

## Awareness of covid-19 and its effect on cardio-respiratory system among physiotherapy students and professionals—cross sectional study

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### Abstract

Understanding the effects of COVID-19 on the cardiorespiratory system is imperative as it is the primarily affected system of the body. Physiotherapists play a vital role in the treatment of COVID-19 patients; therefore, our study aims to assess the awareness regarding effects of COVID-19 on cardio-respiratory system among physiotherapy students and professionals. A self-structured validated questionnaire was distributed through an online method. A total of 240 participants consisting of physiotherapy professionals, post graduate, interns and under graduate physiotherapy students were included. The study revealed that out of 240 participants, 46 participants (19.16%) had poor, 155 participants (64%) had average and 39 participants had (16.25%) good awareness regarding COVID-19 and its effect on cardio-respiratory system. Both in the professionals and students' group, more than half the participants (71.66% and 64.44%) had average awareness and the highest awareness was found to be in the post graduate group i.e., in the good category of about 31.66%.

**Keywords:** Awareness, cardiac, COVID-19, effect, physiotherapy, respiratory

### Introduction

In December 2019, many people in Wuhan, China started presenting to local hospitals with severe pneumonia of unknown cause. On 7th January the causative virus was identified as a coronavirus <sup>(1)</sup>. World Health Organization named this disease coronavirus disease 2019 (COVID-19), which started as an epidemic in Wuhan but later was declared as a pandemic due to the widespread infectivity and high contagion rate <sup>(2,3)</sup>. Reports suggest that, SARS-CoV-2 virus, which has affected the health systems worldwide belongs to the same Beta coronavirus genus as the coronaviruses responsible for the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks previously <sup>(4)</sup>. Knowledge of SARS-CoV-2 virus is evolving and the healthcare workers and health organizations are taking all possible measures to stop the spread of the virus and keep it under control <sup>(5)</sup>.

SARS-CoV2 binds to the ACE2 receptor which is highly expressed in the lower respiratory tract such as type II alveolar cells (AT2) of the lungs, upper oesophagus and stratified epithelial cells, cells in the ileum and colon, cholangiocytes, myocardial cells, kidney proximal tubule cells and bladder urothelial cells <sup>(6)</sup>, associating it with various clinical manifestations, including affection of the lungs, heart, kidneys, central nervous system, gastrointestinal system, skin and blood coagulation <sup>(7)</sup>. The most common organ system affected by SARS-CoV-2 is the respiratory system and the manifestations related to it include cough, shortness of breath, sputum production, respiratory failure, and ARDS <sup>(8)</sup>. It may also have systemic effects especially on the cardiovascular and immune systems <sup>(9)</sup>. Cardiac involvement is identified by elevated troponin which often leads to poor prognosis.

Critical illness survivors often experience huge number of problems that begin in the intensive care unit (ICU) and continue after discharge. To diminish the impact of these problems' early interventions such as breathing exercise or respiratory muscle strengthening, mobilization and active exercises are helpful

<sup>(10)</sup>. Physiotherapy is an essential part of critical care management with the aim to prevent and manage the pulmonary complications and also focus on early rehabilitation by reducing effects of immobilization <sup>(11)</sup>. The aim of physiotherapy in COVID-19 patients is to reduce dyspnea and relieve the anxiety and depression in short term and in long term, it is to improve physical function, which in turn improves quality of life <sup>(12)</sup>.

Understanding the effects of COVID-19 on the cardiorespiratory system is imperative as it is the primarily affected system of the body. There are several studies which have assessed the overall knowledge, attitude and perception of health care workers of various fields. Yet, no study had been conducted to assess this knowledge in physiotherapists specifically. It is necessary for physiotherapy professionals, post graduates and interns to have detailed knowledge regarding the effects of COVID-19 on the cardiorespiratory system as they currently must be managing the COVID-19 patients. It will also enable them to make the treatment protocol more efficient and more goal oriented. The eradication of COVID-19 completely is a long way; hence it is essential for physiotherapy students to have knowledge regarding the same as they will be treating COVID-19 patients in the near future. Students and professionals may also act as a source of information for the public and help in removing the myths and misconceptions regarding COVID-19. In order to do this, it is imperative that the physiotherapists have appropriate knowledge. Our study was carried out with the objective of assessing the knowledge and awareness regarding the effects of COVID-19 on the cardio-respiratory system among physiotherapy professionals and students.

## Material and methods

Our study was approved by the MGM-ECRHS on 22<sup>nd</sup> September 2019. Our study was conducted in accordance with declaration of Helsinki. It was a cross sectional observational study with convenient sampling done. The sample size calculated with the allowable error of 8% was found to be 150 or above. A total of 240 samples were collected from 30<sup>th</sup> November 2020 to 18<sup>th</sup> January 2021 with 60 participants in each of the 4 groups. A self-structured questionnaire was used as a material, titled- "Awareness of effects of covid-19 on cardio-respiratory system"

This questionnaire had been validated and had a reliability of (Cronbach's alpha) – 0.766. The questionnaire consisted of 20 questions with 4 options from which 1 option was the correct choice.

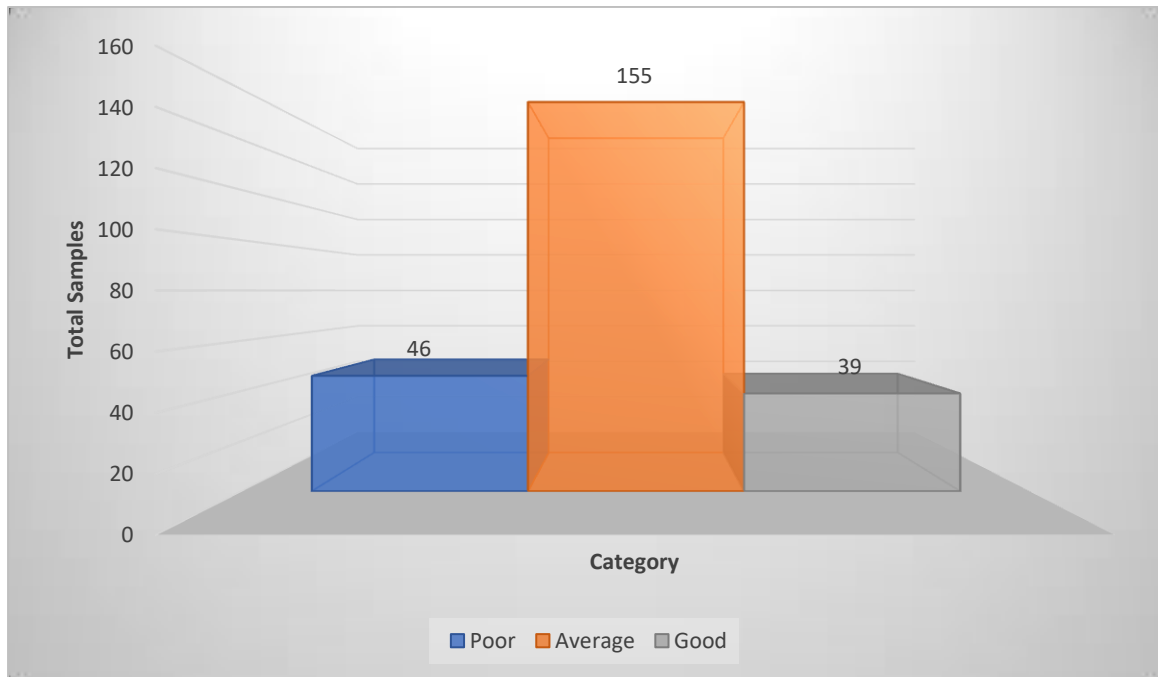
$$20 \div 3 \approx 7$$

Therefore, according to this the participants were divided into 3 categories having poor, good or excellent awareness with their total score being 0-7, 8-14 and above 14 respectively in each category. The questionnaire was distributed online via google forms to the participants. After agreeing to participate in the study, the participants were asked to answer all the questions and submit the form.

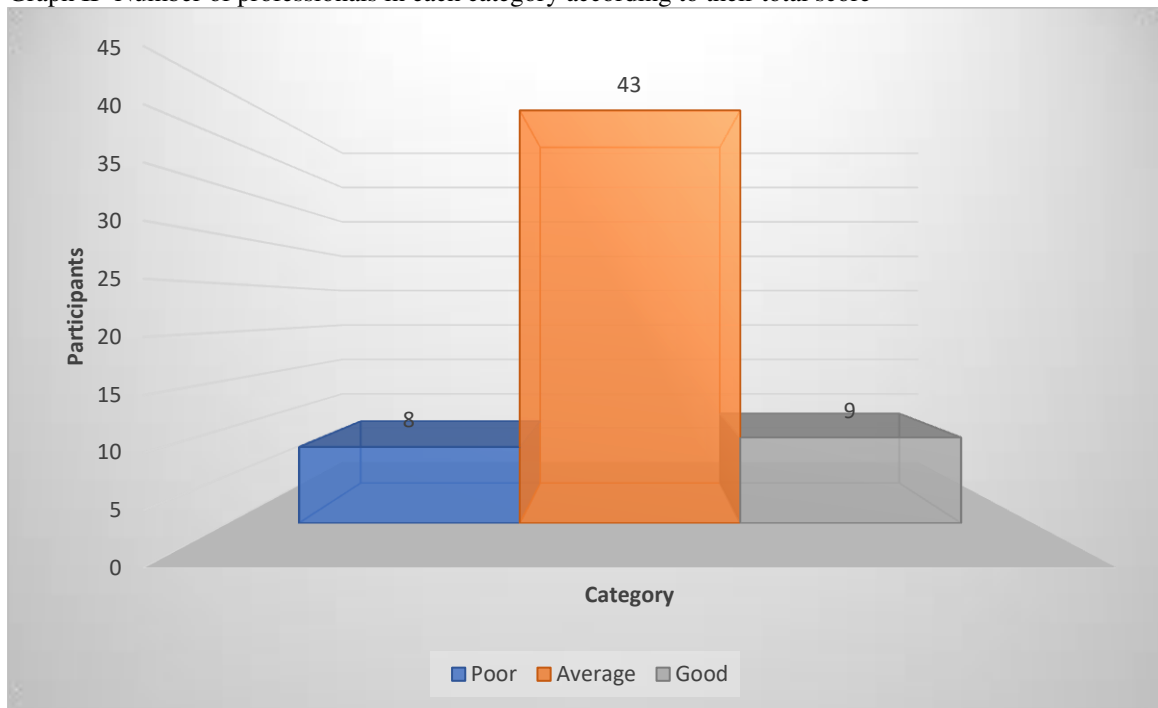
## Result

Among 240 participants, 46 participants (19.16%) had poor, 155 participants (64%) had average and 39 participants had (16.25%) good awareness depicted in GRAPH I

Graph I- Total number of participants in each category according to their total score

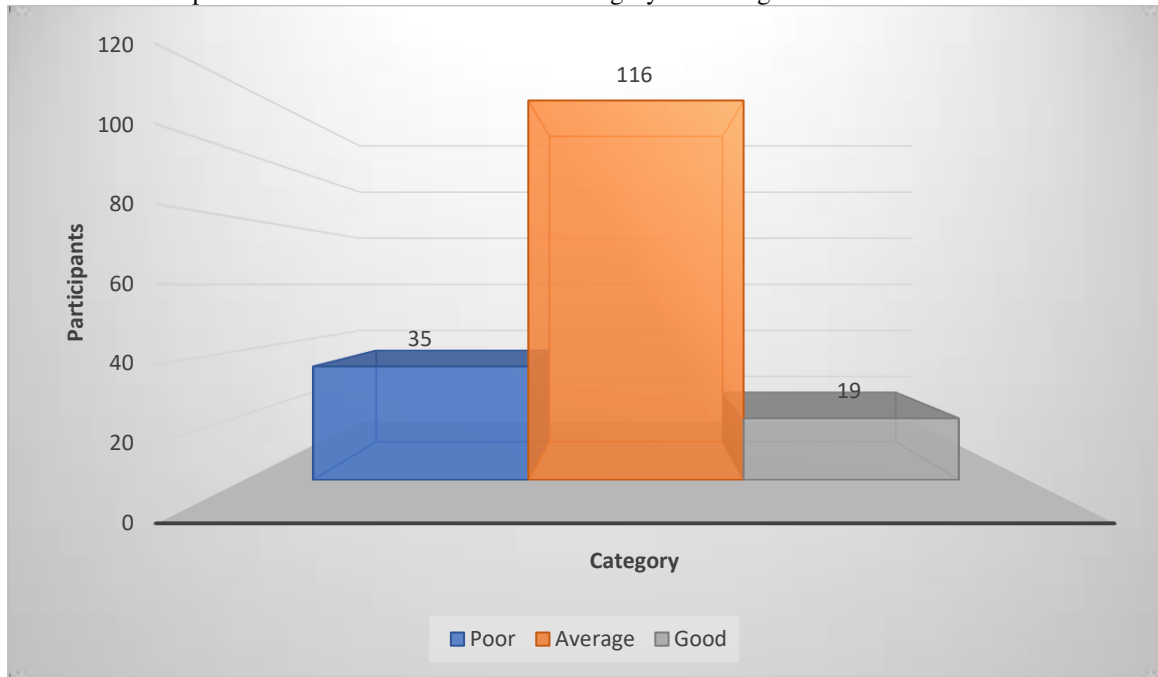


In the professional group, out of 60 participants, 8 participants (13.33%) had poor, 43 participants (71.66%) had average and 9 participants (15%) had good awareness which is shown in GRAPH II. Graph II- Number of professionals in each category according to their total score



In the student's category (post graduate, intern and under graduate students), out of 180 participants, 35 participants (19.44%) had poor, 116 participants (64.44%) had average and 29 participants (16.11%) had good awareness which is shown in GRAPH III

Graph III- Number of students in each category according to their total score



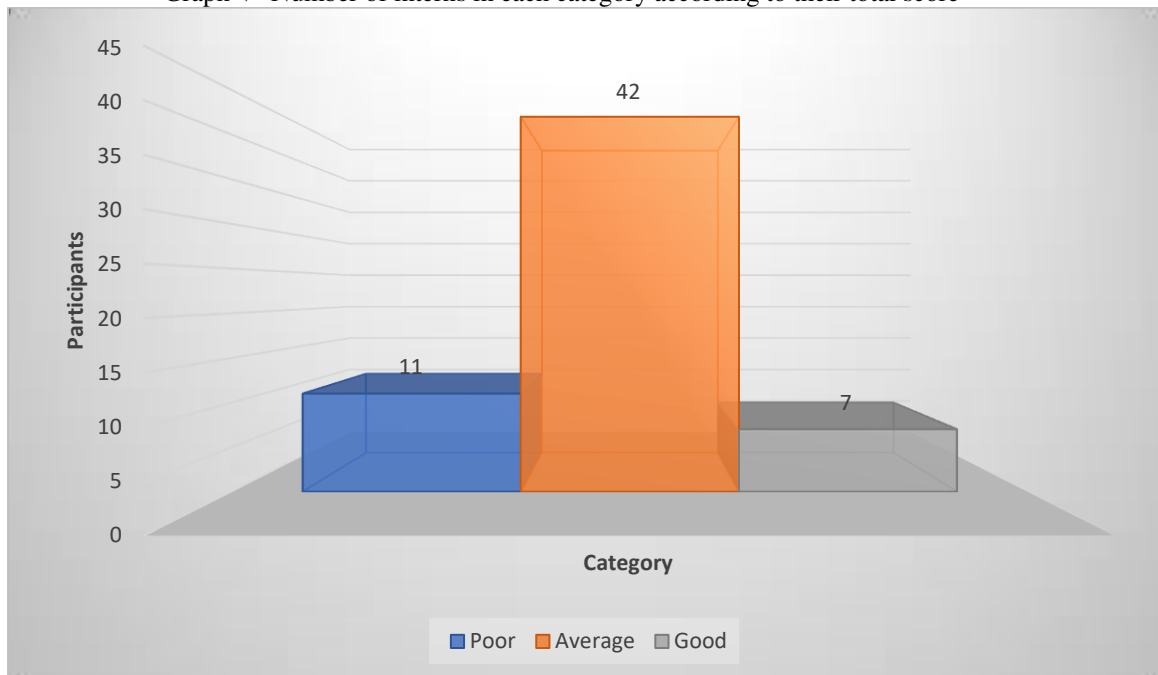
In post graduate group, out of 60 participants, 8 participants (13.33%) had poor, 33 participants (55%) had average and 19 participants (31.66%) had good awareness which is shown in GRAPH IV.

Graph IV- Number of post graduates in each category according to their total score



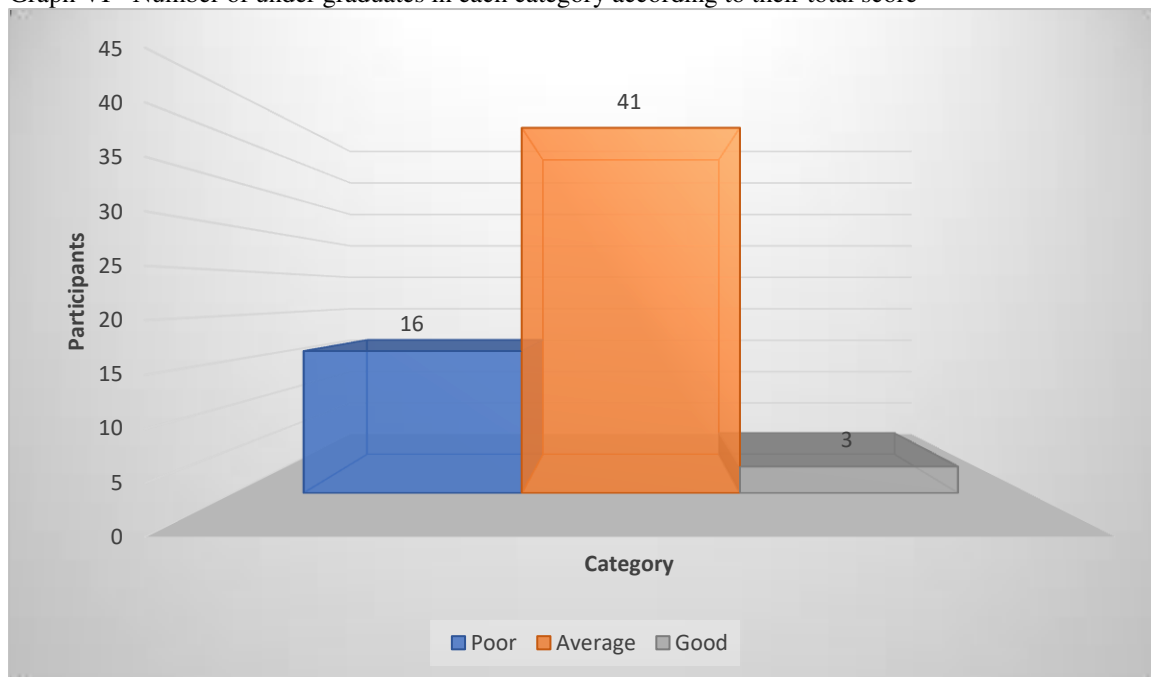
In the interns' group, out of 60 participants, 11 participants (18.33%) had poor, 42 participants (70%) had average and 7 participants (11.66%) had good awareness depicted in GRAPH V.

Graph V- Number of interns in each category according to their total score



In the under graduate group, out of 60 participants, 16 participants (26.66%) had poor, 41 participants (68.33%) had average and 3 participants (5%) had good awareness depicted in GRAPH VI.

Graph VI - Number of under graduates in each category according to their total score



The percent of correct responses for every question were calculated by dividing the number of correct answers by the total number of participants and was multiplied by 100 to convert the value into percentage (TABLE A).

Table A- The percentage of correct responses achieved amongst total 240 participants

Question number	Question	Correct answered
1	The most common system affected in COVID-19 is	60.42%
2	Which of the enzyme acts as a functional receptor and portal of entry in SARS-CoV-2	46.67%
3	CT findings of COVID-19 are	42.08%
4	Common pulmonary condition associated with COVID-19 is	65.42%
5	Improving aerobic capacity can improve immune and respiratory function in COVID-19 patients	72.92%
6	Presence of underlying heart disease can lead to development of severe form of COVID-19?	65.83%
7	The risk of having myocardial infarction is greater in COVID-19 patients	47.92%
8	Major histopathological findings of lung in severe ARDS in COVID-19 infection are	65.42%

9	CO-RADS score is based on which findings in COVID-19	70.42%
10	Cardiac manifestations of COVID-19 are	64.58%
11	The predominant pattern of lung lesions in patients with COVID-19 is diffuse alveolar damage	59.58%
12	The most common cardiac pathology seen in 2D echocardiography is	25.42%
13	Acute myocardial injury in COVID-19 is suggested by increased levels of troponin I	58.75%
14	Can cardiogenic shock be caused due to COVID-19	44.58%
15	Mechanism of acute myocardial injury due to COVID-19 virus can be	55%
16	The risk of developing pulmonary fibrosis in COVID-19 is increased by	62.92%
17	Distinct parenchymal changes in lungs include	51.67%
18	Silent hypoxemia in COVID-19 is seen when	42.92%
19	Poor prognosis of COVID-19 can be related with	51.25%
20	Is productive cough/ cough with sputum present in COVID-19 patients	35.83%

### Discussion

The current study aimed to find the awareness of effects of COVID-19 on cardio respiratory system in physiotherapists. Our study revealed that out of 240 participants, 19.16% participants had poor, 64% participants had average and 16.25% participants had good awareness regarding the effects of COVID-19 on cardio respiratory system.

Several studies have been conducted to find out the knowledge and awareness regarding COVID-19 in various sets of population. Pranav D Modi et al <sup>(13)</sup> conducted a survey on healthcare students and professionals concluding that students and professionals had adequate knowledge and awareness regarding COVID-19. A similar study was conducted by M Zhang et al <sup>(14)</sup> on knowledge, attitude and practice regarding COVID-19 in health care workers stating that most of the workers had sufficient knowledge and also followed correct practices but they had a fear regarding self-infection with the virus. Kushalkumar et al <sup>(15)</sup> conducted a study in medical and allied health sciences students to assess the knowledge and perceptions regarding COVID-19 stating that majority of the students had adequate knowledge while partial knowledge regarding the symptoms of mild and severe cases was also observed. Correct responses in these studies were from the health care workers, medical students and the lowest was from non-clinical students and the administrative staff. There was lack of awareness regarding the signs and symptoms observed in various systems affected by COVID-19. These studies revealed that there is a strong need to implement educational interventions and training programs regarding COVID-19 across all healthcare professions including students.

The previous studies assessed general and overall knowledge of COVID-19 and not specific to any system. Assessing the knowledge regarding effects of COVID-19 on cardio-respiratory system is imperial because COVID-19 is primarily a respiratory infection with involvement of other systems as

well. Evidence of cardiac involvement is evident in COVID-19 patients and their rate of survival is found to be poor <sup>(16)</sup>.

Having adequate knowledge and awareness regarding COVID-19 can influence the perceptions of all the health care workers including physiotherapists in providing efficient treatment to the patients <sup>(17)</sup>. Physiotherapists work in the critical care units and help reduce mortality and morbidity. Physiotherapy for critically ill patients, in critical and post-critical illness, is based on a multisystem approach which comprises not only chest physiotherapy but also musculoskeletal rehabilitation which helps to reduce the incidence of complications, encourage weaning from mechanical ventilation and facilitate recovery of the patient. Early physiotherapy, which is started during mechanical ventilation, is considered achievable and safe to improve patient performance and long-term quality of life <sup>(11)</sup>. Depending on the affection and symptoms observed in patients affected with COVID-19, physiotherapy can be beneficial to reduce the severity of their condition and improve quality of life. Though the students are not directly involved in managing COVID-19 patients, they can serve as an information provider. They can sensitize the community about maintaining personal hygiene, symptoms of COVID-19 and how to prevent its spread. Students must possess knowledge and awareness regarding the condition as they will be handling patients of COVID-19 in near future <sup>(12)</sup>. As physiotherapists will be dealing with the respiratory and cardiac symptoms of COVID-19 it is of utmost importance to have awareness regarding the effects of COVID-19 on cardio-respiratory system.

The self-structured questionnaire used in our study focused on the mechanism of entry of the virus, effect of presence of co-morbidities in the affected individual, radiological findings of COVID-19, pathological changes seen in lungs and heart and the mechanism of injury to the cardiac as well as pulmonary system. The mean score achieved by the participants was 10.93 out of 20 i.e., the category of awareness was average. As seen in Table A, the questions which were answered correctly by maximum participants were those focusing on the most common system affected in COVID-19 (60.42%), common pulmonary condition associated with COVID-19 (65.42%), whether improving aerobic capacity can help improve immune response (72.92%), presence of underlying cardiac condition can increase the severity of the condition (65.83%), histopathological findings in lungs (65.42%), CO-RADS score is based on which radiological finding (70.42%), cardiac manifestations of COVID-19 (64.58%) and risk of developing pulmonary fibrosis is increased by (62.92%). From these findings it is evident that physiotherapists have significant knowledge and awareness regarding the pulmonary and cardiac manifestations as well as the severity of COVID-19 when an underlying condition is already present. Although satisfactory awareness was found related to these topics, there were certain areas where the awareness was lacking. The lowest scoring questions were, common cardiac pathology seen in COVID-19 (25.42%) and whether or not productive cough is seen in COVID-19 (35.83%). This reveals that though the participants are aware regarding the pulmonary pathology, there is low awareness regarding the symptoms of COVID-19 and cardiac pathology and conditions related to it.

The least awareness was found in the under graduate group with 26.66%. 71.66% in the professional group had average category of awareness and 31.66% had a good amount of knowledge in the post graduate group. From these results it is evident that most of the physiotherapists including students and professionals had poor or average level of awareness regarding COVID-19 and its effect on cardio-respiratory system. Under graduate students' source of knowledge majorly can be considered to be from social media or from the internet. This along with the point that they do not treat COVID-19 patients, the level of awareness observed in them is poor. A significant level of awareness was seen in the professionals, post graduate and interns' group as they are currently treating the affected patients which helps in increasing their knowledge regarding the condition and their source of information along with the internet could also be various researches and articles which have already been conducted or going on, on COVID-19.

From the results, it is imperative that physiotherapists, not only students but from all the areas of the profession should be made aware regarding COVID-19. Not only overall knowledge should be given but it should also focus on the pathology as well as the effects on various systems which would help the therapist to provide effective treatment to the patient. Understanding the condition and having awareness regarding the process of affection will improve the efficacy of their treatment approach leading to improvement in the patient's condition and overall quality of life. This can also help in spreading knowledge in the community which will ultimately help in controlling or reducing the spread of the virus along with breaking all misconceptions, myths and reducing fear of the disease and virus itself.

Our study had few limitations including the chances of recall bias in information as well as the possibility that the participants may have looked up the answers to some of the questions before



answering. As it was an internet based online survey, responses from the regions without internet access could not be taken which may lead to demographic selection bias. Further studies can be conducted to assess the awareness regarding the effects of COVID-19 on other systems including all medical as well as allied health sciences fields. Studies can also be done in view of health promotion strategies in health care workers.

## Conclusion

Our study revealed that among 240 participants, 19.16% participants had poor, 64% participants had average and 16.25% participants had good awareness regarding COVID-19 and its effect on cardio-respiratory system. Both in the professionals and students' group, more than half the participants (71.66% and 64.44%) had average awareness regarding the effects of COVID-19. The post graduate group of students had a greater number of participants i.e., 31.66% in the good category of awareness when compared to all the other groups.

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