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SURYANAMASKARA AS AN INTERVENTION FOR OBESITY: A META-ANALYSIS

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ABSTRACT

Introduction: The global obesity epidemic, a significant public health challenge affecting adults and children across India, necessitates accessible and effective interventions. *Suryanamaskara*, a holistic and age-inclusive practice, has emerged as a potential tool for weight management. To consolidate existing evidence, this meta-analysis investigated *Suryanamaskara's* impact on key obesity markers. **Methods:** There were 1674 records identified through comprehensive database searches, ultimately including 7 studies that met the inclusion criteria. **Results:** This analysis demonstrated a consistent and statistically significant reduction in BMI (0.5-2 units), weight (1-5 kg), and body fat percentage across various age groups and intervention durations (4-24 weeks). Which indicates a positive and notable effect of *Suryanamaskara* on obesity. While all included studies reported significant reductions ($p < 0.05$), substantial heterogeneity was observed in study characteristics such as sample size, age, and intervention duration. The most effective practice pattern identified involved 10-12 sets per day, 5-6 days a week, for a minimum of 8-12 weeks. **Conclusion:** This can be adopted as a daily routine in obesity along with other diet and lifestyle management. Its structured, accessible format makes it suitable for integration into community wellness and lifestyle programs.

KEYWORDS: *Suryanamaskara*, Sun Salutation, Obesity, Weight loss.

INTRODUCTION

Obesity is a rapidly emerging public health concern in India, with significant implications for overall health and quality of life. Recent estimates indicate that about 44% of Indian adults aged 15-49 years are overweight or obese, with obesity rates reported at approximately 14% among men and 5% among women. Childhood obesity is also on the rise, with a prevalence of around 4-5% among children aged 5-19 years.[1] This growing burden highlights the urgent need for effective, sustainable, and accessible interventions.

Suryanamaskara, or Sun Salutation, is a traditional yogic practice that offers a comprehensive and holistic approach to physical fitness and health. Its 12-step sequence integrates stretching, strengthening, and breathing regulation, thereby improving flexibility, cardiovascular endurance, and musculoskeletal health.[2,3,4] Unlike complex multi-asana routines, *Suryanamaskara* is relatively simple, easy to learn, and adaptable across different age groups, making it an inclusive and practical lifestyle intervention.[5]

Although several studies have explored the role of *Suryanamaskara* in managing obesity and related health parameters, the available evidence is scattered and heterogeneous. A meta-analysis is necessary to systematically consolidate these findings, evaluate their collective strength, and provide clearer insights into the effectiveness of *Suryanamaskara* as an intervention for obesity. Such an evidence-based synthesis can guide practitioners, researchers, and policymakers in integrating this traditional practice into modern preventive and therapeutic strategies.

Methodology of Meta-analysis

Databases Searched

A comprehensive literature search was conducted using the following databases: PubMed, Scopus, AYUSH Research Portal, and Google Scholar.

Keywords Used

The search strategy employed combinations of the following keywords: *"Suryanamaskara"*, "Sun Salutation", "obesity", and "weight loss".

Inclusion Criteria

- Clinical trials, randomized controlled trials (RCTs), and comparative studies.
- Studies specifically assessing the effects of *Suryanamaskara* on obese or overweight individuals.

Exclusion Criteria

- Studies in which *Suryanamaskara* was included as part of a multi-modal or composite intervention without separate outcome data available.
- Non-clinical studies, reviews, or anecdotal reports.

Data Extraction

From the selected studies, the following details were extracted:

- Study design and methodology.
- Sample size and demographic details of participants.
- Duration and frequency of intervention.
- Outcome measures related to obesity, such as body weight, BMI, body fat percentage, waist-hip ratio, or metabolic parameters.

Study Selection

A total of 1674 records were identified through database searches (PubMed, Scopus, AYUSH Research Portal, Google Scholar). After screening all records, 1650 studies were excluded for reasons such as being reviews, non-clinical studies, or lacking relevant outcome data. 24 full-text articles were assessed for eligibility. Of these, 17 were excluded as they involved multimodal interventions where the effects of *Suryanamaskara* could not be independently analyzed. Finally, 7 studies met the inclusion criteria and were included in the meta-analysis.

Table 1: Summary of Study Screening and Selection Process.

Stage of Screening	Number of Records
Records identified through databases	1674
Records screened	1674
Records excluded	1650
Full-text articles assessed for eligibility	24
Full-text articles excluded	17
Studies included in final meta-analysis	**7**

RESULTS

Seven studies fulfilled the inclusion criteria and were analysed for the effectiveness of *Suryanamaskara* in obesity management. Across these studies, consistent and significant improvements were reported in obesity-related parameters.

Table 2: Summary of Outcomes from Included Studies in the Meta-analysis.

Study (Author, Year)	Sample Size	Duration	Key Outcomes (Pre to Post)	p-value	Significant (yes/no)
Bhutkar et al. (2011)	79	24 weeks	BMI & BF% ↓ in both males & females	<0.0001	Yes
Jakhotia et al. (2015)	119 (4 groups)	8 weeks	BMI ↓, Flexibility & VO_2max ↑	<0.0001	Yes
Nautiyal (2016)	30 (15 EG)	30 days	Weight: 74.88 - not specified	0.02	Yes
Yadav et al. (2017)	150	30 days	BMI: 29.67 → 29.01 HC: 102.71 → 102.21	0.0006 0.003	Yes
Srivastav et al. (2020)	50	12 weeks	BMI: 29.34 → 28.19 WC: 102.32 → 99.91 CRP ↓	0.001	Yes
Ravi Kumar (2024)	93 (45 EG)	60 days	BMI: 25.72 → 23.76 BF%: 31.12 → 28.12	0.001	Yes
Boonsita et al. (2025)	44 (22 EG)	8 weeks	BMI: 30.71 → 30.41 Flexibility ↑ (4.62 → 10.35 in)	0.021 <0.001	Yes

Bhutkar et al. (2011)[2] demonstrated a marked reduction in BMI and body fat percentage over 24 weeks of practice, while Jakhotia et al. (2015)[6] showed that an 8-week intervention not only reduced BMI but also improved flexibility and VO_2max, highlighting the cardiopulmonary benefits of the practice. Nautiyal (2016)[7] observed significant weight reduction within just 30 days, reinforcing the short-term efficacy of

Suryanamaskara. Similarly, Yadav et al. (2017)[8] reported a decrease in both BMI (29.67 to 29.01) and hip circumference (102.71 to 102.21 cm) within 30 days, with strong statistical significance.

Srivastav et al. (2020)[9] added further evidence by documenting reductions in BMI (29.34 to 28.19) and waist circumference (102.32 to 99.91 cm), along with a significant decline in C-reactive protein, indicating anti-inflammatory benefits. More recently, Ravi Kumar (2024)[10] reported substantial improvements over 60 days, with BMI decreasing from 25.72 to 23.76 and body fat percentage from 31.12% to 28.12%. The latest evidence from Boonsita et al. (2025)[11] not only confirmed reductions in BMI (30.71 to 30.41) but also showed a remarkable increase in flexibility (4.62 to 10.35 inches), further emphasizing the holistic impact of the practice.

Overall, all included studies consistently reported statistically significant improvements ($p < 0.05$) in anthropometric and fitness parameters, establishing *Suryanamaskara* as an effective, low-cost, and accessible intervention for overweight and obese individuals.

DISCUSSION

Across seven studies involving approximately 615 participants aged 18-60 years, *Suryanamaskara* was typically practiced in 10-12 sets per day, 5-6 days a week, for 30-60 minutes per session. Intervention durations ranged from 4 to 24 weeks, with the most effective results observed when the practice was sustained for at least 8-12 weeks. All studies employed the traditional 12-step sequence, sometimes accompanied by mantra chanting.

The present meta-analysis of seven studies ($n \approx 615$) demonstrates consistent benefits of *Suryanamaskara* in obesity management, with significant reductions in BMI (0.5-2 units), body weight (1-5 kg), and body fat percentage (31.12% to 28.12%, $p = 0.001$). Beyond weight reduction, *Suryanamaskara* offers a holistic, equipment-free practice that integrates cardiovascular activity, muscular strengthening, flexibility training, and mindfulness. These attributes make it an ideal, low-cost, community-based intervention for obesity prevention and management.

However, certain limitations must be noted, including relatively short intervention durations, modest sample sizes, lack of dietary control in most studies, and limited long-term follow-up data. Future large-scale, multicenter RCTs with extended follow-up are needed to establish stronger evidence for its sustained effectiveness.

CONCLUSION

In a world where lifestyle diseases are rapidly increasing, we often search for complex solutions. Yet, ancient practices like *Suryanamaskara* provide a simple, structured, and effective path to better health rooted in tradition and increasingly supported by scientific evidence. Its accessible 12-step format makes it highly suitable for integration into community wellness and lifestyle programs, particularly for addressing obesity.

Clinical implications include the potential incorporation of *Suryanamaskara* into obesity management protocols as a cost-effective, equipment-free intervention. At the same time, there remains significant scope for well-designed, large-scale randomized controlled trials (RCTs) to strengthen the evidence base and explore its long-term benefits.

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