Original Research Article

Efficacy of pilates based group therapy on fatigue and quality of life in brain tumor survivors – A randomized control trial

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Abstract

Introduction: Fatigue is one of the most common problems experienced by the cancer patients. It is a normal and necessary instrument of physiologic self-regulation and protects the body from exaggerated or harmful efforts. It becomes pathologic when it appears during normal activities and does not improve after rest. It is one of the prevalent symptoms of the patients receiving radiation therapy, cytotoxic chemotherapy or biological response modifiers. Fatigue is inversely associated with activity level and functional capacity.

Aim: To evaluate the effectiveness of the pilates based group therapy on the reduction of the levels of fatigue, symptom burden and the improvement in the domain the global functioning, functional component of the EORTC QLQ C30.

Materials and methods: Interventional experimental Randomized control trial was used in this study. The study included brain tumor survivors both genders (male and female) with age group ranging from 18 – 65 and completion of the treatment with surgery, radiotherapy, chemotherapy with or without current hormone treatment and overall kps score >70 were randomly allocated into two groups. Group A and Group B. Group A performed pilates exercises and Group B performed conventional therapy which includes ROM exercises and strengthening exercises to the upper limb, lower limb back and both the groups advised walking for 15 min daily.

Results: The experimental group A performing a pilates exercises showed statistically significant improvement in the reduction of the fatigue levels and the symptom burden and improvement in the global functioning and functional components of the EORTC QLQ C30 Questionnaire with the probability of <0.005.

Conclusion: Pilates based group therapy found to be effective in reducing fatigue levels and symptom burden there by improving the quality of life in brain tumor survivors according to the statistical data available.

Key words

Pilates, Fatigue, Quality of life, Brain tumors, Group therapy.

Introduction

Brain tumor is defined as an abnormal growth of cells that have proliferated in an uncontrolled manner [1]. It is a group of neoplasm regarded as one of the most devastating group of neurological disease associated with significant neurological morbidity that lead to progressive physical, cognitive, emotional dysfunction and frequently fatal [2]. The incidence of tumors in India ranges from 5 to 10 per 100000 populations with an increasing trend and accounts for 2% of malignancies [3, 4]. Astrocytomas (38.7%) were the most common primary tumors. The frequencies of other tumors are medulloblastoma (11.4%), craniopharyngioma (9.7%), ependymal tumors (4.8%) and nerve sheath tumors (4.1%) [5, 6]. Evidence of radiation exposure increases the risk of developing the tumor. Additional risk factors include head trauma, allergies, diet, tobacco, and alcohol. In parallel to these studies exploration of viral and genetic causes is burgeoning [7, 8].

In the patients with the primary brain tumors, prior studies have identified that fatigue occurs commonly in patients undergoing radiation therapy and that chronic fatigue may occur in patients with low grade tumors [9]. Headaches that tend to worsen in the morning, Seizures Stumbling, dizziness, and difficulty in walking, Speech problems, abnormal eye movements hemiparesis, drowsiness [10]. Tests include: Computed Tomography, Magnetic Resonance Imaging, biopsy: biomarkers or genetic mutations found in tumor may help in determine the prognosis. These include: IDH1, IDH2, MGMT, and 1p / 19q co deletion [11].

Fatigue is inversely associated with activity level and functional capacity [12]. In the present study patient performance test, sex and having active disease were the strongest predictors of the fatigue [13].

Evidences show that QOL variables tested, fatigue is recognized to have a strongest relationship and considered to be the most prevalent and distressing symptom of the cancer therapy [14] which have a negative impact on the QOL and functional capacity in brain tumor survivors [15].

There is evidence in current literature quoting that pilates has a positive impact in improving the QOL there by decreasing the fatigue in patients with various cancers and there is no proper evidence for treating the fatigue in brain tumors. Hence, there is a necessity to conduct a study to plan out and evaluate the appropriate and timely intervention of pilates to treat the main area of concern fatigue to improve the overall quality of life in brain tumor survivors. The aim of the study was to explore the effectiveness of the pilates group therapy on fatigue and QOL in brain tumor survivors.

Materials and methods

A comparative interventional clinical trial with random sampling and a sample size of 30 male and females with an age group of 18-65 years. The study was conducted in KIMS Hospitals,

Secunderabad for 1 year. The intervention was given for 12 weeks.

Materials

- Sandbags.
- Mat or soft cushion.
- Pencil.
- Sensory examination tool.
- Motor examination tool.

Inclusion criteria [16, 17]

- Both genders (male and female).
- Age included 18 – 65 years.
- Subjects diagnosed with the brain tumors and completion of the treatment with surgery, radiotherapy, chemotherapy with or without current hormone treatment.
- Cognitive function good enough to understand the questionnaires.
- Consent to participate in the study.
- Kps score >70.

Exclusion criteria

Subjects having

- Lymphedema.
- Cardiac diseases (excluding the intense exercise NYHA group 3 and 4).
- Uncontrolled hypertension.
- Acute or chronic respiratory diseases.
- Uncontrolled Diabetes mellitus.
- Mental illness.
- Infections.
- Uncontrolled immune and endocrine abnormality.
- Severe muscular impairment.
- Vision impairments and auditory impairments.
- Pronounced impressive and expressive aphasia.

Outcome measures

- Brief fatigue inventory scale [18].
- EORTC QLQ C [19]

Patients diagnosed from the neurosurgery and neurooncology department and fulfilling the neurophysiotherapy assessment criteria were enrolled for the therapy.

The signature of the participant in the consent form was taken. Participants were divided into two groups. The participant was given an in detailed relevant explanation regarding the therapy. Pretest recording of the outcome measures was done for the patients.

Group A: Experimental: Pilates along with home program.

Pilates exercise performed 60 min per day, 3 times a week for 12 weeks. Before the pilates exercises, the patient undergoes a warm up phase of 10 min which includes elevation, flexion and rotation of the shoulders, body rotating, Lateral flexion of the body, Flexion of the knees, dorsiflexion of the ankle, mini squat, after a warm up phase, patients were given pilates exercise 40 min comprising of one leg stretch, double leg stretch, shoulder bridge, arm opening, Clamp, Hip twist, Side kick, all the exercises performed. (2 sets and 10 rep).

Lastly cool down phase 10 min consists of breathing exercise (diaphragmatic breathing exercise), stretching (shoulder and pectoral muscles, gastrocnemius, soleus, flexors and rotators of hip and back muscles). (Hold 10 sec with 5 sec relaxation) 10-15 rep. Relaxation exercises. (Contract-relax is used). Home program includes walking (15) min three times a week for 12 weeks followed by breathing exercises.

Group B: Control: A designed exercises for home program (walking) and conventional therapy includes ROM exercises, strengthening exercises to the upper limb, lower limb, and back walking three times a week for 12 weeks followed by breathing exercises for 15 min.

After completion of the therapy period, at the end of the study, post-test recording of the outcome measures were taken and the data analysis was

done. They were two drop outs one in experimental and other in conventional. The drop outs were due to the reoccurrence of the tumor and the other with difficulty in the transportation and unable to attend the session on time thrice a week.

The statistical software namely SPSS 22.0 and R environment version 3.2.2 were used for the analysis of the data and Microsoft word and excel have been used to generate graphs, tables, etc. [20].

Descriptive and inferential statistical analysis has been carried out in the present study. Results were on continuous measurements were presented on mean and standard deviation (min – max) and results on categorical measurements were presented in number (%). Significance was assessed at 5% level of significance .The following assumptions on data was made.

Student t test (two tailed, independent) has been used to find the significance of the study parameters on continuous scale between two groups (inter group analysis) on metric parameters. Levens test for homogeneity of variance has been performed to assess the homogeneity of variance. Student t test (two tailed dependent) has been used to find the significance of study parameters on continuous scale within each group.

Age samples matched with the student t test whereas the gender with chi-square test.

Results

Samples were age matched with P=0.862, student t test. Samples were gender matched with P=0.109, chi-square test (**Table – 1**).

The fatigue levels got dropped from pretest to the post test of the experimental group with a difference of 0.571 and in the control group 0.350 (**Table – 2**).

The increment in the global functioning component was shown better in the experimental group rather than a control group with a difference of the pretest and post-test values 1.014 and 0.964 (**Table – 3**).

Table – 1: Gender.

Gender	Experimental Group	Control Group	Total
Female	2(13.3%)	7(46.7%)	9(30%)
Male	13(86.7%)	8(53.3%)	21(70%)
Total	15(100%)	15(100%)	30(100%)

Table – 2: Brief Fatigue Inventory.

Brief Fatigue Inventory	Experimental Group	Control Group	Total	P value
Pre Test	4.44±1.04	4.09±1.55	4.27±1.31	0.489
Post Test	3.87±1.01	4.44±1.26	4.16±1.16	0.196
Difference	0.571	0.350	0.111	-
P value	<0.001**	0.160	0.482	-

Table - 3: Global Functioning.

Global Functioning	Experimental Group	Control Group	Total	P value
Pre Test	4.07±1.16	4.25±1.42	4.16±1.28	0.719
Post Test	5.09±0.93	3.29±1.53	4.19±1.54	0.001**
Difference	1.014	0.964	0.025	-
P value	<0.001**	0.002**	0.921	-

Table - 4: Functional Scale.

Functional Scale	Experimental Group	Control Group	Total	P value
Pre Test	-33.11±1.04	-33.26±1.21	-33.19±1.11	0.715
Post Test	-29±18.29	-33.81±1.28	-31.41±12.96	0.335
Difference	4.107	0.550	1.779	-
P value	0.415	0.005**	0.472	-

Table - 5: Symptoms Scale.

Symptoms Scale	Experimental Group	Control Group	Total	P value
Pre Test	-31.25±1.1	-32.38±1.55	-31.81±1.44	0.035*
Post Test	-32.24±1.01	-32.79±1.69	-32.52±1.4	0.306
Difference	0.993	0.414	0.704	-
P value	<0.001**	0.004**	<0.001**	-

Table – 6: Comparison of the brief inventory fatigue scores pre and post intervention for group A (Experimental) and group B (control).

	Experimental	Control	Total
Difference	0.571	0.350	0.111
P value	<0.001**	0.160	0.482

Table – 7: Scores of the global functioning domain of the EORTCQLQ C30 scale.

	Experimental	Control	Total
Difference	1.014	0.964	0.025
P value	<0.001**	0.002**	0.921

Table – 8: Functional domain of the EORTC quality of life C 30.

	Experimental	Control	Total
Difference	4.107	0.550	1.779
P value	0.415	0.005**	0.472

Table – 9: Symptom burden among the patients.

	Experimental	Control	Total
Difference	0.993	0.414	0.704
P value	<0.001**	0.004**	<0.001**

The functional component was improved statistically in experimental when compared to control group (**Table – 4**).

The symptom burden slightly reduced according to the test values observed in the experimental group (**Table – 5**).

All the participants except the two, one in control and other in the experimental group completed the program without any adverse effects. At the completion of the program all were reported with the improvement in fatigue and all the domains of QOL.

Comparison of the scores of the fatigue and domains of the quality of life scale done on the first day as well as o the last day of the 12th week for both the groups with p values a 5% level of significance.

Comparison of the brief inventory fatigue scores pre and post intervention for group A (Experimental) and group B (Control) was as per **Table - 6**. There was a statistically significant improvement in group A rather than group B. The difference of the pretest and post-test values in experimental group was 0.571with a probability of <0.001 where as in control group 0.350 and p value of 0.160.

Estimated the scores of the global functioning domain of the EORTCQLQ C30 scale where both the group A and group B was statistically significant (**Table – 7**). On comparison to the group A to the group B, Experimental group A was statistically more significant.

The functional domain of the EORTC quality of life C 30 showed the significant improvements in the group B than group A (**Table – 8**). The difference of the pretest and post test results in experimental group found to be 4.107 (p value 0.415) where as in control group 0.550 (0.005) with a mean total of p value of 0.472 and the difference 1.779.

Table – 9 represents the symptom burden among the patients which tend to shown a reduction in both the experimental and control groups with the difference of the pretest and the post-test values and obtained p values.

There was a significant difference in the fatigue levels and domain of global functioning and the functional domain as well as in the symptom burden in the experimental group rather than control group. Pilates has shown the improvement in reducing the fatigue levels, symptom burden, and increased the scores of global functioning, functional scale components and therefore improves the quality of life in the brain tumor survivors. Hence, the study supported alternate hypothesis.

Discussion

The present study investigated the effects of pilates exercise on the dimensions of the levels of fatigue and the quality of life status including the global functioning, symptom scale as well as the functional components.

At the end of the study, differences between the scores of pretest and posttest evaluation statistically shown a significant improvement in fatigue levels on BFI and the EORTC QLQC 30 for the quality of life in the brain tumor survivors in the experimental group rather than control group.

Based on the results in the table mean quality of life shown a significant improvement after the intervention in two groups, which reveals the pilates exercise could promote quality of life of the patient in the dimensions of functional scale symptom burden as well as global functioning.

A study conducted by the Eyigor, et al. [17] revealed that fatigue has a negative impact and the QOL and functional capacity .this study revealed, fatigue scores of all the patients improved though the changes were not statistically significant. This was attributed to the short period of time of exercise and other factors that might affect fatigue where as in the current study the improvement in the reduction of the fatigue levels is clearly noted and the same study in the breast cancer showed an improvement in physical functioning there by improving the QOL which is being correlated with current study.

Although our results on the QOL confirm the findings of others, it is also true that intervention was not similar in all of its aspects. Therefore while some studies also used one session a week or three sessions a week. There are few inconsistencies with other studies related to the interventional time. Some studies also lasted 12 weeks although other studies had a six month and one year duration. However, in some studies the total intervention time was shorter than the present conducted study, 4 weeks, 5 weeks, 6 weeks or 8 weeks. This fact confirms the statement by Desouza and Vieira that there are no establish protocols on pilates exercise format

that are commonly used. This lack of establish protocol should be taken into account in future studies because studies like that by cruz ferreire et all have not shown a significant improvement observe with a pilates intervention, but not after a three-month intervention. This aspect does not correlate with the results of the current study.

Borges et al indicated all the dimensions of QOL had a significant difference in the patients with the lower back pain but no significant difference in physical functioning dimension where as in the present study there is a significant difference in physical functioning as well as in the symptom burden scale and all the domains of the EORTC QLQ c 30 does not correlate with pilates therapy intervention in brain tumor survivors.

Conclusion

The current study of pilates in brain tumor survivors states that the significant improvement in the reduction of the fatigue levels, symptom burden and the domains of the global functioning and the functional scale in symptom burden. Hence, the parameters of the EORTC QLQ C30 and BFI parameters are fulfilled in improving the quality of life thereby reducing the fatigue levels NEG.

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