Design and validation of Integrated Yoga Therapy module for Antarctic expeditioners

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A B S T R A C T

Background: Extreme environments are inherently stressful and are characterized by a variety of physical and psychosocial stressors, including, but not limited to, isolation, confinement, social tensions, minimal possibility of medical evacuation, boredom, monotony, and danger. Previous research studies recommend adaptation to the environment to maintain optimal function and remain healthy. Different interventions have been tried in the past for effective management of stress. Yoga practices have been shown to be beneficial for coping with stress and enhance quality of life, sleep and immune status.

Objective: The current article describes preparation of a Yoga module for better management of stressors in extreme environmental condition of Antarctica.

Materials and methods: A Yoga module was designed based on the traditional and contemporary yoga literature as well as published studies. The Yoga module was sent for validation to forty experts of which thirty responded.

Results: Experts (n = 30) gave their opinion on the usefulness of the yoga module. In total 29 out of 30 practices were retained. The average content validity ratio and intra class correlation of the entire module was 0.89 & 0.78 respectively.

Conclusion: A specific yoga module for coping and facilitating adaptation in Antarctica was designed and validated. This module was used in the 35th Indian Scientific expedition to Antarctica, and experiments are underway to understand the efficacy and utility of Yoga on psychological stress, sleep, serum biomarkers and gene expression. Further outcomes shall provide the efficacy and utility of this module in Antarctic environments.

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scientist and psychologists to offering periodic support through online group or individual psychological counselling sessions for helping expeditioners deal with the stress [2].

Several psychological and physiological changes are observed in Antarctic expeditioners. Psychological changes range from behaviour changes like aggression, mood swings to psychiatric problems like depression [3]. Isolation seems to have a considerable effect. Isolation and inherent danger associated in Antarctic environment might enhance the extent of repetitive negative thinking based on the personality of the individual. Reports suggest an increase in smoking, loneliness, homesickness and a reduction in rapport during the isolated dark winter months [4]. Physiologically, decreased immune responsiveness accompanied with variations in circulating insulin, thyroid stimulating hormones, testosterone, cortisol, melatonin, pro-inflammatory Cytokines, 25-OH-vitamin D and a significant increase in total cholesterol have been recorded [5–8]. Some studies also suggest that such challenging environments also turn to be salutogenic in certain individuals. With limited access to health care in the Antarctic environment, strategies are required to be adopted to promote overall psycho-physical wellness of an individual and also the group. Interestingly, Yoga practices have been known to be beneficial and promote psycho-physiological well being across human cultures.

Physical postures (asana), voluntarily regulated breathing (pranayama), and meditation (dhyana) are the three main components of Yoga practiced in India over thousands of years. In the past decade, Yoga has gained popularity as a fitness strategy and as well as an adjunct therapeutic tool in the management of obesity [9], diabetes [10], hypertension [11] and even auto-immune disorders [12]. Yoga practices have been shown to alleviate anxiety, fear [13,14], negative thinking [15], and enhance cardio-pulmonary fitness [16], immune status [17,18], and also telomere length [19] in regular practitioners. Yoga practices improve the overall sleep efficiency and total sleep time [20]. Yoga practice in high altitudes showed a lower reduction in oral temperature and lower increase in Oxygen consumption and energy expenditure compared to physical therapy [21]. Meta-analysis of data on Yoga recommend Yoga to be considered as an ancillary treatment option in the management of depressive disorders [22].

A study was conducted on the summer and wintering over members of the 35th Indian Scientific Expedition Members to Antarctica to understand the role of Yoga practices on facilitating human adaptation to extreme climatic conditions. Even though Yoga practices are known to be beneficial for individuals irrespective of their health and disease states, it is essential to structure specific Yoga practices that are intended to provide most benefits. Yoga practices for Antarctica were designed with the following objectives:

i. To regulate mood and alleviate psychological stress caused due to isolation
ii. To enhance physical wellness, overcome fatigue and regulate metabolism
iii. To enable better thermoregulation
iv. To enhance better sleep and promote interpersonal relationship

The objectives were listed based on the earlier reports on the psychological and physiological changes in Antarctic expeditioners. Practices identified were compiled together to promote calmness of mind and sleep, overcome stress and fatigue, promote overall endurance of the body, regulate digestion, metabolism and enable better pulmonary functions (supplementary material 1). The current study present the data on the designing and validation of the Yoga module that was implemented in the expedition members.

2. Materials and methods

The classical and contemporary yoga texts were reviewed to develop the content of the Yoga module. Texts on Yoga Sutras of Patanjali, Hatha Yoga Pradipika, Shiva Samhitha, Cheranda Samhita, Hatharathnavali, Bhagavad Gita, Upanishads, Yoga Vashista and Yogic Sukhshma Vyayama were reviewed [23–31]. Practices that might be difficult for the expeditioners to practice and those that are contra-indicated in common disorders such as hypertension and cardiovascular disorders were not included. Similarly, those practices that were difficult to objectively verify and certain Sukhshma vyayama (loosening exercise) practices that might not be feasible to practice in group inside the Antarctic stations like Jangha Shakti vikasaka [31] were not included. The Yoga module that was designed consisted of postures with slow movements and breath awareness, loosening exercises, suryanamaskara, asana, pranayama, relaxation and nadanusandhana. The duration of the entire practice is 1 h.

The Yoga module was sent along with the objectives to forty yoga experts out of whom thirty responded with their scores and comments. Members with allopathic & AYUSH streams of medicine with post graduate medical degree in Yoga therapy, researchers with doctoral degree in yoga, and yoga & naturopathic physicians with over 7 years of clinical experience were considered to be included in the expert panel for validating the Yoga module. The experts rated the usefulness of the module on a scale of 1–5 (1 not at all useful, 2 a little useful, 3 moderately useful, 4 very useful, 5 extremely useful). Content Validity Ratio (CVR) for suitability of items was calculated following Lawshe's method [32]. Dichotomous (yes/no) responses were obtained to determine the duration of the individual practice and the entire yoga session.

2.1. Statistical analysis

Lawshe’s CVR ratio was calculated [32] for each item in the module. Items with a CVR of 0.6 and above were considered beyond change agreement (p < 0.05, one tailed) for 30 experts. Intraclass correlation was calculated for inter-rater reliability [33].

3. Results

Thirty experts in Yoga therapy and research consented to contribute to the content validation of the Yoga module for extreme Antarctic environmental conditions. These Yoga experts had experience in various traditions of Yoga. The experts age ranged from 32 to 50 years (mean 36.3 ± 4.17 years). The average experience following formal yoga training was 12.3 years ranging between 8 and 26 years. The scores obtained for the individual practices and the calculated CVR are shown in the supplementary material 2. One practice viparitakarani with CVR <0.6 was excluded. The average CVR for the entire Yoga module was 0.89. Good agreement is noted for most practices listed in the yoga module. Intra Class Correlation [33] for the entire module was 0.78.

All the experts opined on the need for practicing Suryanamaskara (sun salutation), relaxation and breath awareness based practices and pranayama. Most experts agreed on the duration of 1 h for the Yoga practices (Table 1). In addition to the practices that were asked to be scored by experts, seven experts recommended to include varan dhattu kriya (voluntarily induced vomiting after drinking saline water in empty stomach). But, was not considered in module due to challenges in water treatment and discharge at Antarctica.
4. Discussion

The Yoga module for application in the extreme Antarctic conditions appears to be acceptable for most of the experts. Similar strategy was used in earlier studies for validating yoga modules for various pathological conditions [34,35]. The experts from different schools of yoga were in agreement with the contents of the module. Only *viparitakarani* was not favoured to be included in the final module as indicated by the CVR score (<0.6). Seven experts suggested including *vaman dhauti kriya*. However, with concerns over processing the waste water and maintenance in the Antarctic stations and the decision of experts not being unanimous, the recommendation was not taken further into validation.

Several interventions like psychiatric counselling, group therapy, medications and diet are tried on the expeditioners to reduce their psycho-physiological stress. Yoga, a widely accepted reliever of stress [36], has never been tried in Antarctica until now. Also, the strengths of this module is that it consists of simple postures that are easy to follow and as the practices are derived from traditional yoga texts, yoga instructor following any school of Yoga should be able to teach the module. The classical Yoga texts do not describe specific symptom based guidelines for their practice — as the primary objective of Yoga practices is to gain mastery over mind [26] and the observed physical and mental benefits might be actual by-product of yoga practice. Therefore, the practices have been selected from the texts based on the approximating descriptions of mental and physical health benefits of specific Yoga practices and that are feasible to be practiced at the Indian Antarctic station. This is the first attempt made to administer structured Yoga practices with an objective to understand its mechanisms of action in isolated, stressful and extreme Antarctic conditions. The effect of the Yoga intervention will be known when the study on the summer [Voyage team] and wintering over [Bharati, Larsenmann hills, (69°24’28”S 76°11’14”E)] members of the 35th Indian Scientific Expedition to Antarctica will be analysed for changes in their psychological stress, sleep, serum biomarkers, and gene expression regulations.

5. Conclusion

A comprehensive and traditional text based Yoga module was developed as an intervention to facilitate coping up with the psychological and physiological stressors in the Antarctica. The Yoga module was validated by 30 experts who agreed to most of the practices. The final module was used as an intervention in the 35th Indian Scientific Expedition to Antarctica. Testing of efficacy of the intervention on alleviating psycho-physiological stress at genetic and molecular level is underway and might prove to be an efficient way to deal the stressors associated with the extreme Antarctic environments.

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Conflict of interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaim.2017.11.005.

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