SCIE DOI: 10.14744/scie.2017.99608
South. Clin. Ist. Euras. 2017;28(3):168-174

Original Article

Do Characteristics of Lung Cancer Differ Between the Age Groups of Under and Over 55 Years of Age?

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Submitted: 11.08.2017
Accepted: 23.10.2017

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Keywords: Age; lung cancer; young age.

ABSTRACT

Objective: The aim of this study was to investigate the sociodemographic, clinical, radiological, histopathological, and survival characteristics of lung cancer patients ≤55 years of age.

Methods: The files of patients diagnosed in the clinic as lung cancer between January 2014 and December 2016 were retrospectively evaluated. These cases were divided into 2 groups: patients who were ≤55 years of age and patients >55 years of age. The clinical, radiological, and demographic findings; histopathological type and stage of cancer; treatment modalities used; and survival data were analyzed and compared.

Results: A total of 323 cases, 85 (26.3%) of them aged ≤55 years and 238 (73.7%) aged >55 years, were included in the study. The stage and histopathological type of lung cancer, smoking history, gender, oncological and surgical treatment modalities used, and survival characteristics were similar in both groups (p>0.05).

Conclusion: Since the 2 groups of lung cancer patients formed on the basis of the age limit of 55 years were similar in many respects, and because the number of cancer cases increases in 5-year subgroups under the age of 55 years, screening for lung cancer may be recommended for those under 55 years, especially in cases with risk factors.

INTRODUCTION

Lung cancer is most often observed in the middle-aged and older adult groups (60–70 years old); it is rarely seen in the young.[1,2] Studies have shown that a low-dose computed tomography (CT) scan before 55 years of age may lead to a reduction in lung cancer mortality.[3–5] In the recently published NCCN-2017 (The National Comprehensive Cancer Network) guideline, it was suggested that individuals with the risk factors of age ≥55 years and a smoking history of ≥30 pack years should be screened with CT using low doses of radiation.[5]

Numerous studies have been performed with lung cancer patients of various age groups.[6–8] Therefore, there are conflicting results concerning histopathological types, survival rates, and treatment characteristics with regard to young patients.[9–11]

This study was designed to examine sociodemographic, clinical, radiological, histopathological, and survival characteristics of patients with the diagnosis of lung cancer aged ≤55 and >55 years.

MATERIAL AND METHODS

This study was a retrospective, observational cross-sectional analysis of data gathered from the medical files of patients who were examined with the initial diagnosis of lung cancer at the clinic between January 2014 and December 2016. These cases were divided into 2 groups: those aged ≤55 years and those aged >55 years. Demographic findings of age, gender, and smoking status; complaints on initial presentation; long-axis dimensions of lung tumors (mm) detected on thoracic CT; oncological anamnesis, including histopathological type and stage

of the lung cancer; chemotherapy, radiotherapy (RT), or chemoradiotherapy (if any) received; surgical anamnesis of patients who underwent early stage surgical treatment; any postoperative chemotherapy, RT or chemoradiotherapy, and survival data of the 2 patient groups were compared. Staging was performed according to the TNM (tumor-node-metastasis) classification system for lung cancer staging, seventh edition.[12] The TNM staging factors and the distribution of stages are shown in Tables 1–4. Written patient approval was obtained for all

Table 1. Assessment of factor T based on the TNM Classification of Malignant Tumours, seventh edition

TX	Primary tumor cannot be assessed, or the tumor is proven by the presence of malignant cells in sputum or bronchial washing but is not visualized by imaging or bronchoscopy
T0	No evidence of primary tumor
Tis	Carcinoma in situ
T1	The greatest dimension of the tumor is ≤3 cm; surrounded by lung or visceral pleura, no bronchoscopic evidence of invasion more proximal than the lobar bronchus (not in the main bronchus); superficial spreading of tumor in the central airways (confined to the bronchial wall)
	T1a: The greatest dimension of the tumor is ≤2 cm
	T1b: The greatest dimension of the tumor is >2 cm but ≤3 cm
T2	The greatest dimension of the tumor is >3 cm but ≤7 cm; involvement of main bronchus ≥2 cm distal to carina; visceral pleura invasion; atelectasis/obstructive pneumonitis extending to hilar region without involving the entire lung
	T2a: The greatest dimension of the tumor is >3 cm but ≤5 cm
	T2b: The greatest dimension of the tumor is >5 cm but ≤7 cm
T3	The greatest dimension of the tumor is >7 cm with invasion of the chest wall (including superior sulcus tumors), diaphragm, phrenic nerve, mediastinal pleura, or parietal pericardium; invasion of the main bronchus <2 cm distal to the carina without carinal involvement; total atelectasis or obstructive pneumonia involving entire lung; presence of other tumors anatomically distinct from the tumor in question in the same lobe
T4	Aa tumor of any size that invades the mediastinum, heart, major vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina, or separate tumor nodule(s) in a different, ipsilateral lobe

TNM: Tumor, node and metastasis.

Table 2. Assessment of factor N based on the TNM Classification of Malignant Tumours, seventh edition

NX	Regional lymph nodes cannot be assessed
N0	No evidence of regional lymph node metastasis
N1	Metastasis in ipsilateral hilar, peribronchial, interelobar, lobar, segmental, subsegmental lymph nodes
N2	Metastasis in ipsilateral subcarinal and/or mediastinal lymph node
N3	Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph nodes

TNM: Tumor, node and metastasis.

Table 3. Assessment of factor M based on the TNM Classification of Malignant Tumours, seventh edition

MX	Distant metastasis cannot be assessed
M0	No evidence of distant metastasis
M1	Distant metastasis
	M1a: Separate tumor nodule(s) in a contralateral lobe; tumor with pleural nodules or malignant pleural (or pericardial) effusion
	M1b: Distant organ metastasis

TNM: Tumor, node and metastasis.

Table 4. Staging of lung cancer based on the TNM Classification of Malignant Tumours, seventh edition

	Tumor	Lymph node	Metastasis
Occult carcinoma	Tx	N0	M0
Stage 0	Tis	N0	M0
Stage IA	T1a,b	N0	M0
Stage IB	T2a	N0	M0
Stage IIA	T1a,b	N1	M0
	T2a	N1	M0
	T2b	N0	M0
Stage IIB	T2b	N1	M0
	T3	N0	M0
Stage IIA	T1,2	N2	M0
	T3	N1,2	M0
	T4	N0,1	M0
Stage IIIB	T4	N2	M0
	Any T	N3	M0
Stage IV	Any T	Any N	M1a,b

interventional procedures; however, since the study had a retrospective observational, cross-sectional design, additional consent for the use of the medical data was not necessary. The approval of the local Ethics Committee was obtained, and this research was conducted in compliance with Declaration of Helsinki.

Statistical analysis

Statistical analysis was performed using SPSS Statistics for Windows, Version 17.0 (IBM Corp., Armonk, NY, USA) program. Descriptive statistics were used to describe continuous variables as mean±SD and categorical variables as percentages. Fitness of the variables to normal distribution was tested using the Kolmogorov-Smirnov test. The data were evaluated using a chi-square test and the Mann-Whitney U test. Survival rates were calculated based on the Kaplan-Meier method and compared with the log-rank method. P<0.05 was considered statistically significant.

RESULTS

A total of 323 patients aged ≤55 years (n=85, 26.3%; female: n=19, 22.4%; male: n=66, 77.6%) and >55 years (n=238, 73.7%; female: n=36, 15.1%; male: n=202, 84.9%) were included in the study.

The mean age of the group aged ≤55 years was 50±5 years, and it was 66±7.2 years in the older group. The age distribution of the groups is presented in Fig. 1 and 2.

In the group of patients aged ≤55 years, 65 (76.5%) patients

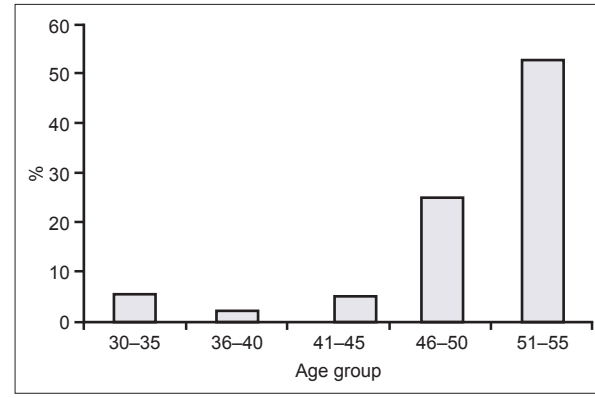

Figure 1. Distribution of patients aged ≤55 years according to age group.

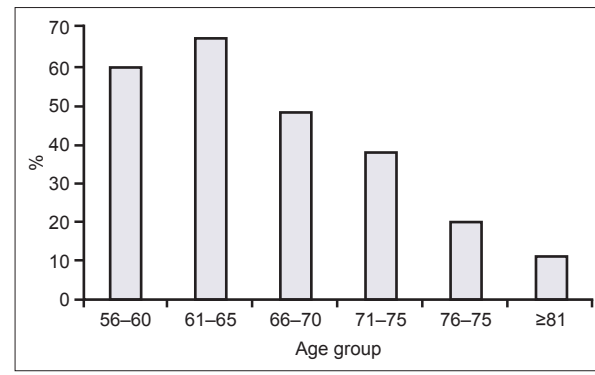

Figure 2. Distribution of patients aged >55 years according to age group.

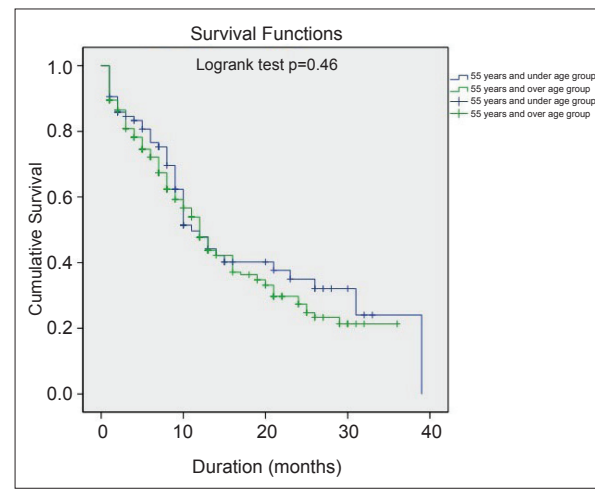

Figure 3. Graph demonstrating overall survival rate of the patients.

were smokers, 6 (7.1%) were non-smokers, and the smoking history of the remaining 14 (16.5%) was not known. Smoking status of the patients is provided in Table 5.

The patients in both groups had more than 1 admission complaint. The most frequent admission complaint was loss of appetite, with 43 (50.5%) reporting the symptom in the group aged ≤55 years and 141 (59.2%) in the older

Table 5. Sociodemographic, and clinical characteristics of the cases

	Age groups		
	≤55 years (n=85)	>55 years (n=238)	p value
Age (mean±standard deviation)	50±5	66±7.2	<0.001
Gender (female/male)	19/66	36/202	0.12
Smoking status (smoker/non-smoker)	65/6	181/10	0.38
Smoking (pack-years)	36.9±14.6	39.8±18.1	0.25
Admission complaint			
Weight loss (n/%)	32/37.6	96/40.3	0.66
Exhaustion (n/%)	40/47	108/45.3	0.79
Coughing (n/%)	37/43.5	125/52.5	0.15
Loss of appetite (n/%)	43/50.5	141/59.2	0.16
Bloody sputum (n/%)	29/34.1	130/54.6	0.014
Other (n/%)	23/27	41/17.2	0.51

Table 6. Distribution of histopathological diagnosis and tumor grade

	Age groups		
	≤55 years (n=85)	≥55 years (n=238)	p value
Distribution of histological diagnosis (n/%)			
• Non-small cell lung cancer	21/24.7	60/25.2	0.92
• Squamous cell carcinoma	28/32.9	94/39.5	0.28
• Adenocarcinoma	21/24.7	42/17.6	0.15
• Small-cell lung carcinoma	13/15.3	40/16.8	0.74
• Large-cell neuroendocrine carcinoma	2/2.4	2/0.8	0.28
Stage (n/%)			
• IA	9/16.5	15/6.3	0.19
• IB	5/10.6	14/5.9	1
• IIA	5/10.6	17/7.1	0.69
• IIB	3/3.5	9/3.8	0.91
• IIIA	11/12.9	34/14.3	0.75
• IIIB	10/11.8	22/9.2	0.50
• IV	28/32.9	85/35.7	0.64

group. A statistically significantly greater number of patients in the group of patients aged >55 years also reported bloody sputum (Table 5).

The mean size of the tumor based on radiological findings was 44.7±22.2 mm in the younger group and 52.9±25.7 mm in the groups with patients aged >55 years. The mean tumor size was statistically significantly greater in the older patient group (p=0.033).

The distribution of histopathological diagnoses of the cases revealed that the most frequently seen in both groups was squamous cell carcinoma. There were 28 (32.9%) cases in the group ≤55 and 94 (39.5%) in the second group. The most frequent TNM classification was stage 4 in both groups. Among patients aged ≤55 years, there were 28 (32.9%), and 85 (35.7%) in the group aged >55 years. The distribution of lung cancer stage and histopathological diagnosis can be seen in Table 6.

When the treatment modalities used in the study were analyzed, no intergroup difference was observed in standard oncological treatment (chemoradiotherapy) or surgi-

Table 7. Treatments received by the patients

	Age groups		
	≤55 years (n=85)	≥55 years (n=238)	p value
Only chemotherapy (n/%)	6/7	2/0.9	0.006
Only radiotherapy (n/%)	6/7	13/5.4	0.63
Chemoradiotherapy (n/%)	43/50.7	114/47.9	0.85
Surgical treatment (n/%)	19/22.4	49/20.6	0.73
Surgical treatment and chemoradiotherapy (n/%)	6/7	14/5.9	0.75
Unknown (n/%)	5/5.9	46/19.3	0.001

cal treatment. The treatment characteristics of the study patients are presented in Table 7.

During the study period, 47 (55.2%) patients in the groups aged ≤55 died, and 140 (58.8%) patients died in the group of those aged >55 years. The mean survival rate calculated in the ≤55 and >55 groups using the Kaplan-Meier and logrank methods was 11±1.3 months and 12±0.8 months, respectively. No statistically significant intergroup difference was found in the mean survival rate (p=0.46) (Fig. 3).

DISCUSSION

This study was designed to examine how lung cancer behavior might be different using the age of 55 as a measurement. One-quarter of the study participants was younger than 55 years of age. The findings regarding histopathological type, stage, treatment characteristics, most clinical features, female/male ratio, and survival rate of all patients in both groups were comparable. In the group with patients <55 years of age, the tumors were smaller, and a previous history of cancer and the complaint of bloody sputum were more frequently detected in the group aged >55 years. The presence of cancer was greater in the age groups of 46 to 50 years and 51 to 55 years.

Diagnosis of lung cancer is usually made between the sixth and seventh decades of life.[13] It is rarely seen in patients younger than 50 years of age; the incidence is reported to be between 9% and 14%.[14–16] Since the biology, epidemiology, clinical behavior of lung cancer, and tolerance to cancer treatment differs in younger patients, multiple studies have been performed with lung cancer patients in different age groups.[17,18] In a study performed in our country with 11,849 cases, the median age of the patients was 58.4 years (range: 20-84 years), and 11.4% of the cases were younger than 45 years of age.[19] In 2005, 13.4% of 1340 lung cancer patients in our country were found to be younger than 50 years of age.[20] In our series, in accordance with the literature, 10.8% of the patients were younger than 45 years of age, 28% were 46 to 50 years of age, and 61.1% were 51 to 55 years of age. The 2- and 3-fold increases we observed in the later age groups years are interesting, and studies should be performed to investigate whether including these age groups in screening programs will or will not affect mortality rates and diagnosis at an early stage.

Smoking is among the most frequent causes of lung cancer. The number of cigarettes consumed and duration in pack-years are closely related to the development of lung cancer.[21] When compared with lung cancer seen in advanced age, the effects of smoking are expected to be smaller in younger patients. In a study performed by Ak et al.,[20] smoking was a dominant etiological agent in advanced age lung cancer, while in younger age groups, an increase in both smoking and vocational exposure was observed. Cornere et al.[22] assessed lung cancer patients aged ≤45 years and >45 years and found a high incidence of smoking in both groups, but with a statistically significantly lower rate in the group of patients aged <45 years.

The pack-year smoking rate in both age groups of our study was similar, and nearly 2 times the 20 pack-year threshold for risk of lung cancer. Although our data demonstrates similar a incidence rate for smoking in both groups, in the group aged ≤55 years, there was a greater incidence of smoking within a short time period, which points to the important relationship between pack-years and developing lung cancer.

We did not find a study in the literature that compared tumor size in young and old patients. In our study, smaller tumors were detected in the group of patients aged ≤55 years, and the patients aged >55 years complained of bloody sputum more frequently. However, though the tumors were smaller, no difference in tumor stage or survival rate was found between groups, and therefore, we think that the smaller tumor size was not clinically significant. We think that the smaller size of the tumor in the younger patients was related to an earlier diagnosis of lung cancer. The greater incidence of bloody sputum in the group of

patients aged >55 years might be related to the larger size of the tumors in this group.

Controversial results have been reported concerning the clinical condition and prognosis of young patients with lung cancer. In some studies, higher rates of adenocarcinoma have been reported in young patients and in female patients.[2,23] Some authors have reported comparable prognoses and survival rates between young and advanced age patients,[22,23] while others indicated either unfavorable[24,25] or better[8,14] prognoses and survival rates for older patients. In our study of patients aged ≤55 years and >55 years, the most frequently seen histopathological type was squamous cell carcinoma and no significant difference was found between groups in disease stage; clinical, demographic, surgical, or oncological treatment characteristics; or overall survival rate.

This was a single-center, retrospective study performed with relatively small number of cases. Therefore, it has some limitations. Since it was a retrospective study, some very important data about the status of the patients were missing. In addition, the results and our comments cannot be generalized beyond the data of this study.

In conclusion, based on the similarities found in our study between lung cancer patients aged ≤55 years and >55 years with respect to prognosis, disease stage, histopathological type of tumor, treatment characteristics, and most of their clinical and demographic features, as well as the 2- and 3-fold increases in the incidence of lung cancer in this general age group every 5 years, suggest that screening tests be performed before the age of 55 years. However, whether screening for lung cancer at an earlier age will contribute to a decrease in the mortality rate or the number of cases diagnosed as lung cancer should be investigated in further prospective studies.

Ethics Committee Approval

The approval of the local Ethics Committee was obtained.

Informed Consent

Written patient approval was obtained for all interventional procedures.

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: E.T.P.; Design: C.D.; Data collection &/or processing: A.F., B.S.; Analysis and/or interpretation: A.F.; Literature search: C.D.; Writing: C.D.; Critical review: S.BS., S.S.C.

Conflict of Interest

None declared.

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Elli Beş Yaş Altı ve Üstü Yaş Gruplarında Akciğer Kanserlerinin Özellikleri Farklı Mıdır?

Amaç: Bu çalışmanın amacı 55 yaş ve altında akciğer kanseri tanısı alan olguların sosyodemografik, klinik, radyolojik, histopatolojik ve sağ kalım özeliklerini araştırmak.

Gereç ve Yöntem: Ocak 2014–Aralık 2016 tarihleri arasında kliniğimizde akciğer kanseri tanısı alan olguların dosyaları geriye dönük olarak incelendi. Bu olgular 55 yaş ve altı ile 55 yaş üstü olmak üzere iki gruba ayrıldı. Olguların klinik, radyolojik, demografik bulguları, kanserlerin histopatolojik tipleri, kanser evreleri, tedavi öyküleri, sağ kalım verileri birbirleri ile karşılaştırıldı.

Bulgular: Çalışmaya 85'i (%26.3) 55 yaş ve altında, 238'i (%73.7) 55 yaşın üstünde toplam 323 olgu alınmıştır. Her iki gruptaki akciğer kanserlerinin evreleri, kanserlerin histopatolojik tipleri, sigara öyküleri, cinsiyet özellikleri, onkolojik ve cerrahi tedavi özellikleri ve sağ kalım özellikleri benzerdi ($p>0.05$).

Sonuç: Akciğer kanserinde 55 yaş sınır seçildiğinde pek çok açıdan gruplar benzer bulunduğundan, 55 yaş altında ise beş yıllık alt gruplarda kanser olgu sayısında katlanarak artışlar olduğu için kanser için tarama yaş sınırı özellikle risk faktörü taşıyan olgularda 55 yaş altı gruplara da önerilebilir.

Anahtar Sözcükler: Akciğer kanseri; genç yaş; yaş.