

Evaluating The Effect of Structured Yoga on WHO Wellbeing Index and Spine Flexibility in Undergraduate Students: An Interventional Study

Gauri Apte¹, Makarand Apte²

¹Associate Professor, Department of Physiology, MAEER MIT Pune's MIMER Medical College and Dr BSTR Hospital, Talegaon Dabhade, Pune, Maharashtra, India

²Associate Professor, Department of Anatomy, MAEER MIT Pune's MIMER Medical College and Dr BSTR Hospital, Talegaon Dabhade, Pune, Maharashtra, India

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Corresponding Author: Dr. Makarand Apte

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Abstract:

Background: Physical inactivity and psychological stress are becoming more and more common among undergraduate students, and this ends up affecting both their mental well-being and physical fitness. Yoga, which is a holistic mind-body practice, has been shown in several studies to improve both physical and psychological parameters in young adults.

Objectives: To evaluate the effect of a structured yoga intervention on the WHO Well-being Index and spinal flexibility among undergraduate students.

Material and Methods: This prospective interventional study was carried out on 97 students of both genders belonging to age group 18–22 years. All participants followed a structured yoga program for 60 minutes daily, five days a week, for a period of six months. The WHO-5 Well-being Index and spinal flexibility (using the Sit & Reach Test) were assessed before and after the intervention. Statistical analysis was done by using Z-test and Mann–Whitney test, with $p < 0.05$ considered significant.

Result and Analysis: There was a statistically significant improvement in spinal flexibility in both male and female participants after the yoga intervention ($p < 0.0001$). The WHO Well-being Index also showed noticeable improvement, with more participants shifting into the “normal well-being” category.

Conclusion: Structured yoga intervention significantly improves both psychological well-being and spinal flexibility in undergraduate students, and it can be considered as a useful preventive health strategy.

Keywords: Yoga, WHO Well-being Index, Flexibility, Sit and Reach Test.

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Introduction

Higher education is often associated with high levels of stress, sedentary habits, and reduced physical activity, all of which can negatively impact both physical and mental health of students. [1,2] Reduced flexibility and poor mental well-being are now increasingly being reported among young adults, probably due to lifestyle changes. [3]

Physical fitness is not just about strength or endurance—it also includes flexibility and psychological health, both of which are important for proper functioning. [4]

The World Health Organization defines health as a state of complete physical, mental, and social well-being, which highlights how important mental health is alongside physical fitness. [5]

Yoga, an ancient Indian practice that combines physical postures (asanas), breathing techniques (pranayama), and meditation, has now gained global

acceptance as a therapeutic approach [6]. Many studies have shown that yoga helps improve musculoskeletal flexibility, enhances parasympathetic activity, and reduces stress hormone levels. [7,8]

It has also been observed that yoga can influence neurobiological pathways by increasing gamma-aminobutyric acid (GABA) levels and reducing cortisol, which ultimately helps in better emotional regulation. [9,10] In addition, structured yoga programs have been linked with improvements in sleep, quality of life, and mental resilience in students. [11,12]

However, even with increasing evidence, there is still a need for more structured interventional studies that look at both physical and psychological outcomes together in undergraduate students. [13] Hence, the present study was planned to evaluate the

effect of yoga on spinal flexibility and the WHO Well-being Index.

Materials and Methods

The present study is a prospective interventional type of study. Permission for the current study was obtained from the institutional ethics committee. The present study was carried out in 97 under graduate students in an urban city of Maharashtra. 47 male and 50 female students of age group of 18-22 years, to whom Yoga training for six months was given. All subjects were chosen according to certain inclusion and exclusion criteria.

Inclusion Criteria

- Subjects participating in regular yoga training for at least 60 mins/day, for at least 5 days a week for 6 months.
- Subjects giving informed consent.

Exclusion Criteria

- History of cardiovascular diseases like rheumatic heart disease, coronary heart disease, congenital heart disease.

- History of respiratory diseases like bronchial asthma, COPD, tuberculosis.
- History of any psychiatric illness.
- History of smoking and alcohol.
- Severe anaemia.
- Physical disability
- History of any chronic illness like hypertension, diabetes mellitus.
- Participants missing 5 consecutive days of yoga training

Written informed consent regarding voluntary participation in study was obtained from all the subjects. Following parameters were estimated in all participants before yoga intervention.

- 1) WHO Well-being Index
- 2) Flexibility of spine by Sit & Reach Test.

WHO (five) Well-being Index consists of five questions related to the daily routine of last two weeks, the answers to which can be scored from grade 5 to grade 0.

Table 1: The World Health Organization-Five Well-Being Index (WHO-5)

Sr. No.	Question	All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
1	I have felt cheerful and in good spirits	5	4	3	2	1	0
2	I have felt calm and relaxed	5	4	3	2	1	0
3	I have felt active and vigorous	5	4	3	2	1	0
4	I woke up feeling fresh and rested	5	4	3	2	1	0
5	My daily life has been filled with things that interest me	5	4	3	2	1	0

The raw score was calculated by totalling the scores on each of the five questions. In this test, the raw score ranges from zero to 25, zero representing worst possible mental well-being and 25 representing best possible mental well-being. The score between 14-25 indicates good to best quality of life.

To get a percentage score ranging from zero to 100, the raw score was multiplied by four. A percentage score of zero represents worst possible mental well-being; a score of 100 represents best possible mental well-being. A percentage score below 50 (or a raw score below 13) has been suggested as a cut-off for poor mental well-being and as an indication for further assessment for the possible presence of a mental health condition (e.g., depressive disorder)

Flexibility of Spine by Sit & Reach Test: The Sit & Reach Test is a simple, reliable, and non-invasive method to assess spinal flexibility and hamstring extensibility, widely used in both clinical and sports settings.

Principle of Sit & Reach Test: The test measures the maximum distance a person can reach forward while sitting with legs extended, which reflects the flexibility of:

- Lumbar spine
- Hip joint
- Hamstring muscles

Equipment Required for this test are Sit and reach box (or a measuring scale fixed on a box), a Flat surface and Marker/scale in centimeters.

Steps in The Sit & Reach Test:

1. Preparation

- The subject removed shoes.
- Sat on the floor with legs fully extended.
- Feet were placed flat against the sit-and-reach box.

2. Starting Position

- Knees remained fully extended (no flexion).
- Arms were stretched forward with one hand placed over the other.
- Palms were facing downward.

3. Performing the Test

- The subject was asked to bend forward slowly from the hip joint.
- Reached forward along the measuring scale as far as possible.
- Movement was smooth and without jerking.

4. Holding the Position

- The final position was held for at least 2 seconds.
- It was ensured that knees did not bend during the attempt.

5. Recording the Score

- The distance reached by the fingertips was recorded in centimeters.
- Usually, three trials were given, and the best reading was taken.

Interpretation of Results of Sit & Reach Test-

- Higher values → better flexibility
- Lower values → reduced spinal/hamstring flexibility

Study Design and Setting: Interventional trial over 6 months.

Intervention: All 97 participants were given 60 minutes of Yoga daily, 5 times a week, for 6 months. A structured yoga program was designed for all the students by a certified yoga teacher. The sessions were conducted under supervision of the yoga teacher. A structured yoga program was devised by the yoga teacher. Practice of Yoga was done from 6 am to 7am every day. For the current study following yoga practice was planned as follows.

1. Prayer (2 minutes)

2. Yogic Posture (20 minutes)

- Jumps (for warming up)
- Suryanamaskar: (12 Postures of sun salutation exercise) - 2 sets
- **Asanas in Standing position:** Tadasan, Uttanasan, Adhomukh shvanasan, Urdhwamukh shvanasan, Adhomukh shvanasan, Uttanasan, Tadasan
- **Asanas in Sitting position:** Vajrasan, Gomukhasan (legs), Baddhakonasan, Dandasana
- **Asanas in Sitting position:** Twisting of upper body
- **Asanas in Prone position:** Alternate hand and legs up down; Hands, neck and shoulders up; Torso up
- **Asanas in Supine position:** Legs up & down; Torso up; Legs up & down 90 degree; Naukasan

3. Resting asanas: Padangushthasan (or) lumbar rest, Shavasan – (10 minutes)

4. Pre-pranayam (4 minutes): Observe own breathing (for 5 breaths), Deep inhalation followed by normal exhalation (5 breaths), Deep inhalation followed by prolonged exhalation (5 breaths)

5. Pranayama (15 minutes): Ujjayi, Bhramari, Anulom vilom

6. Meditation (3 minutes)

7. Omkar - 11 times (4 mins)

8. Shantimantra (2 mins)

Post yoga intervention of 6 months, WHO-5 Well-being Index and Spinal flexibility were assessed again in all participants.

Quality control: Same yoga teacher conducted yoga sessions daily in same structured sequence during same time of the day. WHO-5 Well-being Index scoring and Spinal flexibility assessment was done by the same investigator.

Confidentiality: In the informed consent form, was clearly mentioned that details of the participants and their recorded parameters will be kept strictly confidential and will not be divulged.

Plan of analysis/Statistical tools: All the data collected was analyzed using software SPSS (Statistical package for social sciences) version 16. Z-test and Mann–Whitney test was applied with $p < 0.05$ was considered as significant.

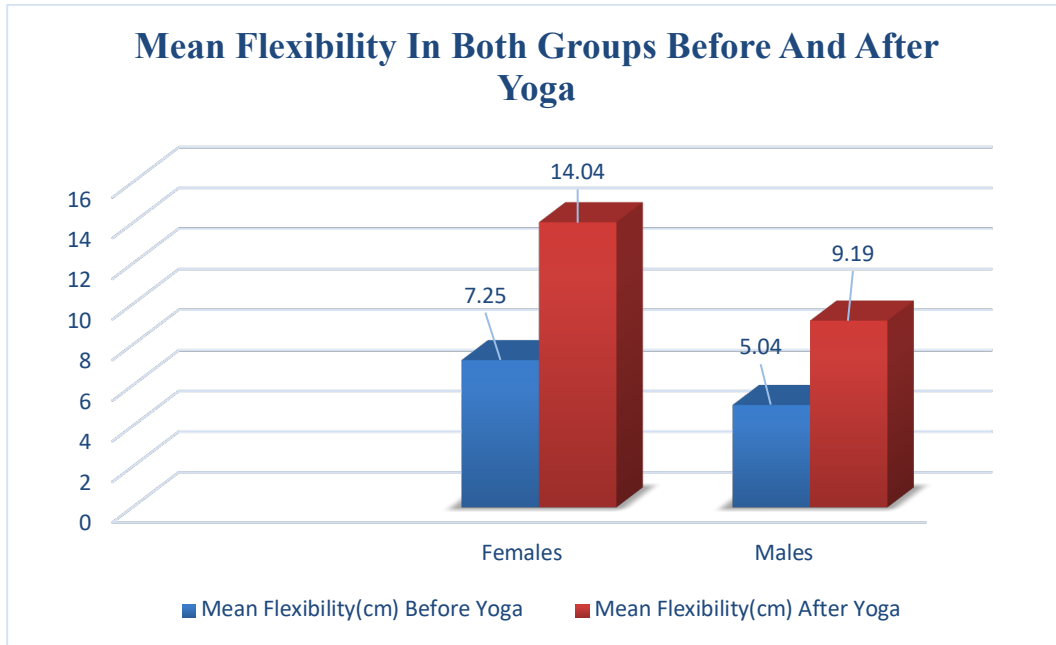
Results

Table 2: Comparison of age amongst male participants in group A and group B

Parameter (Years)	Male Group (n=47)		Female Group (n=450)		Z Value	P Value
	Mean	SD	Mean	SD		
Age	18.10	0.99	18.79	1.09	3.25	>0.05

Table 3: Comparison of Flexibility amongst participants before and after Yoga intervention

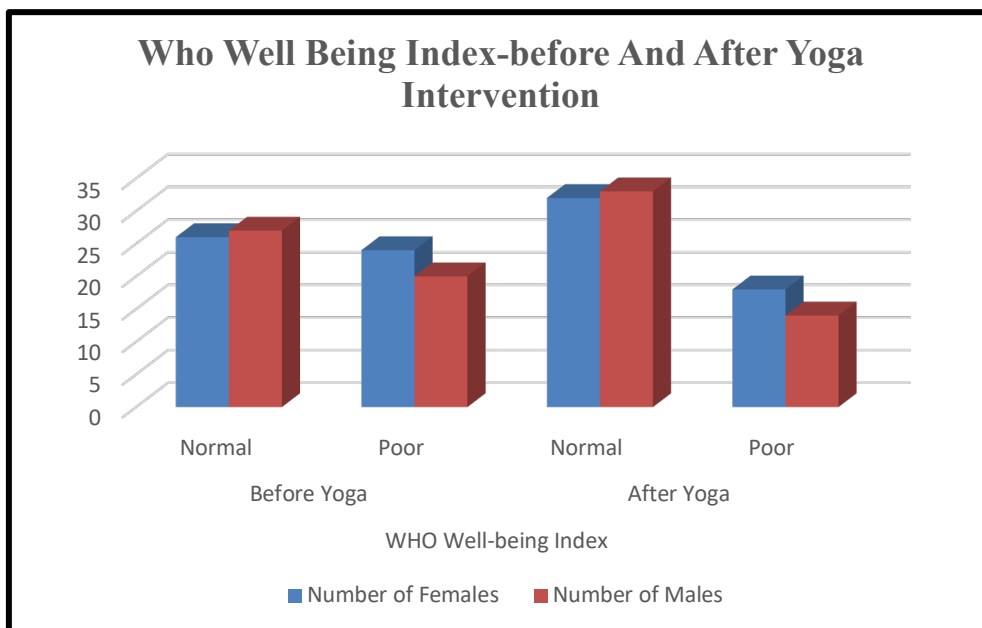
Group	Flexibility(cm)		Z Value	P Value
	Before	After		
	Mean ± SD	Mean ± SD		
Females	7.25 ± 6.39	14.04 ± 5.73	7.10	< 0.0001***
Males	5.04 ± 5.94	9.19 ± 6.76	5.35	< 0.0001***



Graph 1: Mean Flexibility in Both Groups Before and After Yoga Intervention

Table 4: Comparison of WHO Well-being Index amongst participants before and after Yoga intervention

Group	WHO Well-being Index				Z value	P Value
	Before Yoga		After Yoga			
	Normal	Poor	Normal	Poor		
Number of Females	26	24	32	18	3.71	< 0.0001***
Number of Males	27	20	33	14	1.35	< 0.0001***



Graph 2: WHO Well Being Index in Both Females & Males Before and After Yoga Intervention

Discussion

In the present study, there was no statistically significant difference ($p > 0.05$) in age amongst male and female group. So, both groups were comparable with respect to age. (Table 2).

A statistically significant improvement in spine flexibility following Yoga intervention was observed in both male and female groups. (Table 3, Graph 1).[14,15]

This finding is supported by other studies which suggest that yoga improves musculoskeletal flexibility through repeated stretching and neuromuscular adaptation.[16] The sustained stretching involved in yoga postures helps improve elasticity of muscles, ligaments, and fascia, which in turn enhances joint mobility.[17]

The Sit & Reach Test used in this study is a well-established and reliable method for assessing lumbar spine and hamstring flexibility and has been widely used in similar research.[18]

A significant improvement was also observed in the WHO Well-being Index in both males and females after yoga intervention. (Table 4, Graph 2). This is in line with existing evidence that yoga helps in reducing stress, anxiety, and depressive symptoms.[19]

The improvement in psychological well-being may be explained by neuroendocrine mechanisms. Yoga has been shown to reduce cortisol levels and increase GABA activity, leading to better mood regulation and reduced anxiety.[20]

Conclusion

Overall, the study shows that regular practice of structured yoga can significantly improve both flexibility and mental well-being in undergraduate students. Considering the high levels of stress and sedentary lifestyle in this group, yoga can be a simple and effective preventive strategy.

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