

Effect Of Yoga On Lower Extremity Function Among Filarial Lymphoedema Patients

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Abstract

Background:

Lymphatic filariasis (LF) is a neglected mosquito born tropical disease that affects people of low socio-economic group. Filarial lymphoedema has been classified into 4 grades by WHO. Except Grade-1 all other grades 2,3,4 are persistent oedema. There is no pharmacological treatment to cure the disease completely. But leg hygiene is important to prevent progression of disease. If left untreated it may lead to grade 4 and disability will occur, there by mobility of limb is also affected. This disability leads to stress, mental depression and patients lose interest to do any work. Their mobility is restricted, and they complain of pain and difficulty in walking. Therefore, we decided to assess if yoga can be curative and help to improve their physical mobility (Lower extremity function) since already Yoga is being used as a cure for many diseases. Hence by practicing selective asana and pranayama may prove to be a worthy trial in the case of filarial lymphoedema disability.

Materials and Method:

To know the effect of Yoga on lower extremity function among filarial lymphoedema patients, we carried out two arms randomized control trial. Group-1 Experimental group received yoga training (Selective asana and pranayama for 60 minutes, including warm-up and relaxation) along with routine Morbidity Management and Disability Prevention (MMDP) measures which include maintaining leg hygiene by washing the limb, trimming the nail, practicing suitable leg exercises, elevation of the limb, and regular usage of crepe bandages. On the other hand, Group-2 control group received only MMDP measures. We evaluated the impact assessment by testing the mean differences of pre and post measures. We assessed the

effect size using the method Cohens d for the significant mean differences.

Results:

Regular practice of Yoga along with routine MMDP measures for six months showed betterment in lower extremity function. The results were consistent with respect to grades and duration of oedema, and age of the patients.

Conclusion:

Yoga practices have a good, favorable effect on filarial lymphoedema patients' lower extremity functions.

Keywords: Yoga, Asana, Pranayama, Lower extremity functional scale (LEFS), Lymphatic filariasis.

Running title: Yoga impact on LEFS of filarial lymphoedema patients

INTRODUCTION

Lymphatic filariasis (LF) is a neglected tropical disease that affects people of low socio-economic group. It affects the lymphatic system and thereby causing filarial lymphedema of the extremities. Mostly it affects the lower extremity. LF is the world's second leading cause of long-term disability [1]. WHO classified filarial Lymphoedema (FLE) into four grades [2]. Grade-1 - Reversible oedema, Grade-2 -Non-reversible oedema, Grade-3 -Non-reversible oedema with skin thickening and darkening. Grade-4-Irreversible voluminous oedema with skin changes, growth (Wart) etc. Lymphoedema, if left untreated, leads to recurrent episodes of Acute Dermato-Lymphangio Adenitis (ADLA), which subsequently increases the swelling. Except for grade 1, all other Grade 2,3,4 lymphoedema are persistent, and there is no pharmacological cure. Therefore, it causes disability in grade 4 lymphoedema patients, even if unilateral, affecting the daily activities and the quality of life (QoL) [3].

Among the LE patients with advanced grades of III and IV, the disfigurement of the limb affects the gait and leads to disability. Jibril demonstrated that all the filariasis lymphoedema patients experienced discrimination and stigma [4]. The stigma in filarial patients leads to severe stress in their life. They feel lonely and isolated from the family and society, and subsequently, they develop stress and anxiety. These factors make them inactive and they themselves restrict their mobility. Many types of research have proved that regular yoga practice will alleviate stress and improve the functioning of almost all body systems. [5,6]

We carried out a randomized control trial to study the impact of Yoga (asana and pranayama) on Lower Extremity Functional Scale (LEFS) of FLE patients.

Materials and Method:

Study design: Two arms randomized control trial with Yoga intervention.

Study area: Filarial Lymphoedema patients of Pondicherry.

Human Ethics Committee clearance and consent

Institutional Human Ethics Committee (IHEC) of Annamalai University, Chidambaram, South India, approved the study (Certificate number: IHEC/0524/2019 issued on 29.11.2019). We recruited 80 filarial lymphoedema patients after getting their written consent. The study details were explained orally and an information sheet with all the procedures of the study in the local language was given to them.

Study participants

LE patients living in and around Puducherry were recruited following the inclusion and exclusion criteria through snowball sampling techniques. We included the patients either with unilateral or bilateral lymphoedema, aged 18 to 65 years, BMI-up to 40 Kg/m² and willing to participate in the study. We excluded the patients not willing to participate.

Study Procedure

Clinical history and examination

We recorded socio-demographic characteristics, basic Clinical history details such as duration and grade of lymphoedema, course and periodicity of treatment and co-morbidities, if any. In addition, we considered the four-stage grading system described by WHO.

Table .1 The Lower Extremity Functional Scale

| S.No | Activities Do you have any difficulty with the following Activities? <input type="checkbox"/> The appropriate box | Unable to Perform | Extreme difficulty | Moderate Difficulty | Little Difficulty | No Difficulty |
|------|--|-------------------|--------------------|---------------------|-------------------|---------------|
| | | 4 | 3 | 2 | 1 | 0 |
| 1 | Any of your usual work, housework | | | | | |
| 2 | Your usual hobbies, recreational | | | | | |
| 3 | Sitting and getting up from toilet | | | | | |
| 4 | Walking between rooms | | | | | |
| 5 | Putting on your footwear | | | | | |
| 6 | Squatting | | | | | |
| 7 | Lifting an object, like a bag of groceries from the floor | | | | | |
| 8 | Performing light activities around your home | | | | | |
| 9 | Performing heavy activities around your home | | | | | |
| 10 | Getting into or out of public transport | | | | | |
| 11 | Walking a Km | | | | | |
| 12 | Walking a mile | | | | | |
| 13 | Going up or down 10 stairs | | | | | |
| 14 | Standing for 1 hour | | | | | |
| 15 | Sitting for 1 hour | | | | | |
| 16 | Fast walking on even ground | | | | | |
| 17 | Fast walking on uneven ground | | | | | |
| 18 | Marking sharp turns while walking | | | | | |
| 19 | Hopping | | | | | |
| 20 | Rolling over in bed | | | | | |

Lower extremity functional scale assessment

Lower extremity functional assessment was done through a standardized Lower Extremity Functional Scale (LEFS) in local language (Tamil) and recorded on the appropriate form (table.1). Source: Binkly et al (1999): The Lower Extremity Functional Scale (LEFS): Scale development, measurement properties and clinical application [7]. It was modified for filarial patients and Published in Lymphatic Research And Biology [8].

Recruitment of the study participants

We recruited 80 FLE patients who gave consent for participating in the study. We randomized these 80 patients into two groups (Yoga and Control) in the ratio of 1:1 using the random function of R-software. The patients allotted to Group-1 received Yoga training with selected asanas and pranayama for the improvement of the Lower extremity function. We continued the yoga training until they performed correctly, and simultaneously we ensured that they continued MMDP measures. Further, these patients were requested to visit Centre for Yoga Therapy, Education and Research (CYTER), Sri Balaji Vidyapeeth, Mahatma Gandhi Medical College & Hospital, Pondicherry for weekly 5 days for the supervision of Yoga practice. Group-2 underwent only MMDP measures. We ensured the loosening practices of various body parts prior to asana practicing in Experimental group (Table-2).

We made house visits at regular intervals to check both the groups to confirm their regularity and perfection in practicing Yoga and MMDP. As a result, we ensured 100% compliance during the six months of training. In addition, after the completion of six months of therapy, we carried out impact evaluation using the same tools that we used during baseline evaluation.

Statistical analysis:

We carried out data analyses using STATA version 16.0. To test for normality assumptions of continuous variables, we adopted the Kolmogorov-Smirnov test. In addition, we calculated descriptive measures such as mean, standard deviation (SD) and range values. To assess the impact of Yoga

Table -2 Yoga protocol for Filarial lymphoedema patiens

| Yoga Parameter | Repetition (No.of times) | Duration (Minutes) |
|---|-------------------------------------|-------------------------------|
| Loosening Practices: | | |
| I.Neck Movements | | |
| 1. Forward and backward bending | 5 | 3 |
| 2 Right and Left bending | | |
| 3.Right and Left twisting | | |
| 4.Neck Rotation | | |
| II.Trunk Movement- Trunk twisting | 10 | 7 |
| III.Knew Movement | | |
| IV.Ankle Rotation- Rotating the ankle clockwise and anticlockwise | | |
| V.Toes Movement-Toes folding and Streching | | |
| Asana;(Relaxation after performing each asana for 30to 45 seconds) | | |
| 1.Sukhasana | 2 | 4 |
| 2.Veerasana | 2 | 4 |
| 3.Ekapada Uttana asana | 2 | 2 |
| 4.Dwipada uttana asana | 2 | 2 |
| 5.Bhujangasana | 3 | 3 |
| 6.Ardha slabasana | 3 | 4 |
| 7.Danurasana | 3 | 3 |
| 8.Makrasana | 3 | 3 |
| Pranayama | | |
| 1.Bhastrika Pranayama | 6 | 15 |
| 2.Ujjayi Pranayama | 6 | |
| 3.Nadishodhana | 6 | |
| 4.Bhramari | 6 | |
| 5.Pranava pranayama | 2 | |
| Shavasana (Conscious Yogic relaxation) | 1 | 10 |
| Total | | 60 Minutes |

Results:

A total of 80 filarial patients including 12 Males (16.2%) and 68 Females (83.8%) were recruited for the study after obtaining their written consent in their native language. These patients consisted of 35% Grade-II, 42% of Grades III, and 23% Grade IV lymphoedema. Overall, 65% of the participants were educated, and 67.5% were below the poverty line. About 68% had more than 15 years of lymphoedema duration with 42% in grade III and 22% in grade IV. In Yoga group one patient did not comply with the scheduled Yoga training due to her hectic household activities. Therefore, we carried out the final analysis with 39 patients in Yoga group and 40 patients in control group.

There were no significant differences in the means score of all the domains in the baseline between the Yoga and control groups. However, there was a substantial reduction ($P < 0.05$) in the mean score of Lower extremity function large effect size $d = 0.80$ in the yoga group compared to the control (Table.3). Further, in the Yoga group, the baseline Mean scores of Lower-extremity functions was reduced significantly ($P < 0.001$) after the Yoga therapy (Table.3)

Table-3 Effect of Yoga on LEFS among Filarial Lymphoedema patient

| Categories | Pre yoga Mean \pm SD | Post yoga Mean \pm SD | P value | Cohen d | Pre control Mean \pm SD | Post Control Mean \pm SD | P.valu |
|----------------|------------------------|-------------------------|---------|---------|---------------------------|----------------------------|--------|
| Females | 14.31 \pm 7.38 | 9.22 \pm 7.22 | .000 | 0.7 | 17.41 \pm 10.28 | 17.94 \pm 9.84 | 0.431 |
| Grade-II | 12.35 \pm 6.64 | 7.29 \pm 6.21 | .000 | 0.78 | 13.30 \pm 6.34 | 13.80 \pm 4.96 | 0.729 |
| Grade-III | 12.92 \pm 6.68 | 7.38 \pm 4.03 | 0.001 | 1 | 13.57 \pm 8.20 | 14 \pm 7.01 | 0.373 |
| Grade-IV | 18.22 \pm 9.64 | 13.22 \pm 9.81 | 0.071 | | 20.78 \pm 13.10 | 24.89 \pm 14.80 | 0.731 |
| <15 yrs of FLE | 13.94 \pm 7.73 | 8.81 \pm 6.05 | 0.001 | 0.73 | 18.40 \pm 12.06 | 17.60 \pm 8.09 | 0.63 |
| >15 yrs FLE | 13.87 \pm 7.71 | 8.61 \pm 7.61 | .000 | 0.69 | 15.53 \pm 9.77 | 16 \pm 10.48 | 0.538 |
| <50 yrs of age | 13.87 \pm 7.71 | 8.61 \pm 7.61 | .000 | 0.77 | 15.53 \pm 9.77 | 16 \pm 10.48 | 0.538 |
| >50yrs of age | 14.32 \pm 8.19 | 8.77 \pm 7.97 | .000 | 0.69 | 17.71 \pm 9.73 | 16.42 \pm 7.72 | 0.142 |

As observed in the overall Yoga group, among filarial lymphoedema patient significant improvement in LEFS (d=0.70) was observed in post-therapy (P<0.05). However, there were no changes in the control group. While carrying out sub-group analysis with respect to grades (Fig1 and Fig.2), Duration of Lymphoedema (Fig.3, Fig.4) and by age groups (Fig.5, Fig.6)

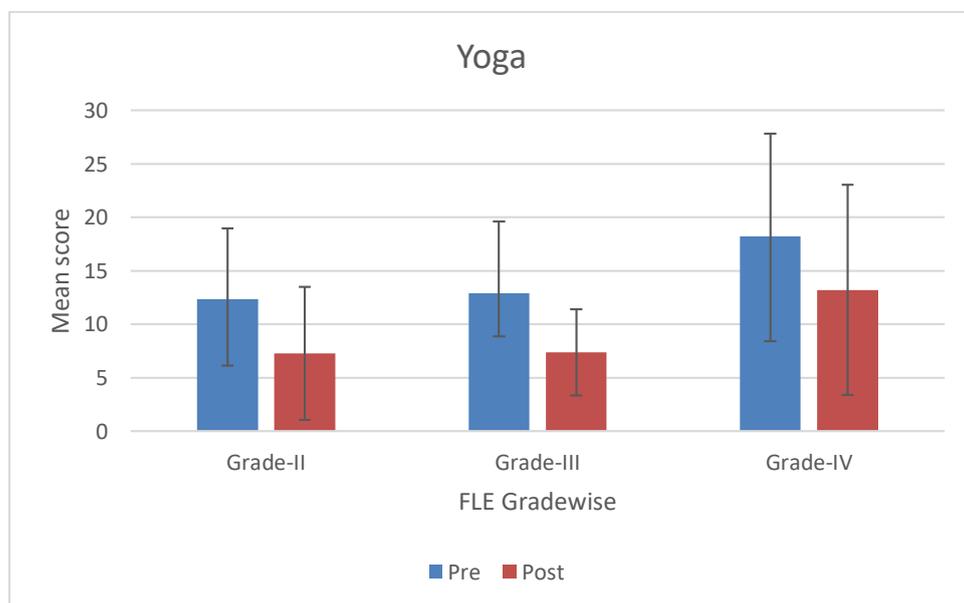
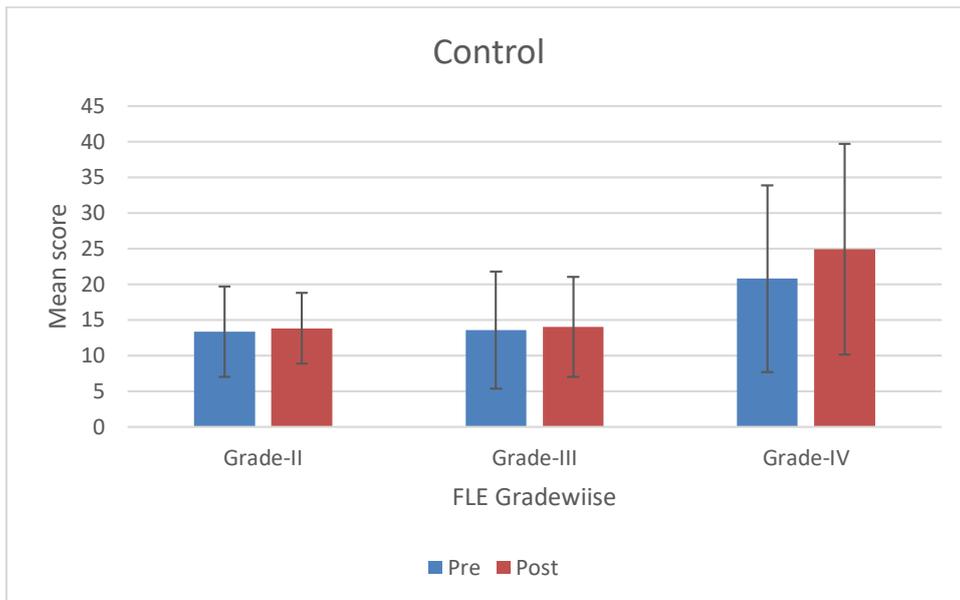
Fig.1 Effect of yoga among filariasis patients by grade wise

Fig.2 pre-post comparison in filariasis patient by grade wise in control group



3. Effect of yoga among filariasis patient’s LEFS by duration wise.

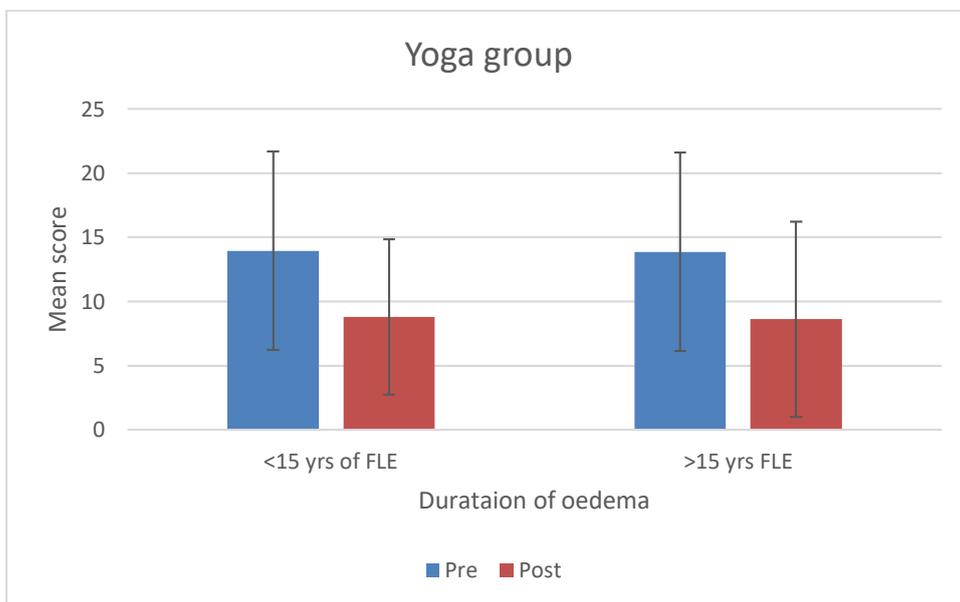


Fig.4. Pre- post comparison of FLE duration wise in control group

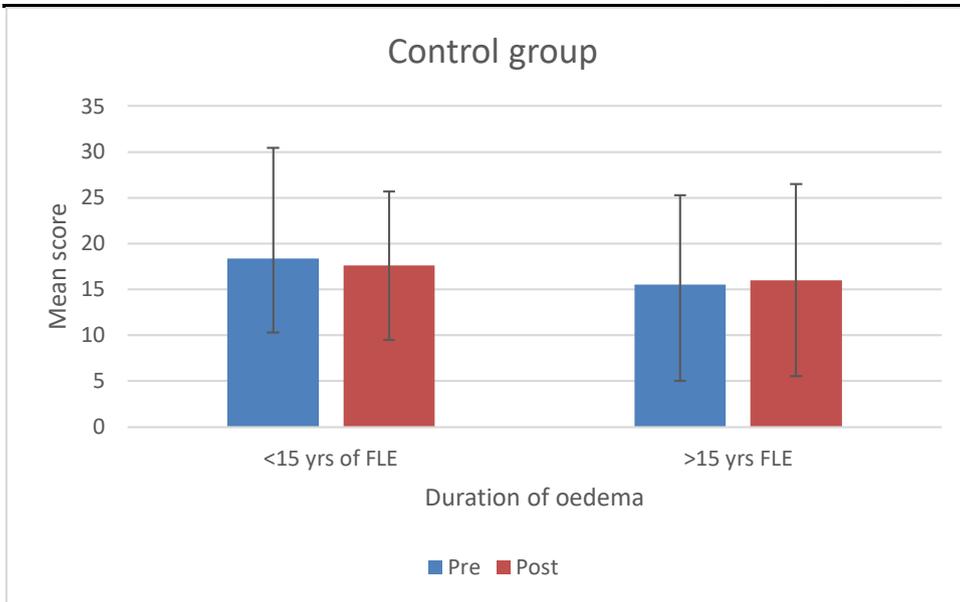


Fig.5. Effect of yoga on LEFS among FLE patients age wise

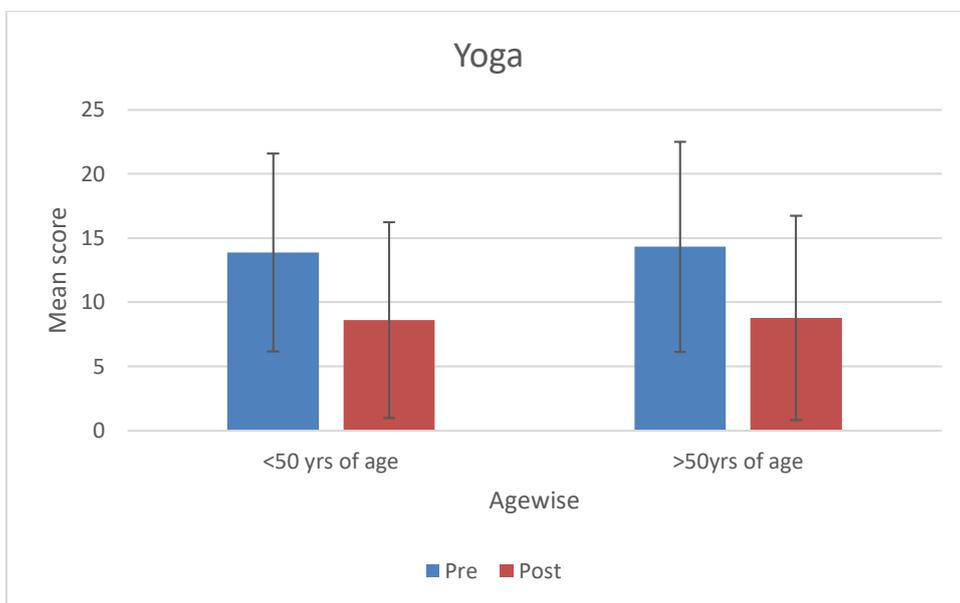
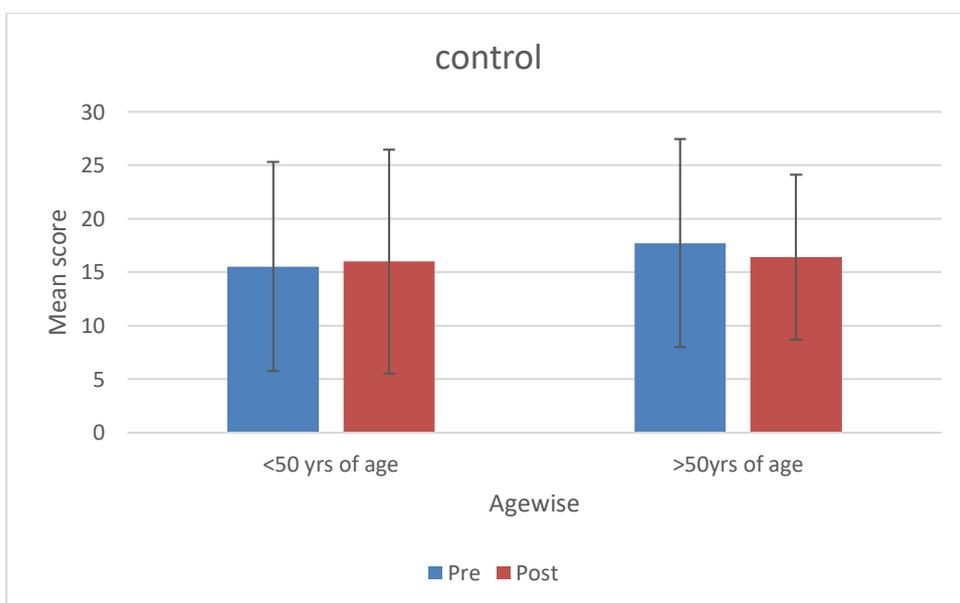


Fig.6. Pre- post comparison FLE patients age wise in control group



Discussion

Global Program to eliminate lymphatic filariasis (GPELF) [9,10] insists MMDP to prevent Acute Dermatolymphangioadenitis (ADLA) episodes. Disfigurement and disability of filarial lymphoedema lead the patient and family into frustration [11]. Filarial lymphoedema patients with long duration of oedema suffer from restriction of mobility of lower extremities. Consequently their restricted mobility lead to tightening of muscle and they become physically disabled. This disability induce stress among advanced grades of the filarial lymphoedema patients. To evaluate the effect of Yoga among Lower extremity function, we recruited 80 FLE patients consisting of both Experimental (40) and control (40) participants who were interviewed and pre and post therapy of 6 months with LEFS were recorded (Table-1).

Yoga is very useful in treating many diseases [5,6]. Yoga was the ancient system of natural treatment for many diseases which was born 5000 years ago in India, and has recently been used as an alternative medicine all over the world [12]. Regular practice of asana and pranayama, make a person fit physically and mentally by improving the function of all cells and systems of body and alleviate stress and mental disorders [5]. Study on regular yoga practice reported moderate effect for gait, balance, body flexibility, body strength [13]. The yoga impact on Lower Extremity function among filarial lymphoedema is significant and we may train all lymphoedema patients to practice Yoga to improve their physical mobility.

Conclusion:

In filariasis, restricted mobility leads to physical and mental disability. MMDP advocated by WHO needs to be further augmented to assess the level of Lower extremity function as it mainly involves with the lower limb. More over leg movements are very essential for normal daily activities. Filariasis mainly affect the lower extremity and leads to stress and mental illness- As this yoga practices how good impact on Improvement in Lower Extremity Function Scale (LEFS), the selected asana and pranayama can be added in our usual protocol of MMDP. Regular practice of Yoga not only causes improvement of LEFS, but it also improve the physical and mental health [5,6].

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