World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(RESEARCH ARTICLE)

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Early detection of lung adenocarcinoma on CT scan

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World Journal of Biology Pharmacy and Health Sciences, 2024, 18(02), 251–259

Publication history: Received on 31 March 2024; revised on 10 May 2024; accepted on 13 May 2024

Article DOI: https://doi.org/10.30574/wjbphs.2024.18.2.0278

Abstract

Background: Lung cancer is the most common human malignancy and the principal cause of cancer-related death worldwide. Nowadays, adenocarcinoma is the most common histologic form, making up over half of all cases

Objective: To determine the early detection of lung adenocarcinoma on CT scan

Methods: A cross-sectional study was conducted at Jinnah Hospital Lahore Pakistan, which was performed between September 2020 to October 2023, The name of CT scan machine which was used in our study was Toshiba 64 slice and its slice thickness was 0.5 mm. Iodine based contrast is used. The total number of patients in our study were 150. The number of Male patients were 61 and female were 89. For all patients, we did diagnostic tests CT test . BMI parameter of every patients we took. We also took detailed history from the patients about the signs and symptoms. We did both the Lung window and the Mediastinal window. Data was tabulated and analyzed by SPSS version 26.

Result: In a current study total 150 patients were enrolled. The minimum age of patients were 43 years and the maximum age of the patients were 77 years. The mean age were 59.60±7.877 years.

The minimum BMI of patients were 26 (Kg/m2) and the maximum BMI were 34 (Kg/m2). The mean BMI were 28.55±3.740 (Kg/m2). The minimum size of the Lung Adenocarcinoma of patients were 0.3 cm and the maximum size of Lung Adenocarcinoma of patients were 2.8 cm. The mean size of the lung adenocarcinoma were 1.413±0.627 cm.

The stage of lung adenocarcinoma in the age group of 41-50 years 1A1 were 8, 1A2 were 7 and 1A3 were 2 . The total patients with age 41-50 years were 17. The stage of lung adenocarcinoma in the age group of 51-65 years 1A1 were 34, 1A2 were 47 and 1A3 were 19. The total patients with age 51-65 years were 99. The stage of lung adenocarcinoma in the age group of >66 years 1A1 were 6, 1A2 were 11 and 1A3 were 17. The total patients with age >66 years were 34.

P-value of stages of lung adenocarcinoma in age group was 0.03.

The stage of lung adenocarcinoma 1A1 in male patients were 17 and female were 31. The stage of lung adenocarcinoma 1A2 in male patients were 28 and female were 36. The stage of lung adenocarcinoma 1A3 in male patients were 16 and female were 22. Total male patients were 61 and females were 89.P-value of stages of lung adenocarcinoma in gender was 0.04.

Conclusion: We concluded that routine CT examination could detect more lung cancer at an early stage, especially adenocarcinoma, and detect patients with less aggressive features. The main advantage of the CT scan is, its non-invasive, painless diagnostic test as compared to biopsies. The chance of spreading of cancer cell is reduced. In our study females were more as compared to males.

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Keywords: Low-dose CT (LDCT); Tumour-node-metastasis (TNM); Computed Tomography (CT); Lung squamous-cell carcinoma (SCC); Positron emission tomography (PET).

1. Introduction

Lung cancer is the second most common cancer and the leading cause of cancer-related mortality worldwide, with an estimated 2.2 million new cases and 1.8 million deaths in 2020, thus imposing severe social and economic burdens [1]. Lung cancer can be classified as small cell lung cancer (SCCLC) or non-small cell lung cancer (NSCLC) based on the histological type. Adenocarcinoma and squamous cell carcinoma are the two primary histopathologic subtypes of nonsmall cell lung cancer (NSCLC), which makes up about 85% of all lung malignancies [2]. The prevalence and mortality of lung cancer in Pakistan are unknown due to the lack of a population-based cancer registry and the conflicting incidence figures [3]. Low-dose CT (LDCT) is currently the gold standard for screening for lung cancer. Furthermore, as compared to no screening, this particular screening offers an 85% selectivity and 99% specificity, according to a study (NELSON). Since lung cancer is frequently discovered after it has progressed to an advanced stage, patients with the condition frequently pass away from it. Treatment for lung cancer entails the use of the right medications, a thorough etiology, and efficient early detection [4]. Clinical intervention is more effective in the early stages of lung cancer due to the aggressive and varied biological aspects of the illness, as well as the frequent lack of symptoms prior to locally progressed or metastatic deposit [5]. The prognosis for advanced lung cancer patients is often poor because to the presence of compressing, invasive, high metastatic potential, or paraneoplastic syndromes [6]. Additionally, there may be a correlation between genetic instability and a larger tumor mutation burden in advanced lung cancer [7]. Life is saved by low-dose computed tomography screening (LDCT) for lung cancer.[8] Because of the latter, smokers are now believed to inhale more deeply, which increases the risk of carcinogen exposure to peripheral airway cells, the site of adenocarcinoma development [9]. demonstrated that employing low-dose Computed Tomography (CT) during three annual screening rounds of high-risk participants significantly lowers the fatality rates [10]. Because of these efforts, radiologists will need to review an excessive number of CT scan images. The difficulty of detecting nodules, even for skilled medical professionals, means that radiologists have an increasingly heavy workload as the quantity of CT scans to review rises [11]. Typically, the disease's symptoms—such as bloody coughing, chest pain, shortness of breath, exhaustion, weight loss, memory loss, bone fracture, joint pains, headache, neurological issue, bleeding, facial swelling, voice changes, and sputum color changes—are used to manually predict the presence of lung cancer [12, 13]. Radiation exposure and a high false-positive rate are two drawbacks of LDCT, though [14]. Lung cancer diagnosis and clinical evaluation. Low-dose spiral computed tomography (CT), magnetic resonance imaging, and X-rays are routine imaging tests used to detect and diagnose lung cancer early on [15,16]. As a result, the best strategies for increasing long-term survival are early screening and diagnosis, which are currently being aggressively investigated [17]. This study addresses workable methods for the early detection and diagnosis of lung cancer and provides an overview of the available data and screening methods. We concentrate on the evidence supporting low-dose computed tomography (LDCT) screening globally, screening admission requirements, and developments in differential diagnosis and treatment approaches for suspected cancers [18].

2. Materials and methods

A cross-sectional study was conducted at Jinnah Hospital Lahore Pakistan, which was performed between September 2020 to October 2023, The name of CT scan machine which was used in our study was Toshiba 64 slice and its slice thickness was 0.5 mm. Iodine-based contrast is used. The total number of patients in our study were 150. The number of Male patients were 61 and females were 89. For all patients, we did diagnostic tests CT test . BMI parameter of every patient we took. We also took detailed history from the patients about the signs and symptoms. We did both the Lung window and the Mediastinal window. Data was tabulated and analyzed by SPSS version 25.

3. Results

Table 1 Mean age, BMI and diameter of appendage of all the enrolled patients (n=150)

Variables	Minimum	Maximum	Mean±SD
Age (Years)	43	77	59.60±7.877
BMI	26	34	28.55±3.740
Size of Lung Adenocarcinoma (cm)	0.3	2.8	1.413±0.627

In a current study total 150 patients were enrolled. The minimum age of patients were 43 years and the maximum age of the patients were 77 years. The mean age were 59.60±7.877 years.

The minimum BMI of patients were 26 (Kg/m2) and the maximum BMI were 34 (Kg/m2). The mean BMI were 28.55±3.740 (Kg/m2). The minimum size of the Lung Adenocarcinoma of patients were 0.3 cm and the maximum size of Lung Adenocarcinoma of patients were 2.8 cm. The mean size of the lung adenocarcinoma were 1.413±0.627 cm.

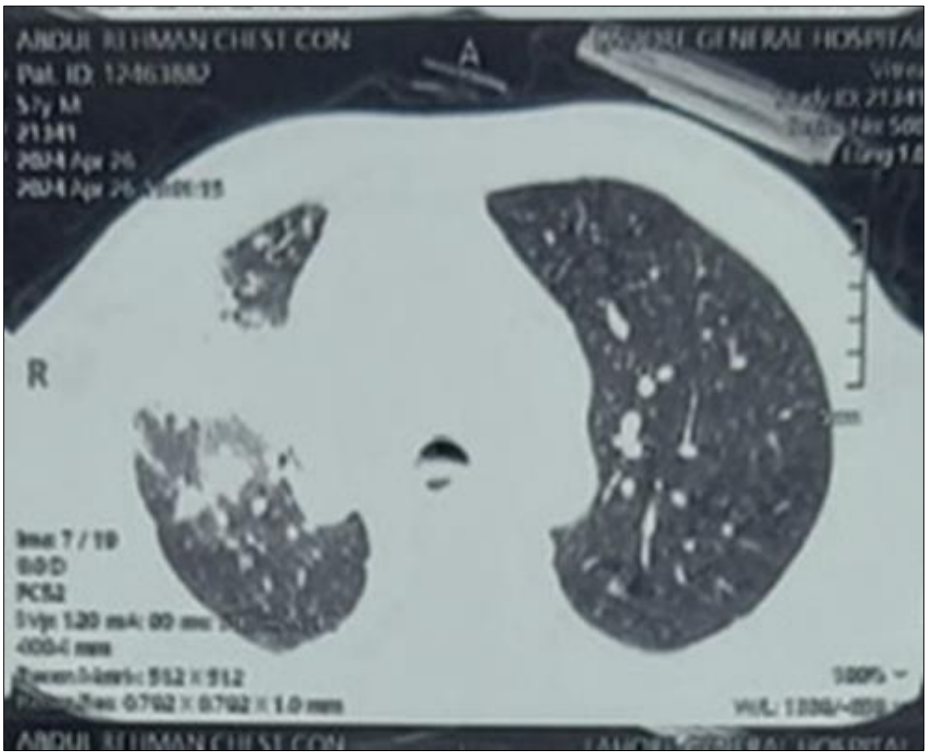

Figure 1 CECT Lung window (Right Lung Adenocarcinoma)

Table 2 Frequency and Percentage of Gender (n=150)

Gender	Frequency	Percent	Valid Percent
F	89	59.3	59.3
M	61	40.7	40.7
Total	150	100.0	100.0

In the above table 2, the frequency of Female patients were 89 and the percentage were 59.3. The cumulative percent were the same 59.3. The frequency of male patients were 61 and the percentage were 40.7. Total number of patients were 100 (100 %) in our study.

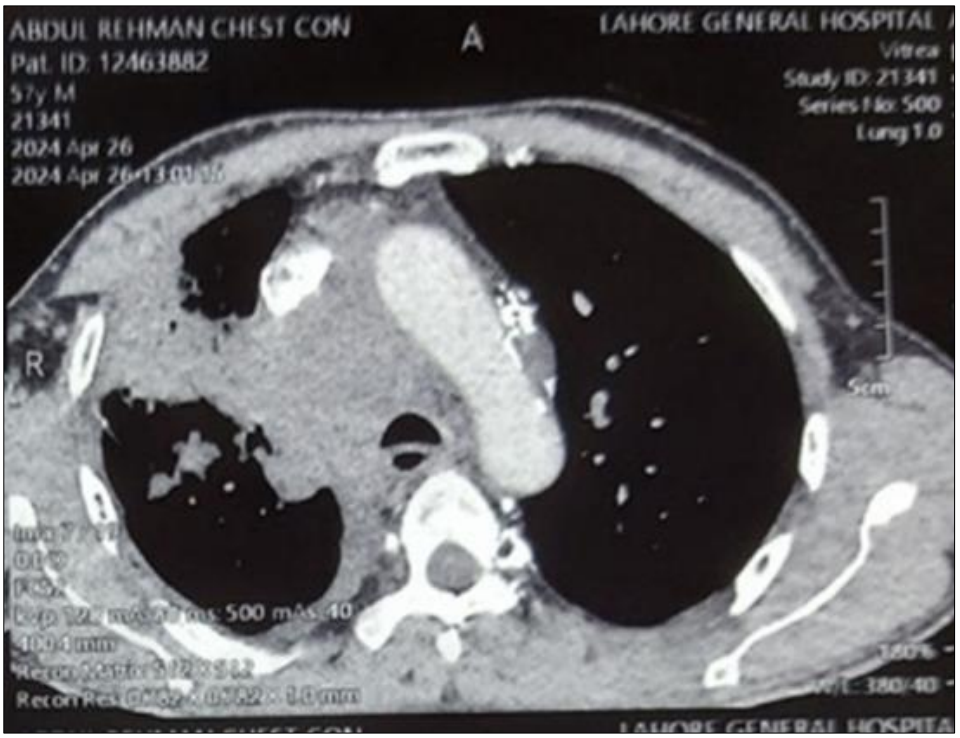

Figure 2 CECT Mediastinal Window

Table 3 Patient characteristics of enrolled patients (n=150)

Variables		
Gender	**Frequency**	**Percentage**
Male	60	40.8
Female	90	59.2
Age Group		
41-50 years	17	11.2
51-65 years	99	66.4
>66 years	34	22.4
Lung Laterality		
Right lung	93	62.5
Left lung	57	37.5
Stage of Lung Adenocarcinoma		
1A1	48	31.6
1A2	64	43.4
1A3	38	25.0
Smoking		
Yes	49	32.2
No	101	67.8

Cough		
Yes	99	66.4
No	51	33.6
Weight Loss		
Yes	92	61.8
No	58	38.2
Chest Pain		
Yes	3	1.0
NO	147	99.1
Cancer spread to Lymph nodes	0	0
Lung Lobe		
Upper Lobe	105	70.4
Middle Lobe	35	23.0
Lower Lobe	10	6.6

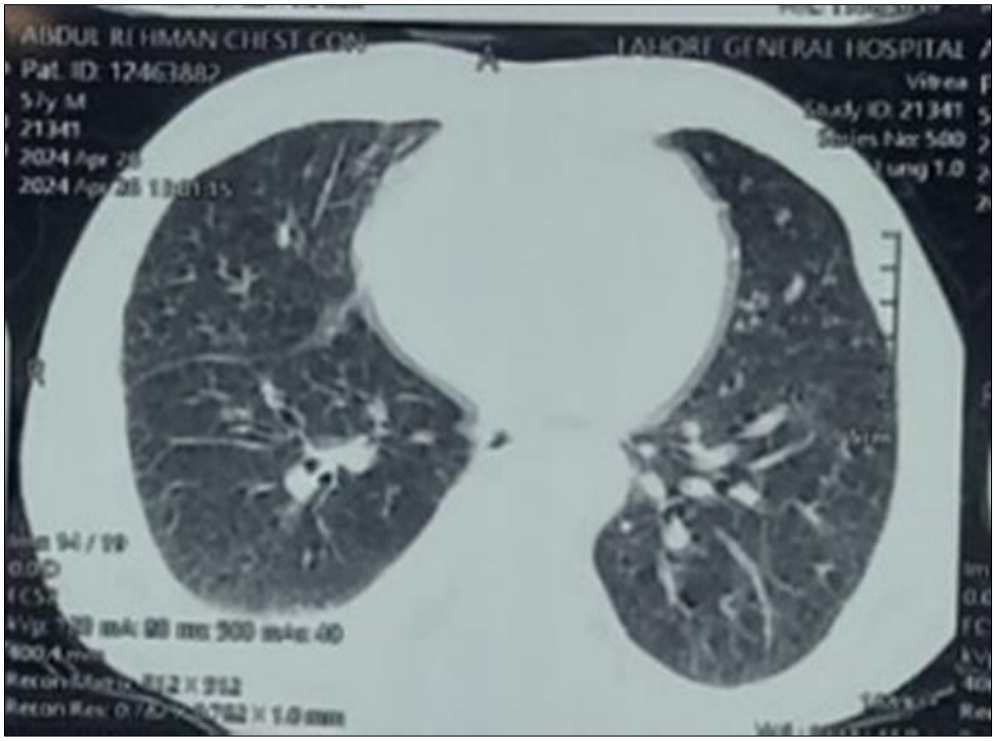

Figure 3 Lung adenocarcinoma in middle lobe (CECT)

The current study included a total of 150 patients with Lung adenocarcinoma whose characteristics are summarized in Table 3. The frequency of male patients in our study were 60 and their percentage was 40.8. The frequency of female patients in our study were 90 and their percentage was 59.2. The frequency of age group 41-50 years patients were 17 and their percentage was 11%. The frequency of age group 51-65 years patients were 99 and their percentage was 66 %. The frequency of age group >66 years patients were 34 and their percentage was 22%. The frequency of the right lung were 93 and their Percentage was 62%. The frequency of the left lung were 57 and their Percentage was 37%. The frequency of the Stage of lung adenocarcinoma in stage 1A1 were 48 and their percentage was 31%. The frequency of the Stage of lung adenocarcinoma in stage 1A2 were 64 and their percentage was 43%. The frequency of the Stage of

lung adenocarcinoma in stage 1A3 were 38 and their percentage was 25%. The frequency of smoker in our study were 49 and their frequency was 32%. The frequency of non-smoker in our study were 101 and their frequency was 67%. The frequency of cough were 99 and their percentage was 66%. The frequency of non cough patients were 51 and their percentage was 33%. The frequency of chest pain were present in 3 patients and its percentage were 1.0 % and chest pain were not present in 147 patients and its percentage were 99%. The frequency of weight loss were 92 and their percentage was 61%. The frequency of patients whose don't loss weight were 58 and their percentage was 38%. The frequency of cancer spread to nearby lymph node or other organs were 0.0 and their percentage was same 0.0%. The frequency of the upper lobe of the lung were 105 and their percentage was 70%. The frequency of the middle lobe of the lung were 35 and their percentage was 23%. The frequency of the lower lobe of the lung were 10 and their percentage was 6%.

Table 4 Stratification of Stage of Lung Adenocarcinoma on the basis of gender and age group (n=150)

	Stage of Lung Adenocarcinoma			**Total**	**P-value**
	1A1	**1A2**	**1A3**		
Age Groups					0.03
41-50 years	8	7	2	17	
51-65 years	34	47	19	99	
>66 years	6	11	17	34	
Gender					
Male	17	28	16	61	
Female	31	36	22	89	

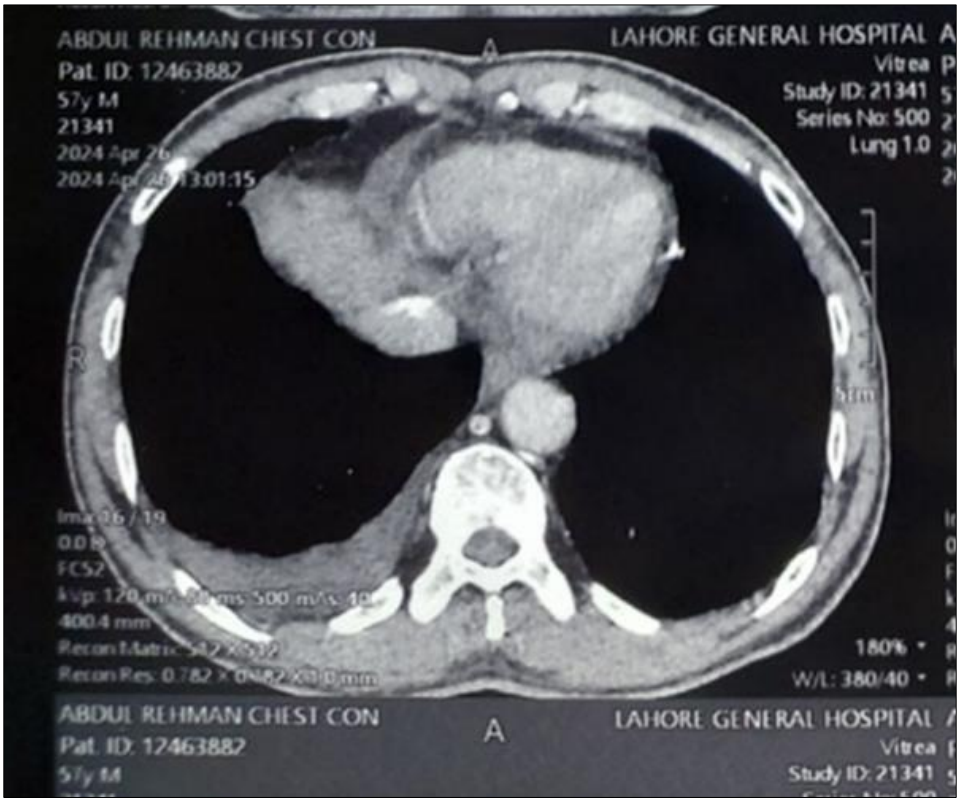

Figure 4 CECT Mediastinal Window

The stage of lung adenocarcinoma in the age group of 41-50 years 1A1 were 8, 1A2 were 7 and 1A3 were 2 . The total patients with age 41-50 years were 17. The stage of lung adenocarcinoma in the age group of 51-65 years 1A1 were 34,

1A2 were 47 and 1A3 were 19. The total patients with age 51-65 years were 99. The stage of lung adenocarcinoma in the age group of >66 years 1A1 were 6, 1A2 were 11 and 1A3 were 17. The total patients with age >66 years were 34.

P-value of stages of lung adenocarcinoma in age group was 0.03.

The stage of lung adenocarcinoma 1A1 in male patients were 17 and female were 31. The stage of lung adenocarcinoma 1A2 in male patients were 28 and female were 36. The stage of lung adenocarcinoma 1A3 in male patients were 16 and female were 22. Total male patients were 61 and females were 89.

P-value of stages of lung adenocarcinoma in gender was 0.04.

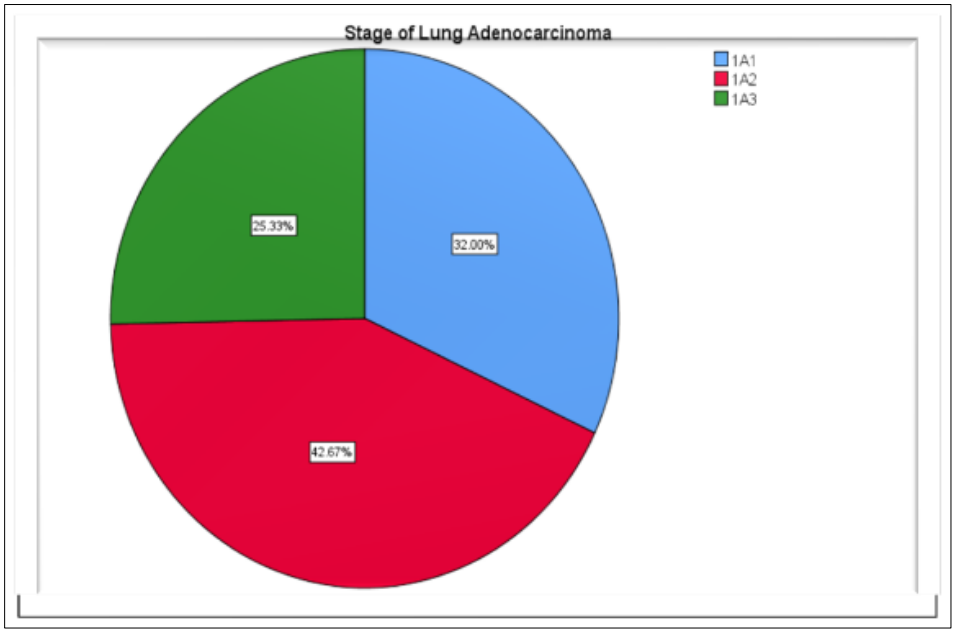

Figure 5 Pie chart of stages of Lung Adenocarcinoma. 1A1 were 32%, 1A2 were 42.67% and 1A3 were 25.33%

4. Discussion

In the NELSON trial, amount Notwithstanding screening intervals that grew over time, CT lung-cancer screening of high-risk former and current smokers, along with the introduction of growth-rate assessment as an imaging biomarker for indeterminate tests, led to low referral rates for additional assessments and significantly lower lung-cancer mortality (in both sexes) than no screening [19]. The male participants exhibited a high level of adherence to CT screening, with at least 87.6% of them undergoing three tests. According to the NELSON trial's mortality results, a significant shift toward lower-stage malignancies at the time of diagnosis and a higher frequency of eligibility for curative treatment (mostly surgery) have resulted from volume CT screening [20]. We anticipate that the results will be highly generalizable, as very slight variations were seen between participants and eligible nonrespondents[21].According to the results of the National Lung Cancer Screening Trial, using LDCT to screen for lung cancer was the most effective way to reduce the disease's fatality rate. However, our research indicates that routine CT screening, especially for adenocarcinoma, considerably lowers hospitalized patients' chance of developing early-stage lung cancer [22]. The high rate of CT screening adherence could be an indication of trial participants' strong conscientiousness [23.24]. Future advancements in individualized risk-based screening choices will likely lead to a more advantageous trade-off between the risks and advantages of CT lung cancer screening [25].

5. Conclusion

We concluded that routine CT examination could detect more lung cancer at an early stage, especially adenocarcinoma, and detect patients with less aggressive features. The chance of spreading of cancer cell is reduced. The main advantage of the CT scan is, its non-invasive, painless diagnostic test as compared to biopsies. In our study females were more as compared to males.

Compliance with ethical standards

Acknowledgment

I am very thankful to my supervisor Juan Yao.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This manuscript is in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of First Affiliated Hospital of Xinjiang Medical University.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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