

# Effects Of 3 Weeks Home Based Exercise on HRQOL And Functional Capacity in Advanced Lung Cancer Subjects After First Chemotherapy

Dr Shahi Kagdi<sup>1</sup>, Dr Aashish Negi<sup>2</sup>, Dr Amit Hemanani<sup>3</sup>

<sup>1</sup>M.P.T (Cardiopulmonary & Intensive care), In charge Principal, Dalia Physiotherapy College, Ahmedabad, Gujarat

<sup>2</sup>M.P.T (Cardiopulmonary), Assoc. Professor, Dept of Physiotherapy, SRHU, Dehradun, Uttarakhand

<sup>3</sup>M.P.T (Musculoskeletal And Sports), Asst. Professor, Gokul Physiotherapy College, Siddhpur, Gujarat

## Abstract

**Aims and objectives:** The aim of the study was to find out the effect of home based exercise on functional capacity and health related quality of life (HRQOL) of individuals having Advanced Lung Cancer & undergoing their first Chemotherapy session.

**Methodology:** 12 subjects were recruited from Cancer Research Institute, Himalayan Hospital, Dehradun. The subjects were randomly divided into two groups. Group A was provided with Home based exercise protocol whereas Group B was kept as Control group. Home based exercise protocol was given in a printed manner (as a leaflet) and was followed on every alternate day for 3 weeks. EORTC QLQ 30, QLQ LC 13 and 6MWD were recorded prior to the 1<sup>st</sup> Chemotherapy session and 3 weeks post- 1<sup>st</sup> chemotherapy session.

**Results:** The results of this study showed that, there was significant increase in the functional capacity in both the groups (Group A & B: Pre & Post, value of p : 0.014 & 0.003 respectively). But it was highly significant in the experimental group when compared with control group (p=0.003).

**Conclusion:** The study concluded that the Home Based Exercise Protocol should be established as a treatment strategy to improve Health Related Quality of Life and Functional Capacity for Advanced Lung Cancer individuals undergoing their 1st Chemotherapy session.

**KEYWORDS:** advanced lung cancer, functional capacity, 6MWD, health related quality of life (HRQOL), home based exercise.

**Introduction:** Lung carcinoma is a malignant tumour characterized by uncontrolled cell growth in tissues of the lung.<sup>1</sup> According to global lung cancer statistics there are 1.8 million new cancer cases annually and 1.6 million of deaths each year are due to its poor prognosis which is 19% of all cancer deaths. According to Indian Council of Medical Research, lung cancer constitutes 6.9% of all new cancer cases and 9.3% of all cancer related deaths in both genders.<sup>2</sup> On the basis of Lung Cancer Symptoms Scale, the most frequent symptoms include fatigue (98%), loss of appetite (98%), respiratory problems (94%), cough (93%), pain (90%), and blood in sputum (70%).<sup>3</sup> Persistent symptoms lead to disorders in physical functioning, while diagnosis and complex treatment adversely affect psychological functioning.<sup>4</sup> Physical functioning disorders are due to the development of cancer cachexia syndrome which leads into impaired

skeletal muscle strength and fatigue.<sup>5</sup> Skeletal muscle dysfunction significantly contributes to exercise intolerance, 70% exercise tests are stopped due to leg discomfort rather than dyspnoea, also the functional capacity is not related to spirometry measures of lung function in this population.<sup>6,7</sup> Decrease in peripheral muscle strength, decreases functional capacity which is the cause of limitation of activity. Functional capacity is also said to be the predictive of health related quality of life and survival in advanced lung cancer. With every 50 m improvement in the 6MWD (six minute walk distance), survival improves by 13% and people who walk at least 400 m before chemotherapy, have greater survival time.<sup>8,9</sup> Exercise for people with advanced lung cancer aims to prevent deterioration in physical and psychological status and maximize independence. Adherence to the exercise training sessions is higher in supervised hospital based training (inpatient setting 95%,<sup>10</sup> outpatient setting 44-77%) than in unsupervised home training (9%).<sup>11,12</sup> However, these adherence rates are from small number of pilot studies and home based training has not been tested in isolation. So, there is a need to study the effects of home based exercise training on health related quality of life (HRQOL) and functional capacity in lung cancer individuals undergoing chemotherapy sessions for the 1<sup>st</sup> time. Therefore, this study aimed to improve the HRQOL as well as their functional capacity for those individuals who are going to be administered with 1<sup>st</sup> chemotherapy session.

**Methodology:** 12 subjects were included on the basis of the inclusion and exclusion criteria. All the subjects were taken from Cancer Research Institute, Himalayan Hospital, Dehradun. Prior to the intervention a signed consent form was taken from the subject/relative/caretaker. Inclusion criteria: diagnosed case of lung cancer with stage III & IV, age > 18 years, both genders, ECOG PS- 1&2, whereas, those subjects who had previously undergone for chemotherapy, those who are unable to understand and follow the command and those who are not willing to participate in the study were excluded.

**Procedure:** Subjects were randomly allocated into two groups on the basis of convenient sampling, Group A: experimental group (6 subjects) and Group B: control group (6 subjects). All the 12 subjects, were given the HRQOLQ that is EORTC QLQ 30 and its sub module QLQ LC 13, which was to be filled by subject themselves or with the help of their caretaker. Then, 6MWD was measured, to check their functional/exercise capacity prior to the administration of chemotherapy. In Group A, all the subjects were given a home based exercise protocol (HBEP) in a printed manner (in a handout form) which was to be followed on alternate days (every other day) for 3 weeks HBEP includes pursed lip breathing ex (10 rep), thoracic expansion ex (10 rep), modified push ups ex (10 rep), partial squatting ex (10 rep), walking (10 min). All the exercises listed on the protocol were explained and demonstrated. Telephonic inquiry was done weekly to keep a record of exercise and for providing guidance regarding the exercise protocol if needed. Whereas in Group B, subjects were given no intervention as this group was taken as a control group for this study. HRQOLQ and 6MWD was taken again after 3 weeks for both the groups.

**Data Analysis:** Statistical analysis was performed using SPSS (version 25). Results were assessed using a level of significance  $p < 0.05$ . Paired t test was used to calculate the data within the group whereas independent sample test was used to calculate data between the groups.

**Results:** The mean comparison of EORTC QLQ 30 at baseline and after 3 weeks of chemotherapy in the Group A is  $59.83 \pm 7.08$  SD and  $46.83 \pm 4.62$  SD respectively. P value obtained is 0.003 which shows

significant difference ( $p < 0.05$ ). Whereas in the Group B, it is  $55.83 \pm 14.64$  SD and  $50.00 \pm 7.58$  SD respectively. P value obtained is 0.163 which shows insignificant difference ( $p > 0.05$ ). The Comparison of mean of EORTC QLQ LC 13 at the baseline and after 3 weeks of chemotherapy in the Group A is  $19.50 \pm 2.66$  SD and  $19.00 \pm 3.09$  SD respectively. P value obtained is 0.762 which shows insignificant difference ( $p > 0.05$ ). And in the Group B, it is  $21.00 \pm 4.81$  SD and  $20.16 \pm 3.25$  SD respectively. P value obtained is 0.665 which shows insignificant difference ( $p > 0.05$ ). The mean comparison of 6MWD at the baseline and after 3 weeks of chemotherapy in the Group A is  $410.00 \pm 52.27$  SD and  $446.33 \pm 60.11$  SD respectively. P value obtained is 0.001 which shows significant difference ( $p < 0.05$ ). but in the Group B, it is  $310.00 \pm 63.24$  SD and  $312.33 \pm 59.28$  SD respectively. P value obtained is 0.765 which shows insignificant difference ( $p > 0.05$ ).

**Table I: Comparison of data at the baseline and after 3 weeks of administration of 1<sup>st</sup> chemotherapy within the group analysis of both the groups.**

	Group A			Group B		
	Baseline	After 3 weeks	P value	Baseline	After 3 weeks	P value
EORTC QLQ 30	$59.83 \pm 7.08$	$46.83 \pm 4.62$	0.003	$55.83 \pm 14.64$	$50.00 \pm 7.58$	0.163
EORTC QLQ LC 13	$19.50 \pm 2.66$	$19.00 \pm 3.09$	0.762	$21.00 \pm 4.81$	$20.16 \pm 3.25$	0.665
6MWD	$410.33 \pm 52.27$	$446.33 \pm 60.11$	0.001	$310.00 \pm 63.24$	$312.33 \pm 59.28$	0.765

The Comparison of mean of EORTC QLQ 30 at the baseline, in between the group analysis, that is in the Group A and in the Group B is  $59.83 \pm 7.08$  SD and  $55.83 \pm 14.64$  SD respectively. P value obtained is 0.560 which shows insignificant difference ( $p > 0.05$ ). whereas when compared after 3 weeks of chemotherapy in between the group analysis, it showed  $46.83 \pm 4.62$  SD and  $50.00 \pm 7.58$  SD respectively. P value obtained is 0.403 which shows insignificant difference ( $p > 0.05$ ).

**Table II: Comparison of data between the group analysis of both groups showing relationship at the baseline and after 3 weeks of administration of 1<sup>st</sup> chemotherapy.**

		Group A	Group B	P value
EORTC QLQ 30	Baseline	$59.83 \pm 7.08$	$55.83 \pm 14.64$	0.560
	After 3 weeks	$46.83 \pm 4.62$	$50.00 \pm 7.58$	0.403
EORTC QLQ LC 13	Baseline	$19.50 \pm 2.66$	$21.00 \pm 4.81$	0.520
	After 3 weeks	$19.00 \pm 3.09$	$20.16 \pm 3.25$	0.539
6MWD	Baseline	$410.00 \pm 52.27$	$310.00 \pm 63.24$	0.014

	After 3 weeks	446.33±60.11	312.33±59.28	0.003
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The Comparison of mean of EORTC QLQ LC 13 at the baseline, in between the group analysis that is in the Group A and in the Group B is  $19.50 \pm 2.66$  SD and  $21.00 \pm 4.81$  SD respectively. P value obtained is 0.520 which shows insignificant difference ( $p > 0.05$ ). whereas when compared after 3 weeks of chemotherapy in between the group analysis, it showed  $19.00 \pm 3.09$  SD and  $20.16 \pm 3.25$  SD respectively. P value obtained is 0.539 which shows insignificant difference ( $p > 0.05$ ). The Comparison of mean of Six Minute Walk Distance at the baseline, in between the group analysis, that is in the experimental(A) group and in the Control(B) group is  $410.00 \pm 52.27$  SD and  $310.00 \pm 63.24$  SD respectively. P value obtained is 0.014 which shows significant difference ( $p < 0.05$ ).but when compared after 3 weeks of chemotherapy in between the group analysis, it showed  $410.00 \pm 52.27$  SD and  $310.00 \pm 63.24$  SD respectively. P value obtained is 0.003 which shows highly significant difference ( $p < 0.05$ ).

**Discussion:** The results were calculated on the basis of data collected from twelve subjects, who underwent this study. The experimental group showed significant changes in their Health Related Quality Of Life assessed through EORTC QLQ 30 questionnaire when compared to their Pre chemotherapy and post 1<sup>st</sup> session of Chemotherapy following 3 weeks of Home Based Exercise Treatment. Whereas the control group showed insignificant changes in their Health Related Quality Of Life assessed through EORTC QLQ 30 questionnaire when compared to their Pre chemotherapy and post 1<sup>st</sup> session Chemotherapy following 3 weeks of Home Based Exercise Treatment. This results were supported by a study which states that Exercise training produces significant improvements in physiological indices and emotional HRQOL and is safe and feasible in patients with advanced stage lung cancer, undergoing chemotherapy.<sup>13</sup> Various other studies concluded that, quality of life was best seen with Chemotherapy treatment among different other treatment options.<sup>14,15</sup> An another study, expressed a decrease in the functional areas of QLQ-30 quality of life and general health status.<sup>16</sup> The EORTC QLQ LC 13 is a symptom questionnaire of lung cancer specifically which, In our study, showed no significant changes, neither in between the group analysis, nor in within the group analysis of experimental and control groups. A study also stated that, Chemotherapy resulted in worsening of symptoms such as dyspnoea, constipation, fatigue, nausea, insomnia and alopecia, whereas only improvement was seen in cough.<sup>17</sup> Heightening of Alopecia, a proven side effect of Chemotherapy, would have been the main reason of insignificant changes seen in our study. Also, this is supported by a study which evaluated the quality of life before and after the therapy, determined rise in alopecia, constipation, and oral ulceration rates.<sup>16</sup> Apart from this, there were significant changes in the functional capacity of the subjects in this study which was assessed through Six Minute Walk Distance comparison in within the group analysis as well as when compared in between the groups analysis. Still the highly significant changes were spotted in the experimental group compared among both the groups as mean difference of pre and post intervention, in the experimental group is of 37 m which falls in the range of minimal important difference in six minute walk distance stated by Catherine L Granger et al. 2015 in her study.<sup>18</sup> The home based exercise intervention given in the experimental group of this study has shown a positive impact on functional capacity as well as on health related quality of life in within the group analysis (that is pre and post intervention analysis). Endurance and resistance training showed improvement in a study among all other chemotherapy-related side-effects in patients of breast cancer.<sup>19</sup> In a Multidisciplinary home-based rehabilitation in inoperable lung cancer: a randomised

controlled trial study, concluded that Home-based rehabilitation did not improve functional exercise capacity but there were improvements in patient-reported exploratory secondary outcomes measures observed at 6 months.<sup>20</sup> Another study, showed that home-based walking exercises have major impact on improvement in the subjective and objective sleep quality of patients with lung cancer, particularly those with poor rest-activity rhythms.<sup>21</sup> The functional capacity in our study, showed significant changes in between the group analysis, but the health related quality of life had insignificant effect when compared in between the group analysis, which states that home based exercise intervention may not have shown positive effects on health related quality of life of the subjects.

Limitations of this study includes small sample size. Future research can be carried out on a large sample size and by using various electronic medias for instance by making videos of the treatment and providing the treatment in an audio visual format, which may aid in encouraging the subjects effectively.

**Conclusion:** The present study concludes that the Home Based Exercise Protocol should be established as a treatment strategy to improve Health Related Quality of Life and Functional Capacity for Advanced Lung Cancer individuals planned for 1st Chemotherapy.

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