

Home-Based Yoga Program for the Patients Suffering from Malignant Lymphoma during Chemotherapy: A Feasibility Study

Abstract

Background: Yoga is proven beneficial in improving quality of life among breast cancer survivors receiving chemotherapy, but its effectiveness in lymphoma patients needs to be explored. As chemotherapy-induced neutropenia is very common among lymphoma patients, they are much prone to infections from the environment. Furthermore, trained yoga instructors are not available in every setting, so there is a need to develop home-based yoga program modules for lymphoma patients receiving chemotherapy. **Aim:** The aim of the study was to explore the feasibility and safety of yogic exercises among lymphoma patients during chemotherapy. **Subjects and Methods:** An interventional, single-arm prepost design study was conducted at a tertiary health-care center. Patients suffering from malignant lymphoma (18–65 years) with Eastern Cooperative Oncology Group performance status from 0 to 2, planned to receive chemotherapy were administered a home-based yoga program over a period of 2 months from the start of chemotherapy. The primary outcome variables were retention rate, acceptance rate, safety, and adherence. Health-related quality of life (HRQOL), fatigue level, overall sleep quality, depression, anxiety level, and pain were also assessed. **Statistical Analysis:** Descriptive statistics was used to see the feasibility and adherence. The paired *t*-test was used to compare various pre and postintervention outcome measures. **Results:** Fourteen patients (median age: 36 years, range 13–65 years) of malignant lymphoma were enrolled in the study. Male-to-female ratio was 9:5. Non-Hodgkin's lymphoma patients constituted 64%. The recruitment rate was 93%. Favorable retention (100%), acceptability (97%), adherence (78.6%), and no serious adverse events following yoga practice were reported. Improvement was also found in HRQOL, fatigue, sleep, depression, and anxiety. However, it needs further validation in a randomized study. **Conclusion:** Home-based yoga program is safe and feasible among the patients suffering from malignant lymphoma receiving chemotherapy.

Keywords: Acceptability, adherence, chemotherapy, malignant lymphoma, recruitment rate, retention rate

Introduction

Lymphoma is a hematological malignancy treated with multiagent chemo-immunotherapy, radiation therapy, and other biological agents. Lymphoma patients receiving these therapies often report fatigue as one of the most distressing symptoms, even worse than other symptoms such as pain, nausea, and vomiting, which are usually treatable with medications. They suffer 2.5–3 times more fatigue than the general population.^[1] Fatigue leads to decline in physical activity during the period of chemotherapy treatment. The chemotherapeutic medications are likely to negatively affect the health-related quality of life (HRQOL).^[2]

Over the past few years, yoga has emerged as an effective intervention in improving

overall well-being. It has been reported to improve sleep and reduce anxiety and depression, thus improving overall quality of life among breast cancer patients.^[3]

One limitation for integration of yoga in mainstream oncology practice is lack of availability of a trained yoga instructor to every patient. Often, cancer patients are advised isolation in post-chemo phase. Therefore, they cannot attend community yoga program during chemotherapy treatment. In the current era, access to audio-visual (AV) devices is very easy even in rural parts of our country. Hence, this study was designed to assess feasibility and safety of home-based yoga intervention administered through AV devices and printed guidebooks after a direct supervised yoga session.

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Subjects and Methods

Study design and settings

This was a single-arm pre- and postdesign interventional study conducted at Postgraduate Institute of Medical Education and Research in Chandigarh, India.

As a feasibility pilot study, a total of 14 patients diagnosed with malignant lymphoma, planned to receive chemotherapy were recruited and study intervention was carried out during first 2 months of chemotherapy (September to November 2016). The inclusion criteria were: (a) aggressive lymphoma patients (Stage II–IV) planned to receive any of the three chemotherapy schedules, i.e., cyclophosphamide, doxorubicin, vincristine, and prednisone (CHOP); CHOP + rituximab; adriamycin, bleomycin, vinblastine, and Dacarbazine (ABVD); (b) age group of 18–65 years; (c) Eastern Cooperative Oncology Group (ECOG) performance status score 0–2 (If the ECOG score was >2 at the time of starting chemotherapy, then these patients were reassessed at the time of beginning of 2nd chemotherapy cycle). In case, the score improved to ECOG <2, then these patients were also offered to participate in the study; (d) participants having access to AV display device (CD player, multimedia/smartphone, and laptop); (e) able to complete questionnaire (by self or by interview) in Hindi, Punjabi, or English. Exclusion criteria were Stage I lymphoma patients, ECOG performance score of 3–4 even at 2nd chemotherapy cycle.

Feasibility of yoga-based intervention in lymphoma patients

The feasibility criteria were taken from a yoga feasibility study done in Japan among breast cancer patients.^[4] It included recruitment, retention, and acceptability rates which were defined as:

- Recruitment rate: The rate of consenting patients divided by the number of eligible patients approached to participate in the study
- Retention rate: Number of recruited participants who completed pre and postintervention questionnaires
- Adherence was assessed using the self-reported number of completed yoga sessions over a period of 2 months, if participants practiced a complete session in a day; it was counted as one yoga session. 20 sessions/month were taken as good adherence
- Acceptability of the intervention was assessed after completion of the program using a 3-point Likert scale
- Safety: Participants were asked to report untoward problem that occurred due to yoga practice in their yoga log books.

Study tools

Well-validated and reliable tools were used in the study:

1. Sociodemographic profile was assessed on the day of registration in the clinic
2. Physical performance status was assessed using ECOG performance scale^[5]

3. HRQOL and fatigue were assessed using lymphoma-specific instruments, i.e., functional assessment of cancer therapy-lymphoma scale^[6]
4. Functional assessment of chronic illness therapy-Fatigue scale^[7]
5. Quality of sleep was measured with Pittsburgh sleep quality index^[8]
6. Depression was assessed using Patient Health Questionnaire-9^[9]
7. Generalized anxiety disorder-7 tool (GAD-7) for measuring anxiety^[10]
8. Numerical pain rating scale to determine intensity of pain.^[11]

The participants were asked to report the adverse events occurring due to yoga practice on their yoga log books.

Intervention

Yoga protocol was taken from the common yoga protocol followed by Government of India on the occasion of “International Yoga Day” 2016.^[12] It included warm-up exercises, Asanas, and Pranayam as detailed in Table 1. At the time of recruitment, participants were taught and then supervised yogic exercises on one-to-one basis by the certified yoga instructor (first author). Once this author was convinced with their practice, they were asked to do same

Table 1: Various yogic exercises included in the Yoga protocol

Yogic exercises
Loosening practices/Yogic Suksma Vyayamas: 4 min
Neck bending (Greeva Sanchalana)
Forward and back bending - 1/2 min
left and right bending - 1/2 min
Hand clenching (Mushtika Banadhana) - 1/2 min, Wrist bending (Mani Bandhanaman) - 1/2 min, wrist joint rotation (Manibandha Chakra) - 1/2 min
Elbow bending (Kehuni Naman) - 1/2 min
Shoulder rotation (Skandha Chakra) - 1/2 min
Toe bending - 1/2 min
Yoga Asanas (physical postures): 16 min
Standing postures
Tadasana (palm tree posture) - 1 min
Ardha Chakrasana - 2 min
Sitting postures
Sasanksana (the hare posture) - 1 min
Vajrasana (sitting on feet posture) - 2 min
Prone postures
Bhujangasana (The Cobra posture) - 2 min
Makarasana (The crocodile posture) - 2 min
Supine posture
Pavanamuktasana (the wind releasing posture) - 1 min
Savasana (the dead body posture) - 5 min
Pranayam (breathing exercises): 10 min
Anuloma Viloma (alternate nostril breathing) - 5 min
Bhramari pranayama - 5 min

Table 2: Performance on adherence (please put ✓ for particular activity done and × for not done)

Yogic activity	Dates of practice at home
Neck bending	
Hand clenching	
Elbow bending	
Shoulder rotation	
Toe bending	
Tadasana	
Ardha Chakrasana	
Sasankasana	
Vajrasana	
Bhujangasana	
Makarasana	
Pavanmuktasana	
Savasana	
Anuloma viloma	
Bhramari pranayama	
Duration	
Adverse event if any	

Table 3: Baseline characteristics of the participants (n=14)

Characteristics	n (%)
Age (years), median age	36 years
13-35	6 (43)
36-65	8 (57)
Gender	
Male	9 (64)
Female	5 (36)
Marital	
Married	10 (71)
Unmarried	4 (29)
Education	
Illiterate	1 (7)
≤High school	6 (43)
Sr secondary	2 (14)
≥Graduate	5 (36)
Occupation	
Business	3 (21.4)
Service worker	3 (21.4)
Unemployed	8 (57.1)

yogic exercises daily at home for 30 min. Yoga video and booklets in different languages guided them in the same. Adherence was measured through yoga logbooks [Table 2] maintained by the participants at their home. Biweekly telephonic reinforcement was done to countercheck and enhance adherence.

Study procedure

Ethical approval was obtained from the Institute's Ethical Committee. Informed consent was obtained from all participants. In orientation phase, every participant was informed about the yogic exercises

to be done at home during the chemotherapy period. Subsequently, they were taught yogic exercises and maintenance of daily yoga logbook. A yoga booklet and video were also provided to them. Biweekly telephonic reinforcement emphasized about protocol adherence. Follow-up was done at 2nd month of commencement of the program.

Statistical analysis

Statistical Package for the Social Sciences (IBM Corp. SPSS version 22. Armonk, New York) was used for data analysis. Descriptive statistics was done for socioeconomic characteristics of the participants. Paired *t*-test was applied to check the difference between baseline and postintervention mean scores.

Results

Recruitment and participant's characteristics

After assessing 25 patients for eligibility, 10 patients were found ineligible to participate in the study (ECOG performance score was 3–4 even at 2nd chemotherapy cycle). One patient refused to participate due to personal reasons; finally, 14 patients were included in the study.

Tables 3 and 4 show the summary of a sociodemographic and clinical profile of the participants, respectively.

Reported access of audio-visual gadgets and booklet by the patients

Except one, all participants reportedly used yoga video as a guide to yoga practice at home (11 watched it on smartphone, 1 on CD player, and 2 on laptop). Thirteen literate participants reportedly read the yoga booklet at home.

Table 4: Participant's clinical details and adherence in terms of number of days of performance of yogic exercises during 1st and 2nd month of chemotherapy

Diagnosis	Stage	Baseline ECOG PS	Chemotherapy type	Yoga started at the baseline (yes/no)	Yoga started after completion of 2 nd cycle of chemotherapy (ECOG PS 2)	Chemo-cycles completed during the intervention period (2 months)*	Adherence during 1 st month (days)	Adherence during 2 nd month (days)
NHL	II	2	CHOP-R	Yes	-	3	15	20
HL	III	1	ABVD	Yes	-	4	20	21
NHL	II	2	CHOP-R	Yes	-	3	15	10
NHL	II	2	CHOP	Yes	-	3	24	25
HL	III	3	ABVD	No	Yes	4	13	15
NHL	II	1	CHOP	Yes	-	3	22	21
HL	IV	2	ABVD	Yes	-	4	24	26
NHL	III	2	CHOP-R	Yes	-	3	20	20
HL	II	1	ABVD	Yes	-	4	24	24
NHL	II	2	CHOP	Yes	-	3	15	20
NHL	III	1	CHOP-R	Yes	-	3	14	20
NHL	II	2	CHOP	Yes	-	3	24	27
HL	II	2	ABVD	Yes	-	4	30	30
NHL	IV	2	CHOP-R	Yes	-	3	10	10

*ABVD=14 days cycle, CHOP and CHOP-R=21 days cycle. NHL=Non-Hodgkin's lymphoma, HL=Hodgkin's lymphoma, ECOG PS score=Eastern Cooperative Oncology Group Performance score, CHOP= Cyclophosphamide, Doxorubicin, Vincristine, and Prednisone, CHOP-R= CHOP+ Rituximab, ABVD=Adriamycin, Bleomycin, Vinblastine, Dacarbazine

Table 5: Good adherence* in terms of number of participants practicing various components and complete yoga session (n=14)

	1 st month, n (%)	2 nd month, n (%)
Warm up	14 (100)	14 (100)
Pranayam	12 (86)	14 (100)
Asanas	8 (57)	11 (78.6)
Complete session	8 (57)	11 (78.6)

*Good adherence: 20 complete sessions per month were taken as good adherence

Feasibility of the yoga program

Recruitment rate was 93% and retention rate was reported to be 100%. All the participants maintained the Yoga Log book daily at home. Table 4 shows reported adherence to yoga by the participants during 1st and 2nd month of chemotherapy. Table 5 shows reported adherence to the various components of the yogic exercises.

Side effects of chemotherapy such as fatigue, pain in upper extremity where chemotherapy was administered, nausea and vomiting, fever, and diarrhea along with the absence of companion, and low mood were cited as the most frequent reason for skipping the yoga practice at home. The improvement was observed in all secondary outcome variables except pain [Table 6]. At the end of 2nd month of intervention, all participants completed intervention acceptability questionnaire and acceptability rate was found to be 97% [Table 7].

Adverse events

No yoga-related serious adverse event was reported by the patients during the study period.

Discussion

Considering the good 100% retention rate, 93% recruitment rate, 97% acceptability rate, 78.6% adherence rate, and no "yoga" related serious adverse events during chemotherapy, it can be suggested that home-based yoga intervention among lymphoma patients undergoing chemotherapy is feasible and safe.

Adherence to the warm-up exercises was good, i.e., 100% in both 1st and 2nd month, and it improved for Asanas from 57% to 78.6% and for Pranayam from 86% to 100% in the 2nd month as compared to the 1st month of chemotherapy. It is understandable that Yogic Asanas are more complex than warm-up exercises. They need slightly more physical fitness than the warm-up activity. In our study, we believe that, after one/two chemotherapy, cycle reduction in tumor burden might have led to improvement in physical condition of the patients which would have enabled them to perform Yogic Asanas in an easier manner than at the time of recruitment. Another possible explanation for better performance is the knowledge that chemotherapy-related adverse events are more likely in the first few weeks of starting of chemotherapy and they may hinder any kind of physical activity.^[13] We feel that good adherence in our study may be due to cultural aspects of our study population, as acceptance for Yoga is higher in Indian culture.

Our intervention program was home based, so it was more convenient for the participants to comply with it. Further, patients undergoing chemotherapy are neutropenic so are extremely susceptible to get infection which may be of serious life-threatening infections in nature.^[13] Hence,

Table 6: Effects of Yoga on patient-rated outcome at baseline (before start) and 2nd month of chemotherapy

Outcome	Scale	Max score	Mean±SD		t*	P
			Baseline	At 2 nd month (postintervention)		
HRQOL	FACT-L	0-168	74±13.45	86±16.34	-2.783	0.015
Fatigue	FACIT-F	0-52	24.07±6.17	33.92±8.24	-3.312	0.006
Sleep	PSQI	0-21	9.142±2.28	3.714±2.16	6.34	0.000
Depression	PHQ-9	0-27	9.714±3.911	5.428±1.603	3.356	0.005
Anxiety	GAD-7	0-21	9.571±4.237	5.642±1.691	3.55	0.004
Pain	NPRS	0-10	1.55±1.652	0.8571±0.77	1.351	0.2

*Paired t-test applied to check the difference between baseline and postintervention mean scores. SD=Standard deviation, HRQOL=Health-related quality of life, FACT-L=Functional assessment of cancer therapy-lymphoma, FACIT-F=Functional assessment of chronic illness therapy-fatigue, PSQI=Pittsburgh sleep quality index, PHQ-9=Patient health questionnaire-9, GAD-7=Generalized anxiety disorder-7, NPRS=Numerical pain rating scale

Table 7: Acceptability of the yoga program (n=14)

Acceptability questionnaire items	Disagree, n (%)	Agree, n (%)	Strongly agree, n (%)
1. Was the objective of the program clear?	0	5 (37.1)	9 (64.3)
2. Did you clearly understand the yoga exercises?	0	4 (28.6)	10 (71.4)
3. Was it easy to incorporate the yoga in your daily life?	2 (14.3)	5 (37.1)	7 (50)
4. Were you interested in the program?	0	2 (14.3)	12 (85.70)
5. Do you wish to continue the yoga practice?	0	1 (7.1)	13 (92.9)

practicing yoga at home is preferable for this highly immunosuppressed cohort.

One of the hindrances in use of yoga with the modern medicine is lack of availability of trained yoga instructor at every place, especially semi-urban/rural areas do not have access to trained yoga experts. On the contrary, these days, electronic sources such as smartphone/laptops are readily available even in the rural settings. The results of this study show that the use of these gadgets can help patients to practice yoga at home.

The secondary outcomes, for example, quality of life, fatigue, anxiety, depression and sleep also improved in our study and these results are consistent with the result of other similar studies done in cancer survivors.^[14,15] Hence, yoga-based programs should be considered in the management of lymphoma patients.

As this was a feasibility study for home-based yoga intervention, however, it needs further validation about improvement in HRQOL, fatigue, sleep, anxiety, and depression by taking up future randomized study on a larger study sample.

Conclusion

The results of the present study support the safety and feasibility of yogic interventions in patients diagnosed with lymphoma undergoing multiagent chemotherapy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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