Section: Community Medicine

Original Research Article

YOGA FOR INSOMNIA AMONG URBAN ADULTS: A MIXED-METHOD EVALUATION EFFECTIVENESS, ADHERENCE, EXPERIENCES

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Received *: 10/04/2026*
Received in revised form *: 20/05/2026*
Accepted *: 05/06/2026*

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DOI: 10.70034/ijmedph.2026.2.564

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 3411-3416

ABSTRACT

Background: These days, many city workers in India find it more difficult to get a good night's sleep, especially those who work late at night and spend a lot of time using computers or telephones. Yoga is famous for helping people calm down and is a major part of our Indian culture, but there isn't much research on how it impacts young and middle-aged adults who are working. The objective is to explore if a 12-week Hatha Yoga plan—alongside a basic phone app that sent reminders - could help reduce sleep problems in Chennai's urban workforce.

Materials and Methods: To study the effects of yoga and online tools on sleep, researchers split 120 people with long-term sleep problems into two groups. One group did yoga and used online tools in their day to day life and another just got advice on healthy sleep habits. The researchers used some special questionnaires, such as the Pittsburgh Sleep Quality Index and the Insomnia Severity Index to assess each group's sleeping quality. They also interviewed the participants of the study and found out how they felt and what they complained about with respect to adherence to their routines and their preferences with the online tools. When the two groups were compared side by side, the researchers could tell which was the most effective.

Results: The participants who were given yoga plus app-based support had a greater improvement in sleep quality, and had fewer insomnia symptoms ($p < .001$). The focus group and qualitative interviews supported three patterns: a perceived sense of inner calm that facilitated sleep onset, continual time pressure that kept some participants from being able to practice on a consistent basis, and phone alerts as a subtle cue to move.

Conclusion: In conclusion, it seems that a combined approach, bringing together yoga and digital tools, could be a viable solution - one that not only respects local customs but also provides genuine health benefits for sleep problems affecting working adults in Chennai.

Keywords: Insomnia, Yoga, Mixed Methods, Sleep Quality, PSQI, ISI, Chennai.

INTRODUCTION

Sleep problems are on the rise in urban cities. The people most commly affected are the ones who have high screen time and heavy workloads which cause stress on both physical and mental aspect of our body. In Chennai, these circumstances prove to be way worse due to long travels, congested streets and blasting weather which take a huge toll. All of these factors combined disrupt our body's natural circadian rhythm, the end result being lack of sleep. Sleep as we all well know is vital part of life,

providing the necessary refreshment for the next day's activities. Lack of it affects our mood, energy levls and ability to focus, making it harder to cope with the demands of our daily life.

In this matter, Yoga proves to be a substantial tool to give better control over our bodies autonomic function such as heart rate and breathing and helps with relaxation and stress reduction all of which helps get a great night's sleep. However, a big fall back on this correlation is that the study is mainly focused on elderly and part time workers. For people working in the It sector and software development, it can be difficult to stick to a routine and do yoga amidst their heavy packed schedule. Small notifications provide a gentle nudge to get into a flow but there seems to be insufficient research on the use of digital tools in urban cities. This study looks at how effective a 12-week yoga programme for adults in Chennai can be. This programme uses the guide of smartphone app and digihealth tools and reviews the patterns, numbers and feedback concisely. The goal of the study is to understand how the programme helps people with sleep difficulties and the challenges faced.

MATERIALS AND METHODS

Study Design: To study this topic, we did a combined approach that included both numbers and stories of the participants. This means we conducted two types of research simultaneously: one using statistics and another examining people's experiences. Then, we combined the two sets of information to better understand the results. We have followed a set of guidelines to ensure that the quality of our research is good

Participants and Setting: Researchers at a major healthcare center recruited people for a study through the community medicine and yoga departments. They sought adults between 25 and 55 who were doing office or technology jobs and had persistent sleep problems. Partcipants had to meet specific criteria for sleep problems. Exclusion criteria of people with serious mental health conditions, addiction and irregular work schedule were not allowed to join as these factors can affect the quality of the study in multiple ways. A total of 120 people were randomly split into two groups for the study.

Assessment of Loneliness: Loneliness was measured using UCLA's Solitude Scale, version 3, consisting of 20 questions; participants' responses result in a score of 20 to 80 (Russell, 1996). This tool was translated into the local language using the WHO's translation method, which includes both forward and backward steps (WHO, 2019). An expert panel consisting of public health researchers, practitioners and bilingualists found how well the content fits culturally. Cognitive interviews proved to be more useful ensuring that people understood the questions and their suitability for the situation.

Psychometric Evaluation of the Local Language Version: A different validation group (n = 110) helped check consistency and structural accuracy. The certainty was strong, with Kronbach's α at .89; meanwhile, the item–total links vary between.48 and .69. The verified analysis showed solid results: RMSEA reached .06, while CFI reached .94 and TLI stood at .92. This clearly suggests that the local language version works well for the local population who manage diabetes. Solitude levels were divided into three groups—low (≤35), intermediate (36–50) or high (>50)— based on the score range.

Intervention

Yoga + Digital Support Group: The study participants attended a 12-week yoga class, with yoga sessions of an hour's duration each day. Their lessons were held with a teacher 3 times a week, and they were mentally prepared and then some light exercise was done to relax their body. Next, they did specific yoga poses to help their backs and chests be more flexible and at the end practiced breathing techniques in a controlled way using their diaphragm. They ended each class by relaxing their bodies using techniques such as scanning their body, visualizing calm or pleasant thoughts and resting deeply. Four times per week the people performed at home with a simplified version of the exercises that fit into their busy schedule. Making it easy to work around, adults were able to remain consistent and make it part of their routine. A new mobile application was developed to aid people sleep better. Sent reminders in the evening and brief audio tracks to help you relax. Users can also record their sleep time, if they woke up during the night, their sleep quality and if they got REM sleep or not. This app was used to support the participants to stay on track with their sleep schedule, as well as to gather beneficial information for enhancing the entire program. People gained an understanding of their sleep habits, and made adjustments in their sleep habits with this app to enhance their sleep quality.

Control Group: People received tips on how to improve their sleep habits by following standard health guidelines.

Quantitative Measures

Sleep results were measured using:

Pittsburgh Sleep Quality Index (PSQI),[6]

Insomnia Severity Index (ISI),[7]

The study also looked at how quickly people fell asleep, the quality of their rest at night, and how well they performed during the day.

Qualitative Component: We picked twenty people on purpose, based on how well they followed the rules, to talk to them in depth. We used a special method to find the main ideas and organise the information, which is called reflexive thematic analysis.[17]

Statistical Analysis

To understand the results, special tests like t-tests and chi-square methods are used to compare the starting points. After the treatment, they analysed the results again, taking into account the initial

values, using a method called ANCOVA. They also calculated the size of the effects using Cohen's d. Additionally, they used a mixed methods approach, which involved combining the results in a joint display, as seen in previous studies.[14] This helped them get a clearer picture of what was happening.

RESULTS

Quantitative Results

The results showed a strong retention rate, with 110 out of 120 participants remaining, which translates to 92%. Before the study began, the two groups appeared to be quite similar in terms of their characteristics.

The people who took part in the yoga and tech program had great results when it came to sleep. On average, their PSQI scores went down by about 4.8 points, which is a big deal. The control group, on the other hand, only saw a small drop of 1.9 points. The tested group also did well with ISI values, which went down by 7.2 points, whereas the control group only changed by 2.8 points. These results are pretty significant, showing that the program had a strong effect on sleep.

The time it took to fall asleep was significantly decreased for the test group, with an average reduction of 22.4 minutes. In contrast, the control group saw a much smaller decrease of just 8.6 minutes. Additionally, sleep efficiency was greatly improved in the test group, with an increase of 11.2%, whereas the control group only experienced a 4.1% improvement.

It seems that people who didn't travel much and had less stress at work tended to do better initially. On the other hand, those who spent a lot of time on screens showed the most improvement in their ISI scores. This might be because they were more likely to have racing thoughts and mental over activity to begin with.

(See Tables 1–4; data stay the same.)

Qualitative Results

People who practised yoga on a regular base felt a sense of calm and zen. They said breathing exercises helped ease their mind and breathe better. They also found it easier to stop thinking too much about work and relax as it helped them separate their personal and work life

Even with all the hustle and bustle in their life finding time and space to incorporate their activity seemed to be a challenge. But luckily, the memory of their devices helped give them a gentle push to stay on track, especially on really stressful days when it was easy to stop.

Integration

Mixed methods showed clear overlap. Sleep onset got shorter - this matched reports about calming thoughts and body tension. Changes in progress depended on how much time pressure people felt. The technology component helped reduce some barriers, although others persisted.

Table 1: Baseline Characteristics of Study Participants (N = 120)

Characteristic	Yoga + Digital (n = 60)	Control (n = 60)
Age, mean (SD), years	36.8 (7.4)	37.2 (7.1)
Gender, n (%)		
Male	31 (51.7)	30 (50.0)
Female	29 (48.3)	30 (50.0)
Mean commute time, minutes (SD)	62.4 (18.2)	64.1 (19.5)
Screen time per day, hours (SD)	4.8 (1.1)	4.7 (1.2)
Baseline PSQI score, mean (SD)	13.1 (2.5)	12.9 (2.4)
Baseline ISI score, mean (SD)	18.7 (3.4)	18.4 (3.3)

Note. No statistically significant differences between groups at baseline (all p > .05). PSQI = Pittsburgh Sleep Quality Index; ISI = Insomnia Severity Index

Table 2: Changes in Primary Sleep Outcomes After 12-Week Intervention

Outcome	Yoga + Digital (n = 60)	Control (n = 60)	p value	Effect Size (Cohen's d)
PSQI score change, mean (SD)	–4.8 (2.1)	–1.9 (1.5)	< .001	0.92
ISI score change, mean (SD)	–7.2 (3.0)	–2.8 (2.1)	< .001	1.10
Sleep latency change, minutes (SD)	–22.4 (7.8)	–8.6 (5.2)	< .001	1.03
Sleep efficiency change, % (SD)	+11.2 (4.5)	+4.1 (3.1)	< .001	0.88

Note. Negative change scores represent improvement (reductions in severity or latency). PSQI = Pittsburgh Sleep Quality Index; ISI = Insomnia Severity Index.

Table 3: Subgroup Analysis of Change in Insomnia Severity (ISI)

Subgroup	Yoga + Digital Mean Change (SD)	Control Mean Change (SD)	p value
Short commute (< 60 min/day)	–7.9 (2.8)	–3.1 (2.0)	< .001
Long commute (≥ 60 min/day)	–6.4 (2.9)	–2.4 (2.2)	< .001
High screen time (≥ 5 hr/day)	–8.2 (3.2)	–3.0 (2.1)	< .001
Low screen time (< 5 hr/day)	–6.5 (2.7)	–2.6 (2.0)	< .001

Note. Larger negative values represent greater improvement.

Table 4: Summary of Qualitative Themes with Representative Quotes

Theme	Description	Illustrative Quote
Somatic settling	Participants described reduced physical tension and deeper bodily awareness.	"My shoulders would slowly soften after the breathing work, and sleep felt easier."
Cognitive quieting	Reduced racing thoughts and mental hyperactivity before sleep.	"The mind didn't keep running marathons at night anymore."
Time-poverty barriers	Demanding commutes and workloads disrupted routine.	"Some days Chennai traffic just ate up my whole evening."
Digital nudging	App reminders helped maintain consistency.	"The reminder ping was like a little nudge saying—hey, don't skip today."

Note. Themes derived using reflexive thematic analysis.

Table 5: Joint Display Integrating Quantitative and Qualitative Findings**

Quantitative Findings	Qualitative Themes	Integrated Interpretation (Meta-Inferences)
Significant reduction in PSQI scores in the yoga + digital group (–4.8 ± 2.1) compared with control (–1.9 ± 1.5).	Somatic settling: people said their bodies felt "softer" while stress dropped following nightly sessions.	Better sleep links directly to bodily relaxation noted in interview reports. Physical calmness felt by participants matches actual gains seen in PSQI scores.
Marked decrease in ISI scores (–7.2 ± 3.0 vs –2.8 ± 2.1). Many achieved clinically meaningful change (≥ 6 points).	Cognitive quieting: Breathing techniques reduced racing thoughts at night - relaxation also helped ease mental chatter before sleep.	Improvements in sleep problems seem linked to lower mental overactivity. Personal reports help explain how ISI score changes happen.
Reduction in sleep latency by 22.4 minutes in the intervention group vs 8.6 minutes in control.	Evening mental slowdown: people noticed a sharper shift from job mode to downtime because of planned routines.	Faster time to fall asleep matches what people reported about relaxing better at night - evidence shows their feelings align with actual sleep data.
Higher adherence to supervised sessions (85%) and moderate adherence to home practice (≈63%).	Time scarcity: Lengthy travel to work, erratic job requirements, or exhaustion reduced stable habits.	Variability in results comes from uneven practice at home. In Chennai, rigid work and travel routines affect how well treatments work.
Consistent interaction with app reminders and sleep logs.	Digital nudging: Evening reminders helped users start home exercises - especially on days with little drive. These cues made beginning easier, because motivation often dropped after work.	The digital part reduced issues with sticking to routines. Numbers on usage match feedback showing alerts helped shape actions.
Subgroup effects: High screen-time participants benefited more; long-commute participants benefitted less.	Contextual strain: Some tied minimal progress to tiredness from long commutes.	Screen time, how long people travel, or tiredness from jobs can change how well treatments work. Because of these factors, some groups respond differently - this helps explain patterns found in numbers.

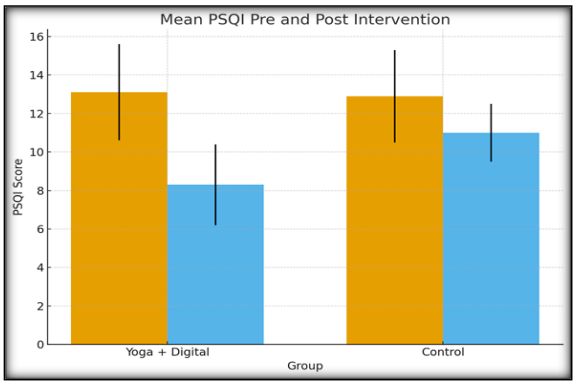

Figure 1: Mean PSQI Pre and Post Intervention

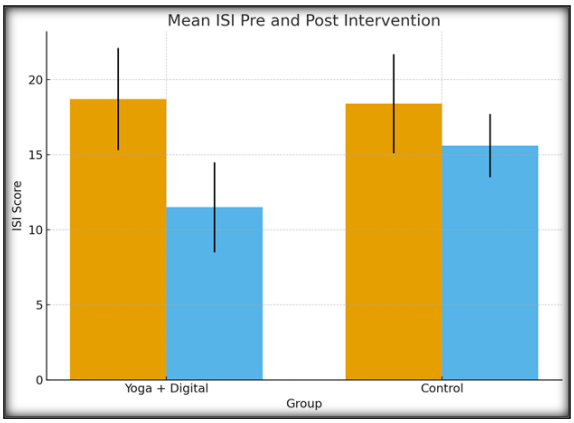

Figure 2: Mean ISI Pre and Post Intervention

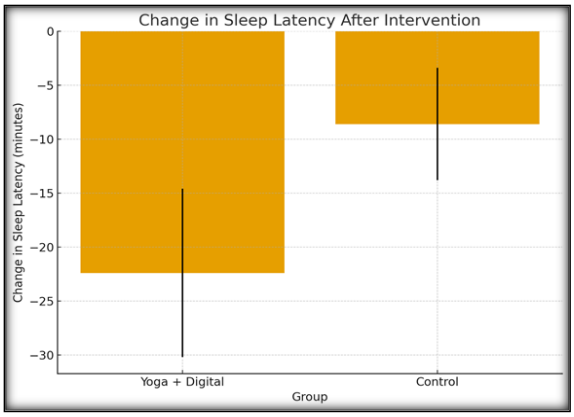

Figure 3: Change in Sleep Latency After Intervention

DISCUSSION

This research brings together different methods to show that yoga, when used with a simple digital tool, can really help working adults in Chennai sleep better. The improvement in sleep quality was even better than typical treatments for sleep problems. This suggests that combining guided yoga sessions with regular reminders can have a better effect on reducing insomnia.[3,7,9]

Yoga has a big impact on the systems that control rest and stress. It helps in sending signals that are important for falling asleep and staying awake. Many people who practice yoga notice their body slowly relaxing, which matches what's happening physically. Some people even change their nighttime routines to be calm and peaceful. One of the main reasons people have trouble sleeping is that their mind is hyperstimulated before bed.

People who used digital tools found that yoga wasn't hard, but allocating time was the real challenge. Their work schedules would change all the time, their travels were long, and they'd get really tired - which was pretty common for people who work in IT technology in Chennai. When there are days that seem too downtrodden and energy less the app reminds them to keep practicing even when they didn't feel like it. These pings at the right time kept people moving at the right time. It's also interesting to see how yoga seems to be a more cultural fit to our society rather than pills and therapy. It matches the values of the community and provides ways to improve sleep. Yoga provides a positive experience overall—a trend that's noted in studies of mind-body practices in India.

There are some demerits to be addressed. For example, the study is based on people's own memory of sleep quality rather than using direct methods such as monitoring their movements during rest or monitoring brain activity. While tools such as PSQI and ISI have been widely used and validated in previous studies, the use of more objective measures can help the participant gain a more detailed understanding of the different stages of sleep. Study participants followed the program for three months, long enough to see some changes, but not long enough to know if the effects would last permanently. In addition, the study people came mainly from offices and technical jobs, which limited how well the results could apply to other groups of people. Future studies may attempt to track human progress for extended periods of time, using more objective sleep measures to accurately calculate and see if smaller yoga programs or classes held at work can be more effective for people with busy schedules. This can help to address some of the limitations of current studies and to realise the advantages and disadvantages of the programme.

When you look at the numbers and hear people's stories, it's clear that something is working. People who practice yoga say they feel better physically and mentally, and the data backs this up—they react faster, feel better and their symptoms aren't as bad as before. This connection between how people feel and the numbers makes a strong case for using yoga, along with digital tools to help deal with these problems in the city, where life zooms past us. By combining these two approaches, we might get practical real life solution to this common issue.

Clinical and Public Health Implications

Yoga can be a great way to help with insomnia and stress without the use of any medication, which is especially great for the people who are worried on their dependency on pills or having a brain fog. Using digital tools can also make it easier to stick to a routine, because let's be honest, tech has really changed the way we lead our lives for the better. Insomnia is a big problem that can lead to more trips to the doctor, unsatisfactory work performance, and an increased risk of feeling anxious, depressed and mentally drained. This issue is getting worse in urban cities, where the economy is on the fast lane and technology is rapidly improving people's lives. A simple way to tackle this is to incorporate simple yoga programmes into workplace wellness schedules and even into the cities health systems. This helps reduces sleep related health issues drastically enough to improve their overall well-being.

This novel approach aligns with our national objectives of treating chronic disease as well as introducing minute daily habit changes that improves the person as a whole. Since digital tools require minimal setup in this current era of tech, they can be easily integrated into public programs, either through official wellness apps or partnerships with private companies.

CONCLUSION

A new study has found that a 12-week yoga plan combined with a simple digital tool to track progress has actually helped Chennai residents sleep better and reduce insomnia. The decisive role was played not only by the physical part of yoga, but also by the

peace of mind that came with regular practice. This approach can be a great way to improve sleep based on local needs. Using a combination of traditional mobility methods and easy technology could be the flexible solution that is needed in our community. Hence we find an effective and affordable way to ease people into their slumber.

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