	1.10
FSH mlU/m	10.43	1.53	5.14	0.71

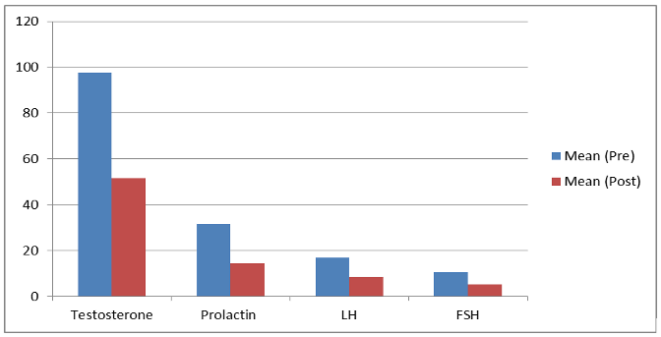
The mean values of all the participants' hormone levels selected for this study were measured before the *Yoga* Therapy intervention and after three months of the *Yoga* therapy intervention program are presented in table 2.

In the above **t**able it may be observed that the participants' mean Serum Testosterone values were 96.43 (Sd=/-8.39) and 50.47 (Sd=/-11.82) before and after *yoga* therapy respectively. Serum Prolactin values were 30.36 (Sd=/-3.10) and 13.30 (Sd=/-1.28) before and after *yoga* therapy respectively. Serum LH values were 15.72 (Sd/-1.12) and 7.59 (Sd/-1.10) before and after *yoga* therapy respectively. Serum FSH values were 10.43(Sd/-1.53) and 5.14 (Sd/-o.71) before and after *yoga* therapy respectively.

Table: 3: Showing the 't' Values of The data Obtained Before and After *Yoga* Therapy Intervention.

S. no	Variable	*Yoga* Therapy-Intervention				
		Pre Mean ±Sd	Post Mean ± Sd	Mean difference	t-Value	p-Value
1	Serum Testosterone ng/Dl	96.43± 8.39	50.47± 11.82	45.96± 8.44	21.52	<0.001
2	Prolactin mg/mL	30.36± 3.10	13.30± 1.28	17.06± 2.39	22.13	<0.001
3	LH mlU/mL	15.72± 1.12	7.59± 1.10	8.13± 0.86	30.10	<0.001
4	FSH mlU/ mL	10.43± 1.53	5.14± 0.71	5.29± 1.15	14.16	<0.001

Graph 1



The study showed that before *yoga* therapy intervention serum testosterone mean values were 96.43 ± 8.39 and after three months of *yoga* therapy intervention the mean values are 50.47 ± 11.82, The difference between the two means yielded a 't-value' of 21.52 which was found to be significant at ($p<0.01$). The results indicate that there was a significant reduction in Serum Testosterone levels after *yoga* therapy. Before *yoga* therapy intervention Serum Prolactin mean values were 30.36 ± 3.10 and after three months of *yoga* therapy intervention mean values are 13.30 ± 1.28, The difference between the two means yielded a 't-value' of 22.13 which was found to be significant ($p<0.01$). The results indicate that there was a significant reduction in Serum Prolactin levels after *yoga* therapy. Before *yoga* therapy intervention Serum LH mean values were 15.72 ± 1.12 and after three months of *yoga* therapy intervention mean values are 7.59 ± 1.10, The difference between the two means yielded a 't-value' of 25.23 which was found to be significant ($p<0.01$). The results indicate that there was a significant reduction in Serum LH levels after *yoga* therapy. Before *yoga* therapy intervention Serum FSH mean values were 10.43 ± 1.53 and after three months of *yoga* therapy intervention mean values are 5.14 ± 0.71, The difference between the two means yielded a 't-value' of 14.16 which was found to be significant ($p<0.01$). The results indicate that there was a significant reduction in Serum FSH levels after *yoga* therapy, without medication.

Discussion

This study is the non-randomized controlled trial, and it was conducted to evaluate the effectiveness of 12 weeks of *yoga* therapy on hormonal parameters such as Serum Testosterone, Serum Prolactin, Serum LH, Serum FSH in PCOS. The usual range for Testosterone is 15 to 70 ng/Dl, high Testosterone levels can have a negative effect on a woman's physical appearance in a variety of ways, including excessive body and facial hair, acne, irregular menstrual cycles, and mood swings. In the present study all the subjects were having high levels of Testosterone. The 12 weeks of *yoga* therapy started with *yogic kriya*s (cleansing techniques) *Agnisara kriy*a which cleanse the impurities of the body, cleanses and activates abdominal muscles and stimulates ovaries. *Jala Neti kriya* activates respiratory, circulatory and nervous systems and improves lung capacity. By doing these *kriyas,* and *Sukhma Vyayama* (Loosening Exercise) subjects felt lightness in the body and mind level. After that subjects regularly practiced *asanas* like "*Sarvangasana"* which promote the hormonal secretions by stimulating the endocrine system and have positive effects on endocrine glands. Based on the pose description in the *yoga* book Light on *Yoga* (28), subjects practiced these *asanas* and got positive results in Testosterone hormone levels.

The normal range of Serum Prolactin, a hormone released by the pituitary gland, is 3.8 to 23 mg/ml (milligrams per milliliter). When prolactin levels are high, periods are irregular or nonexistent, having infertility and menopause symptoms, .If left untreated for a longer length of time, it may result in osteoporosis (a thinning and weakening of the bones) (29) *Yoga* poses like *Dhanurasana* which tones the abdominal region and open up the chest region and facilitate better breathing. *Paschimottanasana* stretches the lower abdomen and spinal cord nerve system, which encourages the spine mobility and overall body flexibility, which tends to smooth functioning of body organs. For instance, *moola bandha* is said to trigger the pituitary gland in the late 17th-century classic "*Gheranda Samhita*." The perineal area is immediately impacted, which has an indirect effect on the pituitary, pineal glands and these are the most important glands for hormone secretion and ovaries, uterus function (30) in present study subjects practiced *Moola Bandha* regularly and their hormone secretion was balanced. Similarly *Viparita Karani Mudra* was practiced by the subjects which were specifically recommended in the *yoga* book "*Light on Yoga*" because it is thought to promote the reproductive organs and enhance pituitary blood flow. One more asana *Supta Kurmasana* practiced by the subjects which open up the pelvic area and ovaries, uterus gets massaged properly which reduces pelvic pain and balances the hormone secretion (31).

The normal range for LH is 1.7 to 15 mIU/mL. (Milli-international units per milliliter). The late 17th-century Sanskrit text "*Gheranda Samhita*" claims that *Pranayama* like *Brahmari* develops vital energy and reduces stress which is one of the causes for PCOS occurrence, by regulating the breathing it ,instils physical, mental, and emotional tranquilly by practicing these *pranayamas* including *Dhyana* (meditation) and *savasana* subjects got relaxation in physical and mental level which reverse the menstrual disparities (32).

Follicle-stimulating hormone (FSH), produced by the pituitary gland, regulates the menstrual cycle and encourages egg production in the ovaries (33). FSH typically falls within the 1.4 to 9.9 mIU/Ml range. High levels of FSH will causes ovarian dysfunction or failure, which results in a hormonal imbalance that causes ovarian cyst formation (34). According to the yogic classical books, poses like "*Prasarita Pada Uttanasana*", "*Baddha Konasana"* tone and massage all of the organs in the abdomen and pelvic region, including the liver, pancreas, spleen, urogenital system, and adrenal glands, which improve pelvic blood flow, supply oxygenated blood to the ovaries, and thereby regularise menstrual cycles (35). A prior study found that yoga positions increase consciousness, improve

pelvic blood flow, supply oxygenated blood to the ovaries, and thereby regularise menstrual cycles (36).

Conclusion

This study's conclusions suggest that *yoga* therapy is a successful treatment for PCOS issues. A probability of negative side effects persisting after stopping an allopathic treatment exists in any treatment scenario. Hormonal imbalance is significantly reduced by *yoga* therapy, which is both inexpensive and risk-free. All of the participants' lives may be spent doing this. *Yoga* treatment, which focuses on more than just the physical body, offers a comprehensive approach to treating polycystic ovarian syndrome. *Yoga* therapy therefore has a positive impact on PCOS issues. It serves as evidence of the benefits of complementary therapy (intervention). Among PCOS-affected women, changing one's lifestyle may be a successful technique for reducing the risk of PCOS-related physiological and psychological disorders. Emerging evidence of the cost-effectiveness of numerous alternative therapies in comparison to standard care has been uncovered via thorough systematic evaluations. As a cost-effective initial intervention, *yoga* therapy interventions could therefore be very beneficial for women's reproductive health.

Advantages

- The advantages of this study are as follows.
- *Yoga* practises won't have any negative impacts.
- Individualized *yoga* therapy focuses on metabolic effects and reducing additional problems.
- These *yoga* practices can be performed for the rest of one's life without incurring further costs after learning them. Due to the country's high population, these *yoga* practices can become more inexpensive.

Limitations: A moderate sample size.

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