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Chest radiography: Awareness and perception as a medical imaging procedure among patients in Central Hospital Warri, Delta State in Nigeria

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Abstract
Introduction: The Medical field has benefited immensely from the discovery of X-ray as an important diagnostic tool due to its non-invasive and easily accessible feature. This study is aimed at evaluating awareness and the perception of Chest radiography as a medical imaging procedure among patients in Central Hospital Warri, Delta State in Nigeria.
Material and Methods: The descriptive cross-sectional study design was employed, with respondents within the ages of 21-70 years. Data were obtained via questionnaire which were later computed and arranged into data sheets. Prior to data collection ethical consent was obtained from the Research and Ethics Committee, Human Anatomy and Cell Biology Department, Delta State University, Abraka in Nigeria. Data obtained were analysed with the aid of Statistical Package for Social Sciences version 25, with chi-square employed as a statistical tool for inferential statistics.
Results: Findings from the study showed Hospital (28, 25.7%) been the most predominant sources of recommendation for an X-ray with health awareness been the least (13, 11.9%). Results also showed educational status having a significance with p-value of 0.030, 0.008 when compared against response to the questions on X-ray; 'Have you heard of X-ray? 'Do you think a chest X-ray is harmful?' respectively.
Conclusion: The Hospital was the most predominant source of recommendation as regards awareness and also educational status had a significant relationship when compared against response to questions on X-ray.

Keywords: chest x-ray, awareness, perception, medical imaging

Introduction

The concept of radiology in medical innovations has played a pivotal role since its conception in 1865 by a German physicist Wilhelm Roentgen [1]. Over the years the use of radiation has been of benefit to other fields of study such as physics with the general purpose of radiation been the investigation and appreciation of internal structure via exposure to ionizing radiations [2]. Radiology has proven important in the medical world with non-invasive, easily accessible, cheap and effective diagnostic tool for internal structures [3]. For example, cases of lung diseases, bone fractures alongside blood vessel lesions via the use of medium such as barium [4].

X-ray as a radiological diagnostic tool is the oldest non-invasive setup which has proven helpful to physicians in treatment of medical conditions with its means of operation attributed to exposure of examined body surface to an ionizing radiation which possess sufficient energy in splitting electrons resulting in the production of free radicals which are unstable and highly reactive chemically of low dose to avoid the development of other health challenges such as cancer [4]. As a result of risks associated with this diagnostic tool, pregnant women are advised not to be exposed to such radiations which is detrimental to the foetus which could lead to the death of the foetus.

According to Brenner and Hall, 1.5% - 2% of cancer cases in United States have been attributed to incidence of over-exposure to radiation particles during a body examination [5].

The uses of X-ray have increased rapidly and extensively due to its implantation in therapeutic practices; due to its extensive use, proper knowledge on this diagnostic tool is required with the major issue on X-ray been its level of exposure in course of its therapeutic use [6]. Vahdat *et al.*, explained that sufficient level of awareness on the topic of X-ray would provide the patients a sense of calm and a cogent reason behind the use of the diagnostic imaging technique been used [7]. Study on X-ray have been conducted conducted by Subramaniyan and John on the awareness of radiation employed in the use of X-ray among radiology residents and technologists [8]. From a certain study, a significant level of connotation of dosage and cancer risk examination on the radiologist, and technologist exist; part of which pose a risk to the health of both radiology workers and patients [9].

Also, in a study conducted by Lorenzo *et al.*, it was observed that on careful evaluation of awareness on radiation protection among medical students, radiology students alongside radiology residents there was a limited level of awareness on the concept of radiation protection with the insufficiency in awareness creating a sense of concern for both radiologists and patients [10].

This study is aimed at evaluating the awareness and knowledge level of X-ray by Patients in Central Hospital, Warri, in Nigeria as well as its relationship with observed socio-economic factors.

Materials and Methods

The descriptive cross-sectional study design was employed alongside random sampling technique. Questionnaires pertaining to questions on chest x-ray awareness and perception were used in data collection with research consent obtained from the Research Ethics Committee of Human Anatomy and Cell Biology Department, Delta State University, Abraka. Respondents were patients at the Central Hospital in Warri, Delta State, Nigeria; they were aged twenty-one (21) – sixty (60) years with their consent obtained prior to the study. Results obtained were analysed with the aid of Statistical Package for Social Science version 25, with statistical tool such as chi-square been employed, data analysed were presented in tables.

Results

Table 1: Sociodemographic variable in the studied population

Sociodemographic factors		Frequency (%)
Gender	Male	194 (50.5)
	Female	190 (49.5)
Age groups	21-30years	102 (26.6)
	31-40years	100 (26.0)
	41-50years	88 (22.9)
	51-60years	94 (24.5)
Ethnicity/ Tribe	Urhobo	104 (27.1)
	Isoko	88 (22.9)
	Ijaw	84 (21.9)
	Iteskiri	108 (28.1)
Occupation	Student	104 (27.1)
	Trader	91 (23.7)
	Tailor	86 (22.4)
	Government Employee	103 (26.8)
Educational Status	Primary school leaving certificat holder	72 (10.4)
	SSCE holder	134 (34.9)
	Bachelor's degree holder	109 (28.4)
	Master's degree holder	61 (15.9)
	PhD holder	8 (2.1)
Total		384 (100.0)

Table 2: Distribution of response as regards X-ray from the studied population

Questions	Responses	Frequency (%)
Have you heard about X-ray?	Yes	109 (28.4)
	No	139 (36.2)
	Not sure	136 (35.4)
Have you done a chest X-ray before?	Yes	137 (35.7)
	No	128 (33.3)
	Not sure	119 (31.0)
Do you think chest X-ray is necessary?	Yes	139 (36.2)
	No	127 (33.1)
	Not sure	118 (30.7)
Do you think chest X-ray is a harmful procedure	Yes	123 (32.0)
	No	122 (31.8)
	Not sure	139 (36.2)
Total		384 (100.0)

Table 3: Response distribution of respondents who answered yes to the question (Have you heard about X-ray?)

Responses	Frequency (%)
School	22 (20.2)
News	13 (11.9)
Hospital	28 (25.7)
Internet	17 (15.6)
Family / friends	16 (14.7)
Health awareness programmes	13 (11.9)
Total	109 (100.0)

Table 4: Response distribution of respondents who answered yes to the question (Who recommended the chest X-ray carried out?)

Responses	Frequency (%)
Doctor	23 (16.8)
Nurse	25 (18.2)
Radiographer	25 (18.2)
Self	37 (27.0)
Non-medical personnel	27 (19.7)
Total	137 (100.0)

Table 5: Response distribution of respondents who answered yes to the question: 'Do you think a chest X-ray is necessary?'

Responses	Frequency (%)
It was recommended medically.	22 (15.8)
It is a standard medical procedure	24 (17.3)
Necessary for general body examination	24 (17.3)
Helpful in identification of fractures	27 (19.4)
Helpful in identification of lung disease and conditions	15 (10.8)
Used in the identification of abnormalities such as tumours and cyst.	27 (19.4)
Total	139 (100.0)

Table 6: Response distribution of respondents who answered yes to the question: 'Do you think a chest X-ray is harmful?'

Responses	Frequency (%)
If used too frequently can led to cancer	32 (26.0)
Can led to malformation in babies.	29 (23.6)
Due to its harmful radiation emission radiologists are at risk	23 (18.7)
Can led to detoriation of health if overexposed to its radiation	39 (31.7)
Total	123 (100.0)

Table 7: Chi-square test of association between sociodemographic factors and the question: 'Have you heard about X-ray?'

Sociodemographic factors		Frequency (%)			Chi-square	df	P-value
		Yes	No	Not sure			
Gender	Male	47 (12.2)	79 (20.6)	68 (17.7)	4.620	2	0.099
	Female	62 (16.1)	60 (15.6)	68 (17.7)			
Age groups	21-30years	28 (7.3)	34 (8.9)	40 (10.4)	11.285	6	0.080
	31-40years	37 (9.6)	32 (8.3)	31 (8.1)			
	41-50years	28 (7.3)	33 (8.6)	27 (7.0)			
	51-60years	16 (4.2)	40 (10.4)	38 (9.9)			
Ethnicity/ Tribe	Urhobo	36 (9.4)	33 (8.6)	35 (9.1)	9.663	6	0.140
	Isoko	23 (6.0)	41 (10.7)	24 (6.3)			
	Ijaw	24 (6.3)	30 (7.8)	30 (7.8)			
	Iteskiri	26 (6.8)	35 (9.1)	47 (12.2)			
Occupation	Student	32 (8.1)	40 (10.4)	33 (8.6)	3.210	6	0.782
	Trader	27 (7.0)	30 (7.8)	34 (8.9)			
	Tailor	24 (6.3)	35 (9.1)	27 (7.0)			
	Government Employee	27 (7.0)	34 (8.9)	42 (10.9)			
Educational Status	Primary school leaving certificate holder	20 (5.2)	30 (7.8)	22 (5.7)	16.987	8	0.030
	SSCE holder	42 (10.9)	47 (12.2)	45 (11.7)			
	Bachelor's degree holder	30 (7.8)	42 (10.9)	37 (9.6)			
	Master's degree holder	17 (4.4)	20 (5.2)	24 (6.3)			
	PHD holder	-	-	8 (100.0)			
Total		109 (28.4)	139 (36.2)	136 (35.4)			

Table 8: Chi-square test of association between sociodemographic factors and the question: 'Have you done a chest X-ray before?'

Sociodemographic factors		Frequency (%)			Chi-square	df	P-value
		Yes	No	Not sure			
Gender	Male	70 (18.2)	64 (16.7)	60 (15.6)	0.032	2	0.984
	Female	67 (17.4)	64 (16.7)	59 (15.4)			
Age groups	21-30years	31 (8.1)	34 (8.9)	37 (9.6)	6.282	6	0.392
	31-40years	36 (9.4)	33 (8.6)	31 (8.1)			
	41-50years	40 (10.4)	26 (6.8)	22 (5.7)			

	51-60years	30 (7.8)	35 (9.1)	29 (7.6)			
Ethnicity/ Tribe	Urhobo	39 (10.2)	43 (11.2)	22 (5.7)	8.907	6	0.179
	Isoko	34 (8.9)	25 (6.5)	29 (7.6)			
	Ijaw	25 (6.5)	28 (7.3)	31 (8.1)			
	Iteskiri	39 (10.2)	32 (8.3)	37 (9.6)			
Occupation	Student	32 (8.3)	38 (9.9)	34 (8.9)	3.716	6	0.715
	Trader	34 (8.9)	27 (7.0)	30 (7.8)			
	Tailor	34 (8.9)	31 (8.1)	21 (5.5)			
	Government Employee	37 (9.6)	32 (8.3)	34 (8.9)			
Educational Status	Primary school leaving certificate holder	28 (7.3)	22 (5.7)	22 (5.7)	3.969	8	0.860
	SSCE holder	53 (13.8)	40 (10.4)	41 (10.7)			
	Bachelor's degree holder	33 (8.6)	39 (10.2)	37 (9.6)			
	Master's degree holder	20 (5.2)	24 (6.3)	17 (4.4)			
	PhD holder	3 (0.8)	3 (0.8)	2 (0.5)			
	Total	137 (35.7)	128 (33.3)	119 (31.0)			

Table 9: Chi-square test of association between sociodemographic factors and the question: 'Do you think a chest X-ray is necessary?'

Sociodemographic factors		**Frequency (%)**			Chi-square	df	P-value
		Yes	No	Not sure			
Gender	Male	68 (17.7)	57 (14.8)	69 (18.0)	4.744	2	0.093
	Female	71 (18.5)	70 (18.2)	49 (12.8)			
Age groups	21-30years	39 (10.2)	28 (7.3)	35 (9.1)	4.182	6	0.652
	31-40years	3910.2)	34 (8.9)	27 (7.0)			
	41-50years	33 (8.6)	29 (7.6)	26 (6.8)			
	51-60years	28 (7.3)	36 (9.4)	30 (7.8)			
Ethnicity/ Tribe	Urhobo	41 (10.7)	34 (8.9)	29 (7.6)	5.900	6	0.434
	Isoko	37 (9.6)	29 (7.6)	22 (5.7)			
	Ijaw	24 (6.3)	27 (7.0)	33 (8.6)			
	Iteskiri	37 (9.6)	37 (9.6)	34 (8.9)			
Occupation	Student	27 (7.0)	47 (12.2)	30 (7.8)	14.536	6	0.024
	Trader	34 (8.9)	22 (5.7)	35 (9.1)			
	Tailor	38 (9.9)	26 (6.8)	22 (5.7)			
	Government Employee	40 (10.4)	32 (8.3)	31 (8.1)			
Educational Status	Primary school leaving certificate holder	26 (6.8)	22 (5.7)	24 (6.3)	6.609	8	0.579
	SSCE holder	56 (14.6)	38 (9.9)	40 (10.4)			
	Bachelor's degree holder	34 (8.9)	43 (11.2)	32 (8.3)			
	Master's degree holder	22 (5.7)	20 (5.2)	19 (4.9)			
	PhD holder	1 (0.3)	4 (3.1)	3 (2.5)			
Total		139 (36.2)	127 (33.1)	118 (30.7)			

Table 10: Chi-square test of association between sociodemographic factors and the question: 'Do you think a chest X-ray is harmful?'

Sociodemographic factors		**Frequency (%)**			Chi-square	df	P-value
		Yes	No	Not sure			
Gender	Male	63 (16.4)	65 (16.9)	66 (17.2)	0.909	2	0.635
	Female	60 (15.6)	57 (14.8)	73 (19.0)			
Age groups	21-30years	36 (9.4)	32 (8.3)	34 (8.9)	9.141	6	0.166
	31-40years	28 (7.3)	35 (9.1)	37 (9.6)			
	41-50years	37 (9.6)	24 (6.3)	27 (7.0)			
	51-60years	22 (5.7)	31 (8.1)	41 (10.7)			
Ethnicity/ Tribe	Urhobo	37 (9.6)	32 (8.3)	35 (9.1)	2.103	6	0.910
	Isoko	29 (7.6)	28 (7.3)	31 (8.1)			
	Ijaw	24 (6.3)	25 (6.5)	35 (9.1)			
	Iteskiri	33 (8.6)	37 (9.6)	38 (9.9)			
Occupation	Student	32 (8.3)	32 (8.3)	40 (10.4)	6.729	6	0.347
	Trader	36 (9.4)	21 (5.5)	34 (8.9)			
	Tailor	27 (7.0)	32 (8.3)	27 (7.0)			
	Government Employee	28 (7.3)	37 (9.6)	38 (9.9)			
Educational Status	Primary school leaving certificate holder	30 (7.8)	22 (5.7)	20 (5.2)	20.831	8	0.008
	SSCE holder	41 (10.7)	50 (13.0)	43 (11.2			
	Bachelor's degree holder	33 (8.6)	33 (8.6)	43 (11.2)			
	Master's degree holder	19 (4.9)	17 (4.4)	25 (6.5)			
	PHD holder	-	-	8 (2.1)			
Total		123 (32.0)	122 (31.8)	139 (36.2)			

Table 1 illustrates the socio-demographic factor distribution of respondents in the studied population with male 194 (50.5%) having a higher frequency than females 190 (49.5%). With regards the age groups, observed respondents within the ages of 21-30 years 102 (26.6%) were the most predominant with those with the ages of 41-50 years 88 (22.9%) been the least prevalent. On further observation of the observed tribes, occupations and educational status; Iteskiri 108 (28.1%), Students 104 (27.1%) and Senior secondary school certificate holders 134 (34.9%) had the highest frequency among the distribution with Ijaw 84 (21.9%), Tailor 86(22.4%) and Doctor of philosophy degree holders 8(2.1%) been the least prevalent respectively.

From table 2, it could be deduced that a higher positive response was observed when individuals were asked the questions; 'Do you think chest X-ray is necessary?' (139, 36.2%), 'Have you done a chest X-ray before?' 137 (35.7%). With the question; 'Have you heard about X-ray?' having a higher level of negative response (139, 36.2%) than positive response (109, 28.4%).

Results from table 3 simply show the distribution of the medium through which the respondents heard about X-ray, with the most predominant means been from hospital (28, 25.7%) which is closely followed by school (22, 20.2%) and the least among the distribution been from health awareness programmes (13,11.9%).

Table 4 illustrates the response distribution of respondents who answered yes to the question: 'Who recommended the X-ray to be carried out? It was observed that majority of the response were self-recommendation (37, 27.0%) with the least prevalent response on x-ray recommendation been Doctors (23, 16.8%)

Evaluation from Table 5 depicts the response 'Helpful in identifying fractures' (27, 19.4%) been the most prevalent response provided when the question; 'Do you think a chest X-ray is necessary?' was answered positively. With the least response been 'Helpful in identification of lung disease and conditions' (15, 10.8%).

Table 6 depicts the most common response provided by respondents who answered yes, to the question 'Do you think a chest X-ray is harmful?' was: 'Can led to detoriation of health if overexposed to its radiation' (39, 31.7%) and the response with the least frequency been 'As result of its harmful radiation emission radiologists are at risk' (23, 18.7%).

Table 7 depicts educational status (p=0.030) been the only observed socio-economic factor having significant association when compare against response to 'Have you heard of X-ray?' with the rest observed socio-economic elements having a p-value of Gender (0.099), Age (0.080), Ethnicity (0.140) and Occupation (0.782) respectively.

Results from Table 8 show none of the observed socio-economic features having any significant association with the response to 'Have you done a chest X-ray before?' with the observed socio-economic sorts having p-value of gender (0.984), age (0.392), ethnicity (0.179), occupation (0.715) and Educational status (0.860) respectively.

Table 9 illustrates occupation (p=0.024) been the only observed socio-economic feature with significant association when compared against the response: 'Do you think a chest X-ray is necessary?' with the rest observed socio-economic components having a p-value of gender (0.093), age (0.652), ethnicity (0.434) and occupation (0.579) respectively.

On observation of Table 7, it could be deduced that educational status (p=0.008) was the only observed socio-economic category having significant association with response to the question: 'Do you think a chest X-ray is harmful?' with the rest observed socio-economic factors having a p-value of gender (0.635), age (0.166), ethnicity (0.910) and occupation (0.347) respectively.

Discussion

X-ray has been proven as an effective, non-invasive and cheap medical diagnostics tool with therapeutic uses. Despite its outstanding and profound benefit in medicine, certain issues and challenges have been attributed to X-ray, some of which include amount of radiation employed in X-ray, exposure rate when conducting an X-ray which according to a survey conducted by Brenner and Hall, observed that 1.5% - 2% of the cancer cases in United States are as a result of over-exposure to radiation particles [5].

Findings from the present study were similar to those observed by Zhou *et al.,* who observed a high level of negative response to the awareness level on the subject of X-ray [11]. Similar reports were also observed by Günalp *et al.;* Portelli *et al.*, McCusker *et al.*, who reported a low level of awareness on the concept of X-ray [12, 13, 9]. Our findings contradict that observed by Brown and Jones who submitted a high level of knowledge and awareness with regards the subject of X-ray [14].

Findings from this study were similar to those observed in studies by Finestone *et al.;* Daniel *et al.;* Gower-Thomas *et al.,* who observed the educational status of respondents to be significantly associated to their awareness and knowledge of X-ray [5, 16, 17]. This finding is not in keeping with submission of Correia *et al.*, who reported no signification association between awareness and knowledge level of X-ray against educational status of respondents [18].

Conclusion

Findings from the study revealed Hospital (28, 25.7%) to be the most common source of information on chest X-ray among the respondents. It could be deduced from the study that educational status of the respondents had a significance association when compared against the response to the questions on awareness and perception of chest X-ray.

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