

Effect of Yoga on Cognitive function in Filarial Lymphoedema Patients

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ABSTRACT

Background: Lymphatic filariasis (LF) is a neglected tropical vector borne disease that affects people of low and middle income groups. The filarial lymphoedema is classified into four grades (grades I, II, III and IV) based on the severity and external manifestation of the disease. Grade I is reversible whereas grades II, III and IV are persistent oedema and there is no pharmacological cure. Most of the Grade IV lymphoedema patients suffer due to the physical disability which affects their daily activities and quality of life (QoL), besides causing very low cognitive function, which may be due to the economic burden caused by their disability. Therefore, the study of the impact of Yoga on cognitive function in filarial lymphoedema patients was undertaken with the noble cause of alleviating the distress of these patients.

Materials and Method: To know the effect of Yoga on cognitive function among filarial lymphoedema patients, we carried out a study consisting of two arms i.e. one study and one control group. Morbidity Management Disability Prevention (MMDP) measures 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. This package of MMDP was given to both arms and in addition to this, the study Group was given yoga training (Selective asana and pranayama for 60 minutes, including warm-up and relaxation). We evaluated the impact assessment by testing the mean differences of pre and post measure. We assessed the effect size using the method Cohens d for the significant mean differences.

Results: We randomized 80 patients (1:1 ratio) into two groups. Regular practice of Yoga along with routine MMDP measures for six months showed a large effect size (≥ 0.8) in cognitive function. The results were consistent with respect to grades and duration of lymphoedema, and age of the patients.

Conclusion: Yoga practices have a good, favorable effect on filarial lymphoedema patients' cognitive function.

Keywords: Yoga, Asana, Pranayama, Cognitive function, Lymphatic filariasis.

Running title: Yoga impact on cognitive function among lymphedema patient

INTRODUCTION

Lymphatic filariasis (LF) is a neglected mosquito borne tropical disease that affects people of low and middle-income groups. As per the WHO report on May 2021[1], almost 859 million cases in 50 countries are suffering from lymphatic filariasis. Lymphatic filariasis is affecting the lymphatic system. LF is the world's second leading cause of long-term disability [2]. WHO classified filarial Lymphoedema (FLE) into four grades [3]. Grade-I - Reversible oedema, Grade-II, III and IV are persisting oedema. Lymphoedema, if left untreated, leads to recurrent episodes of Acute Dermato-Lymphangio Adenitis (ADLA) filarial fever, which increases swelling, it causes disability in grade 4 lymphoedema patients, even if

unilateral, affecting the daily activities and the quality of life (QoL) [4]. In addition, these patients not only physically and mentally got disturbed. These disturbances have effect on their cognitive function.

They feel lonely and isolated from the family and society, and subsequently, they develop stress and anxiety. 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 cognitive function in FLE patients.

MATERIALS AND METHOD

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

Study area: Selection of Filarial Lymphoedema patients from Puducherry.

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 provided patients with an information sheet informing all the procedures of the study in the local language. 80 FLE cases were recruited based on their willingness after getting their written consent.

Study participants:

Filarial patients from various Primary Health Centers (PHC) of Pondicherry were visited and 80 Filarial lymphoedema patients selected following inclusion and exclusion criteria. We invited them to participate in the study after obtaining written informed consent following the Ethical Guidelines of ICMR 2017.

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.

Cognitive function assessment

Cognitive Function in local (Tamil) language recorded on the appropriate form. (Table 1).

Table.1 Cognitive functioning questionnaire

✓ The appropriate box

S.no	Cognitive Functioning	Response				
		Yes	Mostly	Some times	Rarely	No
		4	3	2	1	0
1.	Are you unable to concentrate on your daily house-hold chores					
2.	Do you feel the life is unworthy with LE leg?					
3.	Are you worried about ADL Attacks?					
4.	Are you anxious about your future with the filarial lymphoedema leg?					
5.	Do you feel guilty that you are not able to fulfil your responsibilities?					
6.	Do you feel depressed because of your filarial leg?					
7.	Do you tend to hide the swollen legs?					
8.	Do you feel you are a burden to your family?					
9.	Do you feel everything in your life is affected by LE?					

10.	Do you think LE has spoiled the happiness of your life?					
11.	Do you feel that you are unable to perform your family responsibilities?					
12.	Are you unable to wear the foot wear and dress of your choice due to filarial Lymphoedema?					
13.	Has LE affected your marital relationship?					
14.	Has LE affected your sexual relationship?					

Recruitment of the study participants

Recruited the identified 80 FLE patients following inclusion and exclusion criteria after getting their written consent for the study. We randomized these 80 patients into two groups (Study and Control) in the ratio of 1:1 using the random function of R-software. We assessed baseline Cognitive function level in all 80 FLE patients. Morbidity Management Disability Prevention (MMDP) measures include maintaining leg hygiene by washing the limb, trimming the nail, practicing suitable leg exercises, elevation of the limb, and regular using crepe bandages is the package of MMDP. MMDP training was given to both arms. The patients of study group in addition to MMDP, were also trained in Yoga at Centre for Yoga Therapy, Education and Research (CYTER), Sri Balaji Vidyapeeth, Pondicherry with selected asanas and pranayama for the improvement of Cognitive function. We continued the yoga training until they performed correctly. Further, these patients were requested to visit the Yoga Centre 5 days in a week for one month, weekly twice the supervision of Yoga practice and the remaining days they practiced at home for the following 5 months.

We made house visits at regular intervals to check both the groups and confirm their regularity and perfection in practicing Yoga and MMDP. After the completion of six months of therapy, we carried out impact evaluation of the same tools that we used during baseline evaluation.

Table -2 Yoga protocol for Filariasis lymphoedema patients

Yoga Parameter	Repetition (No. of times)	Duration (Minutes)
Loosening Practices:		
I. Neck Movements	5	3
1. Forward and backward bending		
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 pranayma	2	
Shavasana (Conscious Yogic relaxation)	1	10
Total		60 Minutes

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, on cognitive function means of differences between baseline and post-intervention were tested using Students t-paired test under the null hypothesis that the mean difference is zero. Further, means of differences between yoga and control group were tested using Students t-independent test. All the tests were carried out in respect to LE grades, duration of LE, and age group. We calculated effect size (d) using the method of Cohen's d for all the statistically significant mean differences. Cohen classified effect size was large ($d \geq 0.8$) in cognitive function.

RESULTS

A total of 80 FLE patients (Males -12 and Females-68) consisting of 28 (35%) Grade-II (Males- 2 and Females-26), 34 (42%) Grade III (Males-4 & Female-30), and 18 (23%) Grade IV patients (Male-6 & Female-12) gave written consent in their native language. About 68% had more than 15 years of lymphoedema duration, with 42% in grade three and 22% in grade four (WHO grading) [3]. 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 and 40 patients in Yoga and control groups respectively.

There were no significant differences in the means score of cognitive function in the baseline between the Yoga and control groups (Table 3). However, there was a substantial reduction ($P < 0.05$) in the mean score of cognitive function (very large effect size $d = 1.02$), in the yoga group compared to the control. Further, in the Yoga group, the baseline mean scores of Cognitive function, selected has reduced significantly ($P < 0.001$) after the 6 months follow up of yoga. The impact of yoga was very phenomenal on cognitive function with the large effect size ($d > 0.8$).

Table 3: Effect of Yoga on cognitive function in FLE

	Yoga group (n=39)				Control group (n=40)			
	Pre-Yoga Mean (\pm SD)	Post-Yoga Mean (\pm SD)	P-value	Coh end	Base-line	Post-assessment Mean (\pm SD)	P-value	Coh end
					Mean (\pm SD)			
Females	31.59 \pm 11.51	20.69 \pm 11	0.000	0.97	34.47 \pm 12.59	34.88 \pm 12.32	0.514	
Grade-II	29.47 \pm 10.20	17.65 \pm 8.43	.000	1.26	25.80 \pm 9.59	26.90 \pm 10.53	0.402	
Grade-III	13.08 \pm 8.28	19.46 \pm 8.52	.000	1.26	31.76 \pm 10.51	32 \pm 10.41	0.774	
Grade-IV	42.22 \pm 13.34	32.78 \pm 14.90	0.002	0.67	46.78 \pm 8.47	46.33 \pm 8.49	0.482	
<15 yrs of FLE	32.88 \pm 12.32	21.56 \pm 13.28	.000	0.89	32.50 \pm 13.94	35.10 \pm 13.34	0.096	
>15 yrs FLE	32.43 \pm 11.11	21.87 \pm 10.85	.000	0.95	34.03 \pm 11.87	33.57 \pm 11.86	0.352	
<50 yrs of age	32.65 \pm 10.33	22.53 \pm 10.90	.000	0.95	31.56 \pm 11.33	31.81 \pm 12.21	0.774	
>50yrs of age	32.59 \pm 12.51	21.14 \pm 12.56	.000	0.91	35.04 \pm 12.87	35.38 \pm 12.05	0.646	

As observed in the overall Yoga group (Fig.1), While carrying out sub-group analysis with respect to gender, grades of LE, duration of LE and by age groups, a significant reduction in cognitive function ($d = 0.97$), However, there were no changes in the sub-group analysis with respect to gender, grades of LE, duration of LE and by age groups in control group (Fig.2).

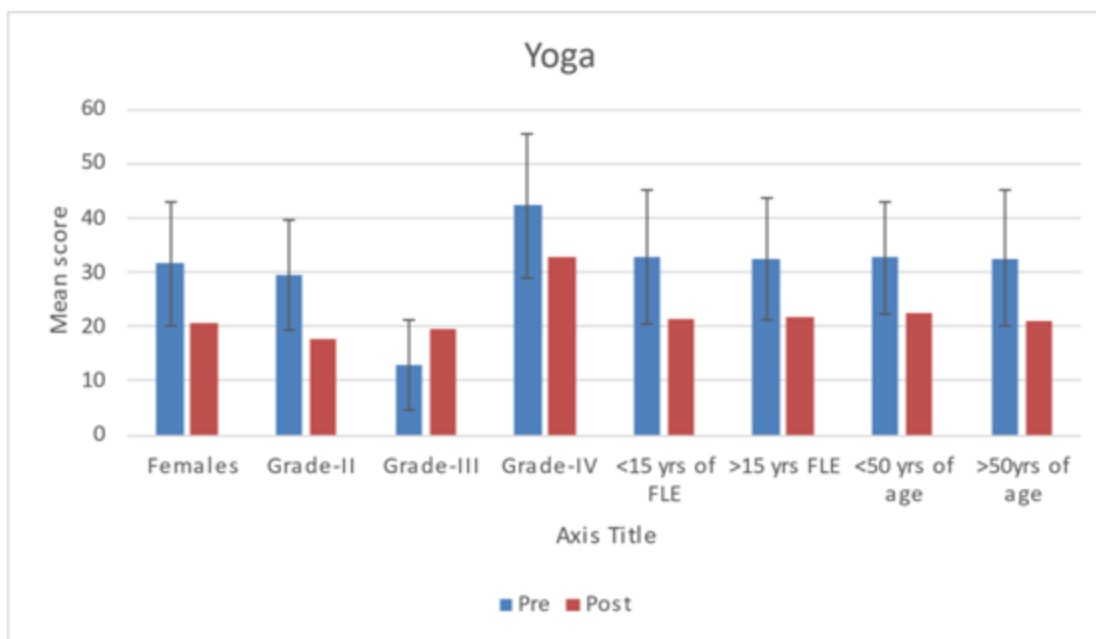


Fig.1. Effect of yoga on cognitive function among filarial lymphoedema

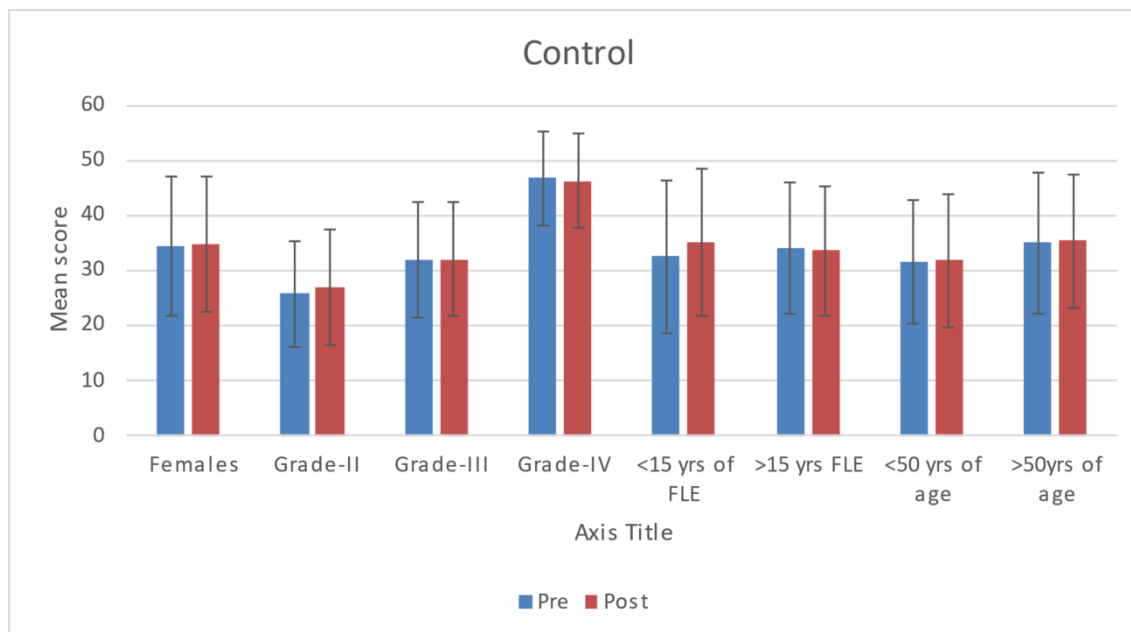


Fig.2. Pre and post analysis of control group

DISCUSSION

Global program me to eliminate lymphatic filariasis (GPELF)[7,8][insists MMDP to prevent Acute Dermato Lymphangio Adenitis (ADLA) episodes. Disfigurement and disability of filarial lymphoedema lead to anxiety, fear, and frustration [9]. Filarial lymphoedema patients with long duration of suffering, feel depressed, find themselves as burden to family and society.

This study was carried out as an intervention study to assess the effect of Yoga on cognitive function among the different grades of the filarial lymphoedema patients. To evaluate the effect of Yoga, recruited 80 FLE patients of both study and control participants were interviewed and recorded pre and post therapy of 6 months with cognitive questionnaire.

Yoga is very useful in treating many diseases [5,6]. Practicing Yoga, controls the mind and central nervous system, the hormonal emissions, physiological factors, and regulation of nerve impulses and help to alleviate stress and mental disorders [5]. Yoga was born in India, and has been in practice since 5000 years ago in the eastern region and has recently been used as an alternative medicine all over the world [10]. Regular practice of Yoga decrease stress, anxiety and improve general psychological health [11&12]. Yoga in clinical trials have highlighted significant efficacy in stress management, the reduction of burnout and in overall improvement of quality of life (QoL) [13]. Review of 12 articles of various types of yoga practice (e.g., Hatha Yoga, Bikram yoga, Kundalini yoga, Sudarshan Kriya yoga, Kripalu yoga, Yin yoga) prove positive effects on stress reduction [14]. The yoga impact on filarial lymphoedema cognitive function is more significant and we may train all lymphoedema patients to practice Yoga to improve their cognitive function.

CONCLUSION

In filariasis, Stigma and stigma induced stress affect the patients and their family, with negative impact on caregivers' Quality of Life (QoL) is likely to be profound when the patients suffer from filarial fever as the family members forfeit an average of 6 to 7 days wages during these acute attack [15]. MMDP advocated by WHO needs to be further augmented to assess the level of cognitive function among the diseased and their family members. As this yoga practice showed good impact on Cognitive factor, these selected asana and pranayama can be added in our usual protocol of MMDP. Regular practice of Yoga not only for improvement of cognitive function, it may also help to keep them fit both physically and mentally [5&6]].

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