

Nationwide Study to Assess the Psychosocial, Financial, and Professional Impact of COVID-19 Pandemic on Radiation Therapy Technologists

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PURPOSE Radiation therapy technologists (RTTs), being the frontline health care workers, are vulnerable to COVID-19 disease and subsequent detrimental consequences of the pandemic. Hence, the study was undertaken for the comprehensive assessment of adverse effects of COVID-19 pandemic on RTTs.

MATERIALS AND METHODS This cross-sectional, survey-based study was carried out among RTTs working in various cancer centers across India. Assessment was carried out by using a questionnaire comprising the demographic profile and a structured instrument to quantify psychological, social, financial, and professional impact of COVID-19 pandemic. Responses were collected between February 1, 2021, and April 31, 2021.

RESULTS Of 302 responders, more than two third of the RTTs were concerned for getting COVID-19 disease either outside the hospital (n = 210, 69.5%) or from patients or attendants (n = 220, 72.8%). More than one third of RTTs were very much concerned for increased financial burden of COVID-19 pandemic (n = 94, 34.1%), and one third (n = 92, 30.5%) were very much concerned for newly imposed restrictions. RTTs working in a private setup (P = .000), living in a tier 1 city (P = .028), and lacking the coverage of COVID-19 disease in health insurance (P = .010) faced a significantly higher financial burden. RTTs living in tier 1 city (P = .023) and those who were in profession for > 5 years (P = .013) had significantly higher concern for ensuring proper sanitization of the professional environment. More than half (n = 171, 56.6%) were interested in taking COVID-19 vaccine.

CONCLUSION COVID-19 pandemic adversely affected psychosocial, financial, and professional well-being of RTTs even after subsidizing the initial wave, and a timely intervention is warranted for their well-being and to sustain oncologic facilities.

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INTRODUCTION

With the surge in infected cases and sharp rise in death toll, WHO, declared the novel COVID-19 disease as a pandemic on March 11, 2020.¹ Mitigating this crisis put a tremendous pressure on all aspects of health care systems, including cancer care.² Radiation oncology being one of the disciplines involved in cancer management that deals with the controlled use of radiation for the treatment of various malignant and few benign lesions has also faced detrimental effects of the pandemic.²

A team comprising radiation oncologist, medical physicist, radiation therapy technologist (RTT), oncology nurse, and other support staff deals with the radiation therapy. RTTs also known as radiographers are the professionals involved in various aspects of radiotherapy. They participate actively in various radiotherapy treatment-related processes including patient counseling, immobilization, simulation, and actual treatment delivery³ and hence play

an important role in the holistic approach of radiation treatment.^{4,5} At all these steps, they are often exposed to both patients and their attenders. The need of continuation of cancer care especially radiotherapy during the pandemic makes RTTs frontline health care workers (HCWs), and hence, they are one of the vulnerable populations to COVID-19 disease.⁶

Various guidelines and preventive measures have been proposed to mitigate the issue and to offer an optimum cancer care during the pandemic.⁷⁻¹² These guidelines can be broadly subcategorized as clinical adaptations, medical physics-related modifications, technical aspects of radiation delivery, and universal precautions for all HCWs. Clinical adaptations, such as patient triaging¹² and use of hypofractionated schedules,¹¹ were given an emphasis during the pandemic. Categorical division of labor and more often use of measures and equipment that are easy to disinfect¹¹ are considered in the medical physics department. Minimizing beam angles, reduction in the

ASSOCIATED CONTENT

Data Supplement

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

To assess the psychosocial, professional, and financial impact of COVID-19 pandemic on the well-being of frontline radiation therapy technologists (RTTs) across India.

Knowledge Generated

This cross-sectional, survey-based study of 302 RTTs has shown that two thirds were concerned for getting COVID-19 disease either outside the hospital (69.5%) or from patients or attendants (72.8%). One third (35.5%) were not at all facing any difficulty in handling the additional responsibility of sanitization of the working environment. More than half were having difficulty in following COVID-19 appropriate behavior at working place, in terms of frequent hand washing (53.3%) and using appropriate personal protective equipment kits (85.1%).

Relevance

The pandemic has significantly affected overall well-being of RTTs, and higher financial impact has been observed among those working in nongovernment setups and living in metropolitan cities. Strategies need to be formulated for better penetration of vaccination drive to increase the compliance, as only half of the studied population (56.6%) was willing to get vaccinated.

use of beam accessories, and restricting respiratory-gated treatments¹¹ were suggested in technical modifications. Use of appropriate personal protective equipment (PPE) kits and masks, frequent hand washing, and sanitization of working environments, including treatment couches, immobilization devices, beam modification devices, etc,¹¹ were included in the universal precautionary measures.

However, the need of ensuring strict adherence to these guidelines results in an additional responsibility and workload on RTTs, particularly on those who are working in relatively busy and resource-constrained setups. Alongside, the need of psychosocial adjustment^{13,14} and financial insecurity¹⁵ arising from the pandemic are expected to further affect their morale. Various studies in the initial phase of the pandemic had raised severe psychosocial and professional concerns for the entire radiation oncology fraternity.^{6,14,16-18} However, the actual impact of the pandemic on RTTs has largely been underestimated. Also, the impact at the time of withdrawal of restrictions and introduction of various vaccination strategies has never been evaluated. Hence, as this pandemic is expected to leave a long-term effect,¹⁹ a study was undertaken for the comprehensive assessment of the adverse effects of COVID-19 pandemic on RTTs in terms of psychological, social, financial, and professional burden.

MATERIALS AND METHODS

Study Design and Participants

Institutional Ethical Committee approval was obtained before the initiation of the study. This cross-sectional, survey-based study was carried out among RTTs working in various cancer centers across India. Participants were enrolled between February 1, 2021, and April 31, 2021.

Procedures

All members of the Association of Radiation Therapy Technologists of India, an official forum of RTTs, were

invited to participate in the study. Participation in the study was entirely voluntary. Participants were requested to fill the Google forms containing a basic demographic profile and a structured instrument that was designed by a group of oncologists and RTTs (Data Supplement). The instrument used in the study was designed on the basis of the daily experience and challenges faced by the radiation oncology team members at the onset of pandemic. Direct information revealing identity was not sought from the participants to keep the survey anonymous.

The structured instrument was divided into four parts to quantify psychological, social, financial, and professional impact of COVID-19 pandemic. Nine questions that were used to assess psychological impact included fears of getting infection, carrying infection to family members, being quarantined, family members getting quarantined, subsequent waves of COVID-19 disease, losing job, and death. Three questions were included to assess financial impact, consisting of increases in daily expenditure (to purchase grocery items, diet, etc) and special expenditure to combat COVID-19 disease (like purchasing sanitizers, hand rubs, masks etc), along with paying medical bills in an event of acquiring COVID-19 disease. Social impact was assessed with a set of five questions comprising restrictions in social contact, in travel, in family gatherings, and in daily social contact with colleagues and difficulty faced by schooling of children from home. Professional impact was assessed by four different questions comprising difficulties in working for extended hours with PPE kits, frequent hand washing, and frequent sanitization of the working environment including immobilization devices and treatment couch (Data Supplement).

All the responses were recorded on a scale of four points: not at all, a little, quite a bit, and very much. Alongside, questions regarding testing for COVID-19 disease and its

result, health insurance status, and the acceptance of vaccination were asked.

Data Analysis

Responses were collected, and the data were imported from Google forms. Analysis was performed using Statistical Package for Social Sciences software, Version 26. Descriptive statistics such as frequency, percentage, mean value, median values, and standard deviation were used to summarize the results. Responses were clubbed into two categories. Not at all or a little responses were grouped as no to mild form of concern, and quite a bit or very much responses were recorded as moderate to severe form of concern. The chi-square test of independence was used to assess the association of different variables across all the questions of the structured instrument. Odds ratio and 95% CI were calculated using logistic regression analysis to study the effect of variables on the intention of RTTs to take COVID-19 vaccine once it is approved for clinical use. The significance level was set at $P < .05$ ($< 5\%$ significance level).

RESULTS

Of 1,050 RTTs who were invited, 323 (30.7%) participated in the study. Twenty-one forms were incomplete, and hence, 302 participants were included in the final analysis. [Table 1](#) summarizes the sociodemographic profile of participants. The median age of RTTs was 29 years (range 19-60 years), and the majority were in the age group of 20-30 years (60.3%). Of 302 participants, 186 (61.6%) RTTs had health or medical insurance coverage. For those with insurance coverage, 139 (74.7%) RTTs, it was provided by the employer, and only 80 (43%) insurers included COVID-19 coverage. A majority of RTTs, 170 (56.3%), had undergone some form of testing for COVID-19 disease, and 33 (19.4%) were tested positive. Responses for various questions of the instrument are shown graphically in [Figure 1](#), and the summary of the significant association of variables with moderate to severe form of concerns is given in [Table 2](#).

Psychological Impact of COVID-19 Disease on RTTs

More than two third of the RTTs showed concern regarding getting COVID-19 disease either outside the hospital premises ($n = 210$, 69.5%) or from patients or attendants ($n = 220$, 72.8%). Professionals having an experience of > 5 years showed a significant form of moderate to severe fear of getting infection either outside the hospital ($P = .040$) or from a patient ($P = .049$).

A majority of RTTs showed very much concern for carrying the infection to family members ($n = 106$, 35.1%) and for family members being quarantined ($n = 101$, 33.4%). Women had significantly higher fears of being quarantined either themselves ($P = .035$) or family members ($P = .022$) and of the subsequent waves of COVID-19 pandemic ($P = .017$). Those who had senior citizens in the family expressed moderate to severe form of concern for subsequent waves of COVID-19 disease ($P = .032$) and losing the

current job ($P = .033$). The moderate to severe level of fear about losing the job was seen in those who were working in the private setup ($P = .000$) and in younger RTTs (age ≤ 35 years; $P = .032$).

Although 188 (62.2%) RTTs expressed not at all concern for death in the pandemic, those who had school-going child in the family ($P = .011$) and were age > 35 years ($P = .004$) were having significantly moderate to severe form of concern about death.

Financial Impact of COVID-19 Disease on RTTs

More than one third of RTTs expressed very much concern about increased financial burden in the form of increase in daily expenditure ($n = 108$, 35.8%) and increase in special expenditure to combat COVID-19 pandemic ($n = 94$, 34.1%). Various factors including age ≤ 35 years ($P = .012$), living in a tier 1 city ($P = .028$), working in a private setup ($P = .000$), having senior citizens in the family ($P = .010$), and lacking the coverage of COVID-19 disease in health insurance ($P = .010$) were significantly associated with moderate to severe increase in daily expenditure.

Social Impact of COVID-19 Disease on RTTs

Analyzing the social impact, 92 (30.5%) participants scored very much concern toward newly imposed restrictions in the daily social contact with neighborhood and friends, 104 (34.4%) expressed very much concern for restrictions in travel, and 99 (32.8%) showed very much concern for restrictions in the gatherings of family and friends. Particularly those RTTs who had COVID-19 coverage in the health insurance scheme had moderate to severe concern for the imposed restrictions in the daily social contact with friends ($P = .039$) and in gatherings of friends and family members ($P = .038$).

Among the responders, 146 (48.4%) reported not at all worry toward schooling of children from home, but those RTTs who were in profession for > 5 years had significantly higher moderate to severe concern for the same ($P = .049$). Moderate to severe form of concern in daily social contact with other colleagues was observed in 133 (44.1%) RTTs, and factors like having school-going child in the family ($P = .003$), female gender ($P = .005$), living in tier 1 city ($P = .038$), and working in a government setup ($P = .035$) showed a significant association.

Professional Impact of COVID-19 Disease on RTTs

Regarding implementing preventive measures and following newer guidelines to combat COVID-19 disease, most of the RTTs ($n = 131$, 43.4%) were "Not at all" worried about frequent hand washing, but RTTs age > 35 years ($P = .028$) and those who are in profession for > 5 years ($P = .041$) were having significantly higher moderate to severe difficulty in frequent hand washing. Ninety-eight (32.4%) were very much concerned for wearing appropriate PPE kits for extended hours at their workplace, and

TABLE 1. Sociodemographic Profile of Participant Radiation Therapy Technologists N = 302

Characteristic	No. (%) Participants
Age, years	
≤ 35	246 (81.5)
≤ 25	84 (27.8)
25-35	162 (53.6)
> 35	56 (18.5)
36-50	45 (14.9)
> 50	11 (3.6)
Sex	
Male	236 (78.1)
Female	66 (21.9)
Marital status	
Single	132 (43.7)
Married	170 (56.3)
Radiotherapy setup	
Government	103 (34.1)
Private hospital	199 (65.9)
Geographical distribution of radiotherapy setups	
West zone	106 (35.1)
South zone	86 (28.5)
North zone	63 (20.9)
East zone	29 (9.6)
Central	09 (2.9)
North-east zone	07 (2.3)
Unknown	02 (0.7)
Classification of city	
Tier 1	166 (54.9)
Tier 2	92 (30.5)
Tier 3	44 (14.6)
Years in profession	
≤ 5	134 (44.4)
> 5	168 (55.6)
No. of dependent family members	
None	14 (4.6)
Yes	288 (95.4)
1	11 (3.6)
2	47 (15.5)
3	64 (21.2)
4	76 (25.2)
≥ 5	90 (29.9)
No. of school-going children in the family	
None	185 (61.3)
Yes	117 (38.7)

(Continued in next column)

TABLE 1. Sociodemographic Profile of Participant Radiation Therapy Technologists N = 302 (Continued)

Characteristic	No. (%) Participants
1	62 (20.5)
2	45 (14.9)
> 2	10 (3.3)
No. of senior citizens in the family	
None	97 (32.1)
Yes	205 (67.9)
1	92 (30.5)
2	105 (34.8)
> 2	8 (2.6)
Comorbidities	
None	199 (65.9)
Yes	103 (34.1)
Coronary artery disease	4 (1.3)
Diabetes	31 (10.3)
Hypertension	29 (9.6)
Neuromuscular diseases	6 (2)
Hyperthyroidism	1 (0.3)
Psychiatric illness	1 (0.3)
Others	31 (10.3)

particularly, those who were living in tier 1 city had significantly higher concern ($P = .002$). Ninety-four (31.1%) and 106 (35.1%) RTTs were “Not at all” facing any difficulty in handling an extra responsibility in the form of ensuring sanitization of immobilization devices and treatment area, respectively.

Intention of Getting COVID-19 Vaccine

Of 302, 171 (56.6%) were interested in taking COVID-19 vaccine, 107 (35.4%) were not in favor of taking it, and 24 (8%) were unable to decide. Younger RTTs with age ≤ 35 years ($P = .045$), having senior citizens in the family ($P = .049$), those who were having moderate to severe concerns for restrictions of gatherings ($P = .014$), and daily social contact with colleagues ($P = .049$) were positively interested in taking vaccination (Table 3).

DISCUSSION

The present study included RTTs from different parts of a country. The study was carried out in a relatively later phase of COVID-19 pandemic. It has been already observed that cancer care has faced a detrimental effect in the COVID-19 pandemic.¹⁰ During the active phase, reorganization of oncologic facilities to limit the spread of the virus, modifications in the decision with an emphasis on teleconsultation, decreased overall screening programs, and restrictions of inpatient care certainly hampered oncologic services including

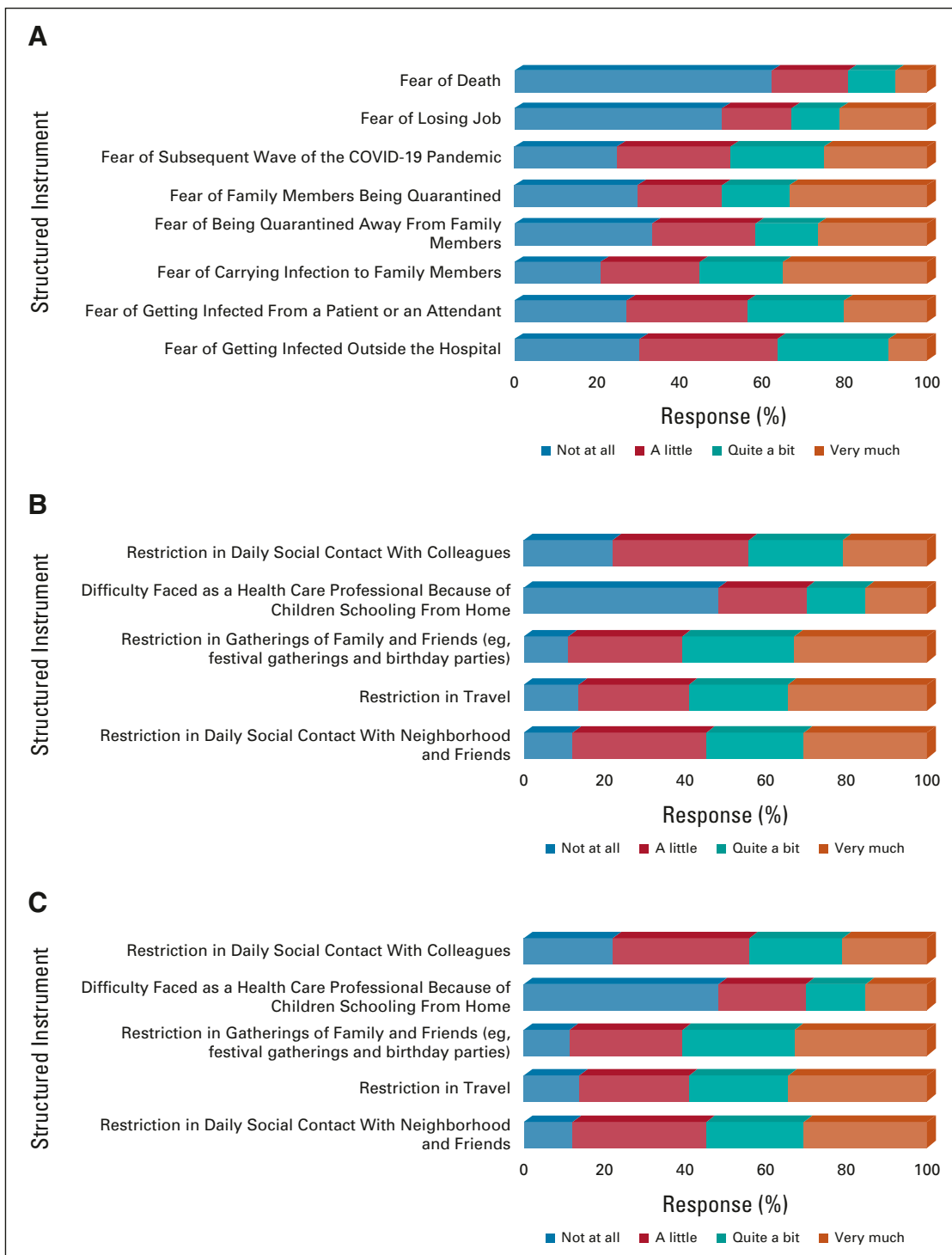


FIG. 1. (A) Responses for the instrument to assess psychological response. (B) Responses for the instrument to assess professional and financial impact. (C) Responses for the instrument to assess social impact.

radiation treatment facilities.^{2,20} Alongside, emergence of this unfamiliar situation, imposition of social restrictions, and implementation of unaccustomed preventive and precautionary measures had a negative impact on mental

health of HCWs of radiation oncology, resulting in higher levels of anxiety and distress^{6,14,16-18} (Table 4). However, it was believed that the negative impact of the pandemic will last for a longer duration,²⁰ and this study was carried

TABLE 2. Factors Having Significant Association With a Higher Level of Concerns (quite a bit or very much responses)

Instrument Question	Factors Showing Significant Association	Chi-Square Test	P
Psychological impact			
Fear of getting infected outside the hospital	Professional experience > 5 v ≤ 5 years	41.6% v 30.1%	.040
	Health insurance coverage by the employer No v yes	42.4% v 31.3%	.045
Fear of getting infected from a patient or attendant	Dependent family members ≤ 3 v > 3 members	53.7% v 35.5%	.002
	Professional experience > 5 v ≤ 5 years	48.8% v 37.5%	.049
	COVID-19 test result Negative v positive	50.8% v 38.2%	.030
Fear of carrying infection to family members	Age of RTT > 35 v ≤ 35 years	33.3% v 16.1%	.004
	School-going child in the family Yes v none	26.5% v 14.6%	.011
Fear of being quarantined away from family members	Sex of RTT Female v male	53% v 38.6%	.035
	Marital status Married v unmarried	48.23% v 33.3%	.013
Fear of family members being quarantined	Sex of RTT Female v male	62.1% v 46.2%	.022
	Professional experience > 5 v ≤ 5 years	50% v 31.6%	.001
	Residential location of RTT Tier 1 v tier 2 v tier 3	55.4% v 46.7% v 34.1%	.034
Fear of subsequent waves of COVID-19 pandemic	Sex of RTT Female v male	60.6% v 44.1%	.017
	Senior citizens in the family Yes v no	52% v 38.8%	.032
	Having comorbidities Yes v no	59.2% v 41.7%	.004
Fear of losing job	Age of RTT ≤ 35 v > 35 years	35.5% v 20.4%	.032
	Professional institute Private v government setup	41.2% v 16.5%	.000
	Senior citizens in the family Yes v no	36.8% v 24.5%	.033
Fear of death	School-going child in the family Yes v no	26.5% v 14.6%	.011
	Age of RTT > 35 v ≤ 35 years	33.3% v 16.1%	.004
Financial impact			
Increase in daily expenditure (like grocery, diet, etc) with decreases in income	Age of RTT ≤ 35 v > 35 years	61.3% v 42.6%	.012
	Residential location of RTT Tier 1 v tier 2 v tier 3	63.9% v 46.7% v 59.1%	.028
	Professional institute Private v government setup	65.3% v 43.7%	.000
	Senior citizens in the family Yes v no	62.3% v 49%	.029
	COVID-19 coverage in health insurance No v yes	62.3% v 45.6%	.010
	COVID-19 test result Negative v positive	65.7% v 42.4%	.014
Increase in special expenses to combat the COVID-19 pandemic (both therapeutic and preventive, like use of sanitizer/mask/hand rubs/medicines)	Dependent family members > 3 v ≤ 3 members	63.9% v 52.9%	.049

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TABLE 2. Factors Having Significant Association With a Higher Level of Concerns (quite a bit or very much responses) (Continued)

Instrument Question	Factors Showing Significant Association	Chi-Square Test	P	
Paying medical bills in the case of acquiring COVID-19 disease	Professional institute	Private v government setup	46.7% v 23.3%	.000
	Senior citizens in the family	Yes v no	44.6% v 26.5%	.003
Social impact				
Restriction in daily social contact with neighborhood and friends	COVID-19 coverage in health insurance	Yes v no	64.6% v 51.1%	.039
Restriction in gatherings of family and friends (eg, festival gatherings and birthday parties)	Residential location of RTT	Tier 1 v tier 2 v tier 3	66.9% v 51.1% v 56.8%	.039
	COVID-19 coverage in health insurance	Yes v no	66.9% v 55.2%	.038
Difficulty faced as a health care professional because of children schooling from home	Professional experience	> 5 v ≤ 5 years	55.6% v 36.1%	.049
Restriction in daily social contact with colleagues	School-going child in the family	Yes v none	54.7% v 37.3%	.003
	Sex of RTT	Female v Male	59.1% v 39.8%	.005
	Residential location of RTT	Tier 1 v tier 2 v tier 3	50.6% v 37% v 34.1%	.038
	Professional experience	Government v private setup	52.4% v 39.7%	.035
Professional impact				
Difficulty in working for extended hours with PPE kits/N95 mask/face shield	Residential location of RTT	Tier 1 v tier 2 v tier 3	66.9% v 46.7% v 47.7%	.002
Difficulty in frequent hand washing	Age of RTT	> 35 v ≤ 35 years	44.4% v 29%	.028
	Professional experience	> 5 v ≤ 5 years	36.7% v 25.7%	.041
Difficulty in handling extra responsibility such as to ensure sanitization of thermoplastic mask/other immobilization devices	Residential location of RTT	Tier 1 v tier 2 v tier 3	49.4% v 34.8% v 31.8%	.023
	Professional experience	> 5 v ≤ 5 years	48.8% v 34.6%	.013

Abbreviations: PPE, personal protective equipment; RTT, radiation therapy technologist.

out in a phase of pandemic where all restrictions were lifted and vaccination strategies were introduced. The study has highlighted some interesting findings.

One of the key findings of the study was that RTTs with a higher professional experience and advanced age faced a higher difficulty in COVID-19 appropriate adaptation, which resulted in a higher fear among themselves of getting infection

TABLE 3. Factors Significantly Associated With an Intention to Get COVID-19 Vaccine

Parameter	OR (95% CI)	P
Age ≤ 35 years	0.859 (0.808 to 0.903)	.045
Senior citizens in the family	0.343 (0.112 to 1.048)	.049
Moderate to severe concern for restriction in gatherings of family and friends	2.875 (1.202 to 6.877)	.014
Moderate to severe concern for restriction in daily social contact with colleagues	2.40 (0.947 to 6.083)	.049

Abbreviation: OR, odds ratio.

and carrying infection to other household members and higher level of fear of death. On the other hand, younger RTTs with probable lesser salaries and lesser financial backup had difficulty in managing finances and fear of losing job in the pandemic. Family composition and social and domestic responsibilities of HCWs resulted in the increased level of psychosocial and financial burden, where women were more worried for being quarantined and faced a higher level of restrictions in social contact with colleagues and those having higher dependent household members had a higher financial concern, resulting in a higher level of fear of losing job and subsequent waves of COVID-19 disease. Professional environment also determined the concerns of RTTs. Those who were having government jobs had a higher level of financial security as they were able to manage increased financial expenditure more efficiently, compared with those working in corporate/private setups. A similar higher level of concerns was observed for RTTs working in metropolitan cities/tier 1 cities. Many factors appeared to be responsible. First, metropolitan cities were the worst affected cities during the early phase of the pandemic in India, resulting in higher levels of

TABLE 4. Studies Addressing the Impact of COVID-19 Disease on Radiation Oncology Staff

Author	Participants	Study Timescale	Structured Questionnaires That Were Used	Highlights of Responses of Participants
Jazieh et al ¹⁶	N = 1,010 oncologists (64.5% were clinical oncologists) from Middle East, North Africa, Brazil, and Philippines	Between April 24 and May 15, 2020	Tool with 42 questions to assess knowledge, attitude and practice, experience of pandemic, and its impact on their lives	<p>Fear of contracting the virus: mildly in 62%, extremely in 30%</p> <p>Fear of transmitting virus to family: 84.85%</p> <p>Negative impact of pandemic on psychosocial factors:</p> <ol style="list-style-type: none"> 1. Relation with coworkers: 15.84% 2. Relation with family: 27.84% 3. Emotional and mental well-being: 48.51% 4. Financial income: 52.28% <p>Intention to take COVID-19 vaccine: 76.93%</p>
Hilmi et al ¹⁸	N = 222 oncologic residents of France (medical: 61% and radiation therapists: 39%)	Between May 4 and 14, 2020	Tool with 39 questions to determine psychological and professional difficulties, HADS, and virtual VAS	<p>Facing ethical issues: 70%</p> <p>Worried about own health: 35%</p> <p>Psychological distress: 23%</p> <p>According to the HDAS scale, anxiety: 32% and depression: 17%</p> <p>Increase in consumption of addictive:</p> <ol style="list-style-type: none"> 1. Tobacco: 31% 2. Psychostimulants: 24% 3. Alcohol: 29%
Wadasadawala et al ¹⁴	N = 758 HCWs working in the Department of Radiation Oncology from 29 cancer care centers of Bangladesh, India, Indonesia, and Nepal	Between May 16 and July 25, 2020	7-item GAD, 9-item PHQ, and 22-item IES-R to assess anxiety, depression, and post-traumatic stress disorder	<p>Moderate to severe levels of</p> <ol style="list-style-type: none"> 1. Anxiety: 34.8% 2. Depression: 31.2% 3. Stress: 18.2% <p>Severe personal concerns: 60.9%</p> <p>Factors that predicted increase in anxiety, depression, and stress:</p> <ol style="list-style-type: none"> 1. Presence of commonly reported symptoms of COVID-19 disease in the past 2 weeks 2. Contact history 3. Compliance with precautionary measures
Selvaraja et al ¹⁷	N = 82 radiation oncologists of India	Between July 14 and 21, 2020	A tool consisting of 23 questions to assess the impact on routine work, practice, and mental state	<p>Reduction in cancer screening: 91.9%</p> <p>Reduction in new cases: 53.7%</p> <p>Satisfaction about safety: 42.7%</p> <p>Worried about patient's safety: 43.9%</p> <p>Fear of contracting infection: 69.5%</p> <p>Fear of transferring infection to family: 78%</p> <p>Satisfaction for patient care: 41.4%</p>

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TABLE 4. Studies Addressing the Impact of COVID-19 Disease on Radiation Oncology Staff (Continued)

Author	Participants	Study Timescale	Structured Questionnaires That Were Used	Highlights of Responses of Participants
Akudjedu et al ⁶	N = 522 radiographers (diagnostic: 78.9% and therapeutic: 21.1%) of United Kingdom (England, Wales, Scotland, and Northern Ireland)	Between March 25 and April 26, 2020	A tool to get information of demographics and impact of pandemic on professional practice, infection control, and stress	<p>Strongly agree that radiographers are a part of major frontline HCWs: 85.7%</p> <p>Agreed for having good understanding of mode of transmission: 83.6%</p> <p>Agreed of having adequate understanding of IPC: 62.5%</p> <p>Received specific training for safe handling of patients with COVID-19 disease: 48.3%</p> <p>Agreed of having adequate PPEs at workplace: 50.4%</p> <p>Perceived level of stress did not differ between diagnostic and therapeutic radiographers</p> <p>Major stressors:</p> <ol style="list-style-type: none"> 1. Fear of contracting infection (both diagnostic and therapeutic radiographers) 2. Perceived inadequacy of PPE (both diagnostic and therapeutic radiographers) 3. Staff testing for COVID-19 (and therapeutic radiographers)

Abbreviations: GAD, Generalized Anxiety Disorder; HADS, Hospital Anxiety and Depression scale; HCW, health care workers; IES-R, impacts of Events Scale-Revised; IPC, infection prevention and control; PHQ, Patient Health Questionnaire; PPE, personal protective equipment; VAS, visual analog scale.

psychosocial distress.¹⁴ Second, as most of the health care facilities are concentrated in tier 1 cities, these centers already experience a higher patient load. This trend must have continued during the pandemic as well. Hence, because of higher professional burden, RTTs had significantly higher professional difficulty in ensuring appropriate sanitization of the working environment and wearing PPE kits for extended hours. Third, the cost of living in tier 1 city is always a point of concern, particularly in the pandemic situation, when various restrictions were imposed to contain the infection, cost of living must have increased, resulting in a higher financial burden.

Other studies that were carried out during an early phase of pandemic showed similar results (Table 4). It was observed that more than two third of all HCWs of radiotherapy fraternity had fear of contracting COVID-19 disease^{16,17} and more than one third had fear of transferring virus to family members,^{16,17} resulting in moderate to severe form of anxiety in more than one third of HCWs.^{14,18} Along with these, more than half had observed a decrease in patient safety¹⁷ and professional satisfaction.¹⁷ Behavioral changes were also observed in a significant proportion of HCWs,¹⁸ leading to an increase in consumption of psychostimulants and other addictive substances.¹⁸ Although most of the radiographers/RTTs were having a good understanding and knowledge of mode of transmission of infection⁶ and infection control/preventive measures,⁶ more than half felt a lacking in the

targeted training for safe handling of the patients with COVID-19 disease⁶ and more than half were not receiving an adequate supply of PPE kits.⁶

More than half of RTTs were willing to take COVID-19 vaccine; those with younger age (≤ 35 years), having senior citizens in the family, those having higher social concern for restrictions of family gatherings, and social communication with colleagues showed a positive intent. The timing of the study was believed to be one of the limiting factors for this outcome. As it was carried out at the onset of vaccination strategies and unavailability of robust safety and efficacy data, it might have resulted in an apprehension toward easy adaptation for the vaccination policy.

In a similar study where the impact of COVID-19 disease during an early phase of pandemic was assessed on oncologists, factors such as male gender ($P < .001$), clinical oncologists ($P = .022$), > 11 years in practice ($P = .001$), taking flu vaccine regularly ($P < .001$), and having COVID-19-infected coworker ($P < .001$) were significantly associated with a positive intent to take COVID-19 vaccine.¹⁶

Penetration of insurance among RTTs appears to be reasonably low. Only two third of the population was covered by insurance schemes, which resulted in significantly higher fear of getting infection and in restrictions of social contact. An initiative to enhance the penetration of insurance among all HCWs is warranted, and along with coverage of other health-

related ailments, inclusion of COVID-19–related ailments in insurance schemes is desired.

The strength of the study is that we have addressed a selective group of HCWs having a relatively homogenous population. This cross-sectional study was carried out at an important phase of the pandemic; with the subsidizing initial phase and withdrawal of most of the restrictions, it is expected that all cancer care facilities will resume their performance to pre-COVID-19 era and this will increase professional and social burden on HCWs. However, the captured information at a specific time frame is going to change as the pandemic evolves and a follow-up re-evaluation is needed.

One of the major limitations of the study was pretested, validated questionnaire was not used, and rather as discussed earlier, a structured instrument specifically designed by the team of RTTs and oncologists was used to capture the information. Hence, we acknowledge the shortcomings of such a questionnaire in the form of noninclusion of some psychological and financial elements such as depression, anxiety, and the impact of frequent COVID-19 testing or lower pay rolls. Although a lower response rate was observed for the survey, the number of responses still qualifies for a reasonably important outcome.

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EQUAL CONTRIBUTION

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On the basis of the acquired knowledge through this study, psychotherapeutic interventions depending on the severity of concerns for RTTs are strongly recommended. Maintenance of a healthy compassionate professional environment; close group discussions with colleagues, friends, and seniors; meditation to relax the mind and body; engagement in hobbies and passions; and an early referral to professionals for psychotherapy on a case-to-case basis will certainly benefit.

In conclusion, this survey has demonstrated that COVID-19 pandemic adversely affected a majority of radiographers/RTTs downgrading their psychosocial, financial, and professional well-being and the sustained ill aftereffects of the pandemic still continued even after subsidizing the initial wave. Considering the critical role played by radiographers/RTTs in sustaining oncologic services, utmost care needs to be provided to them and a timely intervention in the form of increasing awareness, progressive knowledge regarding disease spectrum, preventive measures, involvement in various insurance/health schemes, and utmost provision of work-friendly atmosphere is warranted.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](http://OpenPayments)).

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