

Challenges faced in Implementing LDCT in High-risk subjects for lung cancer screening in Indian scenario

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How to citation this article: Dr. Ramprasath, Dr. Meenakshi N, Dr. Sridhar R, Dr. Sai Archana P, “Challenges faced in Implementing LDCT in High-risk subjects for lung cancer screening in Indian scenario”, IJMACR-January - 2023, Volume – 6, Issue - 1, P. No. 667– 670.

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Type of Publication:Original Research Article

Conflicts of Interest: Nil

Abstract

Lung cancer is the leading cause of cancer mortality¹. However only 16% of lung cancer patients are diagnosed at early stages¹. LDCT is a sensitive tool for identification of early lung cancer and radiation exposure is 5-6 times less than that of a conventional CT. Early diagnosis will aid in optimal management leading to decrease in morbidity and mortality. The present study is undertaken to assess the challenges in implementing LDCT in Indian scenario. This is a prospective cross-sectional study, involving 73 High-risk participants divided into two Groups (Group 1 ≥ 30 pack years history of smoking or smoking index >600 and Group 2 ≥ 20 pack years history of smoking) as per NCCN

guidelines 2018. Eligible participants were evaluated with structured questionnaires and underwent LDCT screening and were followed up for a period of 18 months. The data collected was analysed with SPSS version 23.0. Among the subjects 43(58.9%) belong to GROUP I and 30(41.1%) to GROUPII. Current smokers were maximum among the GROUPII (50%) compared to 11.6% in GROUPI. Out of 73 participants 21% of the study population were not willing for LDCT due to affordability (81.1%), fear of unwanted diagnosis (9.5%) and fear of radiation exposure (9.5%). Lung cancer screening using LDCT has the potential to diagnose lung malignancy early, thereby lowering mortality rates and improving survival rates. But in our study of 18 months

duration, we could not identify anybody suffering from lung malignancy by LDCT. The smaller sample size and 28% of the High-risk population refusing for screening could be the cause for this result. An affordable effective screening program is still a challenge in developing countries due to cost and other reasons like fear of unwanted diagnosis, fear of radiation exposure and moreover frequent follow ups are needed to diagnose lung cancer at earliest which is a challenge for LDCT screening.

Keywords: low dose computed tomography, Lung cancer, screening, National comprehensive cancer network, Pack years.

Introduction

About 28% of all cancer-related fatalities are attributable to lung cancer, which is the main cause of cancer mortality¹ bestowing to the most recent estimate, 7% of people born today will develop lung cancer in their lifetime and 6% will pass away from it. According to GLOBOCAN 2012², China accounts for 35.78% of all newly detected cases of lung cancer and 37.56% of all lung cancer fatalities. Furthermore, according to projections, the disease would rank third in high-income nations and the sixth-leading cause of death globally by 2030². As a result, it is a significant public health issue. Despite the development of new therapeutic agents and technology, the 5-year survival rate for lung cancer, which ranges from 6% to 18%, has not increased.¹ However, just 16% of lung cancer patients receive an early diagnosis, compared to 61% of breast cancer patients and 91% of prostate cancer patients, thanks to advancements in early detection and treatment^{3,4}. Early diagnosis also increases the disease's 5-year survival probability to 67%. As a result, the mortality rates for breast and prostate cancers have fallen by 34% and 45%,

respectively, from their peaks.^{3,4} Accordingly, accurate early identification and treatment of lung cancer is a promising strategy for enhancing the prognosis of lung cancer. Radiation exposure during LDCT of the chest is relatively low. The routine use of minimally invasive procedures for diagnosis and staging as well as LDCT for screening remain uncommon. The NLST findings show that LDCT lung cancer screening significantly reduced mortality rates among at-risk people by 20%. In comparison to a conventional CT scan of the thorax, the radiation exposure associated with LDCT is 5–6 times lower.⁵

Materials and methods

A prospective cross-sectional study, among 73 High-risk participants as per NCCN guidelines attending a territory care hospital will be included. Inclusion criteria will be subjects aged between 55-74 years with ≥ 30 pack years history of smoking (or smoking index >600) who are current smokers or quit within the last 15 years (or) Individual aged 50-74 years with ≥ 20 pack years history of smoking who are current or former smokers with at least one additional risk factor, such as Occupational exposure to lung carcinogen.

All subjects with Chronic lung disease other than COPD (e.g. bronchiectasis, chronic pulmonary aspergillosis, treated TB), Presence of symptoms which lead to a suspicion of lung cancer (e.g. hemoptysis or unexplained weight loss [>5 kg] within the last 6 months), Conditions which may interfere interpretation of CT (e.g. metallic implants on chest wall, cardiac pacemakers), Treatment for any other cancer in the last 5 years, Any Active Pulmonary infection (for which treatment with antimicrobials is indicated), Patients who have underwent CT chest within the last 18 months will be excluded.

All High-risk subjects will be evaluated with structured questioners, clinical examination and subjects who are eligible and willing to give consent will be subjected to LDCT and followed up for a period of 18 months as per NCCN guidelines. Challenges encountered in implementation and follow up will be recorded and data will be analysed as per appropriate statistical method.

Results and discussion

In our study, 43 participants belong to GROUP I and the rest 30 participants (58.9%) belongs to GROUP II (41.1%). The mean age of GROUP I was 61.1 ± 7.1 years and mean age of GROUP II was 60.6 ± 6.8 years. Likewise, a study conducted by Corbie et al found the mean age of the study group as 64.1 years and high-risk group as 64.7 years and low risk group as 63.4 years.⁵ In our study more of the study participants were farmers (26%) followed by driver (9.6%) and house-keeping (8.2%).and we also found 46.6 % had Diabetic Mellitus and around 30% had systemic hypertension.

In our study, around 41 percentage of the participants had 20 pack years and 59 % of the participants had 30 pack years and the mean pack years was 25.8 ± 4.9 packs where as a study done by Corbie et al had Mean pack years of 36.7 packs among their study participants.⁶ In the present study, Current smokers were more in GROUP II (50%) compared to 11.6 % in GROUP I; (p value < 0.00) similarly, study done by Corbie et al had 52.8% of current smokers among high risk and 12.3% of current smokers among low-risk groups.⁶

Likewise in a study done by Ali N et al, 48.4% of their participants were current smokers⁷ while Simmons et al had 76 % of current smokers among their study participants.⁶ In our study, among GROUP I participants 88.4 % were former smoker while 50 % were former smoker among GROUP II; significant difference was

observed between the groups (p value < 0.00). Corbie et al in their study had 47.2% of former smokers among high risk and 87.7% among low-risk group.⁶ Whereas, study done by Ali et al found 51.5% as former smokers⁷. Among the study participants 32 (74.4%) among GROUP I and 20 (66.7%) among GROUP II showed willingness for LDCT; no significant difference was observed between the groups (p value < 0.60). In our study among the study participants who were unwilling for the LDCT, 81% gave the reason of lack of affordability for non-willingness for LDCT followed by fear of unwanted diagnosis (9.5 %) and fear of radiation exposure (9.5 %). Similar study conducted by Ali N et al came out with the following reasons practical barriers, emotional barriers, age, trial acceptability, low perceived risk and dislikes for non-willingness.⁷

In another study, the most commonly mentioned barriers were costs and the potential for false positive results. Some providers mentioned lack of understanding of the testing process and follow-ups for abnormal results.

The majority perceived that patient refusal and fear were also significant barriers to lung screening.⁶ A few participants mentioned feeling fear or worry when they thought about cancer screening, and indicated fear, particularly of a positive result, has prevented them from pursuing screening.

Although most participants were aware of a chest X-ray, the majority had never heard of LDCT screening and were unclear how it differed from a traditional chest X-ray. The most common concern among all participants was the fear of bad news (cancer diagnosis).

The majority had additional concerns about associated monetary costs, and questioned whether the screening would be covered by their health insurance.⁶

Conclusion

Incidence of lung cancer has significantly increased over the last three decades and has a worrisome increase in developing countries. Lung cancer screening using LDCT has the potential to help in early diagnosis, thereby lowering mortality rates and improving survival of the disease. The possibility of early detection via LDCT has created an unprecedented opportunity to reduce lung cancer mortality. Engaging both the medical community, and those at increased risk for lung cancer is paramount for successful implementation.

Educational materials should be made available to the patients for use in waiting rooms to increase awareness about LDCT screening and to stimulate physician-patient communication and shared decision-making.

An effective lung cancer screening program is still a challenge in developing countries despite a high incidence of lung cancer. LDCT could be a good choice for screening, however, high cost of LDCT, large population size to be screened make it difficult to implement such a program.

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