



Effects of Sudarshan Kriya Yoga (SKY) on the stress and self-esteem of medical doctors in a tertiary care hospital: a prospective analytical study

Bharat Khadka, MD^a, Bishal Dhakal, MBBS^{a,*}, Binaya Dhakal, BE^b, Purushottam Adhikari, MD^a, Utsav Piya, MBBS^a, Shreejan Ghimire, MBBS^a, Sagun Dawadi, MBBS^a, Kshitiz Pasakhala, MBBS^a, Krish Mahat, MBBS^a, Suman Prasad Adhikari, MD^a, Pradeep Manandhar, MD^a, Yujal Mansingh, MD^a

Objectives: Sudarshan Kriya Yoga (SKY) is a unique yoga practice incorporated into the Art of Living course. It is found to have a beneficial effect on different psychiatric disorders. This study was conducted to investigate the impact of SKY practice on stress and self-esteem among medical doctors.

Materials and methods: A prospective study was conducted among medical doctors (interns, residents, and consultants) in a tertiary care center. The Perceived Stress Scale and Rosenberg Self-Esteem Scale were used for the assessment of stress and self-esteem levels, respectively. The parameters were assessed at baseline, 3-day and 40-day follow-up of SKY practice. The statistical analysis was performed using Statistical Package for Social Sciences, version 25.

Results: A total of 58 participants were included in the study. The scores for stress decreased (19.07 to 18.62 to 16.33) and self-esteem levels increased (19.09 to 19.64 to 20.81) after the practice signifying the beneficial impact. It was statistically significant ($P < 0.05$) with considerable effect sizes (Cohen's d 0.2–0.5 and > 0.5 for self-esteem and stress levels, respectively). On MANOVA, gender (more in male participants) was significantly associated with stress levels even after the practice of SKY ($P = 0.042$).

Conclusion: Amid the hectic schedule, regular practice of SKY is proven beneficial for medical doctors with its positive impact on stress, and self-esteem levels by our study.

Keywords: medical professionals, practice, self-esteem, stress, Sudarshan Kriya Yoga

Introduction

The healthcare profession has always been demanding. Healthcare professionals are in a state of continuous work in hospitals and healthcare centers. Approximately, one in three physicians is experiencing burnout in the healthcare profession^[1]. A study from Nepal shows a moderate level (89.5%) of burnout among healthcare professionals. The major sources of burnout included time management, patients' relatives, and administrative purposes^[2]. This has increased stress levels and decreased self-confidence among them. With the advent of COVID-19, they

HIGHLIGHTS

- Sudarshan Kriya Yoga is a unique pattern of yogic practice.
- It has beneficial implications in daily life activities and different psychiatric disorders like depression and anxiety.
- The stress level is found to be decreased with the improvement in self-esteem levels of medical doctors by this yogic practice.

are much more affected in terms of lack of personal fulfillment, emotional exhaustion, and depersonalization^[3].

Yoga is a system of spiritual as well as moral and physical practices containing physical postures called asana and breathing exercises called pranayama^[4]. There are shreds of evidence that these practices result in physiological effects like increased parasympathetic drive, the release of hormones, the calming down of stress responses in the body, and the modulation of thalamic generators^[5]. Among them, one is Sudarshan Kriya Yoga (SKY), which has been incorporated in The Art of Living course sponsored by the non-profit organization Art of Living Foundation. SKY is a unique practice of yogic patterns consisting of different breathing patterns and Om chanting^[6–8].

A study conducted in Italy among 69 subjects has been found to significantly decrease the score on depression and anxiety rating scales after regular SKY practice for eight weeks^[9]. The practitioners of SKY have been found to have a high activity of alpha and beta waves in electroencephalography (EEG), signifying increased mental focus as well as relaxation^[10]. Those who practiced this yoga more than four times a week had significantly higher odds of

^aNepalese Army Institute of Health Sciences, Kathmandu and ^bWestern Region Campus, Pokhara, Nepal

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*Corresponding author. Address: Nepalese Army Institute of Health and Sciences, Kathmandu, Nepal. Tel.: +977 984 649 1651. E-mail: swarnimdhakal@gmail.com (B. Dhakal).

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having a healthier lifestyle in terms of seven factors: diet, exercise, sleep, smoking, alcohol, stress, and weight^[11]. Likewise, a study on SKY during the COVID-19 pandemic found elevated professional fulfillment among healthcare practitioners^[12]. We can find evidence on the impact of SKY on the Indian^[13,14] and Western populations^[8,15,16], but a paucity of literature still exists in the context of the Nepalese population. This study was conducted with the aim to evaluate and assess the effects of SKY practice on stress and self-esteem among medical doctors.

Methodology

Study design

This was a prospective study conducted among medical doctors in a tertiary care center. The semi-structured questionnaires were constructed using the socio-demographic details and standard questionnaires relevant to the study. These questionnaires were developed using Google Docs and distributed online accordingly. The standard questionnaires on stress and self-esteem scale were used. The assessment was done at three-time points: before the SKY practice (baseline), after the 3 days of the practice (3 days follow-up), and after the 40 days of the practice (40 days follow-up). The study was conducted after the ethical approval from the institutional review committee (IRC) with reference number 626. The informed verbal and written consent were taken from the patients. The privacy and anonymity of patient information were well-maintained. The STROCSS, Supplemental Digital Content 1, <http://links.lww.com/MS9/A516> guideline was followed in reporting the findings and writing the manuscript^[17]. This study is conducted per the declaration of Helsinki.

Study setting and population

This study was conducted at a tertiary care center. We employed simple convenience non-probability sampling by including the available doctors for the study. The study participants were medical doctors from the tertiary care center. It included the intern doctors, the post-graduate residents from different faculties, and the consultant doctors (MD). All the other medical professionals were excluded. Both genders were taken for the study. The scales were administered to the participants in the form of a Google form at baseline, day 4, and day 40. Before the beginning of the study, the questionnaire was provided through an online Google Docs form to record the details before the SKY practice. The participants were monitored for daily practice through social media groups.

Intervention (SKY technique)

The trainers from The Art of Living Foundation facilitate the SKY technique. It was conducted in a shortened format (20–30 min) for our convenience. It consists of four stages. The first one, Ujjayi breath (Three-stage *Pranayama*) is done in three stages. The second one, Bhastrika, or bellow breath consists of using normal deep breaths in and out for three rounds. Then comes Om chanting three times with prolonged expiration. Finally, Sudarshan Kriya is a rhythmic breathing sequence consisting of long, medium, and fast breaths taken in a pattern. The process is ended with ten deep breaths followed by lying down for ten minutes. The practice was to be done at least once a day. This completes a session of the shorter form of SKY.

Study tools and measures

The standard tools and measures used in this study were the Perceived Stress Scale (PSS)^[18] and Rosenberg Self-Esteem Scale (RSS)^[19] to determine stress levels and self-esteem, respectively. PSS is a classical stress assessment scale. It consists of ten questions (positive and negative), which are scored based on a 0–4 Likert scale. The total score (range between 0–40) is then calculated by the addition of the individual scores from all ten questions. The scores ranging from 0 to 13, 14 to 26, and 27 to 40 are considered as having low, moderate, and high perceived stress, respectively.

RSS is a commonly used scale to determine self-esteem level. It also consists of ten questions (positive and negative), which are scored based on a 0–3 Likert scale. The total score ranges from 0 to 30. The score between 15 and 30 are within the normal range, while scores below 15 indicate low self-esteem levels. These scores were taken on three different occasions during the study: at baseline, 3 and 40-day follow-up.

Data synthesis and statistical analysis

The Google Docs forms with semi-structured questionnaires (along with the three scales) were used for data collection from the participants. The acquired data was then extracted from Google Docs to the Excel spreadsheet. Finally, the Excel data were imported to Statistical Package for Social Sciences (SPSS), version 25. The statistical analysis of the obtained data was done in SPSS, version 25. The categorical data was represented by number and percentage whereas the continuous data was represented by mean/standard deviation (SD) or median/inter-quartile range (IQR) based on the normality of the data. The normality of the data was tested using the Shapiro–Wilk test and histograms. As this study was conducted to acknowledge the effect of SKY on the stress and self-esteem of medical doctors, the repeated measures analysis of variance (ANOVA) or Friedman ANOVA was applied to assess the effect based on the normality of the data. The scores on perceived stress and self-esteem were taken before the practice of SKY, after 3 days of the practice, and after 40 days of the practice. The effect sizes (Cohen's *d*) were calculated for each score based on the different time frames of SKY practice. Similarly, to assess the independent associations of socio-demographic variables with the different scores at different times, multivariate analysis of variance (MANOVA) was used after assessing the multicollinearity and homogeneity of the variables.

Results

Socio-demographic characteristics

Among the 58 participants, intern doctors [37 (63.79)] constituted the majority of the portion in the study followed by the MD (Doctor in Medicine) doctors [19 (32.76)] as shown in Table 1. The males [32 (55.17)] constituted more proportion as compared to females [26 (44.83)]. 65.52% of participants fell in the 20–30 years age group. As the majority were intern doctors, the unmarried ones [41 (70.69)] were the most in the study.

PSS and RSES scores

The baseline mean stress score was 19.07 ± 4.611 . The level of stress tended to decrease with the subsequent practice of SKY in 3 (18.62 ± 5.005) and 40 days (16.33 ± 3.086) as shown in Table 2. This was statistically significant on repeated measures ANOVA

Table 1
Socio-demographic characteristics

Characteristics	Total, n (%)
Age (years)	
20–30	38 (65.52)
> 30	(34.48)
Sex	
Male	32 (55.17)
Female	26 (44.83)
Participants	
Intern doctors	37 (63.79)
Post-graduate resident	2 (3.45)
MD doctors	19 (32.76)
Marital status	
Married	17 (29.31)
Unmarried	41 (70.69)

(Wilk’s $\lambda = 0.660$, $P < 0.01$) (supplementary file, Supplemental Digital Content 1, <http://links.lww.com/MS9/A517>).

Likewise, the baseline mean self-esteem score, which was 19.09 ± 3.686 gradually increased after practicing SKY in three (19.64 ± 4.250) and forty days (20.81 ± 3.471). And like the stress score, it was also statistically significant on repeated measures ANOVA (Wilk’s $\lambda = 0.856$, $P = 0.013$).

Pairwise comparisons for PSS and RSES in repeated measures ANOVA

In repeat measures ANOVA, after the Bonferroni adjustment for multiple comparisons, pairwise comparisons were performed for three levels of the obtained scores as shown in Table 3. In regards to the effect of SKY practice on stress levels, there was a statistically significant mean difference between PSS at baseline and 40-day follow-up [mean differences (MD) = 2.741, $P = 0.001$] and between PSS at 3 and 40-day follow-up (MD = 2.293, $P < 0.001$).

However, for the self-esteem scores, the MD were negative subsequently after practicing the SKY suggesting the increment in self-esteem level due to the regular practice of SKY. This was statistically significant between RSES at 3 and 40-day follow-up (MD = - 1.172, $P = 0.043$).

PSS and RSES grading

The level of stress decreased with more participants falling under the low-level stress group after the practice of SKY (10.34% to 13.79% to 17.24%) (supplementary file, Supplemental Digital

Table 2
The PSS and RSES scores at baseline, 3 and 40-day follow-up of SKY

Scales	Scores
Perceived stress scale (PSS)	
Baseline	19.07 ± 4.61
3-day follow-up	18.62 ± 5.0
40-day follow-up	16.33 ± 3.09
Rosenberg self-esteem scale (RSES)	
Baseline	19.09 ± 3.69
3-day follow-up	19.64 ± 4.25
40-day follow-up	20.81 ± 3.47

SKY, Sudarshan Kriya Yoga.

Table 3
Pairwise comparisons for PSS and RSES scores at baseline, 3 and 40-day follow-up of SKY

Scales	Mean difference	P^b
PSS		
Between baseline and 3-day follow-up	0.45	1.00
Between baseline and 40-day follow-up	2.74 ^a	0.001
Between 3 and 40-day follow-up	2.29 ^a	< 0.001
RSES		
Between baseline and 3-day follow-up	- 0.55	1.00
Between baseline and 40-day follow-up	- 1.72	0.056
Between 3 and 40-day follow-up	- 1.17 ^a	0.043

PSS, perceived stress scale; RSES, Rosenberg self-esteem scale; SKY, Sudarshan Kriya Yoga.

^aSignificant at 0.05 level.

^bAfter Bonferroni adjustment for multiple comparisons.

Bold values indicates statistically significant.

Content 1, <http://links.lww.com/MS9/A517>). And the participants having low self-esteem before practicing SKY gradually decreased with the practice of SKY (15.52% to 10.34% to 3.45%).

Effect sizes for PSS and RSS

The consolidated effect sizes for before and after the practice of SKY were moderate (Cohen’s $d = 0.2-0.5$) and good (Cohen’s $d > 0.5$) for the level of self-esteem and stress, respectively, as shown in Table 4. And this was statistically significant ($P < 0.05$).

Multivariate analysis of variance

After testing for normality, multicollinearity, and homogeneity for dependent and independent variables, MANOVA was performed with age, sex, participants, and marital status as independent variables and the PSS and RSES as dependent variables. Sex was significantly associated with PSS at 3-day follow-up ($P = 0.042$) with mean PSS of 17.19 ± 4.596 and 19.78 ± 5.091 in females and males, respectively.

Discussion

The various forms and types of yoga have been used extensively for relaxation and therapeutic purposes. From the physiological point of view, it has been shown to increase the endogenous secretion of melatonin (influencing the biological rhythm) and increase the cardiac output (influencing the basal

Table 4
Effect sizes for PSS and RSS at different time frames of SKY practice

Populations	Cohen’s d value
PSS	
Baseline-3-day follow-up	0.07
Baseline-40-day follow-up	0.51
3-40-day follow-up	0.53
RSS	
Baseline-3-day follow-up	0.10
Baseline-40-day follow-up	0.21
3-40-day follow-up	0.24

PSS, perceived stress scale; RSS, Rosenberg self-esteem scale; SKY, Sudarshan Kriya Yoga.

metabolic rate). Psychologically, it is associated with a decrement in stress, depression, and anxiety and an improvement in sleep quality, self-efficacy, resilience, and cognitive performance of individuals^[6,8,16,20–22]. The SKY is a unique type of yoga practice consisting of Ujjayi, Bhastrika, Om, and Sudarshan Kriya^[23].

The level of stress decreased among the professionals after practicing SKY as the mean stress score consistently decreased at 3 and 40 days of the SKY practice. This was statistically significant ($P < 0.01$) at every level with considerable effect sizes (Cohen's $d > 0.5$), thus, signifying the beneficial impact of regular SKY practice in reducing day-to-day stress levels among medical doctors. This was in agreement with previous studies showing a noteworthy reduction in stress among SKY practitioners^[24,25]. Our findings were also consistent with the previous pilot studies^[7,13,15], suggesting the important role of the day-to-day practice of SKY in minimizing personal stress to a greater extent.

Likewise, the statistically significant ($P = 0.013$) result with moderate effect sizes (Cohen's $d = 0.2–0.5$) for increment in self-esteem due to the day-to-day practice of SKY is a unique finding from our study. A similar effect of SKY on well-being and character strengths is reported by previous studies^[20,23]. This suggests the role of daily SKY practice in improving the confidence level and own abilities among medical doctors

On MANOVA analysis, gender (male and females) was significantly associated with the stress level even after the practice of SKY. This was similar to the finding reported from the study by Agte *et al.*^[7]. This signifies the impact of gender, more in males in our study, on perceiving stress even after the SKY practice.

As this is one of the first studies evaluating the effect of SKY practice on perceived stress and self-esteem levels among medical professionals, it can pave the way for a holistic understanding of SKY practice in our daily life. And the results from this study can be a reserve for larger studies that need to be conducted evaluating the efficacy of SKY in our day-to-day life. However, as our sample size was small, the results from our study may be difficult to generalize to the whole population. Similarly, the effect of SKY practice was looked upon for 40 days only. It would have been better if the follow-up was done for a longer period. The inter-observer variability and redundancy in filling the forms also remain in the form of limitations. Due to the busy schedule of the medical doctors, the time constraints were the major hurdle in the study. Likewise, daily working hours were not analyzed differently.

Conclusion

As the medical profession incorporates a hectic workload with a negative impact on the quality of life, this SKY breathing technique can be an effective way of improving it. Our study demonstrates the positive effect of regular SKY practice on perceived stress and the self-esteem level of medical professionals. This can help medical professionals in providing health care more effectively.

Ethical approval

The study was approved by the institutional review committee of the Nepalese Army Institute of Health Sciences with registration No.626. The informed verbal and written consent were taken from the patients.

Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

B.K.: conceptualization, supervision, writing—editing. Bishal D.: conceptualization, writing—original draft. Binaya D.: data validation, data curation, formal analysis. S.D.: literature review, writing—editing, supervision. P.A., U.P., S.G., K.P., K.M.: resources, data validation. P.M., S.P.A., Y.M.: supervision, writing—editing. All authors approved the manuscript.

Conflicts of interest disclosure

The authors declare no conflicts of interest.

Research registration unique identifying number (UIN)

The research is registered in [researchregistry.com](https://www.researchregistry.com) with the unique identifying number of [researchregistry9980](https://www.researchregistry.com/record/9980).

Guarantor

Bishal Dhakal.

Data availability statement

The data will be made available upon request to the corresponding author.

Provenance and peer review

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