



**2024  
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***OA10.03 - Restful Nights & Revitalizing  
Hearts: Impact of a 12-week Meditation &  
Breath Intervention on Sleep and Cardiac  
Health in Indian Medical Professionals***

# Presented By:

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# Introduction

## The Challenge

Medical Professionals (MPs) often experience job-related stress and burnout.

Prolonged stress when not managed timely causes deregulation of the PNS & SNS.

The nature of their job makes MPs rarely follow a proper sleep cycle.

## The Consequences

Chronic stress can decrease Heart Rate Variability (HRV).

Combined with poor sleep regimes, it may cause cardiomyopathy and diabetes in the long run.

## The Solution

Sudarshan Kriya Yoga (SKY) is a rhythmic yoga breathing and meditation technique developed by H.H. Sri Sri Ravi Shankar.

SKY has been shown to improve health, vitality, well-being, and peace of mind, while reducing stress and anxiety.

## Novelty & Scope

No previous work has studied the long term effects of SKY on objective measures of sleep and HRV among MPs.

mHealth aided SKY practice could act as a useful tool in managing stress among MPs.

## Aim

To determine the effects observed before and after an mHealth aided 12-week SKY Intervention among MPs of an Indian tertiary care hospital, on change in HRV and Sleep parameters in comparison to a waitlist control group.

## Objectives

To assess change between groups after 12 weeks in the following outcomes:

**HRV:** SDNN, RMSSD, LF/HF.

**Sleep Parameters:** Total Sleep Duration, Deep Sleep, REM Sleep, Light Sleep.

**Vitals:** Resting Heart Rate and Breath Rate.



# Study Participants

## Participants' Characteristics:

- Residential Doctors, Nursing Officers & Nursing Staff
- Posted at HDU, CCU, ICU, Trauma & Emergency Units
- Consenting MPs (62 males, 36 females)
- Average age of  $28.26 \pm 3.547$  years

## Inclusion Criteria:

- Working at AIIMS Rishikesh for at least 6 months
- Within 18-65 years of age
- Willing to commit to the intervention
- Having an internet enabled Smartphone, Laptop or PC

## Exclusion Criteria

- Already practicing Yoga/Meditation/Stress Reduction
- Having severe physical or mental ailments
- Pregnant women
- Not willing to provide written consent

# Methods:

## Study Design:

- Randomized Waitlist Controlled Trial
- Randomization done using computer generated sequence
- SNOSE implemented for allocation concealment

## Enrolment Process:

- Intro-talks for MPs at HDU, CCU, ICU, Trauma & Emergency Units
- E-posters circulated on social media groups
- Interested participants were contacted in-person after work hours

## Data Collection:

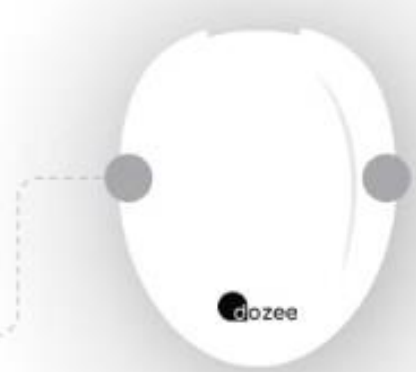
- Written informed consent obtained prior to enrolment
- Baseline outcomes assessed before intervention
- Outcome measures were recorded using a Ballistocardiography based proprietary contactless health monitor - "Dozee" (Turtle Shell Tech. Pvt. Ltd.)

1 Place Sensor under mattress

2 Connect to Pod

3 Auto-sync data to cloud

4 Remotely access live data



- API gateway for easy EMR/EHR integration
- Compatible with iOS and Android

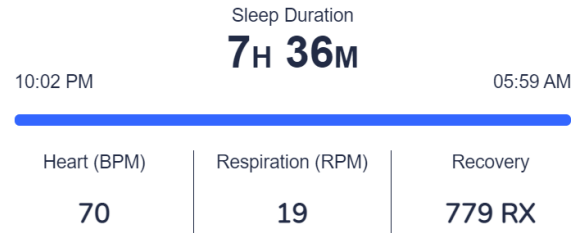


### Score ⓘ



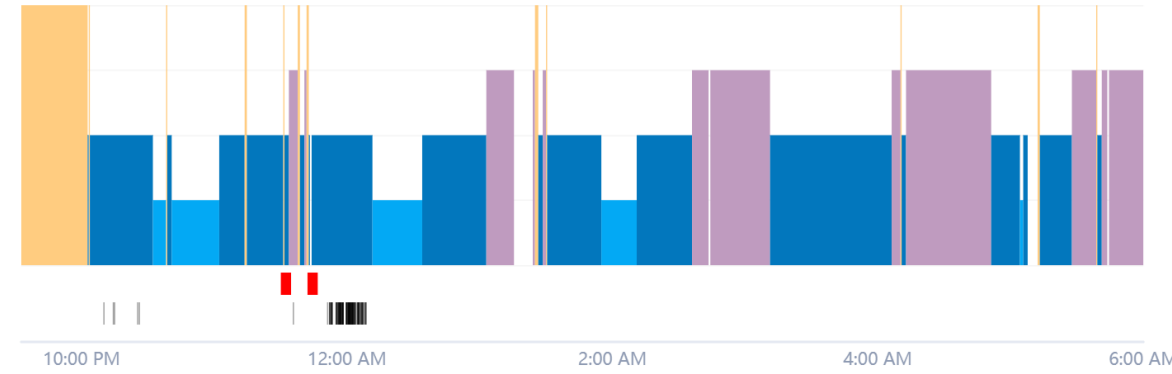
Sleep Quality	35 / 40
Sleep Routine	15 / 20
Vitals	25 / 30
Restfulness	2 / 10

### Summary ⓘ



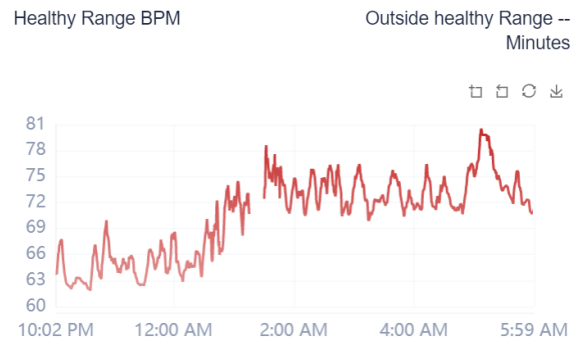
### Sleep ⓘ

- Awake 39 m
- REM 128 m
- Light 261 m
- Deep 68 m
- Time to sleep 30 m
- No. of awakenings 11
- Restlessness 8m
- Snoring 2m



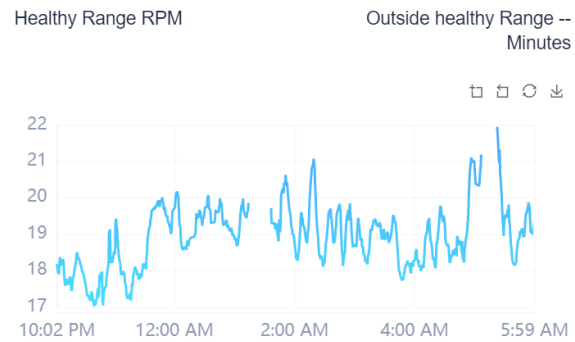
### Heart Rate (BPM) ⓘ

Minimum	Average	Maximum
62	70	81

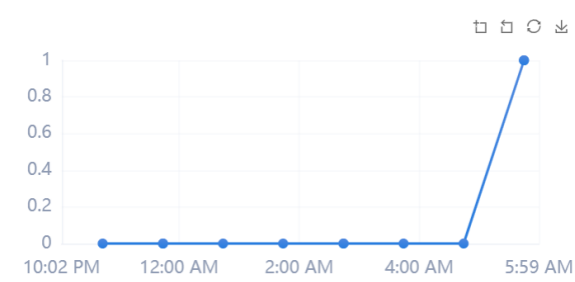


### Respiration Rate (RPM) ⓘ

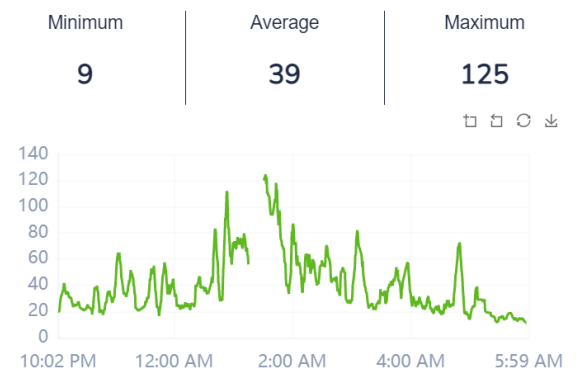
Minimum	Average	Maximum
17	19	22



### DEWS ⓘ

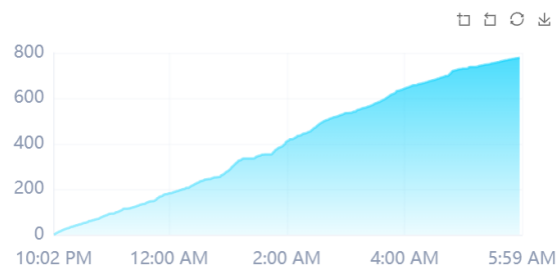


### SDNN ⓘ



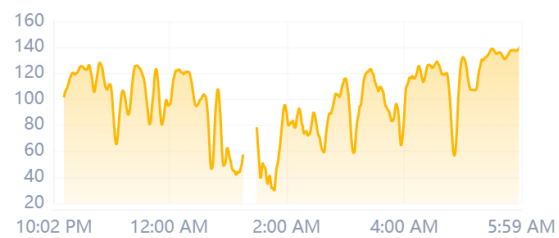
### Recovery (RX) ⓘ

779 RX



### Stress (MS) ⓘ

Minimum	Average	Maximum
Low (30)	Medium (100)	High (142)



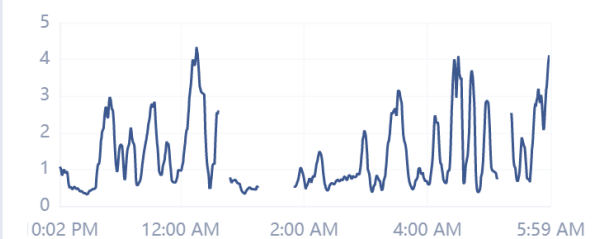
### RMSSD ⓘ

Minimum	Average	Maximum
7	43	118



### LF/HF ⓘ

Minimum	Average	Maximum
--	1	4





# Components of SKY Intervention:

- **Initial 4-day in Workshop:**

Included interactive sessions along with demonstrating SKY practice using "Zoom Meetings App".

- **Daily SKY practice at home using mobile application:**

Lasted 30-40 minutes, once a day, every six days a week.

- **Weekly follow-up sessions:**

Supervised by skilled yoga professionals in virtual presence of the research investigators.

- Regular practice reminders were sent to participants.
- Participants' attendance logs were maintained.
- A minimum of 75% compliance was necessary for final evaluation.



1<sup>st</sup> stage



2<sup>nd</sup> stage



3<sup>rd</sup> stage

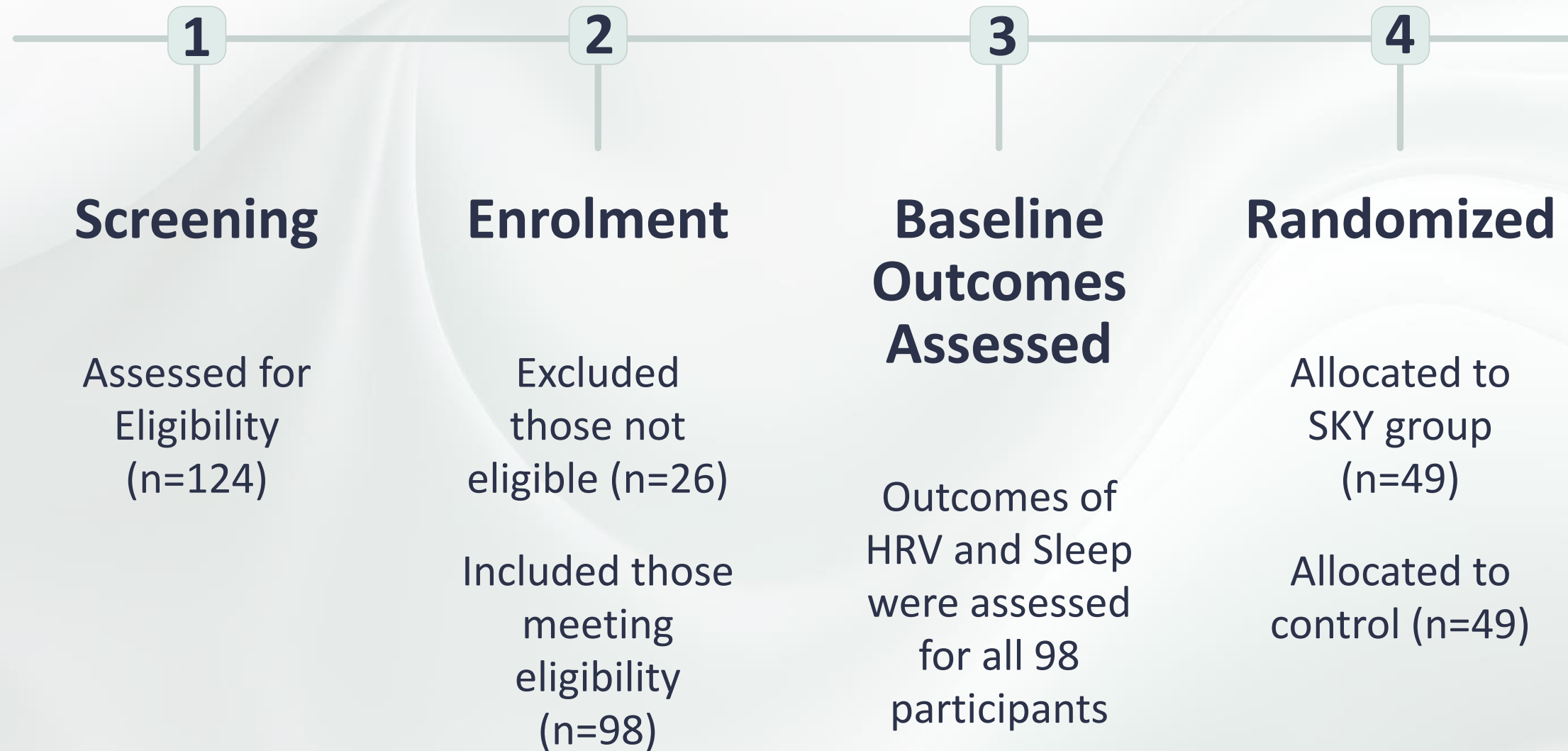


Breathe In



Breathe out

# Study Flow:



5

## Intervention & Follow Up

SKY group was provided mHealth aided intervention

Control group was waitlisted

All 98 participants were followed up after 12 weeks

6

## Compliance & Dropouts

Discontinued SKY (n=2)

Left the institute/lost interest (n=2)

<75% attendance (n=5)

7

## Endpoint Outcomes Assessed (n=94)

Outcomes of HRV and Sleep were re-assessed for remaining 94 participants after 12 weeks of intervention

8

## Intention to Treat Analysis

Endpoint outcomes not considered due to lack of compliance (n=5), dropout (n=4)

Last observed values carried forward with intention to treat (n=9)

**TABLE 1: Demographic Distribution Across Study Population**

Demographic Variable (Type and Name)		TOTAL (N=98)	SKY Group (n=49)	Control Group (n=49)	P <sub>between groups</sub>
Gender (Counts & Percentage)	Female	36 (36.73%)	19 (38.77%)	17 (34.69%)	0.417*
	Male	62 (63.26%)	30 (61.22%)	32 (65.30%)	
Job Role (Counts & Percentage)	Resident Doctor	8 (8.16%)	5 (10.20%)	3 (6.12%)	0.216#
	Medical Student	8 (8.16%)	5 (10.20%)	3 (6.12%)	
	Nursing Officer	62 (63.26%)	33 (67.34%)	29 (59.18%)	
	Nursing Staff	20 (20.40%)	6 (12.24%)	14 (28.57%)	
Age in years (Mean & SD)		28.26 ± 3.547	27.61 ± 3.610	28.90 ± 3.399	0.73\$

\*Based on Chi-Square Test; \$Based on Independent T test; #Based on Fisher's Exact Test.

# 1 Significant Improvements

The SKY group showed significant improvements in various parameters compared to the control group:

- **Heart rate (p=0.043)**
- **SDNN (p=0.007)**
- **RMSSD (p=0.026)**
- **Total time asleep (p < 0.001)**
- **Light sleep (p=0.002)**
- **Deep sleep (p=0.007)**
- **REM sleep (p=0.004)**

# 2 Other Improvements

Breath rate, LF/HF, and total time awake also showed improvement in the SKY group compared to the control group.

# Results - Cardiac Health Parameters

## 1 Heart Rate

SKY group showed significant improvements in heart rate ( $p = 0.043$ ), suggesting enhanced cardiac health among participants.

## 3 RMSSD

SKY participants demonstrated a significant enhancement in RMSSD ( $p = 0.026$ ), reflecting improved cardiac autonomic function.

## 2 SDNN

SKY participants showed significant improvement in SDNN ( $p = 0.007$ ), indicating improved heart rate variability.

## 4 LF/HF

SKY group exhibited improvements in LF/HF ratio, suggesting a shift towards improved autonomic balance.

**TABLE 2: Intergroup Comparison for Outcomes of Heart Rate, Breath Rate & Heart Rate Variability.**

Outcome Variable	Baseline			Endpoint		
	SKY Group (n=49)	Control Group (n=49)	P <sub>between groups</sub>	SKY Group (n=49)	Control Group (n=49)	P <sub>between groups</sub>
Heart Rate	68.53 ± 8.797	66.86 ± 8.672	0.345 <sup>\$</sup>	66.35 ± 6.873	69.49 ± 8.257	0.043 <sup>\$*</sup>
Breath Rate	17.20 ± 2.398	17.02 ± 1.854	0.903 <sup>#</sup>	16.65 ± 2.107	17.18 ± 1.878	0.187 <sup>#</sup>
SDNN	44.88 ± 11.930	49.39 ± 12.882	0.089 <sup>#</sup>	57.16 ± 14.883	49.29 ± 13.589	0.007 <sup>\$*</sup>
RMSSD	44.98 ± 12.482	50.57 ± 15.331	0.064 <sup>#</sup>	55.33 ± 14.465	48.65 ± 14.722	0.026 <sup>\$*</sup>
LF/HF	1.31 ± 0.585	1.29 ± 0.500	0.996 <sup>#</sup>	1.20 ± 0.407	1.37 ± 0.834	0.420 <sup>#</sup>

\*Significant value (< 0.05); <sup>\$</sup>Based on Independent T test; <sup>#</sup>Based on Mann-Whitney U test.



# Results - Sleep Parameters

## 1 Total Time Asleep

SKY group demonstrated a substantial enhancement in total time asleep ( $p < 0.001$ ), indicating improved sleep duration.

## 2 Light Sleep

Significant improvement in light sleep ( $p = 0.002$ ), suggesting better sleep architecture in SKY participants.

## 3 Deep Sleep

SKY group showed significant enhancements in deep sleep ( $p = 0.007$ ), suggesting to a more restorative sleep experience.

## 4 REM Sleep

SKY participants experienced a significant increase in REM sleep ( $p = 0.004$ ), indicating improved sleep quality and dreaming patterns.

## 5 Time Awake

SKY group also demonstrated reduction in time spent awake during sleep, implying better overall sleep quality.

**TABLE 3: Intergroup Comparison for Outcomes of Sleep.**

Outcome Variable	Baseline			Endpoint		
	SKY Group (n=49)	Control Group (n=49)	p between groups	SKY Group (n=49)	Control Group (n=49)	p between groups
Total Sleep	351.63 ± 105.470	348.59 ± 108.496	0.926 <sup>#</sup>	402.08 ± 47.903	356.80 ± 67.729	0.000 <sup>**</sup>
Awake	39.47 ± 13.351	38.92 ± 13.411	0.725 <sup>#</sup>	42.45 ± 12.639	39.31 ± 15.663	0.099 <sup>#</sup>
Light Sleep	215.55 ± 69.340	214.16 ± 67.641	0.969 <sup>#</sup>	243.82 ± 45.115	213.39 ± 50.207	0.002 <sup>\$*</sup>
Deep Sleep	53.29 ± 15.992	56.06 ± 14.073	0.693 <sup>#</sup>	63.51 ± 11.318	56.18 ± 12.767	0.007 <sup>**</sup>
REM Sleep	76.20 ± 36.445	72.59 ± 34.890	0.617 <sup>\$</sup>	92.90 ± 30.188	76.82 ± 23.281	0.004 <sup>\$*</sup>

\*Significant value (< 0.05); \$Based on Independent T test; #Based on Mann-Whitney U test.

# Conclusions

1

## Improved HRV

12-weeks of SKY demonstrated remarkable effectiveness in improving heart rate variability.

2

## Improved Sleep

12-weeks of SKY also enhanced sleep quality, and stabilized respiratory patterns among medical professionals.

# Implications & Future Research

## 1 Effective tool for Stress Management

This low-cost, simple and easy to access intervention can help alleviate stress and sleep-related challenges faced by MPs.

## 2 Enhanced Patient Care

Implementing SKY may lead to improved overall well-being among MPs, thus enhancing performance and patient care in long-run.

## 3 Implementable

mHealth provides a practical approach for MPs and other professionals to improve well-being by incorporating yoga and meditation into their hectic schedules.

## 4 Potential for Broader Application

Success of SKY highlights its potential for broader application in positively impacting the well-being of a wide range of professionals.

## 5 Future Research

Investigating the long-term efficacy of SKY among different participant demographics. Further exploration to assess the scalability and sustainability of mHealth-aided Yoga interventions for broader implementation.



# Acknowledgements

- Professionals of the host institute for their participation
- Art of Living Trust for facilitating highly skilled SKY trainers for virtually training the participants
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- H.H. Gurudev Sri Sri Ravi Shankar Ji



## **Ethics & Registration:**

This study commenced after obtaining due approval from the institutional ethics committee (AIIMS/IEC/20/733) and registration with the Clinical Trial Registry of India (CTRI/2020/11/029136).

## **Conflict of Interest:**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

# THANK YOU!

Please feel free to reach out:



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