


## Relationship between weight gain and survival rate in patients with metastatic lung cancer

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### Abstract

**Background:** Lung cancer accounts for about 13% of all cancers and about 60% of patients with lung cancer also experience weight loss during treatment. There seems to be a clear correlation between the therapeutic outcomes of patients based on their weight changes during treatment. The aim of this study was to investigate the relationship between weight changes during and after treatment and the therapeutic outcomes of a patient with metastatic lung cancer.

**Methods:** This cohort study was performed on patients with the diagnosis of non-surgical metastatic lung cancer referred to Hematology and Oncology Clinic, Rasoul-e-Akram Hospital. Patients were divided into two groups with a weight gain of more than 5% and a weight gain of 5% and less. The information was entered into the SPSS version 21 software. In the descriptive analysis, mean and standard deviation (SD) were used. To compare quantitative variables, independent samples t-test, Mann-Whitney, chi-square or Fisher exact tests were used to compare qualitative variables and correlation test was used to determine the correlation between quantitative data. Survival curves were used to show differences in two groups of studies. A regression model was used to calculate the hazard ratio. The significance level was less than 0.05.

**Results:** Sixty patients, including 40 males (66.7%) and 20 females (33.3%) were studied. The mean age of patients was 62.22±9.00 years (43-83 years). The mean weight changes in the patients were -1.28±6.11 kg (-16 to 16kg). Forty-seven patients (78.3%) had weight gain less than 5%. There was no significant difference in overall survival (OS) and progression-free survival (PFS) according to weight gain.

**Conclusion:** Finally, the findings of the study showed that, despite the fact that PFS and OS in the weight gain group were greater than 5% of the original weight; the difference was not statistically significant.

**Keywords:** Metastatic lung cancer, Weight gain, Overall survival, Progressive free survival

**Conflicts of Interest:** None declared

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### Introduction

Lung cancer is about 13% of all cancers in the world. Its mortality rate is highest among all cancers (1). The tumor status and stage of the disease are two important factors in

determining the prognosis of lung cancer (2, 3). The studies about metastatic lung cancer show that appetite loss and weight loss are the new prognostic factors (4, 5). Al-

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#### ↑What is “already known” in this topic:

About sixty percent of patients with lung cancer experience weight loss during treatment. There seems to be a correlation between the therapeutic outcomes of patients based on their weight changes during treatment.

#### →What this article adds:

This study showed that overall survival and progression-free survival were higher in the weight gain of more than 5% group compared to the other group. However, there was no significant difference in the survival curve between the two groups.

so, about 60% of patients with lung cancer experience weight loss during treatment (6). It is always the question of whether the continuation of weight loss or its stabilization can be effective in overall survival (OS) or survival without progression of the disease (Progression-free survival, PFS) (7, 8). In some cancers, lowering energy consumption due to inactivity and hormonal abnormalities can lead to weight gain. There are different data on the association of weight gain with worse disease outcomes in some cancers (9, 10). Some studies have shown that instability in weight, including weight gain and weight loss, is associated with worse survival in cancer patients (11).

Some studies show that the PFS and OS in lung cancer patients who had a steady weight during treatment were about two months longer than other patients. In local cases, weight gain was associated with increased survival during the treatment (12, 13). In addition, patients with advanced stages of lung cancer with weight gain after treatment had greater survival rates (14).

There seems to be a correlation between the therapeutic outcomes of patients based on their weight changes during treatment. Therefore, the present study aims to investigate the relationship between weight changes during and after treatment and the outcomes in patients with metastatic lung cancer.

## Methods

### Study population

This cohort study was performed in patients with a diagnosis of non-surgical metastatic lung cancer, in Rasool Akram Hospital, Tehran, Iran from 2018 to 2019. Upon approval of the Iran University's Ethics Committee (IR.IUMS.FMD.REC.1396.9411160003), data collection was carried out. Written consent was received from all patients. Patients' information was collected based on clinical documentation, pathologic report, interview and follow up.

### Weighing

Patients were weighed and their topographic characteristics, including weight, height and body mass index, were recorded before the treatment. The patients were weighed at the beginning of each treatment period and the body mass index was calculated in the highest weight. Weight changes and body mass index were calculated after treatment, and their ratio was calculated based on the initial values. According to a similar study (15), patients were divided into two groups including weight gain of more than 5% (group 1) and weight gain of 5% and less (group 1). Progression-free survival (PFS) and overall survival (OS) were calculated at the beginning of the treatment.

### Statistical analysis

After completing the checklist, their information was entered into the SPSS version 21 software. In the descriptive analysis, mean and standard deviation (SD) were used. To compare quantitative variables, independent t-test or Mann-Whitney, chi-square or Fisher exact tests were used to compare qualitative variables and correlation test was used to determine the correlation between the quantitative variables. Survival curves were used to show survival differences in the two groups of study. Univariate Cox regression was used to calculate the hazard ratio. The significance level was less than 0.05.

### Results

Sixty patients with metastatic lung cancer were enrolled in the study. Forty cases (66.7%) were male, and 20 (33.3%) were female. The mean age of patients was  $62.82 \pm 9.006$  years (43-83 years). The mean weight changes in the patients were  $-1.28 \pm 6.11$  kg (-16 to 16kg). Forty-seven patients (78.3%) had weight gain less than 5% and 20 cases (21.7%) had weight gain more than 5%. The median survival in both groups is shown in Table 1.

There was no statistically significant difference in mean of PFS and OS in terms of percent overweight. PFS and OS are shown in two groups (Charts 1 and 2).

According to log-rank test, weight gain of 5% and less has no risk to reduce OS or PFS (HR= 1.18; 95%CI: 0.610-2.285)

### Discussion

In the present study, it was not found that the weight gain of more than 5% could be associated with increased OS and PFS. In other studies, obesity was one of the major causes of increased mortality due to gastric and prostate cancer in men and breast, endometrial, cervical and ovarian cancers, with 14% and 20% of case fatality rate in men and women, respectively (16, 17).

However, the progression of the disease in cancer patients and the development of metastasis can lead to complications such as bowel obstruction and metabolic problems, which can lead to severe weight loss for these patients. This situation can be effective in reducing the life expectancy of patients (18, 19). Also, the patients may become overweight due to reduced physical activity and the administration of certain chemotherapy drugs during the diagnosis and treatment of cancer (20-23). Overall, weight gain results from the patient's nutritional status and physical activity (24, 25). Many studies have shown that the occurrence or progression of underlying diseases such as diabetes and hypertension can lead to weight gain and obesity during chemotherapy in cancer patients (26, 27).

It was no significant relationship between weight gain and OS and PFS in the present study. But in some studies,

Table 1. Distribution of overall survival (OS) and disease-free survival (PFS) Median according to weight gain

Variables	Groups	
	Weight gain $\leq$ 5%	Weight gain $>$ 5%
PFS (months) (median (95%CI))	6 (5-10)	7 (6-11)
OS (months) (median (95%CI))	9 (6-12)	9 (6-24)

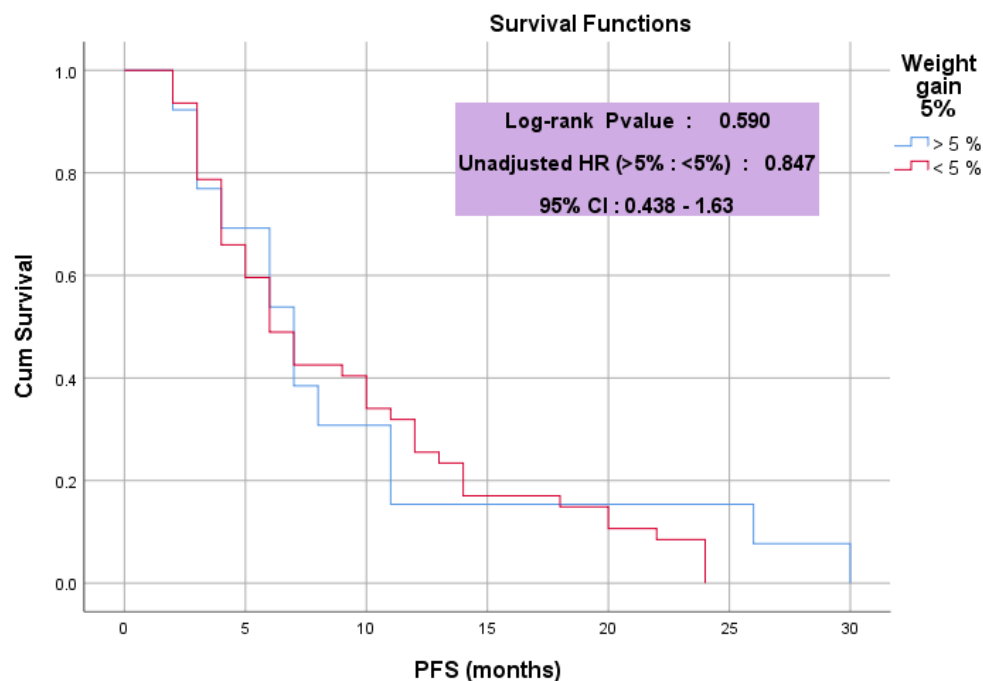


Fig. 1. Survival analysis of PFS in two groups

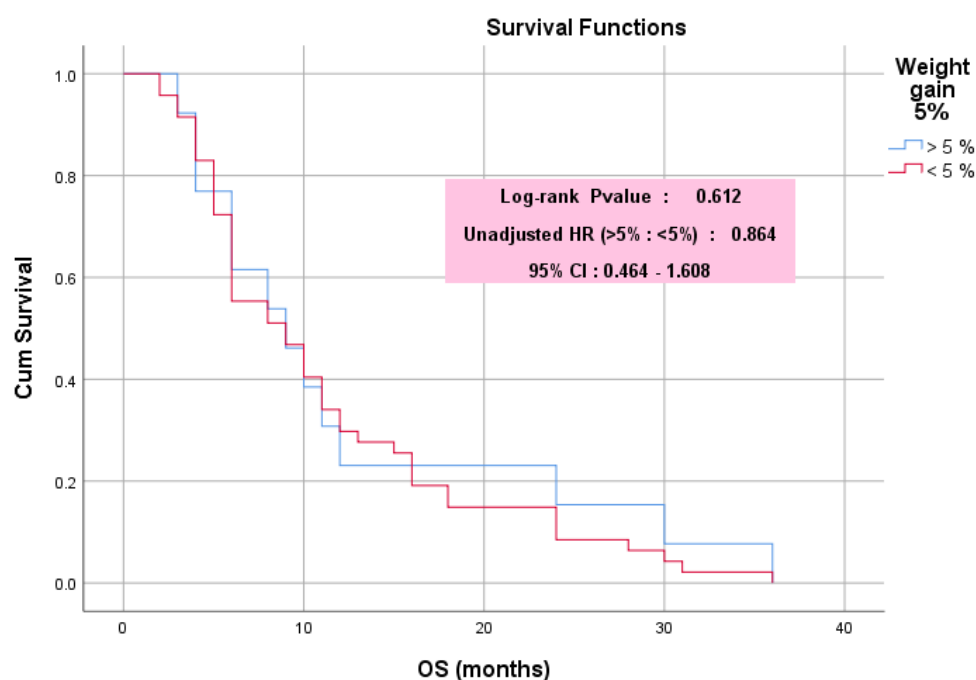


Fig. 2. Survival analysis of OS in two groups

such as the Patel et al, patients with breast cancer who gained more than 5% of their initial weight had more survival compared to the other patients (27). A similar finding was also observed in patients with ovarian cancer that the OS of patients with weight gain more than 5% of the initial weight was greater than the patients without weight gain (25). In this study, it seems that the responsiveness of patients to treatment and increased appetite has led to improved patient nutrition and weight gain. Also, OS and

PFS increased. In group I ( $\leq 5\%$ ), OS was  $11.26 \pm 8.43$  m and in group II ( $>5\%$ ), OS was  $12.54 \pm 10.61$  m.

### Conclusion

Finally, the findings of the study showed that OS and PFS were higher in group I compared to the group II. However, there was no significant difference in the survival curve between the two groups.

## Acknowledgment

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## Conflict of Interests

The authors declare that they have no competing interests.

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