

# Knowledge, attitude, and practice of healthcare providers towards chest physiotherapy for COVID-19 patients at Al Baha, Saudi Arabia

Wael Alghamdi <sup>1</sup>, Osman Babiker Osman <sup>2</sup>, AbdAllah Ibrahim Mudawi <sup>3</sup>,  
Waled AM Ahmed <sup>1</sup>

(1) Nursing Department, Faculty of Applied Medical Sciences, Al Baha University, Al-Baha, Saudi Arabia.

(2) Public Health Department, Faculty of Applied Medical Sciences, Al Baha University, Al-Baha, Saudi Arabia.

(3) Dental Health Department, Faculty of Applied Medical Sciences, Al Baha University, Al-Baha, Saudi Arabia.

## Corresponding author:

Wael Alghamdi,  
Nursing Department, Faculty of Applied Medical Sciences,  
Al Baha University,  
Al-Baha, Saudi Arabia

**Email:** waelalghamdi@bu.edu.sa

Received: February 2023 Accepted: February 2023; Published: March 1, 2023.

Citation: Alghamdi W. et al. Knowledge, attitude, and practice of healthcare providers towards chest physiotherapy for COVID-19 patients at Al Baha, Saudi Arabia. World Family Medicine. March 2023; 21(2): 41- 51

DOI: 10.5742/MEWFM.2023.95256056

## Abstract

**Background:** The knowledge, attitude, and practice of health professionals in Covid-19 medical centers are considered as the cornerstone for improvement of Covid-19 patients. This study aimed to assess the knowledge, attitude, and practice of the healthcare professionals in chest physiotherapy for COVID-19 patients.

**Methods:** This is a descriptive cross-sectional study; it was conducted among healthcare professionals working at ICUs at King Fahad Hospital and Prince Meshari Hospital, in Al-Baha Region, Saudi Arabia. A convenient sampling technique was used to collect data using a questionnaire about knowledge attitude and practice toward chest physiotherapy for COVID-19 patients which was adopted from a previously validated questionnaire. A specific coding for knowledge, attitude and practice was used to calculate the overall scores. Data was analyzed using SPSS software.

**Results:** Among 34 of healthcare providers working at King Fahad Hospital (44.1%) and Prince Meshari Hospital (55.9%), it was shown that 82.4% of healthcare providers have adequate knowledge, 91.2% have positive attitude and 70.6% have appropriate practice towards COVID-19 physiotherapy in ICUs.

A significant relationship was reported between marital status of healthcare providers and adequate knowledge ( $p=0.39$ ), where singles and divorced participants have 100% adequate knowledge compared to married workers. It was also reported that knowledge significantly enhances levels of attitude and practice of healthcare providers by 0.609 and 0.61 respectively. Furthermore, their attitude affects positively the level of practice by 0.572.

**Conclusions:** This study highlighted that majority of healthcare providers (physiotherapists, nurses or medical) are knowledgeable; they also have positive attitude and appropriate practices about COVID-19 physiotherapy management in ICUs at Al-Baha governmental hospitals.

**Keywords:** knowledge, attitude, practice, healthcare professionals, COVID-19, physiotherapy.

## Introduction

All levels of the health care system were affected by the ongoing pandemic of coronavirus disease 2019 (COVID-19) which is caused by the SARS CoV-2 virus. This highly infectious respiratory disease has yet infected more than 199 million people worldwide and has already resulted in 4.2 million deaths [1].

A significant number of patients with COVID-19 admitted to rehabilitation have spent time in the intensive care unit (ICU) and have symptoms common to other ICU patients, including dyspnea, anxiety, depression, prolonged pain, impaired physical function and poor quality of life [2, 3]. Although the lung is the primary target of coronavirus infection, clinical signs of central (i.e., dizziness, headache, and/or impaired consciousness) and/or peripheral nervous system (i.e., taste and/or smell impairment) involvement have been reported, especially in patients requiring mechanical ventilation [4].

The rehabilitation system, including patient care, education and research is strongly affected and physiotherapeutic practice is currently changing during the COVID-19 pandemic. Even though clinical studies on post-acute COVID-19 rehabilitation are still ongoing, several reports and guidelines provide recommendations for physiotherapeutic rehabilitation based on previous SARS/MERS experience as well as being based on recent data and patient case studies [5-9]. Recommended physiotherapy for post-acute COVID-19 syndrome can be conducted at home or in outpatient settings [5, 10, 11].

Based on the above-described functional problems, pulmonary rehabilitation (PR) is essential following the acute phase. So, a comprehensive multimodalities and interdisciplinary pulmonary rehabilitation is needed, triaged according to the level of the impairment caused by the infection, the activity restrictions, and the patients' disorders.

However, little is known regarding to what extent these goals of pulmonary rehabilitation can be achieved in post-COVID-19 patients, particularly in comparison to patients with pulmonary diseases usually referred to pulmonary rehabilitation. The first experiences with pulmonary rehabilitation in post-COVID-19 patients indicated that improvements were significant according to physical performance and subjective health status, regardless of previous ventilation [12].

Accordingly, the knowledge, attitude, and practice of the health professionals in COVID-19 centers are considered as the corner stone of improvement of COVID-19 patients especially those cases that were complicated by the necessity of retransfer to an acute clinic due to a renewed deterioration. So, this study aimed to assess the knowledge, attitude, and practice of the healthcare professionals in chest physiotherapy for COVID-19 patients.

## Methods and Materials

**Design:** This is a Descriptive cross-sectional study; it was conducted among healthcare professionals working at ICUs.

**Study population:** This study was conducted on all healthcare professionals working at ICUs in King Fahad Hospital and Prince Meshari Hospital, in Al-Baha Region, Saudi Arabia.

**Inclusion Criteria:**

1. Healthcare professionals who work directly with COVID-19 diagnosed patients.
2. Those who can read English
3. Those who agreed to participate

**Exclusion Criteria:**

1. Refused to fill out the questionnaire

**Sampling and sample size:** A Convenient sampling technique was used; it included healthcare professionals in the hospital who agreed to participate.

**Data collection:** Direct questions were asked to participants concerning their Knowledge attitude and practice towards chest physiotherapy for COVID-19 patients.

**Instruments:**

Demographic questionnaire, knowledge of physiotherapy care questionnaire, attitude of physiotherapy care questionnaire, practice of physiotherapy care questionnaire; they were all adopted from one questionnaire used by Alfadil TA.

**Measurements of KAP among healthcare workers:**

The measurement of the KAP among healthcare workers were calculated as follows: For knowledge (14 items), the response gives 1 point for the correct, and zero point for incorrect or I don't know answers. The total of 7 points or more was considered as adequate knowledge about COVID-19 physiotherapy. For the attitude (twelve items), the response gives two points for each positive response, one point for neutral, and zero points for negative answers; a total of 12 points or more is considered as a positive attitude towards COVID-19 physiotherapy. For practice (fifteen items), the response gives three points for "always," two points for "sometimes," one point for "rarely," and zero points for "never." A total of 30 points or more was considered as an appropriate practice.

**Data analysis plan:**

Data was analyzed using descriptive statistics like frequency and percentage for demographic data and for details of knowledge attitude and practice of health professionals towards chest physiotherapy for COVID-19 patients. Inferential statistics like correlation and associations were established using an appropriate statistical test such as Chi square, Pearson correlation coefficient and regression. Secondary outcomes were drawn according to the data extraction.

**Ethical consideration:**

Formal permission was obtained from Al-Baha Health Affairs, IBR:1442-21.

## Results

### Results and summary:

Table 1 shows the demographic characteristics of 34 healthcare providers working at King Fahad Hospital (44.1%) and Prince Meshari Hospital (55.9%). Male participants represent 41.1% and female participants represent 58.9%. The age of included healthcare providers was distributed between two groups: 20-<30 years by 47.1% and 30-<40 years by 52.9%. Most participants were nurses (64.8%), medical (17.6%) or physiotherapists (17.6%); more than half of them (55.9%) have worked less than 5 years, and 20.6% have worked between 5 to 10 years. Table 1 also shows the average level of participants' knowledge (72.7%  $\pm$ 24.5), attitude (87.5%  $\pm$ 16.9), and practice (73.5%  $\pm$ 22.5).

As shown in Figure 1 82.4% of healthcare providers have adequate knowledge, 91.2% have a positive attitude and 70.6% have appropriate practice towards Covid-19 physiotherapy in ICUs.

Table 2 shows the participants' responses to the knowledge questions regarding physiotherapy management of Covid-19 Patients in the ICUs. The true responses were among the majority of them. The correct answers for all questions ranged between 44.1% for (Physiotherapy interventions have a negative impact on the quality of life of COVID-19 patients managed in the ICUs) to 91.2 for (Physiotherapy service is provided to COVID-19 patients in ICU during the recovery from critical illness) and (Mobilization technique can improve functional status of COVID-19 patients in ICU).

Table 3 shows the participants' responses to the attitude questions regarding physiotherapy management of COVID-19 Patients in the ICUs. The positive responses were among the majority of them. The positive responses towards the questions ranged between 55.9% for (referral between medical staff and physiotherapist regarding COVID-19 patients in ICU is rarely practiced) to 88.2% for (It is important to have teamwork between healthcare professionals in ICU to improve patient care).

Table 4 shows the participants' responses to the practice questions regarding physiotherapy management of COVID-19 Patients in the ICUs. The appropriate responses came from the majority of participants. The correct practices towards the questions ranged between 44.1% for (Positive Expiratory Pressure (PEP) Bottle) to 85.3% for (Positioning - Supine, side-lying, prone, sitting, etc.).

Table 5 indicates the relationships between demographic variables of healthcare providers working at ICUs and their knowledge, attitude, and practices towards COVID-19 physiotherapy management. It was reported that the significant relationship was reported between marital status of healthcare providers and adequate knowledge ( $p=0.39$ ), where singles and divorced participants have 100 % adequate knowledge compared to married workers.

In Table 6, it was reported that the correlation between knowledge and attitude and practice of healthcare providers is fair and positive since increase in knowledge level increases attitude by 0.609 and increases practice by 0.61, significantly. Furthermore, the attitude of healthcare providers affects positively their practice by 0.572 significantly. Further information about the data and conditions for access are available from the corresponding author.

Table 1: Demographic characteristics of participants (n=34)

Variables	Frequency	Percentage	Mean	SD
<b>Gender</b>				
Male	14	41.1%	-	-
Female	20	58.9%	-	-
<b>Age</b>				
20-<30 years	16	47.1%	-	-
30-<40 years	18	52.9%	-	-
<b>Marital Status</b>				
Single	13	38.3%	-	-
Married	18	52.9%	-	-
Divorced	3	8.8%	-	-
<b>Profession</b>				
Nursing	22	64.8%	-	-
Medicine	6	17.6%	-	-
Physiotherapy	6	17.6%	-	-
<b>Years of experience</b>				
1- < 5 years	19	55.9%	-	-
5- < 10 years	7	20.6%	-	-
10- < 15 years	6	17.6%	-	-
15- < 20 years	2	5.9%	-	-
<b>Hospital</b>				
King Fahad Hospital	15	44.1%	-	-
Prince Mashari Hospital	19	55.9%	-	-
<b>Knowledge, attitude, and practice scores</b>				
Knowledge	-	-	72.7%	24.5
Attitude	-	-	87.5%	16.9
Practice	-	-	73.5%	22.5

Table 2: The participants' responses to the knowledge questions regarding physiotherapy

Questions	True	False	I don't know
1. Physiotherapy is an integral part of the management of COVID-19 patients in ICUs.	79.4	14.7	5.9
2. Physiotherapy service is provided to COVID-19 patients in ICU during the recovery from critical illness.	91.2	2.9	5.9
3. Physiotherapy services can be provided to COVID-19 patients in different settings such as CCU, ward and HDU.	82.4	5.9	11.8
4. The lack of early physiotherapy care involvement in COVID-19 patients admitted to ICU is associated with increased pulmonary and functional complications.	73.5	14.7	11.8
5. The most common physiotherapy techniques used among COVID-19 patients in the ICU are limb exercises and breathing exercises.	88.2	5.9	5.9
6. Incontinence care such as Catheter, is part of physiotherapy care for COVID-19 patients	50.0	38.2	11.8
7. Early Physiotherapy management prevents delay in weaning from mechanical ventilation for COVID-19 patients.	61.8	8.8	29.4
8. Manual hyperinflation (MH) is one of the physiotherapy interventions for COVID-19 patients	55.9	20.6	23.5
9. Chest physiotherapy can improve the respiratory function of COVID-19 patients admitted to ICU.	88.2	11.8	0
10. Mobilization technique can improve functional status of COVID-19 patients in ICU	91.2	2.9	5.9
11. It is important to provide diet therapy services for COVID-19 patients.	79.4	5.9	14.7
12. Percussion, vibrations and suction are physiotherapy techniques for COVID-19 patients in ICU.	76.5	14.7	8.8
13. Physiotherapy management reduces the length of stay (LOS) of COVID-19 patients in the ICU.	67.6	23.5	8.8
14. Physiotherapy interventions have a negative impact on the quality of life of COVID-19 patients managed in the ICU.	44.1	50.0	5.9

**Table 3: The participants' responses to the attitude questions regarding physiotherapy management of COVID-19 Patients in the ICU (n=34)**

Question	Agree	Neutral	Disagree
1. It is necessary to have physiotherapy care services for COVID-19 patients in the ICU.	85.3	11.8	2.9
2. Your participation in management of COVID-19 patients in ICU is essential and must be considered.	85.3	8.8	5.9
3. In any hospital there is urgent need to apply physiotherapy that deals with pulmonary complications of COVID-19 patients in the ICU.	76.5	20.6	2.9
4. From your experience in ICU, workers have an important role in management of COVID-19 patients.	79.4	17.6	2.9
5. It is important to have teamwork between all Healthcare Professionals in ICU to improve patient care.	88.2	11.8	0
6. Healthcare Professionals must be a part of routine medical staff rounds in ICU providing care to COVID-19 patients.	85.3	14.7	0
7. The physiotherapist should attend the physiotherapy care for COVID-19 patients in ICU.	79.4	17.6	2.9
8. Healthcare Professionals should always participate in case discussion regarding COVID-19 patient progress in ICU.	88.2	11.8	0
9. Healthcare Professionals should be involved in decisions regarding patient weaning from mechanical ventilation for COVID-19 patients in ICU.	85.3	14.7	0
10. Physiotherapy care for COVID-19 patients managed in the ICU is effective.	82.4	11.8	5.9
11. The referral between medical staff and physiotherapist regarding COVID-19 patients in ICU is rarely practiced.	55.9	29.4	14.7
12. Healthcare Professionals should be involved with other medical staff in discharge decisions regarding COVID-19 patients.	88.2	5.9	5.9

Table 3: Factors associated with the risk of eating disorders among adolescents.

Question	Agree	Neutral	Disagree
1. It is necessary to have physiotherapy care services for COVID-19 patients in the ICU.	85.3	11.8	2.9
2. Your participation in management of COVID-19 patients in ICU is essential and must be considered.	85.3	8.8	5.9
3. In any hospital there is urgent need to apply physiotherapy that deals with pulmonary complications of COVID-19 patients in the ICU.	76.5	20.6	2.9
4. From your experience in ICU, workers have an important role in management of COVID-19 patients.	79.4	17.6	2.9
5. It is important to have teamwork between all Healthcare Professionals in ICU to improve patient care.	88.2	11.8	0
6. Healthcare Professionals must be a part of routine medical staff rounds in ICU providing care to COVID-19 patients.	85.3	14.7	0
7. The physiotherapist should attend the physiotherapy care for COVID-19 patients in ICU.	79.4	17.6	2.9
8. Healthcare Professionals should always participate in case discussion regarding COVID-19 patient progress in ICU.	88.2	11.8	0
9. Healthcare Professionals should be involved in decisions regarding patient weaning from mechanical ventilation for COVID-19 patients in ICU.	85.3	14.7	0
10. Physiotherapy care for COVID-19 patients managed in the ICU is effective.	82.4	11.8	5.9
11. The referral between medical staff and physiotherapist regarding COVID-19 patients in ICU is rarely practiced.	55.9	29.4	14.7
12. Healthcare Professionals should be involved with other medical staff in discharge decisions regarding COVID-19 patients.	88.2	5.9	5.9

**Table 4: The participants' responses to the practice questions regarding physiotherapy management of COVID-19 Patients in the ICU (n=34)**

Questions	Always	Sometimes	Rarely	Never
1. Manual airway clearance techniques	73.5	8.8	11.8	5.9
2. Positioning (Supine, side-lying, prone, sitting, etc.)	85.3	11.8	0	2.9
3. Chest manipulation and suctioning	76.5	8.8	2.9	11.8
4. Chest percussion	70.6	23.5	2.9	2.9
5. Vibration	64.7	17.6	11.8	5.9
6. Postural drainage	52.9	14.7	20.6	11.8
7. Limbs exercises	73.5	17.6	5.9	2.9
8. Manual hyperinflation	47.1	29.4	5.9	17.6
9. Breathing exercises	70.6	26.5	0	2.9
10. Non-invasive continuous positive airway pressure (CPAP)	47.1	32.4	2.9	17.6
11. Assisted coughing	61.8	23.5	11.8	2.9
12. Nebulization	61.8	20.6	2.9	14.7
13. Spirometer exercises	50.0	38.2	8.8	2.9
14. Positive Expiratory Pressure (PEP) Bottle	44.1	29.4	11.8	14.7
15. Chest support	55.9	23.5	5.9	14.7



Table 5: Relationships between the demographics and characteristics of the participants and adequate knowledge, positive attitude, and appropriate practices (n=34)

Variables	Adequate knowledge		Positive attitude		Appropriate practices	
	N (%)	p-value	N (%)	p-value	N (%)	p-value
<b>Gender</b>						
Male	11(78.6%)	0.672	12 (85.7%)	0.555	9 (64.3%)	0.7
Female	17 (85.0%)		19 (95.0%)		15 (75.0%)	
<b>Marital Status</b>						
Single	13(100.0%)	0.039*	13 (100.0%)	0.232	11(84.6%)	0.109
Married	12(66.7%)		15 (83.3%)			
Divorced	3(100.0%)		3(100.0%)			
<b>Profession</b>						
Nursing	20(90.9%)	0.066	21(95.5%)	0.062	17(77.3%)	0.084
Medicine	5(83.3%)		6(100.0%)			
Physiotherapy	3(50.0%)		4(66.7%)			
<b>Age</b>						
20-<30 years	14(87.5%)	0.66	15(93.8%)	0.61	10(62.5%)	0.33
30-<40 years	14(77.8%)		16(88.9%)		14 (77.8%)	
<b>Years of experience</b>						
1- < 5 years	16(84.2%)	0.67	17(89.5%)	0.77	12(63.2%)	0.54
5- < 10 years	6(85.7%)		6(85.7%)			
10- < 15 years	5(83.3%)		6(100.0%)			
15- < 20 years	1(50.0%)		2(100.0%)			

(\*): significant

Table 6: The Pearson correlations between overall knowledge, positive attitude, and appropriate practices of the participants

	Knowledge	Attitude	Practice
Knowledge		r =0.609 p =0.000*	r =0.610 p =0.000*
Attitude			r =.572 p =0.000*
Practice			

(\*): significant

## Discussion

This descriptive study was conducted among 34 healthcare providers, who were working at King Fahad Hospital (44.1%) and Prince Meshari Hospital (55.9%). They are working in nursing (64.8%), medicine (17.6%) or physiotherapy (17.6%).

The following are reported as the average level of participants' knowledge (72.7%  $\pm$ 24.5), attitude (87.5%  $\pm$ 16.9), and practice (73.5%  $\pm$ 22.5). The findings of this study showed that 82.4% of healthcare providers have adequate knowledge, 91.2% have positive attitude and 70.6% have appropriate practice towards COVID-19 physiotherapy in ICUs. These findings showed that most healthcare providers at Al-Baha hospitals (72.7%) are knowledgeable about physiotherapy for (COVID-19) patients, which is in line with previous reports from different countries such as a study by Ali AA, et al. [13], about awareness of COVID-19 among the physiotherapists in Pakistan where the majority (96.3%) of them were aware of Covid-19, and other reports by Pedersini et al and [14] Salman et al [15] which showed that the physiotherapists were aware of preventive strategies [14, 15]. On the other hand, a study conducted by Guan et al and Pegado et al indicated that physiotherapists need more knowledge regarding infectious diseases prevention [16, 17].

It was reported that singles and divorced participants have significantly more knowledge compared to married workers. These study findings were found in agreement to the study findings of research conducted in KSA by Omar A. AL Mohammed, et al 2020, where they reported that single HCWs were more likely than married to have adequate knowledge, positive attitude, and follow appropriate practices most of the time [18]. On the other hand, the majority (88.6%) of Physiotherapists of Sindh, Pakistan found married participants showed sound knowledge (93.6%) of COVID-19 [13].

It was also reported that knowledge of participants significantly enhances the level of attitude and practice of healthcare providers by 0.609 and 0.61 respectively. These relationships are similar to the study conducted by Charles Ezema, 2021, across 53 countries to assess participants physiotherapists' demographics, knowledge of COVID-19, attitude, practices, and standard precaution adherence during the pandemic. They reported that all participants had good knowledge of COVID-19 pathology and a positive attitude towards safe clinical practices. They also reported that the percentage score of participants' knowledge regarding COVID-19 pathology, and prevention, their attitude, and adherence to standard precautions averaged 77.73 $\pm$ 10.11, 89.70 $\pm$ 9.26, 77.44 $\pm$ 7.04, and 61.59 $\pm$ 16.63, respectively and this level of Knowledge about COVID-19 pathology was found to be statistically significant across all studied demographic variables ( $p < 0.001$ ) [19].

Furthermore, their attitude affects positively the level of practice by 0.572. these findings are in the same line with the study findings that conducted in Ethiopia by

Gedamnesh Bitew, et al, 2021, where they reported that the mean attitude score for the participants was (19.9  $\pm$  5.9.) and (64% ) of the participants had a good/favorable attitude toward COVID-19 prevention and control and the mean score of practice for the HCP was 3.5 with (SD = 1.5). The study also showed that 55% of participants had good practice toward COVID-19 prevention and prevention mechanisms [20].

There are several limitations associated with our study; the approach for data gathering, was conducted while the incidence rate of the pandemic had dropped which makes it difficult to assess healthcare providers practice of a larger sample size. The method utilized for another limitation is the lack of generalizability of study findings since it was conducted at Al-Baha region solely. Another limitation was the limited number of physiotherapists at the ICU in Al-Baha hospitals; however, nurses could help to overcome this shortage. Nonetheless, this study has several strengths; this study is the first descriptive study for physiotherapy management in Al-Baha region, Saudi Arabia, and it was conducted in the two main hospitals in Al-Baha region (King Fahad Hospital and Prince Meshari Hospital).

## Conclusion

This study highlighted that the majority of healthcare providers (physiotherapists, nurses, or medical) are knowledgeable about Covid-19 physiotherapy management. They also have a positive attitude and appropriate practices towards physiotherapy management for COVID-19 cases at Al-Baha governmental hospitals.

### Acknowledgement:

We would like to express the sincerest gratitude, indebtedness and appreciation to Deanship of Scientific Research, Al Baha University which funds our Project number 1442/4.

### Funding source:

This project was funded by Deanship of Scientific Research, Al Baha University with Project number 1442/4.

## References

1. Organization. WH. WHO COVID-19 Dashboard. Available online: <https://covid19.who.int/>. (accessed on 8 August 2021).
2. Roberts PW, J.; Park, E.; Nuño, M.; Riggs, R. 102, 351–358. Identification of Functional Limitations and Discharge Destination in Patients with COVID-19. *Arch Phys Med Rehabil*. 2021;102, 351–358. [CrossRef] [PubMed].
3. Zhao HMX, Y.X. Wang, C. Rehabilitation. Recommendations for respiratory rehabilitation in adults with coronavirus disease 2019. *Chin Med J*. 2020; 133, 1595–1602. [CrossRef].
4. Mao LJ, H.; Wang, M.; Hu, Y.; Chen, S.; He, Q.; Chang, J.; Hong, C.; Zhou, Y.; Wang, D.; et al. . Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. *JAMA Neurol* 2020;77, 683. [CrossRef].
5. Barker-Davies RMOS, O.; Senaratne, K.P.P.; Baker, P.; Cranley, M.; Dharm-Datta, S.; Ellis, H.; Goodall, D.; Gough, M.; Lewis SeaT, [CrossRef]. The Stanford Hall consensus statement for post-COVID-19 rehabilitation. . *Br J Sports Med* 2020;54, 949–959.
6. Lau HM-CN, G.Y.-F.; Jones, A.Y.-M.; Lee, E.W.-C.; Siu, E.H.-K.; Hui, D.S.-C. 51. A randomised controlled trial of the effectiveness of an exercise training program in patients recovering from severe acute respiratory syndrome. *Aust J Physiother*. 2005;213–219. [CrossRef]
7. Liu KZ, W.; Yang, Y.; Zhang, J.; Li, Y.; Chen, Y. Respiratory rehabilitation in elderly patients with COVID-19: A randomized controlled study. *Complementary Ther Clin Pract*. 2020; 39, 101166. [CrossRef].
8. Brugliera LS, A.; Castellazzi, P.; Cimino, P.; Tettamanti, A.; Houdayer, E.; Arcuri, P.; Alemanno, F.; Mortini, P.; Iannaccone, S.. Rehabilitation of COVID-19 patients. *J Rehabil Med*. 2020; 52, jrm00046. [CrossRef].
9. Rooney SW, A.; Paul, L. Systematic Review of Changes and Recovery in Physical Function and Fitness after Severe Acute Respiratory Syndrome–Related Coronavirus Infection: Implications for COVID-19 Rehabilitation. *Phys Ther* 2020;100,1717–1729. [CrossRef].
10. Kleinitz PM, J.-A.; Connolly, B.; Skelton, P.; Smith, G.; Clift, Z. Rehabilitation Considerations during the COVID-19 Outbreak; Pan. American Health Organization: Washington, DC, USA,. 2020.
11. Krenek BM, A.; Nessizius, S.; Schlegl, C.; Linert, B. Leitlinie Physiotherapie: Für Post-COVID-19-PatientInnen sowie zur Prävention einer COVID-19 induzierten Pneumonie bei gefährdeten Personengruppen;. *Physio Austria: Wien, Austria*. 2020.
12. Hermann MP-E, A.-M.; Witassek, F.; Baumgaertner, R.; Schoendorf, S.; Spielmanns, M. . Feasibility and Efficacy of Cardiopulmonary Rehabilitation following COVID-19. *Am J Phys Med Rehabil* 2020;99, 865–869. [CrossRef] [PubMed].
13. Ali AA, Naqi S, Bugti MK, Rafeeq M, MR MI, Ahmad T, et al. Assess the awareness of COVID-19 among the physiotherapists working in different hospitals of Sindh, Pakistan: A cross sectional survey. *Journal of Novel Physiotherapy and Physical Rehabilitation*. 2021;8(1):005-9.
14. Pedersini P, Corbellini C, Villafañe JH. Italian physical therapists' response to the novel COVID-19 emergency. *Physical therapy*. 2020;100(7):1049-51.
15. Salman M, Mustafa Z, Asif N, Zaidi HA, Shehzadi N, Khan TM, et al. Knowledge, attitude and preventive practices related to COVID-19 among health professionals of Punjab province of Pakistan. *The Journal of Infection in Developing Countries*. 2020;14(07):707-12.
16. Guan L, Zhou L, Zhang J, Peng W, Chen R. More awareness is needed for severe acute respiratory syndrome coronavirus 2019 transmission through exhaled air during non-invasive respiratory support: experience from China. *European Respiratory Journal*. 2020;55(3).
17. Pegado R, Silva-Filho E, Lima IND, Gualdi L. Coronavirus disease 2019 (COVID-19) in Brasil: information to physical therapists. *Revista da associação médica brasileira*. 2020;66:498-501.
18. Almohammed OA, Aldwihi LA, Alragas AM, Almoteer AI, Gopalakrishnan S, Alqahtani NM. Knowledge, attitude, and practices associated with COVID-19 among healthcare workers in hospitals: a cross-sectional study in Saudi Arabia. *Frontiers in public health*. 2021;9:1007.
19. Ezema CI, Onyeso OK, Okafor UA, Mabry LM, Adje ME, Shiraku J, et al. Knowledge, attitude and adherence to standard precautions among frontline clinical physiotherapists during the COVID-19 pandemic: a cross-sectional survey. *European Journal of Physiotherapy*. 2021:1-9.
20. Bitew G, Sharew M, Belsti Y. Factors associated with knowledge, attitude, and practice of COVID-19 among health care professional's working in South Wollo Zone Hospitals, Northeast Ethiopia. *SAGE Open Medicine*. 2021;9:20503121211025147.