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Educating interns about the chest x-ray findings in Covid-19: A qualitative study

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Abstract

The interns along with health care workers are regarded as the covid warriors. This pandemic is caused by a novel type of coronavirus named Covid-19 which was extracted from lower respiratory tract samples of several patients in December 2019 in Wuhan, China on March 11, 2020, The World Health Organization (WHO) declared a global pandemic by the novel coronavirus (COVID-19) outbreak. There are many tests available for detection of covid infection such as RT-PCR, CT chest but Using CXR images has several advantages; they are cost-effective and abundantly available in the modern healthcare system, and radiography examination can be carried out quickly. The radiological findings of COVID 19 on chest xray are as follows: -Ground glass opacity,Peripheral, coarse, horizontal white lines, bands, or reticular changes which can be described, as linear opacities, Consolidation and rarely-nodular lung lesion, pleural effusion and pneumothorax. 100 interns were selected for the study. After approval of ethics committee, consent was taken from all the participants before starting the online survey. A pre-designed and pretested questionnaire was used in this study. Total 12 questions were included in questionnaire, related to basic knowledge of chest x-ray findings of COVID-19. Then the participants were explained about the findings of chest xray of Covid-19 and earlier designed pretest questionnaire was given again to assess their knowledge. When association between pretest and post-test was analyzed, the question number 4 to 12 showed significant statistical association between their pre-test knowledge and interventional teaching with p value <0.05. While, as the answers for the first 3 questions were already known to maximum percent of interns, there found no association between intervention and pretest. Therefore this clearly states that the teaching program imparted significant knowledge among interns regarding chest xray findings in Covid-19. By educating interns about Covid-19 findings on Chest xray, we are actually educating the future medical practitioner of the society and thereby spreading the awareness and how to diagnose Covid-19 cases by medical practitioner other than radiologist.

Keywords: Covid-19, Educating interns, radiography, chest x-ray

Introduction

The health care workers are at the frontline in the war against the Covid-19 infection and they are frequently regarded as the Covid warriors. The interns also play an important role. (1) India's first case of Coronavirus disease was confirmed by The Government of India on 30 January 2020 in the state of Kerala, when a university student from Wuhan travelled back to the state. On 24 March 2020, The Government of India under Prime Minister Narendra Modi ordered a nationwide lockdown on 24th March 2020 for 21 days, as a preventive measure against the COVID-19 pandemic in India This lockdown was done after observing a 14-hour voluntary public curfew on 22 March. After the initial lockdown there were number of lockdowns that were followed with a goal to control coronavirus spread in India. (2)(3)(4)(5) This pandemic is caused by a novel type of coronavirus named Covid-19 which was extracted from lower respiratory tract samples of several patients in December 2019 in Wuhan, China (6). On March 11, 2020, The World Health Organization (WHO) declared a global pandemic by the novel coronavirus (COVID-19) outbreak. (7) Interns along with other health workers are the first line warriors against this fight with this virus. Therefore, their knowledge about the disease pathology and its effect on organs should be known.

The reverse transcription-polymerase chain reaction (RT-PCR) test available for diagnosing COVID-19 is manual, complex, and time-consuming. However there are limited number of test kit available and rapid increase in the number of infected patients.(8)

Computed tomography (CT) scan of thorax exposes more radiation to the patient as compared to chest x-rays.

Chest X-Ray (CXR) is one of the important, non-invasive methods and used as a preliminary investigation to detect different pulmonary abnormalities. It can act as an alternative screening modality for the detection of COVID-19. (8)

The density of the lungs increased in cases of pneumonia which is seen as whiteness in the lung on radiography. Covid-19 pneumonia also causes similar manifestation. This increase in the density depending on the severity of the pneumonia. (9)

The radiological findings of COVID 19 on chest xray are as follows(9):-

1. Ground glass opacity (When lung markings are partially obscured by the increased whiteness)
2. Peripheral, coarse, horizontal white lines, bands, or reticular changes which can be described, as linear opacities
3. Consolidation (When lung markings are completely lost due to the whiteness)
4. Rarely- nodular lung lesion, pleural effusion and pneumothorax,

Part of the lung more affected(9):-

1. Mostly bilateral, but it can be unilateral.
2. Mostly in the peripheral lung adjacent to chest wall and diaphragm.
3. Mostly lower lung zone but can be mid and lower lung zones.

The British Society of Thoracic Imaging (BSTI) have published a reporting proforma for the plain chest radiographic appearances of potential COVID-19 cases (11) (12)

- **Classic/probable COVID-19**
Lower lobe and peripheral predominant multiple opacities that are bilateral (>> unilateral)
- **Indeterminate for COVID-19**
Does not fit classic or non-COVID-19 descriptors
- **Non-COVID-19**
Pneumothorax / lobar pneumonia / pleural effusion(s) / pulmonary edema / other
- **Normal**
COVID-19 not excluded

Aims and Objectives

1. To educate interns about the chest xray findings in Covid-19 infection
2. To create awareness among interns about changes in chest xrays in covid-19 infection

Study Design

Qualitative study.

Study Setting

Radiology department, Lata mangeshkar hospital, Nagpur.

Study Population

100 interns doing internship in the Lata mangeshkar hospital, Hingna for the year 2020-2021.

Methods

After approval of ethics committee, consent was taken from all the participants before starting the online survey. All participants were explained about purpose of the study and directed to complete the online survey.

A predesigned and pretested questionnaire was used in this study. No personal information of students was asked in the questionnaire. Total 12 questions were included in questionnaire, related to basic knowledge of chest x-ray findings of COVID-19

Then the participants were explained about the findings of chest xray of Covid-19 and earlier designed pretest questionnaire was given again to assess their knowledge.

Results

Table 1: Is their involvement of the lungs in Covid-19 infection?

Q1	Pretest		Post test		P value
	Frequenc y	Percen t	Frequenc y	Percen t	
No	2	2.0	1	1.0	> 0.05
Yes	98	98.0	99	99.0	
Total	100	100.0	100	100.0	

As seen in the above table, 99% of interns had knowledge of involvement of the lungs in Covid-19 infection in post test as compared to 98% in pretest.

Table 2: Radiographic Findings at Chest Radiography

Characteristic	No. of Findings
No. of normal baseline chest radiographs	20 (31)
No. of abnormal baseline chest radiographs	44 (69)
No. of patients with normal baseline chest radiographs later becoming abnormal	7 (11)
Type of parenchymal opacity at baseline chest radiography	
Consolidation	30 (47)
Ground-glass opacities	21 (33)
Distribution at baseline chest radiography	
Peripheral predominant	26 (41)
Perihilar predominant	6 (9)
Neither peripheral nor perihilar	19 (30)
Right lung	
Left lung	9 (14)
Bilateral lungs	
Upper zone predominant	0 (0)
Lower zone predominant	32 (50)
No zonal predominance	19 (30)
Other features on baseline chest radiographs	
Pleural effusion	2 (3)
Pulmonary nodules	0 (0)

Note.—Data in parentheses are percentages; percentages were calculated on the basis of 64 patients.

Table 2: Do all Covid-19 infected patient shows chest x-ray findings?

Q2	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
don't know	2	2.0	0	0.0	> 0.05
no	81	81.0	81	81.0	
yes	17	17.0	19	19.0	
Total	100	100.0	100	100.0	

As seen in the above table, 81% of interns had knowledge of chest x-ray findings in Covid-19 infection in post test as compared to 81% in pretest.

Table 3: Are you aware of the chest x-ray finding in a Covid-19 infections?

Q3	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
don't know	5	5.0	0	0.0	> 0.05
No	13	13.0	1	1.0	
Yes	82	76.0	99	86.0	
Total	100	100.0	100	100.0	

As seen in the above table, 99% of interns were aware of chest x-ray finding in a Covid-19 infections in post test as compared to 82% in pretest.

Table 4: Do you know which the part of the lung is most commonly affected by covid-19?

Q4	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
Don't know	7	7.0	0	0.0	< 0.05
No	37	37.0	0	0.0	
Yes	56	46.0	100	95.0	
Total	100	100.0	100	100.0	

As seen in the above table, 100% of interns were knowledge of aware of which part of part of the lung is most commonly affected by covid-19 in post test as compared to 56% in pretest.

Table 5: Do you know the British society of thoracic imaging findings of chest xray in covid-19?

Q5	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
don't know	11	11.0	1	1.0	< 0.05
No	77	77.0	3	3.0	
Yes	12	12.0	96	96.0	
Total	100	100.0	100	100.0	

As seen in the above table, 96% of interns were knowledge of British society of thoracic imaging findings of chest X ray in covid-19 in post test as compared to 12% in pretest.

Table 6: Identify the changes in xray?

Q6	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
Covid	14	14.0	5	5.0	< 0.05
don't know	13	13.0	0	0.0	
Normal	73	73.0	95	95.0	
Total	100	100.0	100	100.0	

As seen in the above table, 95% of interns identified correct X ray findings in post test as compared to 73 % in pretest.

Table 7: Identify the changes in xray?

Q7	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
covid	81	81.0	97	97.0	< 0.05
don't know	18	18.0	0	0.0	
normal	1	1.0	3	3.0	
Total	100	100.0	100	100.0	

As seen in the above table, 97% of interns identified covid 19 changes on chest X ray in post test as compared to 81% in pretest.

Table 8: Identify the changes in X ray?

Q8	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
Covid	10	10.0	9	9.0	< 0.05
don't know	50	50.0	2	2.0	
normal	40	40.0	89	89.0	
Total	100	100.0	100	100.0	

As seen in the above table, 89% of interns identified covid 19 changes on chest X ray in post test as compared to 40% in pretest.

Table 9: Identify the changes in xray?

Q9	Pretest		Post test		P value
	Frequenc y	Percent	Frequenc y	Percent	
Covid	70	70.0	98	98.0	< 0.05
don't know	29	29.0	1	1.0	
Normal	1	1.0	1	1.0	
Total	100	100.0	100	100.0	

As seen in the above table, 98% of interns identified correct chest X ray findings in post test as compared to 40% in pretest.

Table 10: Identify the changes in xray?

Q10	Pretest		Post test		P value
	Frequen cy	Perce nt	Frequen cy	Perce nt	
Covid don't know	37	37.0	71	71.0	< 0.05
Normal	46	46.0	1	1.0	
	17	17.0	28	28.0	
Total	100	100.0	100	100.0	

As seen in the above table, 71% of interns identified covid 19 changes on chest X ray in post test as compared to 37% in pretest.

Table 11: Identify the changes in xray?

Q11	Pretest		Post test		P value
	Frequen cy	Perce nt	Frequen cy	Perce nt	
Covid don't know	73	73.0	99	99.0	< 0.05
Normal	22	22.0	1	1.0	
	5	5.0	0	0.0	
Total	100	100.0	100	100.0	

As seen in the above table, 99% of interns identified covid 19 changes on chest X ray in post test as compared to 73% in pretest.

Table 12: Identify the changes in xray?

Q12	Pretest		Post test		P value
	Frequen cy	Perce nt	Frequen cy	Perce nt	
covid don't know	3	3.0	0	0.0	< 0.05
normal	30	30.0	0	0.0	
	67	67.0	100	100.0	
Total	100	100.0	100	100.0	

As seen in the above table, 100% of interns identified correct chest X ray findings in post test as compared to 67% in pretest.

	Correct responses		Chi square test
	Pretest	Posttest	
Q1	98	99	0.01
Q2	81	81	
Q3	82	99	
Q4	56	100	
Q5	12	96	
Q6	73	95	
Q7	81	97	
Q8	40	89	
Q9	70	98	
Q10	37	71	
Q11	73	99	
Q12	68	100	

Grades	Pretest	Posttest	chi square test
< 5	19	0	0.001
6 to 8	42	0	
> 8	39	100	
Total	100	100	

Discussion

Viruses belonging to the family of coronaviridae had already resulted in acute respiratory distress syndrome (SARS) in 2003 and Middle East respiratory syndrome^{4,5} (MERS) in 2012. COVID 19 virus has recently erupted and is still a mystery. Lot of research is going on all across the world and knowledge is being shared. Portable chest X-ray is the most commonly performed radiological investigation in terms of feasibility and cost effectiveness even in developed countries. Due to limited RT-PCR kits and delayed results up to 48 hours, cases of high clinical suspicion with positive CXR findings are kept in isolation wards. CXR has a low sensitivity and it is difficult to distinguish between COVID 19 and other viral pneumonias purely on CXR findings. Radiological findings were described according to Fleischner Society glossary of terms for Thoracic imaging. 16 Ground glass opacities were defined as increased opacification of lung parenchyma not obscuring blood vessels and bronchi. Consolidation was described as homogenous opacification of lung parenchyma obscuring blood vessels and bronchi. We classified all CXRs on BSTI classification and found that majority of patients had bilateral, peripheral ground glass opacities and consolidation as documented in international studies. Of the 100 interns, all had completed both pretest and posttest questionnaires. In the study, 99% of interns had knowledge of involvement of the lungs in Covid-19 infection in post test as compared to 98% in pretest. The average pretest score was 7.71 (±0.7) and posttest score was 11.24 (±1.1) with a minimum score being 3 and a maximum score being 12. In pretest 39 (39%) were in Grade I (>8 of correct responses), 42 (42%) in Grade II ((6-8 of correct responses), 19 (19%) in Grade III (<5 of correct responses). In the posttest 100 (100%) were in grade I and none were in Grade II and III. In the present study, 99% of interns had knowledge of involvement of the lungs in Covid-19 infection in post test as compared to 98% in pretest. In the present study, 81% of interns had knowledge of chest x-ray findings in Covid-19 infection in post test as compared to 81% in pretest. In the present study, 99% of interns were aware of chest x-ray finding in a Covid-19 infections in post test as compared to 82% in pretest. In the present study, 100% of interns gained knowledge of which part of part of the lung is most commonly affected by covid-19 in post test as compared to 56% in pretest. In the present study, 96% of interns gained knowledge of British society of thoracic imaging findings of chest X ray in covid-19 in post test as compared to 12% in pretest. In the present study, 95% of interns identified correct X ray findings in post test as compared to 73 % in pretest. In the present study, 97% of interns identified covid 19 changes on chest X ray in post test as compared to 81% in pretest. In the present study, 89% of interns identified covid 19 changes on chest X ray in post test as compared to 40% in pretest. In the present study, 98% of interns identified correct chest X ray findings in post test as compared to 40% in pretest. In the present study, 71% of interns identified covid 19 changes on chest X ray in post test as compared to 37% in pretest. In the present study, 99% of interns identified covid 19

changes on chest X ray in post test as compared to 73% in pretest.

In the present study, 100% of interns identified correct chest X ray findings in post test as compared to 67% in pretest.

Conclusion

When association between pretest and post test was analyzed, the question number 4 to 12 showed significant statistical association between their pre test knowledge and interventional teaching with p value <0.05. While, as the answers for the first 3 questions were already known to maximum percent of interns, there found no association between intervention and pretest.

Therefore, this clearly states that the teaching program imparted significant knowledge among interns regarding chest xray findings in Covid-19

Using CXR images has several advantages; they are cost-effective and abundantly available in the modern healthcare system, and radiography examination can be carried out quickly

By educating interns about Covid-19 findings on Chest xray, we are actually educating the future medical practioner of the society and thereby spreading the awareness and how to diagnose Covid-19 cases by medical practioner other than radiologist.

QUESTAINNAIRE

Q1. Is there involvement of the lungs in Covid-19 infection?

Yes No Don't know

Q2. Do all Covid-19 infected patient shows chest x-ray findings?

Yes No Don't know

Q3. Are you aware of the chest x-ray finding in a Covid-19 infections?

Yes No Don't know

If yes, can you enlist some findings

Q4. Do you know which the part of the lung is most commonly affected by covid- 19?

Yes No Don't know

If yes, can you enlist it.

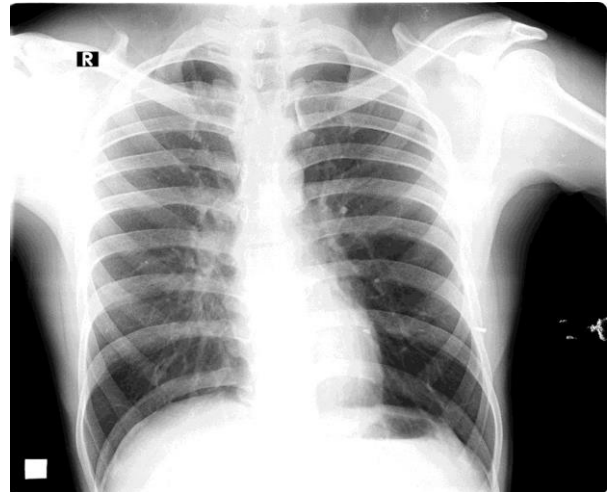
Q5. Do you know the British society of thoracic imaging findings of chest xray in covid-19?

Yes No Don't know

If yes, can you enlist them?

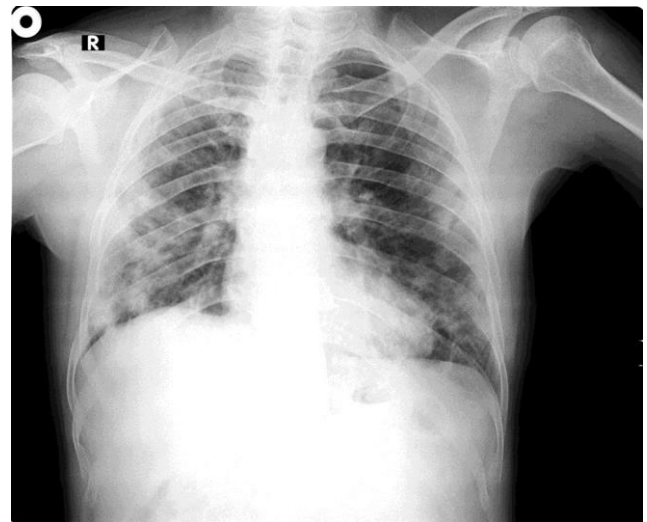
Q6. Identify the changes in xray?

normal covid-19 Don't know



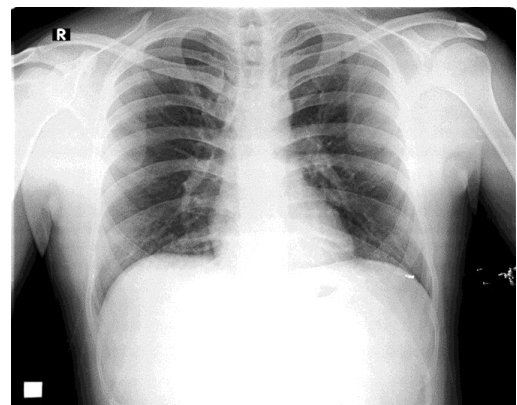
Q7. Identify the changes in xray?

normal covid-19 Don't know



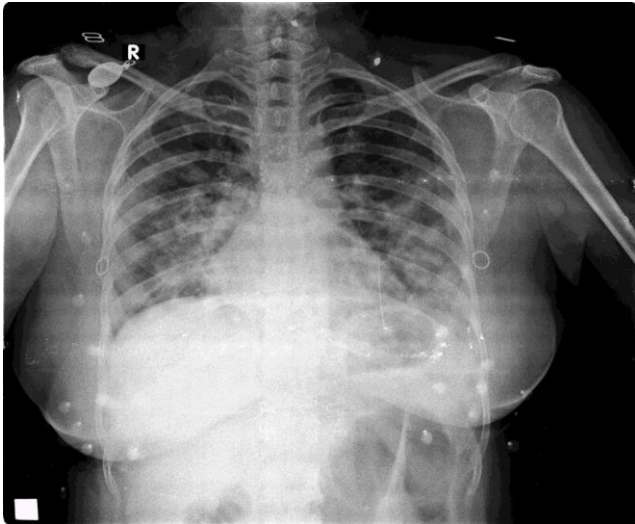
Q8. Identify the changes in xray?

normal covid-19 Don't know



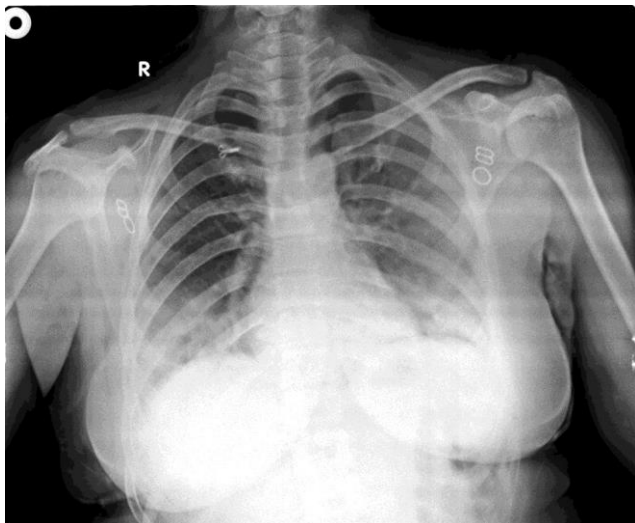
Q9. Identify the changes in xray?

normal covid-19 Don't know



Q10. Identify the changes in xray?

normal covid-19 Don't know



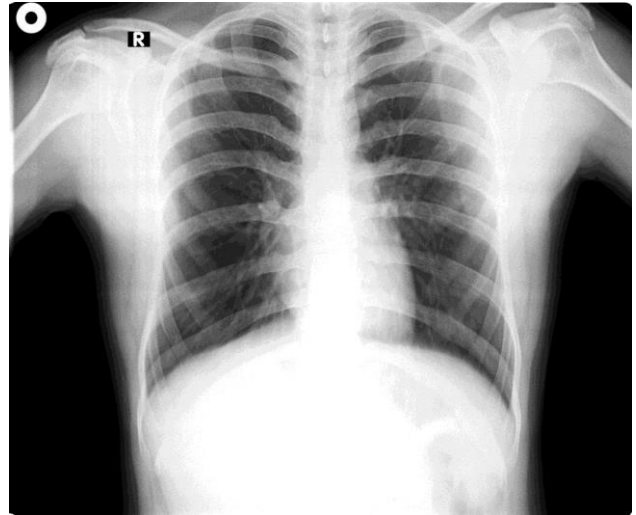
Q11. Identify the changes in xray?

normal covid-19 Don't know



Q12. Identify the changes in xray?

normal covid-19 Don't know



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