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The Routine Pre-Admission Chest Radiograph. How Relevant? An Audit of 7056 Radiographs from a Tertiary University in South-South Nigeria.

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ABSTRACT
The medical screening of new students into the Nigerian universities includes a routine chest radiograph which aims at identifying infectious processes mainly and other abnormalities. The important question -is how relevant is this practice?. This study aims at evaluating the relevance of the routine chest radiography as a part of the pre admission medical screening examination. A retrospective review of 7056 chest radiographs taken in the x ray unit of the Health centre of the University of Port Harcourt for the 2014/2015 session was done. All abnormalities noted were recorded. A total of 7056 radiographs were analysed. 74 (1.05%) had features of pulmonary tuberculosis, 39 (0.55%) had cardiomegaly and 30(0.43%) had Idiopathic scoliosis. 20(0.28%) had various congenital bony abnormalities such as cervical bifida 15(0.21%) while 1 (.014%) had dextrocardia. The use of routine chest radiographs as a part of the medical screening examination for new students in Nigerian universities has a low positive .It is recommended that the chest radiograph should be done when necessary after proper history and clinical examination has been carried out.

Key words: Undergraduates, Routine chest radiographs, tertiary university, south south Nigeria

INTRODUCTION
Although there is a high prevalence of pulmonary tuberculosis in Nigeria which was put at 338/100,000 in 2014 by the World Health Organization[1] it is imperative that the practice of routine chest radiographs being done in young asymptomatic individual be reviewed in accordance with good health practice as well as evidence based medical practice.

The pre admission chest radiographs are done mainly to exclude active tuberculosis, reactivation/previous tuberculosis, other infective and non-infective processes that could be detrimental to the individual and those around. It is done in asymptomatic individuals were no clinical /physical suspicion of a disease state is indicated[2]. Taking into consideration the radiation exposure of radiation dose 0.1 mSv or 10 days of background radiation exposure per chest radiograph[3] , inconvenience and cost incurred (~ $15.00 for each radiograph) in obtaining these radiographs the importance of the chest radiograph in routine pre admission medical examination should be analysed.

The aim of this study is to determine the prevalent radiological pulmonary findings indicative of pulmonary tuberculosis and other abnormal finding in the routine chest radiograph taken as a part of the pre-admission medical screening examination in to tertiary university in Port Harcourt, South south Nigeria.

MATERIALS AND METHODS
A retrospective review was conducted where 7056 pre-admission routine chest radiographs for the new students admitted for the 2013/2014 session into the University of Port Harcourt (Uniport) taken in the X ray unit of the University of Port Harcourt Health Centre were analysed . Uniport is a federal university with a national student enrolment base.

All the chest radiographs of students who presented for the pre admission medical examination and were asymptomatic without documented pathological indications for the examination at the time of presentation were evaluated.All chest radiographs were interpreted by Consultant Radiologists (the researchers) by direct visualization of hard copy image, checking for abnormalities in the lung fields, cardiac shadow , bony rib cage and soft tissue. . Abnormalities were noted and results analysed. Numbers, percentages and frequencies were analyzed using SPSS version 20.0.

A single conventional PA chest radiograph was

obtained using Phillip duo Diagnost x ray machine.

Significant abnormal findingswere taken as abnormalities that were indicative of Pulmonary tuberculosis[4] such as nodular/cystic/cavitory changes, pulmonary effusion . Other findings would need further investigations (laboratory or radiological) for diagnosis and treatment such has cardiomegaly and elevated hemidiapharm were include in significant abnormal findings.

Other abnormal findings which were considered insignificant because no further investigations are needed for diagnosis or treatment were congenial abnormities e.g. spinal bifid and other findings that were not indicative of an infectious condition.

RESULTS

54.3% of the students were males while 45.7% were females with most being in the 16-32 years age group. The mean age (years) at presentation was 21 ± 2.32 for females and 24± 3.32 for males. (Table 1) The youngest age obtained was 16 years while the oldest student was 47 years old. The median age was 26 years.6880 chest radiographs were normal with no abnormalities seen. This made up 97.5% of the total number of radiographs. Radiographs suggestive of PTB were seen in 74 radiographs which were 1.05% of the total radiographs. (Table 3, Figure 1&2.)

Other abnormal findings were seen in 1.45% of the radiographs.

Table 1: Biodata.

SEX	FREQUENCY	PERCENTAGE
FEMALE	3225	45.7%
MALE	3831	54.3%
Total	7056	100%
Age		
16-32years	6543	61.2%
> 32 years	513	34.7%
Total	**7056**	**100%**

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Table 2: Summary of Radiographic Findings.

	Frequency	Percentage %
Total number of radiographs analysed	7056	
Normal radiographs	6880	97.5%
Total number of Radiological abnormalities (Multiple observations taken into account)	183	
Number of radiographs with abnormalities	176	2.5%
Number of radiographs with significant abnormalities		
Features of PTB	74	1.05%
Cardiomegaly	39	
Elevated left hemidiaphragm	11	

Table 3: Frequency of abnormal radiographic findings

Abnormal Radiological Findings	Frequency	Percentage of abnormal radiological findings (n= 183)
Old /healed fractures of the left clavicle	1	0.55%
Dextrocardia	1	0.55%
Destroyed left lung	2	1.09%
Pleural effusion	6	3.28%
Left/ right cervical rib	7	3.83%
Left hemidiaphragmatic elevation	11	6.01%
Cervical spinal bifida	17	9.29%
Scoliosis	31	16.94%
Cardiomegaly	39	21.31%
Streaky/cystic / nodular / cavitory changes/calcific nodules	68	37.16%
Total	183	

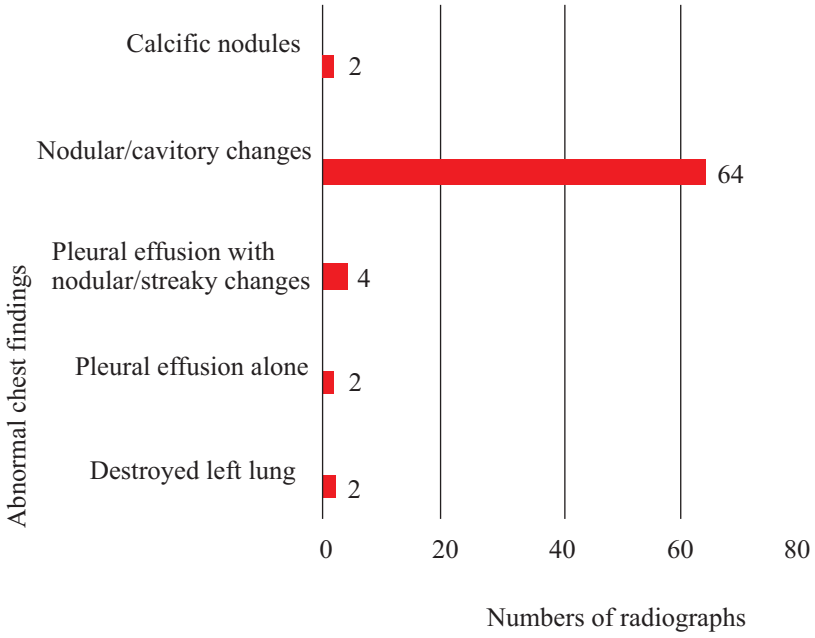

Figure 1: Number of radiographs (74) with features of PTB

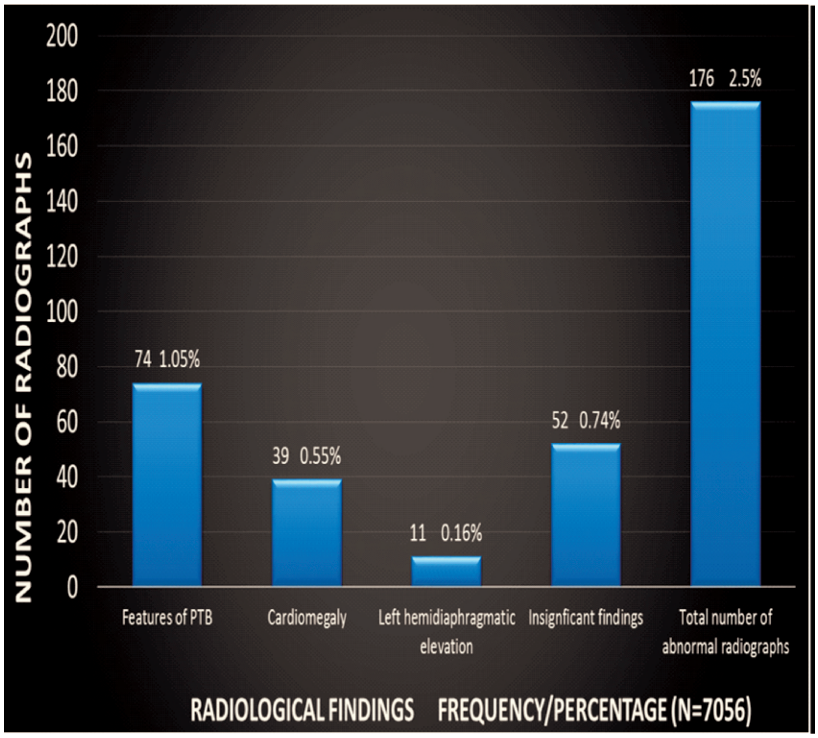

Figure 2: Number of radiographs with significant and insignificant findings

DISCUSSION

In many countries of the world the routine chest radiograph has been found to yield little in identifying potential pulmonary tuberculosis. Studies done by Akinola et al [5] in Lagos where 161 pre admission chest radiographs where reviewed showed only a 0.7% positive yield, this was similar to a study done in Benin[6], were the positive yield was also low. Other studies done in other parts of the world such as Cameroon[7], Saudi Arabia[8], West Indies[9] and Malaysia [10], showed the same. The American Thoracic Society and The WHO Committee on Tuberculosis[11] also agree that routine chest radiographs have a very small insignificant positive yield and should be discouraged as a routine screening that is chest x-rays should not be done as a routine screening method for tuberculosis. This study was in agreement with all previous studies as the prevalence of significant abnormality yield was very low.

It should be noted also that a normal radiograph does not always indicate a patient free of pulmonary tuberculosis as normal radiographic findings may be seen in up to 15% of patients with proved tuberculosis.[12,13]. This could mean that a small percentage of chest radiographs classified as normal may belong to individual with pulmonary tuberculosis supporting the view that other means of screening should be used to identify this dreaded disease.

Considering the high prevalence of PTB in Nigeria, could it be that healthy young individuals are the ones gaining admission into university thus explaining the low yield in this study?.Could it be that mostly students were from the middle and upper class of society and likely to be healthier? This is a topic for further research.

Other laboratory investigations could be employed to identify an individual with pulmonary tuberculosis. Adeyekun and, Egbagbe[14] in their study on the correlation of a positive mantoux test (purified protein derivative test) with chest radiological findings of PTB did not find any correlation thus concluded that sputum analysis, ESAT test and interferon were available should be done before a chest radiograph is requested for.

Cardiomegaly which is a general term used to describe any condition that results in an enlarged heart, was the second common radiological finding noted. Cardiomegaly could be due to various cardiac and non-cardiac causes such as hypertrophic cardiomyopathy and anaemia. The incidence of cardiomegaly was found to be high in other studies[15] presence in a young asymptomatic student population could be due to athletic heart syndrome where cardiomegaly is seen in athletics who exercise daily and have a resting bradycardia. A good history and examination by the primary examining physician could have detected this finding.

Dextrocardia is a congenital cardiac malrotation in which the heart is situated on the right side of the body (dextroversion) with the apex pointing to the right. It is

said to occur in 1 in 12,000 people[16]. A through clinical examination could identify this rare condition with the apex of the heart being on the right instead of the left.
Other conditions such as scoliosis, Cervical spinal bifida and cervical rib are non-lethal conditions.

CONCLUSION

The routine chest radiograph as part of the pre admission examination has a low positive yield thus should be done only when there is an indication for it.

LIMITATION

The students who had various abnormalities in their chest radiographs could not be followed up.

RECOMMENDATIONS

Chest radiographs should be done during the pre-admission medical screening after a thorough clinical examination, history and laboratory findings give a high index of suspicion for a disease process.

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