



Feasibility Of Yoga Intervention As Treatment Plan In Patients With Traumatic Lower Limb Amputation

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Abstract: The theoretical foundations for the therapeutic application of yoga in patients with lower limb amputation are outlined in this article. Yoga has developed and perfected highly effective models and tools for healing and well-being to improve physical and mental health over the course of its several thousand years of existence. There is dearth of literature available to assist researchers in developing treatment protocols on yoga practices for health concerns. This article is written with the intend to explore what factors motivate or inhibit patients to practice yoga as a treatment protocol and establish the feasibility and acceptability of Yogic practices in patients with traumatic lower limb amputations.

Methods: This is prospective single arm design. Traumatic lower limb amputees were enrolled in the study to develop a feasibility and acceptability yoga protocol. Total of 26 patients were enrolled in the study and were made to do the set protocol for the duration of 18 weeks.

Discussion: The research protocol can be used to guide future feasibility studies on yoga for people with lower limb amputation, as well as future yoga intervention studies aimed at determining the most effective and feasible yoga practices.

Introduction

Yoga, a 3000 year old practice, is now recognized as a holistic approach to health throughout the globe, and is listed as a form of complementary and alternative medicine by the national institutes of health (CAM).¹ The term "yoga" is derived from the Sanskrit root "yuj," which means "union," "yoke," "joining," and "directing and concentrating one's attention."² Regular yoga practice increases stamina, endurance, flexibility, and personality traits such as friendliness, kindness, and self-control, all while maintaining a sense of comfort and well-being.³ Sustained practice also has significant implications, such as an improvement in perspective and increased self-awareness, with better sense of energy to live life fully and with genuine pleasure.⁴

Yoga is a form of mind-body exercise that incorporates muscular activity with an internally focused mindful emphasis on self-awareness, breath, and energy.³ Yoga, which includes a number of exercises such as physical postures, breathing techniques, and meditation, has increased in popularity as a way of enhancing one's health, from physical activity to overall quality of life.^{5,6} Yoga has been shown to be an important stress reliever, resulting in biochemical and physiological improvements.^{7,8} Amputation as a surgical procedure is performed in circumstances where salvaging a limb is unlikely and the remaining part of the limb tissue needs excision.⁹ Amputation is an irreversible surgical operation that can leave permanent disability and disfigurement. Many studies in the field of amputation have found that amputation is also related with the loss of a partner, the loss of one's sense of wholeness, symbolic castration, and even death.^{10,11} The loss of a limb may be distressing not just because of the physical loss, but also because of the role constraint and the need to adapt to new lifestyle options. Multiple factors, such as feelings of loss, self-shame, and difficulty coping with the disability, can put a person undergoing amputation at risk of developing depressive disorder.^{12,13} Yoga has been shown to be an important stress reliever, resulting in biochemical and physiological improvements.^{7,8} Despite the fact that there have been many studies on the effectiveness of yoga on various measures of emotional states, the aim of this study was to develop a systematic and adapted yoga protocol as well as its practicability for patients with lower limb amputation.

Methods/ Design

Ethical Clearance: Study was approved by Institutional Ethics Committee: IEC-494/07.10.2016, RP-53/2017

CTRI Registration: Study was registered in the Clinical trial registry- India (REF/2019/10/028767)

Study design: Single arm prospective design

Study Population / Patient Recruitment: All the patients who had come to the emergency department of JPNA Trauma centre with traumatic lower limb injury and underwent amputation of the lower limb were recruited in the study.

Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • IPD patients • Patients with traumatic lower limb amputation • Age 18-65 • Both female and male 	<ul style="list-style-type: none"> • OPD Patients • Children/ Pregnant women • Patient with co-morbidities like cardiac condition, malignancies, coagulation and bleeding disorders. • Patient on anti-epileptics and thyroid drugs • Patients with non-traumatic amputation • Referred patients who underwent amputation in other healthcare facilities • Patients with chemical and burn injuries • Patients on hormone therapy/ steroid therapy • Chronic diseases of liver, kidney and lung • Patient not giving consent

Procedure: After meeting the inclusion and exclusion criteria patients were enrolled in the study and informed consent was taken from all the patients. 26 patients were enrolled in the study and conventional treatment was given to all the patients. Yogic practices were given to the index case (pilot case) and list of practices were selected as per the feasibility of the case. Either unilateral or bilateral lower limb amputation patients were made to practice different types of yogic practices and their feasibility was checked. Specific caution was taken while dealing with multiple trauma cases. Thus there were changes made in the yoga protocol in accordance with

feasibility of practices possible on Lower limb amputees. After that a set protocol was established for regular practice for the duration of 18 weeks. Patients were regularly followed up during this duration for any adverse effects of yoga. Yoga booklet was prepared and was released in house during the celebration of International Yoga Day on 21st June 2018. Yoga Booklet was given to all the enrolled patients so patients can perform yoga practices with precision and keep the log of their exercises.

YOGA PROTOCOL

In the beginning yoga practices were delivered bed side to the patients till the time of their discharges by yoga instructor. Later when patients were discharged from the hospital set up they were called regularly every Monday in amputation clinic and were made to practice yoga in a designated area under supervision of yoga instructor. All the patients were given yoga booklet with a log book so that they can keep a record of the practices which they are doing at home. The protocol taught patients to the core aspects of Yoga, such as asana, pranayama, relaxation methods, mental concentration and philosophy. Sessions consisted of regular yoga practices and its benefits in pain relieving or settling-in relaxing postures, a schedule of sitting and lying practices educational posture counseling, breath exercises, concentration exercises, and 5 to 15 minutes of relaxation. Yoga instructor adapted the practices during the monitored lessons so that each individual may adopt a safe modification of the postures and sequences that would not threaten their other trauma related injuries. For example, when amputation patients (bilateral amputee) were performing different yoga practices assistance was taken from the attendant of the patients during the session for transferring patient from bed to chair or on ground and vice versa. Participants were mostly sitting either in bed (when drains and other tubes were attached to the patients), then on chairs (when free from drains and tubes), and later on ground over the yoga mat. The sessions did not incorporate yoga practices which involved standing postures instead all the asanas were integrated in either seated or lying postures. The sessions tempo and general structure allowed patients more time to recuperate from the more strenuous practices (e.g. by having a simple breathing practice followed by a more-challenging asana). Instructions were presented in brief, single-point sentences with time for information processing to aid comprehension in patients. Patients were made to practice longer warm-up and slower overall speed which was safer for traumatic amputation patients, allowing them to work without feeling "left behind" or

"too disabled for Yoga," or having their self-confidence damaged. The following bullet points summarize how the adapted yoga practices were incorporated in lower limb amputation patients:

- Breathing exercises were done in the form of abdominal, thoracic and yogic breathing. In abdominal breathing patient was made to sit on bed (initially and later on chair) with limbs together and hands placed on thigh/ knees (or stump) in jnana mudra and asked to inhale deeply through nose while expanding abdomen and exhale deeply through nose while contracting abdominal muscles for 10 repetitions. In thoracic breathing same posture as in abdominal breathing was attained in chin mudra and patient was instructed to inhale deeply through nose while expanding chest and exhale deeply through nose, while contracting chest for 10 repetitions. In yogic breathing patient was inhaling through nose, filling the belly first and chest later; and exhaling in reverse order starting from chest and belly later for the duration of 5 repetitions.
- Neck movements: Patient was asked to sit erect with limbs as close as possible while doing deep inhalation and exhaling gently turning the head to the left side; while inhale bring the head to the normal position similarly, while exhaling, turn the head to the right inhale and bring the head to the normal position and 5 repetitions were done.
- Hand movements: patient while inhaling was asked to raise both arms sideways above head with the palm outward and bringing it down on exhalation in the same manner and repeating for 5 times.



- Chest expansion movement was also done in erect sitting with limbs together. Raising both the hands up to shoulder level with palms facing each other while inhaling, taking both hands towards the back and while exhaling bringing down both the hands in the same manner for 5 repetitions.

- Elbow movement: Bending elbows up as far as possible then gasping forearm or wrist with your other hand gently while applying overpressure and holding the bent position of elbow for 5-10 seconds and then releasing the stretch by straightening elbow for 5 repetitions.
- Wrist movement: Patient was asked to hold both the hands in front with palm down and elbows bent and pulling hands back so fingers point down while straightening arms and holding for 3 to 5 seconds and relax for 5 repetitions.
- Finger movements: with fingers extended straight out making a hook fist and returning to straight hand. In next step making full fist; again return to straight hand and finally making a straight fist; return to a straight hand.
- IRT (Instant Relaxation Technique): Lying down on back, placing palm by the side of the thigh while tightening the lower body and taking deep breath; compressing & squeezing the buttocks while exhaling & sucking in the abdomen making the fist of the palms and tighten the arms tighten the whole body from down to head exhale and relax.
- Gomukh asana: patient was asked to sit erect on the ground/chair and gently folding right arm and place it behind the back; then take left arm over the left shoulder, and stretching it to the maximum until it reaches right hand while keeping the trunk erect, expand chest, and lean slightly back. Same steps were followed from the other side for 3 repetitions.
- Uttan manduk asana: patient was made to sit erect on the ground/chair while inhaling and raising right arm, folding it and taking it backward from above the right shoulder and placing the palm below left shoulder; then folding left arm similarly and placing the palm from the above level at below right shoulder while bringing back slowly to remove the left arm and then the right arm for 3 repetitions.



- Kati chakra asana: patient was instructed to sit erect on the ground/chair and raising both the hands up to shoulder level with palms facing each other while exhaling, twisting the body towards the left side, coming back with inhalation while exhaling, twisting the body towards the right side, and returning back with inhalation for 5 times.



- Urdhv Hasttotan Asana: patient was asked to sit erect on the ground/chair; while inhaling, raise both arms sideways above head and while exhaling slowly bend to the left side inhaling slowly coming up and while exhaling slowly bend to the right side and inhale slowly while coming up for 5 repetitions.
- Ardh Kati chakra asana: patient was asked to sit erect on the ground/chair; supporting the back at the sides of the waist with the fingers; while inhaling bend backwards from the lumbar region and come back with exhalation for 3 repetitions.
- Pashchimottan asana: patient was instructed to sit erect on the ground and asked to inhale while raising arms over head stretching exhaling and bending forward. Patient was asked to feel the fold from hip joints while moving chin towards the toes and coming back with exhalation for 3 repetitions.
- Bhujang Asana: with the help of the attendant patient was made to lie down on stomach while placing hands just beside the body on the ground while inhaling slowly, lifting the head and chest up to navel region while exhaling; come back and placing forehead on the ground for 3 repetitions.



- Nadi Shodhan(Pranayama): patient was instructed to sit comfortably with eyes closed and spine erect then inhaling through left nostril; while inhaling close right nostril with right thumb. Patient is asked to

feel the fullness of lungs when air reaches then close left nostril by ring and middle finger, and then close right nostril and exhale through right nostril. After that inhale through right nostril and close the left nostril using left thumb. Inhale completely and close right nostril with thumb and left nostril by ring and middle finger; then exhale with left nostril. Once cycle is complete repeat for 10 repetitions.

- **Bhastrika:** patient was asked to sit erect with limbs close while placing the hands on knees/ thigh in jnana mudra 10 times forcefully completing inhalation and exhalation in relaxed manner for 3 repetitions.



- **Bhramari:** patient was instructed to sit erect with limbs close to each other and ears closed with index finger; inhaling deeply through the nose and exhaling slowly in the controlled manner while making a deep, steady humming sound such as that of a black bee for 5 minutes.
- **Yoga Nidra:** Lying down on the back with limbs comfortably apart; palms facing upward, eyes closed and relaxing the whole body consciously. Become aware of natural breath and allowing it to become slow and shallow while maintaining a mild focus between the eyebrows and be conscious of the breath and focusing on it. Again all the attention is brought to the full body while seeing whole body from top to bottom and reciting 10 words to omkar and gently opening eyes.

Result Interpretation: This approach offered a background and enhanced interpretation of the feasibility results, as well as a clarification of actual actions, perceived facilitators and obstacles to practice. No patient reported for any adverse effects either during or after the study duration.

Discussion

Suggestions regarding alternative therapies for amputee management are available in literature but there is dearth of literature with respect to standardized yoga protocol. In this paper, a systematic yet versatile framework for developing treatment protocols for yoga trials is suggested including consideration of yoga theory, literature reviews and practical consideration. Despite the fact that many studies try to separate aspects

of yoga that are more important in achieving therapeutic results, the holistic essence of yoga appears to be a crucial facilitator of improvement, greater than the sum of its parts. The proposed method starts from the perspective of yoga as it is commonly practiced and suggests modifications to meet the needs of the lower limb amputation patients. All of these approaches rely to some degree on opinion rather than formal observations. As a consequence, participant prejudices cannot always be clarified, and concerns such as lineage loyalty or the potential for benefits from positive research cannot always be ruled out.

The various yoga components (e.g., asana, pranayama, yoga nidra) and variations of these, as well as the heterogeneity of yoga styles and conceptual differences in yoga lineages, provide an almost infinite array of potential interventions.¹⁴ Therefore, to evaluate possible yoga therapies in specific clinical populations (in this case traumatic limb amputation), feasibility studies using sound methodologies and guidelines are needed. Findings from these less resource-intensive studies allow researchers to concentrate their limited resources on researching yoga styles that show the most promise for efficacy and effectiveness in a particular population.¹⁵ Yoga experts warn against using rigid methodological and intervention structures because the interventions may become too prescriptive.¹⁶ Prior to large, resource-intensive study, feasibility studies enable researchers to evaluate guidelines and methodologies, as well as refine appropriate modifications that support the intervention's individualization.¹⁴

The use of frameworks and recommendations like the ones described here is the foundation for replicable studies and confirmation of intervention results, which leads to evidence-based best practices for yoga therapy in clinical settings.¹⁴ The research protocol mentioned here is a single-arm feasibility study with a limited sample size recruited using convenience sampling, which restricts the generalizability of findings. Yoga and yoga therapy study recommendations are beginning to emerge, but there is still a lot of work to be done. The rigor of yoga therapy research designs needs to be strengthened as well as the publication of the results.

Conclusion

This study protocol was created in accordance with existing yoga and yoga therapy research guidelines, as well as those applicable to traumatic lower limb amputation patients. The choice of a theoretical framework provided structure, direction for the selection of outcome measures, and analysis of the study findings. The results of this feasibility study will be used to help plan a broader, randomized, controlled trial to examine the effectiveness of a yoga-style intervention for traumatic limb amputation patients' self-management. Myth that an amputee can not perform YOGA exercises need to be cleared off completely .

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