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CHEST X-RAY FINDINGS AMONG ADULT PATIENTS ATTENDING A PRIVATE DIAGNOSTIC CENTRE IN SOKOTO

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ABSTRACT

Background: Chest X-ray (CXR) is the most frequently requested imaging modality in radiology departments, serving as the primary investigation for common respiratory and cardiac complaints such as chest pain, cough, or difficulty breathing. It is also routinely employed for screening purposes, including pre-employment, annual medical exams, evaluation for metastatic disease, and pre/post-operative assessment.
Aim: This study aimed to determine the prevalent radiological findings in adult patients who underwent chest X-ray examinations at Medistop Clinical Diagnostic Centre.
Methods: A retrospective cross-sectional design was utilized. Data were collected from the chest X-ray request cards and corresponding radiologist reports of adult patients using a structured data capture sheet. Variables included age, sex, clinical history, and final radiological findings (conclusion). Data analysis was performed using Microsoft Excel, employing descriptive statistics (frequencies and percentages) for summarization.
Results: A total of 140 reports were reviewed. The patient cohort was predominantly male (55.71%) and ranged in age from under 20 to over 80 years. The most represented age group was 60-69 years (21.43%), followed by 30-39 years (17.86%). The most common overall finding was normal (30.71%). Among the pathological findings, Congestive Cardiac Failure (CCF) was the most prevalent, reported in 37 cases (26.43%). This was followed by pulmonary tuberculosis, which accounted for 24 reports (17.16%). Lobar pneumonic consolidation was the least common finding (0.71%). Notably, 85% of request cards included a clinical indication, and the study found a statistically significant association between the clinician's presumptive diagnosis and the final chest X-ray findings.
Conclusion: Normal findings were the single most prevalent outcome (30.71%). The most common abnormal finding identified in adult patients was Congestive Cardiac Failure (26.4%), highlighting the significant burden of cardiac-related pathology in the patient population studied. This underscores the CXR's vital role in initial diagnosis and screening for both respiratory and non-respiratory conditions.
Keywords: Evaluation, Findings, Adults, Chest x-ray, CCF.

INTRODUCTION

Chest x ray is the most common radiographic investigation that is performed in the radiology department. It is the first radiologic imaging modality that is requested for the patients that present with complaints of chest pain, cough or difficulty in breathing [1]. Chest x-rays are also used for screening purposes in cases of pre-employment, annual medical examination, screening for metastatic chest disease, also for pre and postoperative evaluation of the chest
Chest radiographs are important for characterizing pulmonary as well as cardio thoracic diseases. It allows for visualization of the chest wall, hilum, great vessels, borders of the heart, and subcutaneous soft tissues of the chest as well as the diaphragm [2, 3].

The accurate interpretation of the chest radiograph can be a bit challenging, especially when there is superimposition of normal anatomic structures with varying radiographic densities. so a good knowledge of the radiologic anatomy of the frontal and lateral chest radiographs are important as obscuration of the normal visualized structures can indicate an abnormality or a disease process [4]. Prompt identification and characterization of abnormal chest radiographic findings aids early diagnosis and possibly guide physicians on follow up imaging modalities and clinical evaluation [2]. It has been reported in the United States of America that about 52 million chest radiographs are usually done annually. Furthermore, routinely done chest x-rays add about $ 1.5 billion to the cost of health care [5]. According to the international commission on radiation and unit measurement, chest x-rays account for 25% of all x-ray examinations performed. Computed Tomography scan and Magnetic Resonance Imaging can be used to evaluate the chest. However, they are expensive and not readily available in developing countries. Chest x-ray has the advantage of being readily available, fast, non-invasive and associated with a low radiation dose compared to other imaging modalities that use ionizing radiation [6]. The effective radiation dose from one chest x-ray is 0.1 mSv for a frontal chest x-ray which is equivalent to ten days of exposure to natural background radiation. There is no safe radiation dose, however the risk is low compared to its benefits [7]. Chest x-ray is the most frequent and the most common adult radiographic examination carried out in most radiology department, a literature cited [8] on a chest x-ray research findings among adult patients attending Usmanu Danfodiyo University Teaching Hospital Sokoto north western Nigeria reported that normal examination was the most common finding and hypertensive heart failure is the most common pathologic finding. Patient turn out in the study centre Medi Stop Clinical Diagnostic Centre is high and most of the patients are from rural areas but there is no any evidence-based research documented on plain chest x-ray findings of adult patients attending the centre to the best of our knowledge. Our study aims to report the most common chest x-ray findings and the association between the clinician's presumptive diagnosis and the findings among adult patients attending the Centre.

MATERIALS AND METHODS:

Study Design

A retrospective cross-sectional.

Study Population

This research covered all existing/reported documents of adult patients that underwent chest x-ray from June 2022 to November 2022

Study Area

Medistop Clinical Diagnostic center Sokoto which was commissioned in March 2012 and is located in Sokoto metropolis. It is the largest private clinical diagnostic centre. Some of their services include X-ray which uses the digital x-ray equipment, ultrasound, echocardiography, endosurgery, colonoscopy, contrast medium studies and laboratory services. All staff working therein are qualified radiographers with more than ten years working/practical experience and also more than ten consultant radiologists that report the radiographs.

The average patient load of the centre is over fifty patients per day.

Inclusion Criteria

All existing/reported documents of chest x-ray findings of adult patients at Medistop Clinical Diagnostic Center Sokoto within the study period.

Exclusion Criteria

All existing but unreported radiographs was excluded from this study.

Instrument of Data Collection

Data capture sheet with rows and columns containing serial number, x--ray number, sex, age, indication and findings was used for data collection.

Method of Data Collection

Using the data extraction sheet as the instrument for data collection, all existing reported documents of adult chest radiographs were retrieved from the archives of Medistop Clinical Diagnostic center Sokoto. The classification of the radiographs was according to age.

Ethical Consideration

The ethical clearance to conduct this study was obtained from the ethical clearance committee of the centre with clearance certificate number MCDC/MAC/SUB/12A/P-3/VI/3190

Source of Data

Secondary.

Method of Data Analysis

IBM SPSS version 25, descriptive statistics and Microsoft Excel was used in the analysis of data. The Results were presented using frequency distribution tables and percentages. Chi-square was used for comparative analysis to determine association. P-value <0.05 was considered statistically significant.

RESULTS

A total of 140 adult chest x-rays were included in this study of 78 (55.71%) were male and 62 (44.29%) are female as shown in table 1.

Table 1: Sex distribution of the patients

Gender	Number	Percentage
Male	78	55.71%
Female	62	44.29%
Total	140	100.00%

Age distribution of patients as shown in table 2 revealed that radiographs of patients used in the study shows age range of 60-69 years have the highest number of radiographs with 30 (21.43%) radiographs while age range of <20 had the lowest number of radiographs with 5 (3.57%) radiographs.

Table 2 Age distribution of patients showing the age group 60 – 69 as the age group with the highest number of chest radiographs

Age range	Number	percentage
<20	5	3.57%
20-29	21	15%
30-39	25	17.86%
40-49	24	17.14%
50-59	17	12.14%
60-69	30	21.43%
70-79	12	8.57%
>80	6	4.29%
Total	140	100%

Table 3 below shows radiographic findings. From the 140 adult chest radiographs evaluated, congestive cardiac failure was the most common finding in 37 (26.43%) radiographs followed by pulmonary tuberculosis in 24 (17.16%) radiographs while lobar pneumonic consolidation being the least finding in 1 (0.71%) radiograph.

Table 3 Findings on radiographs evaluated showing lobar pneumonic consolidation as the least pathologic finding.

Radiographic Findings	Number of findings	Percentage
Normal	43	30.71%
HHDx	10	7.14%
PTB	24	17.16%
Cardiomegaly	12	8.57%
Pleural effusion	5	3.57%
Metastasis	3	2.14%
lobarpneumo consolidation	1	0.71%
Bronchopneumonia	3	2.14%
CCF	37	26.43%
Aortic Unfolding	7	5%

Multiple findings were considered
PTB –Pulmonary Tuberculosis
CCF-Congestive cardiac failure
HHDX-Hypertensive heart disease

Out of the 140 chest radiographs studied normal examination was higher in male than female while pathologic findings of CCF, cardiomegaly, hypertensive heart disease and metastasis are higher in female than male as shown in figure 1

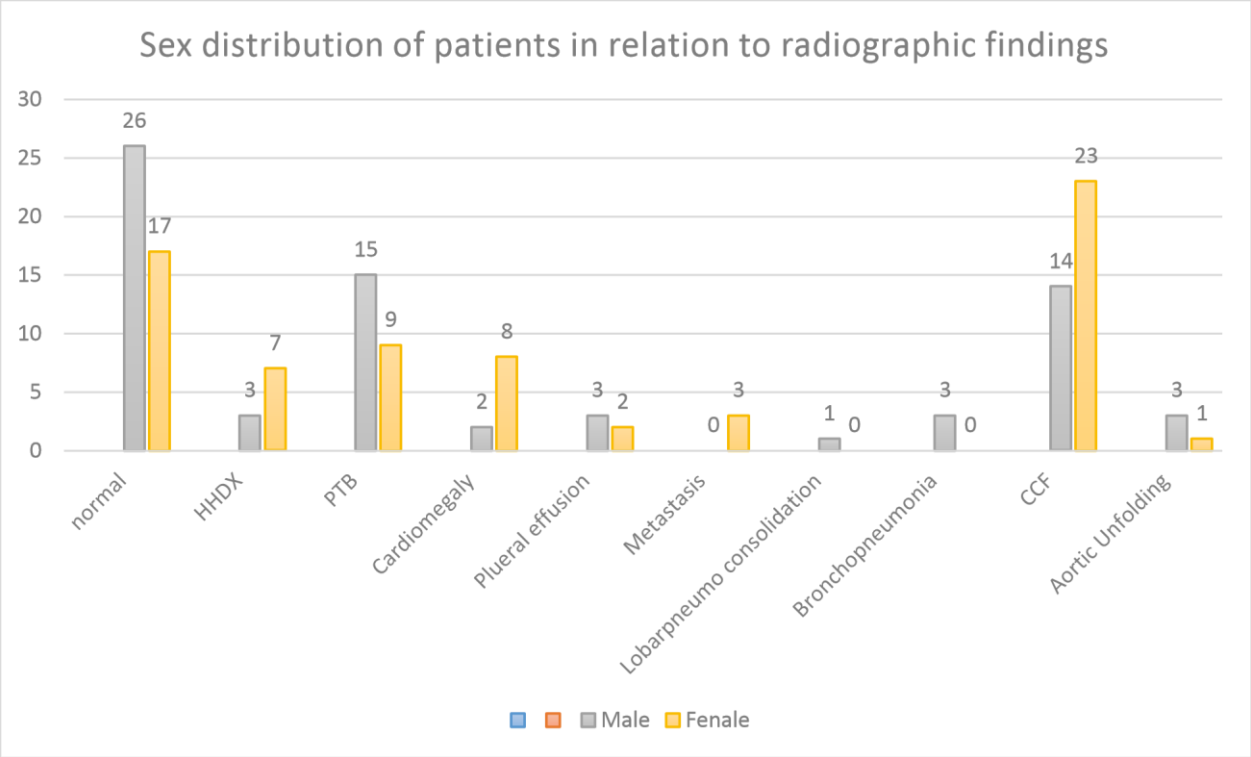

Figure 1:Sex distribution of adult patients in relation to the findings showing normal examinations are higher in male

Table 4 Age distribution of patients in relation to the findings showing normal examination higher among the age group 30 – 39.

Findings/Age groups	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Normal	2	8	15	9	5	1	2	0
HHDX	0	0	0	3	3	9	0	1
PTB	2	4	6	3	5	0	3	0
Cardiomegaly	1	3	2	2	0	3	1	2
Pleural effusion	1	1	0	0	0	1	1	0
Metastasis	0	0	0	0	0	1	0	0
Bronchopneumonia	0	0	0	0	1	0	1	0
CCF	0	3	3	8	2	10	4	2
Aortic unfolding	0	0	0	0	0	4	0	0
Lobar pneumonic consolidation	0	0	0	0	0	2	0	0

Multiple findings were considered

The table 5 below shows the association between the clinician's presumptive diagnosis and chest x-ray findings.it shows that there is statistically significant association (p:0.000) between the clinician's presumptive diagnosis and chest x-ray findings.

Table 5 Association between clinicians' diagnosis and chest x-ray findings

CLINICAL FINDINGS	RADIOLOGICAL FINDINGS		
	NO	YES	STATISTICS
HHDX	17(63.0%)	10(37.0%)	
PTB	6(20.0%)	24(80.0%)	P= 0.000
CARDIOMEGALY	2(33.39%)	4(66.7%)	
CCF	10(35.7%)	18(64.3%)	X^2= 123.79
PLEURAL EFFUSION	2(40.0%)	3(60.0%)	(Fishers exact test)

DISCUSSION

This study was conducted to reveal the prevalence of abnormalities in adult chest x-rays, distribution of the abnormalities base on age group and gender and in a private diagnostic center in Sokoto North western Nigeria.

Of all the 140 adult chest images studied males were higher with 55.71% and females with 44.29%, which is similar to the study conducted at a Nigerian teaching hospital in Sokoto (8)which reported similar sex distribution of males higher with 54% than females with 46%. In the same vein our study is also similar to the study conducted in Philippines [9] which reported that from the 144 adult patients evaluated 93 are males and 51 females. However, our study is contrary to the study conducted in Poland [10] which reported that majority of patients were women accounting for 72.0% while the remaining 28% are male.

In this study patients are classified into eight groups,<20,20-29,30-39,40-49,50-59,60-69,70-79 and >80 of which 60-69 has the highest frequency with 21.43% followed by 30-39 with 17.86% and the least of all is <20 with 3.57%, which is contrary to the study conducted in Lagos [11] which reported 36-45 as the most common age group.

Our study reported 30.71% of the study population have normal findings and 69.29% have pathologic findings, the normal findings reported in this study is lower compared with the study conducted in Lagos – Nigeria [5] and Awka Anambra state – Nigeria [12] which reported 64.9% and 60.36% of normal findings respectively. A study conducted in Poland [10] is contrary to ours in which normal findings were higher with 84.9% and abnormal findings with 15.1%.

Our study reported pleural effusion with 3.57%, higher in male which is lower than the percentage presented by the study conducted in Indonesia [13],which reported pleural effusion of 34.3%.

Our study reported the association between the clinician's presumptive diagnosis and chest x-ray findings.it shows that there is statistically significant association (p:0.000) between the clinician's presumptive diagnosis and chest x-ray findings which is similar to the study conducted in Malawi [14] which reported that there was a high concordance of cardiomegaly classification between the physician and the computer-assisted chest radiographs.

This study reported congestive cardiac failure (CCF) as the highest pathologic finding with 26.43% which is contrary to the study conducted in New York which reported hypertensive heart disease as the most common pathology with 16% [15]. In the same vein our study which

reported congestive cardiac failure as the major abnormal finding is contrary to the study conducted in South Korea which reported pneumonia as the major abnormal finding [16]. A study conducted in Malawi [17] which reported the most common findings detected on CXRs studied was consolidation seen in 218 patients (81.3%) which is contrary to this study that reported congestive cardiac failure as the most common.

CONCLUSION:

In conclusion, out of the 140 adult chest x-ray reports reviewed, males (55.71%) were found to be higher than females (44.29%). Individuals with the age range 60-69 has the highest number of chest x-rays in the study. Chest x-ray findings in adult in Medistop clinical diagnostic centre revealed in this study are normal examination, Hypertensive heart disease, pulmonary tuberculosis, cardiomegaly, pleural effusion, metastasis, bronchopneumonia, congestive cardiac failure, aortic unfolding and lobar pneumoconsolidation. Also 15% of patients present with no indication written on the request cards and 85% with indication on the request card. The evaluation of findings of chest x-ray in Medi-Stop clinical diagnostic centre shows that the most prevalent abnormal findings was congestive cardiac failure (26.43%) while the least is lobar pneumonic consolidation (0.71%).

The most prevalent gender is the male which account for (55.71%) and the female account (44.29%). Age range 60-69 is the most prevalent and <20 is the least with (21.43%) and (3.57%). Also 15% of patients present with no indication written on the request cards and (85%) with indication on the request card with Pulmonary tuberculosis been the most prevalent indication and lobarpneumoconsolidation is the least. The study also found out that there is statistically significant association($p=0.000$) between the clinician's diagnosis and chest x-ray findings. One of the limitations of the study was that fifteen percent (15%) of the patients presented have no indication written on the request cards and as such the 15% of patients we couldn't achieve the association between the indication/clinician's presumptive diagnosis and the radiologist report.

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Conflict of interest

The Authors acknowledge the management and entire staff of the study area.

REFERENCES

1. Sawada H, Kudoh R, Yokoyama A, Hagiwara A, Hiramatsu K, Kadota J-i, et al. Chest X-Ray Features in 130 Patients with Bronchiectasis. Diseases. 2024;12(12):323.
2. Klein JS, Rosado-de-Christenson ML. A systematic approach to chest radiographic analysis. Diseases of the Chest, Breast, Heart and Vessels 2019-2022: Diagnostic and Interventional Imaging. 2019:1-16.
3. Miger K, Overgaard Olesen AS, Grand J, Fabricius-Bjerre A, Sajadieh A, Høst N, et al. Computed tomography or chest X-ray to assess pulmonary congestion in dyspnoeic patients with acute heart failure. ESC Heart Failure. 2024;11(2):1163-73.

4. Pelinski Y, Guindo A, Kassasseya C, Diallo D, Arlet JB, Dessap AM, et al. Is chest X-ray still relevant for acute chest syndrome diagnosis? Health Science Reports. 2024;7(5).
5. Akinola RA, Balogun T, Adeniyi A, Onakoya J, Fabeyibi I. Spectrum Of Chest X-Ray Findings Among Human Immunodeficiency Virus Positive Individuals In A Nigerian Tertiary Hospital. SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS. 2013;10(2):27-34.
6. Lahham A, Issa A, ALMasri H. Patient radiation dose from chest X-ray examinations in the west bank—Palestine. Radiation protection dosimetry. 2018;178(3):298-303.
7. Adelodun M, Anyanwu E. Comprehensive risk management and safety strategies in radiation use in medical imaging. Int J Front Med Surg Res. 2024;6.
8. Mohammed A, Ismail S, Sadiq A, Abubakar U, Gurama A, Yusuf I, et al. Chest X-Ray Findings Among Adult Patients Attending Usmanu Danfodiyo University Teaching Hospital Sokoto North-western Nigeria. Annals of Clinical and Experimental Medicine. 2020;12(1):144-7.
9. Santos JA, Cañal JPA. Chest x-ray findings and temporal changes among adult patients with COVID-19 admitted in a tertiary referral center. European Journal of Radiology Open. 2021;8:100385.
10. Truba O, Dabrowska M, Grabczak EM, Bialek-Gosk K, Rybka-Fraczek A, Klimowicz K, et al. Diagnostic yield of chest radiograph in management of adults with difficult-to-treat chronic cough—retrospective study. Journal of Thoracic Disease. 2023;15(2):928.
11. Chima SA, Aminat FO, Abiodun PO, Nicholas KN, Zaccheus IA, Temitope AO. Plain X-ray findings among chest trauma patients in Lagos. West African Journal Of Radiology. 2016;23(1):16-9.
12. Aronu ME, Okafor CO, Udobi SI. Patterns of Plain Radiographic Findings among Patients with Chest Trauma in Awka, Nigeria. Int J Med Res Health Sci. 2018;7:123-8.
13. Sakti BT, Rosalina R, Pradipta J. Characteristics of Chest X-Ray in Patients with Cancer at the Dharmais Cancer Hospital Emergency Room during the COVID-19 Pandemic. Indonesian Journal of Cancer. 2021;15(4):195-8.
14. Twabi HH, Semphere R, Mukoka M, Chiume L, Nzawa R, Feasey HR, et al. Pattern of abnormalities amongst chest X-rays of adults undergoing computer-assisted digital chest X-ray screening for tuberculosis in Peri-Urban Blantyre, Malawi: A cross-sectional study. Tropical Medicine & International Health. 2021;26(11):1427-37.

15. Toussie D, Voutsinas N, Finkelstein M, Cedillo MA, Manna S, Maron SZ, et al. Clinical and chest radiography features determine patient outcomes in young and middle-aged adults with COVID-19. Radiology. 2020;297(1):E197-E206.
16. An J, Lee J-H, Yoo Y, Kwon H-S, Lee J-S, Lee SW, et al. Chest computed tomography scan utilization and diagnostic outcomes in chronic cough patients with normal chest X-rays: analysis of routinely collected data of a tertiary academic hospital. Journal of Thoracic Disease. 2023;15(4):2324.
17. Yasin R, Gouda W. Chest X-ray findings monitoring COVID-19 disease course and severity. Egyptian Journal of Radiology and Nuclear Medicine. 2020;51:1-18.