

## Suryanamaskara is an Effective Practice for Overall Health Management: A Preliminary Review Study



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### ABSTRACT:

**Background:** With the increased physical inactivity and extreme demand for yogic culture worldwide, the author emphasized particularly one of the main yogic activities namely suryanamaskara (SN), or sun salutation, which has been carrying importance since the Vedic age.

**Purpose:** The author did envisage analyzing as a preliminary review of how SN has been applied to overall health management.

**Method:** A general google search was done for collecting articles, followed by major electronic databases which included Google Scholar, BASE, Semantic scholar, Science direct, ResearchGate, PubMed, DOAJ, and EBSCO. While searching, the keywords had been “surya namaskar\*”, “suryanamaskar\*”, and “sun salutation”. To enhance the chance of getting relevant articles, the author had gone through all references of each article and searched manually. Thereafter, the data were extracted.

**Result:** A total of ninety-five (n=95) articles were amassed from all sources. Eight were excluded as they didn't meet the inclusion criteria. The study had been done with 87 articles. Among these 87 articles, 24 articles were published particularly in yoga-related journals, 12 were published in health, physical education & sports-related journals, and the rest were in other journals. The average of publications on suryanamaskara in the first decade and second decade of the twenty-first century were 0.7 and 8.0 respectively. Overall, the proportion of physiological, psychological, health & fitness, biomechanical, combined, and other studies were 19%, 16%, 44%, 5%, 9%, and 7% respectively.

**Conclusion:** Suryanamaskara had been applied as a medicine in different ways, to different health problems. It is highly established and proven as complementary medicine. Often used in place of a typical fitness program also.

**KEYWORDS:** complementary medicine, fitness, sun salutation, yogic practice.

### INTRODUCTION

The main perennial source of energy is only the Sun<sup>1</sup>. Suryanamaskara (SN), a unique rhythmic physical movement (dynamic asana sequence) that exercises the entire body, is performed to pray to the Sun. It is one of the main traditional yoga practices in India. In the 1920s, Raja of Aundh first popularized SN and had written a book on SN namely “The Ten Point Way To Health: Surya Namaskars”<sup>2</sup>. Later, numerous yogis, yogic organizations, and yogic schools modified the sequences to explore their ideologies, and subsequently, it has been spread around the world<sup>3</sup>. Looking at the current situation, 1 in 4 adults and 3 in 4 adolescents (aged 11–17 years) worldwide do not currently meet the global recommendations for physical activity set by WHO. Inactivity levels rise as countries prosper economically<sup>4</sup>. Poor health is one of the major causes of morbidity and mortality worldwide. According to WHO's report published in 2019, the top global causes of death are non-communicable diseases (NCDs), which are collectively accountable for almost 74% of all deaths worldwide<sup>5</sup>. However, 44 million people die yearly due to NCDs worldwide, and 10.4 million deaths yearly in South-East Asia<sup>6</sup>. To minimize this mortality, WHO recently launched a plan namely ‘Global Action Plan on Physical Activity 2018-2030’ aiming to reduce physical inactivity 10% by 2025 and 15% by 2030<sup>7</sup>. SN is an effective practice to combat any health issue. This traditional approach is more superior in combating modern-day lifestyle disorders. In India, five organizations had launched 75-crore SN program that had been authorized by AYUSH as a homage to India's 75th year of independence in 2022 for 'Sarve Bhavantu Sukhinah' (to make all happy). These organizations are Patanjali Yogpeeth, Heartfulness, Geeta Pariwar, Krida Bharti, and National Yogasana Sports Federation<sup>8</sup>. There have been many articles on SN, where it has been applied as a therapeutic intervention. So, the author emphasized conducting a preliminary review study on how SN has been applied in different domains.

### OBJECTIVE

The objective of the study was to analyze how SN has been applied to different health issues.

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## METHOD

**Literature search strategy:** Author searched the electronic literature databases focusing on SN and its various effects. The main search items for this study were: “surya namaskar\*”, “suryanamaskar\*”, and “sun salutation”. In the beginning, there were no limitations or restrictions in search concerning year, journal type, the theme of the articles, region, etc. Initially, it was started searching the pertinent articles in the search engine namely google search or google. Further, it was started searching in various databases like PubMed, BASE, ResearchGate, EBSCO, Semantic Scholar, Google Scholar, DOAJ, ScienceDirect, etc. The author even went through all reference lists collected from each article to get more additional studies. The study was further delimited with the year of publications from 2001 to 2020.

**Selection criteria:** All types of research articles that contained “surya namaskar\*”, “suryanamaskar\*”, or “sun salutation” in the title were included in this study. It could be an experimental, analytical or theme-based study. SN with a different pace and different variations also were included in this study.

**Exclusion criteria:** The articles which were found abstracts only, poster presentations, conference papers, or publishing years either before 2001 or after 2020 were excluded from the study.

## RESULTS

This preliminary study reviewed, and analyzed the effect of SN and its applications in different health issues. Very few research articles have been found on SN. A total number of 95 articles were collected from different sources. The term either “surya namaskar\*”, “suryanamaskar\*”, or “sun salutation” must have been there in the title of each article. Among these 95 articles, 8 were excluded due to non-availability of full text (n=1), publishing year of the paper was either before or after within the specified time (n=5), poster presentation (n=1), and conference paper (n=1). Afterward, the study worked on 87 articles. A total of twenty-four (n=24) articles were published particularly in yoga-related journals, twelve (n=12) were published in health, physical education & sports-related journals, and the rest of the fifty-one articles (n=51) were published in other journals. These 87 articles which met the inclusion criteria were collected from different databases like BASE, DOAJ, EBSCO, Google Scholar, Google Search, PubMed, ResearchGate, Science Direct, and Semantic Scholar (Fig. 1).

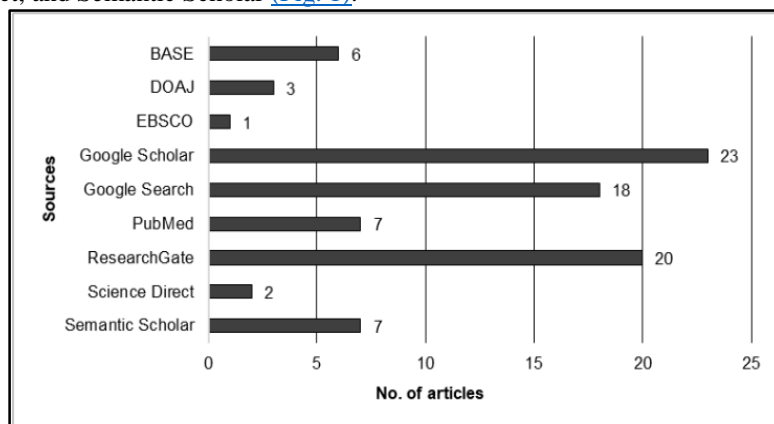


Fig:1. shows the no. of publications on SN collected from different databases.

Fig. 2. depicts the yearly progression of publications on SN. No study was found in 2001, 2002, 2003, 2005, 2006, and 2007. Whereas, yearly most articles (14) were published in 2019. The average of publishing research articles on SN in the first decade (7) and second decade (80) of the twenty-first century was 0.7 and 8.0 respectively. The difference and progression of publications on SN between the first decade and second decade could be seen clearly.

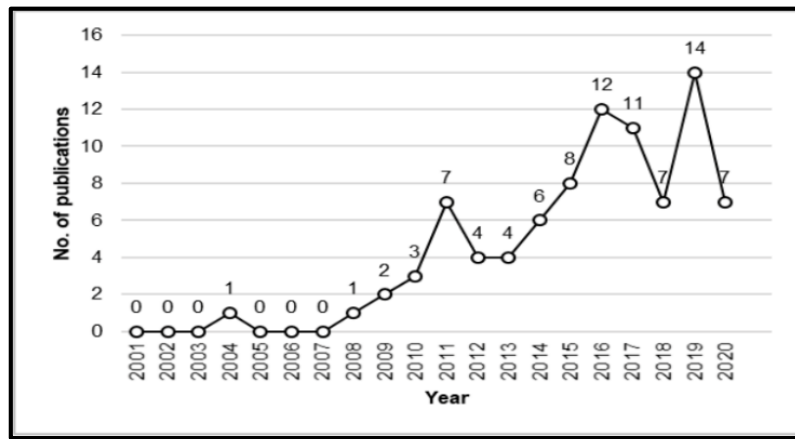


Fig. 2. shows the progression and number of SN publications per year.

The included research articles highlighted some specific areas. These were physiology, psychology, kinesiology, health & fitness, and others. Among these 87, a total of 17 articles were on physiological interventions, 14 studies were on psychological, 38 were health & fitness related studies, 4 studies were biomechanical, and 8 studies combinedly worked either with physiology and psychology or physiology and health or psychology and fitness-related studies and 6 studies coded with ‘others’ were mainly theme-based articles. Overall, the proportion of these physiological, psychological, health & fitness, biomechanical, combined, and other studies were 19%, 16%, 44%, 5%, 9%, and 7% respectively (Fig. 3).

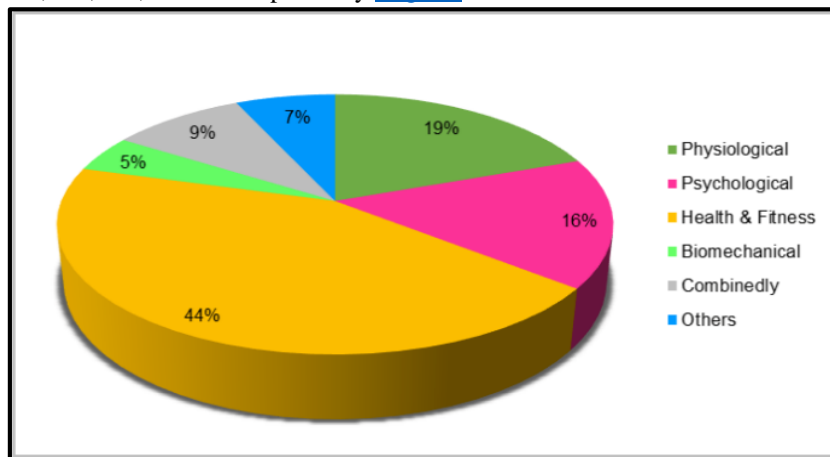


Fig. 3. The pie chart shows the area-wise proportion of all published pieces of literature.

The limited available literature reports that the publications on SN mostly have been done by Indian authors. It also reports that the number of research publications has been increasing rapidly (Fig. 2). Here, some of the included articles were elaborated in the tabular form mentioned below.

Table 1. shows the study characteristics of the effect of SN on different parameters

Sl. No.	Author (s), (Year)	Participants	Intervention	Outcome measures	Results
1.	Balaji, P. (2011) <sup>9</sup>	26 women aged 22-69 years	Hatha yoga and SN; 90 min, 5 days a week for 6 months	Maximum value for the chest after complete inhalation and minimum value of the chest after exhalation	Irregular yoga- practitioners showed a gain in body weights and an increase in other parameters as compared to the general trend shown in the case of regular yoga practitioners. Greatly deducted in waistline, in hips, increased lung flexibility.

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2.	Bhavanani et.al. (2011) <sup>10</sup>	42 school children of 12–16 years	12 postures of SN Rapid (each posture was held for 10 sec), Slow (each posture was held for 30 sec); 30-40 min for 6 months	Pulmonary function, respiratory pressures, handgrip strength, endurance, and resting cardiovascular parameters	SN has positive physiological Benefits. FSN produced a significant increase in pulmonary function, MIP, IHG, HGS, HGE, and resting cardiovascular parameters, systolic pressure, and SSN produced a significant decrease in diastolic pressure.
3.	Bhutkar et.al. (2008) <sup>11</sup>	78 MBBS students, (48 males and 30 females); 18 to 20 years	Prayer, Omkar, Bija Mantra followed by SN; 6 days a week for 6 months	Blood pressure, RME, VC, FEV1, MVV, Aerobic capacity	Both male and female groups showed a statistically highly significant decrease in resting PR, B.P., and statistically highly significant increase in various lung functions and cardio-respiratory efficiency.
4.	Choudhary & Stec, (2010) <sup>12</sup>	20 male participants	SN treatment; 45 min/day, 6 days per week for 6 weeks	The flexibility of the back and leg muscles	The short duration (2 weeks) doesn't result in any flexibility effect. But a little long duration (6 weeks) of practice impacts flexibility significantly.
5.	Karthik, et.al. (2014) <sup>13</sup>	50 1st year M.B.B.S. students aged 17-19 years	Yogic treatment: Nadisuddi, Kapalbhathi, Bhrastika, Bramhari, Pranava Pranayama, and SN; 30 min daily for two months	Pulmonary functions such as VC, TV, ERV, BHT, 40 mm endurance, PEFr	VC, TV, and ERV are increased significantly. BHT, 40 mm endurance, and PEFr improved significantly.
6.	Karthika & Kumar, (2017) <sup>14</sup>	60 Asperger syndrome children 8 to 12 years old	SN and Pranayama; 12 weeks, six days per week	School performance	Suryanamaskar with pranayama combined treatment significantly improved the school performance among Asperger syndrome children.
7.	Kondam et al., (2015) <sup>15</sup>	60 medical students aged 18-24 years	Yoga followed by pranayama; SN for 1 hour, 5 days a week for 6 months	Dynamic spirometric values i.e., FVC (L), FEV1, FEV <sub>3</sub> , FEF <sub>25-75%</sub> , VC, FEV <sub>1</sub> /FVC (%), PEFr, SVC, ERV, IRV, TV	All spirometric values were highly significant (p < 0.05) in the combined (pranayama and SN) group compared to other groups.
8.	Mangaonkar & Puntambekar (2018) <sup>16</sup>	30 physiotherapy students of 19-25 years	SN and dynamic stretching for 15 minutes daily for four weeks	Hamstring flexibility, Knee extension	Bot improved hamstring flexibility but SN is more effective than dynamic stretching
9.	Sinha & Sinha (2014) <sup>17</sup>	9 healthy male Army soldiers 22.3 ± 1.31 years old	SN, meditation, and pranayama; 1 hour daily 5 days a week for 11 months	Cardio-respiratory parameters	All parameters were improved significantly except HR and fR.

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10.	Sinha et al., (2004) <sup>18</sup>	21 male participants, Indian Army	Yogic Practice including hatha yoga asana, pranayama, meditation, and SN; 6 days a week for 3 months	Energy cost and cardiopulmonary parameters	No significant correlation between $V_{O_2}$ and HR, $f_R$ and $V_T$ . Correlation between $V_E$ and $V_{O_2}$ , $V_E$ and $V_{CO_2}$ . Weaker correlation between $V_T$ and HR.
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**Note:** **FSN:** Fast Surya Namaskar, **SSN:** Slow Surya Namaskar, **MIP:** Maximum inspiratory pressure, **IHG:** Isometric Hand Grip, **HGE:** Hand Grip Endurance, **RME:** Respiratory Muscle endurance, **VC:** Vital Capacity, **MVV:** Maximal Voluntary Ventilation, **ERV:** Expiratory Reserve Volume, **PR:** Pulse Rate, **PEFR:** Peak Expiratory Flow Rate, **BHT:** Breath Holding Time, **VT:** Tidal Volume, **FVC:** Forced Vital Capacity, **FEV<sub>1</sub>:** Forced Expiratory Volume in 1 sec, **FEV<sub>3</sub>:** Forced Expiratory Volume in 3 sec, **FEF<sub>25-75%</sub>:** Forced Mid-expiratory Flow, **SVC:** Slow Vital Capacity, **f<sub>R</sub>:** Respiratory Rate, **HR:** Heart Rate, **V<sub>O<sub>2</sub></sub>:** Oxygen Consumption, **V<sub>CO<sub>2</sub></sub>:** Carbon dioxide Output, **V<sub>E</sub>:** Pulmonary Ventilation.

### DISCUSSION

The results of the study indicate that it is a supportive exercise for the whole body. The practice of SN stretches the spine, stomach, intestine, and also tones up all musculo-skeletons<sup>2</sup>. As the sun is the perennial source of vitamin D, so sunlight enters every cell and is synthesized in the body. Even more, skin gets toned up by this practice, body glows as a result<sup>19</sup>. One study suggests that the regular practice of SN improves general health-fitness as well as psychological well-being<sup>12</sup>. Many studies reported the experience of SN is highly beneficial at all (physical, mental, and spiritual) levels. At the physical level, it enhances flexibility<sup>12,16,20,21</sup>, improves muscular strength and endurance<sup>22,23</sup>, power<sup>24</sup>, burns calory<sup>25,26</sup>, improves digestion<sup>27</sup>, losses fat<sup>28</sup>, betters coordination<sup>29</sup>, relieves spinal disorders<sup>19,30</sup>, controls cholesterol level<sup>31</sup>, reduces blood pressure<sup>32</sup> and pulse rate<sup>33-36</sup>, improves cardio-respiratory efficiency,<sup>10,11,18,37-40</sup>, etc. At the mental level, the practice of SN is very effective in reducing stress<sup>32,41</sup>, anxiety<sup>42</sup>, anger<sup>43</sup>, calmness of the mind<sup>44</sup>, makes more attentive<sup>45</sup>, enhances self-confidence<sup>42</sup>, etc. It works at the spiritual level as well; betters command over the body<sup>46</sup>, balances psychic energies<sup>47</sup>, and increases awareness forming a deeper connection between the body, breath, and consciousness<sup>48</sup>, etc. Practicing SN at a fast pace mainly improves cardio-respiratory efficiency, betters metabolic response<sup>27,49</sup>, rises muscle strength, and overall health fitness<sup>50-55</sup>, etc. Whereas, practicing SN at a slow pace improves neuro-cardiological response, and lowers stress<sup>56-60</sup>, improves concentration<sup>57</sup>, self-confidence<sup>56</sup>, develop emotional maturity<sup>61</sup>, enhances perceiving the presence of psychic energy in the body<sup>47</sup> and many more. Moreover, SN is strongly beneficial for holistic health. It is certifiably not a simple arrangement of Asanas. It is the complete practice of all yogic activities. It covers almost all areas of yogic practices like asana, pranayama, mudra, and bandha which have an unimaginable impact on physical, physiological, psychological, psycho-physiological, neurological aspects, etc. It joins body movement with breath and awareness. Whenever this body movement combines with rhythmic breathing and awareness, the practice becomes extraordinarily powerful.

The uniqueness of this study is that it is the only preliminary review of SN. To date, no researcher has previously conducted any review study on SN. Thus, the present study is justified to investigate the effect of SN on different health issues. It is not that this research article has no limitation. Not all published articles on SN were likely obtained and analyzed. But the author had gone through literature search to the best of their abilities to get maximum outcomes.

### CONCLUSION

Based on reviewing 87 literatures, particularly on SN, the author may conclude that most of the studies stated the practice of SN is highly effective for physical, mental, and spiritual health, though some studies got the benefit on many parameters like flexibility, blood pressure, ventilatory function, weight loss, sustaining attention, stress, etc. these were not statistically significant. In this 21<sup>st</sup> century, it is now being applied as a complementary treatment for many health issues. It is a very useful adjunct to many physical fitness programs, awakening psychic energies and even more on medical conditions. Although this review had not covered all the research articles on SN, of course, it would be helpful to create a preliminary groundwork for future researchers.

### COMPETING INTERESTS

The author declares no competing interests.

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