

**THE MENTAL HEALTH OF RADIATION THERAPY WORKERS AFTER
PANDEMIC COVID-19: RESULTS OF A MULTICENTER STUDY****SAÚDE MENTAL DE TRABALHADORES DE RADIOTERAPIA APÓS PANDEMIA
POR COVID-19: RESULTADOS DE UM ESTUDO MULTICÊNTRICO****SALUD MENTAL DE LOS TRABAJADORES DE RADIOTERAPIA TRAS LA
PANDEMIA POR COVID-19: RESULTADOS DE UN ESTUDIO MULTICÉNTRICO**

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ABSTRACT

Objective: To assess the levels of resilience, quality of life (QoL), anxiety and depression of radiotherapy workers after the COVID-19 pandemic. **Method:** Cross-sectional study, carried out with 49 workers from three oncological hospitals. Four questionnaires were applied from a survey sent by message. For the analysis of the results, descriptive statistics, comparison tests, and Linear and Logistic Regression Models were used. **Results:** Workers had moderate to high levels of anxiety and QoL and 28.6% had depression. Married participants were related to better levels of anxiety and QoL, and those who had children were 3.57 times more likely to have high resilience. **Conclusion:** High levels of resilience, QoL and lower presence of anxiety and depression can be observed. Actions aimed at continuous assessment and improvements in mental health of radiotherapy workers are necessary to avoid new cases of burnout and an increase in the number of days off work.

Descriptors: COVID-19; Radiotherapy; Mental Health; Occupational Health.

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RESUMO

Objetivo: Avaliar os níveis de resiliência, qualidade de vida (QV), ansiedade e depressão de trabalhadores de radioterapia após pandemia por COVID-19. **Método:** Estudo transversal, realizado com 49 trabalhadores de três hospitais oncológicos. Aplicou-se quatro questionários a partir de uma *survey* enviada por mensagem. Para análise dos resultados, utilizou-se estatística descritiva, testes de comparação, bem como Modelos de Regressão Linear e Logística. **Resultados:** Os trabalhadores apresentavam níveis moderados a elevados de ansiedade e QV e 28,6% apresentavam depressão. Participantes casados foram relacionados a melhores níveis de ansiedade e QV, sendo que quem tinha filhos apresentavam 3,57 vezes mais chance de ter alta resiliência. **Conclusão:** Pode-se observar altos níveis de resiliência, QV e menor presença de ansiedade e depressão nos participantes. Ações voltadas para avaliação contínua e melhorias da saúde mental dos trabalhadores em radioterapia são necessárias para evitar novos casos de burnout e aumento do número afastamento entre esses profissionais.

Descritores: COVID-19; Radioterapia; Saúde mental; Saúde ocupacional.

RESUMEN

Objetivo: Evaluar los niveles de resiliencia, calidad de vida (CV), ansiedad y depresión de trabajadores de radioterapia tras la pandemia de COVID-19. **Método:** Estudio transversal con 49 trabajadores de tres hospitales oncológicos. Se aplicaron cuatro cuestionarios enviados por mensaje. Para el análisis se utilizó estadística descriptiva, pruebas de comparación, así como Modelos de Regresión Lineal y Logística. **Resultados:** Los trabajadores tenían niveles moderados/altos de ansiedad y CV y el 28,6% tenía depresión. Los participantes casados se relacionaron con mejores niveles de ansiedad y CV, y los que tenían hijos tenían 3,57 veces más probabilidades de tener resiliencia alta. **Conclusión:** Se observan altos niveles de resiliencia, CV y menor presencia de ansiedad y depresión. Son necesarias acciones encaminadas a la evaluación continua y la mejora de la salud mental de los trabajadores de radioterapia para evitar nuevos casos de burnout y un aumento del número de días de baja laboral.

Descriptores: COVID-19; Radioterapia; Salud mental; Salud Ocupacional.

INTRODUCTION

The first COVID-19 case was detected in Brazil on February 26, 2020, about two months after the first alerts in China. With the pandemic declared, the crisis that took hold in health systems around the world was notorious, affecting the treatment of various chronic diseases, including cancer diagnosis and treatment.¹

In this context, with the absence of well-established safety measures and the lack of a vaccine, there has also been an

impact on the mental health of health professionals, with reports of fear of exposure to the virus and the risk of taking the infection home, altered levels of anxiety, stress, sleep quality and motivation to work.²⁻³ In oncology, these symptoms can be exacerbated because, in addition to the threat of imminent personal infection, the professional has to deal with the patient's vulnerability to infection and the need to suspend cancer treatment, with the possibility of disease progression and the

risk of death.^{1,4} If these symptoms persist over time, the feeling of being out of control can increase, leading to exhaustion and, consequently, burnout syndrome and increased depression.⁵ However, not all people exposed to high negative impacts or difficult situations develop such symptoms, and resilience is a protective factor.⁶

Resilience can be understood as "a personality trait that describes an individual's ability to cope with stressful situations".⁷ It can vary from person to person, according to factors such as personality or social and interpersonal environment.

Studies have shown that higher levels of resilience can be related to less irritability, better interpersonal relationships, less musculoskeletal pain, and lower levels of depression.⁸⁻⁹ One of the ways to promote it is to increase the sense of control over the adverse situation, becoming aware of the possibility of protecting oneself with resources available in the department (such as personal protective equipment and changes in the flow of care for people with suspected or confirmed COVID-19 infection), targeted psychological therapies, among others.^{3,7}

In the meantime, considering the low number of studies carried out with employees of radiotherapy departments in Brazil, the post-pandemic state and the impact on mental health that it has brought

worldwide, it is hypothesized that workers in radiotherapy departments will have high levels of anxiety, presence of depression, lower quality of life and regular state of resilience.

Thus, this study aimed to analyze the levels of resilience, quality of life, anxiety and depression of professionals working in radiotherapy and their relationship with sociodemographic, health and professional training data, after one year of the COVID-19 pandemic.

METHODS

This is a cross-sectional, multicenter study carried out in the Radiotherapy Departments of three cancer hospitals located in Barretos (SP), Jales (SP) and Porto Velho (RO), all under the management of the Pio XII Foundation (Hospital de Amor). The sample was obtained by convenience, as there were no published studies with this audience during the project's planning period that could be used as a basis for sample calculation. Data was collected between May and June 2021. All radiotherapy department employees over the age of 18 were invited to take part in the study, regardless of the position they held, and it was therefore by convenience. One participant was excluded for not completing any of the study questionnaires.

A sociodemographic and professional questionnaire (gender, age group, level of

education, marital status, number of children, whether they live with people in the COVID-19 risk group, personal or family history of COVID-19, workload per week, number of jobs, job group and fears in relation to COVID-19) was used to collect the data.

To assess quality of life, we used the *World Health Organization Quality of Life* (EUROHISQOL 8-item) instrument, created by 15 centers around the world and in 20 languages. Its headquarters in Brazil are located in Rio Grande do Sul, where its Portuguese version was developed by the Federal University of Rio Grande do Sul.¹⁰ It consists of eight questions, two from each of the domains (physical, psychological, social relations and environment). The questions are formulated in Likert-type scales. The total score is obtained by averaging the scores for each item, with higher averages suggesting a better perception of quality of life.

The Hospital Anxiety and Depression Scale (HAD) was used to assess levels of anxiety and depression.¹¹ This is a self-assessment instrument made up of 14 multiple-choice questions, seven of which are aimed at assessing anxiety and seven at depression. Each item can be scored from zero to three, giving a maximum score of 21 points for each subscale. The levels of anxiety and depression can then be graded as None, Mild, Moderate or Severe.

In order to assess the participants' *resilience in the face of the Covid-19 pandemic*, the *Connor-Davidson Resilience Scale* (CD-Risc) was used.¹² This is an instrument made up of 25 items referring to the most recent reality, and the respondent is asked to mark the option that reveals how they would have felt if the proposed situations had not occurred. The items are scored on a 5-point Likert scale, which quantifies resilience in the context of exposure to trauma, totaling a final score of 0 to 100 points. It is worth noting that high scores indicate high resilience.

The consent process, as well as data collection, was carried out via the Research Electronic Data Capture (REDCap) survey.¹³ This process was chosen because it allowed employees to access the survey at any time or place that best suited their routine, whether by computer, tablet or cell phone, as well as protecting participants and the research team from unnecessary contact in order to carry out the study procedures. The link to access the invitation was made available via WhatsApp. The lead researcher was added to a group on this communication tool, which included employees from these sectors. This group already existed to facilitate the dissemination of internal communications by the radiotherapy coordinators. The study was approved by the Research Ethics Committee (Opinion 4.725.785) and followed all the precepts of

Resolution 466/2012, Resolution 510/2016 and Circular Letter 1/2021.

The data was analyzed using SPSS 24 software, with a significance level of 0.05 for all analyses. A descriptive analysis of the data was carried out, considering measures of central tendency (mean and median), measures of dispersion (standard deviation, maximum and minimum), absolute and relative frequencies.

Fisher's exact test and the Kruskal-Wallis test were used to analyze the relationship between quality of life, anxiety, depression and resilience (outcome variables) and sociodemographic, work and health characteristics (exposure variables). A Linear Regression Model was also proposed to assess the impact of each exposure variable on the level of resilience and quality of life. A Logistic Regression Model was also used to assess the presence of anxiety or depression. Variables showing an association with a significance level of 20% in the univariate analysis were included in the multivariate models to investigate independent associations with a significance level of 5%.

RESULTS

A total of 49 employees took part in the study, most of whom were female (71.4%, n=35), aged up to 44 (93.9%, n=46), had completed higher education (71.4%, n=35), were married or in a stable union

(55.1%, n=27) and had no children (61.2%, n=30). As for professional characteristics, the majority were physicists, radiology technicians and dosimetrists (63.3%, n=31), working between 40 and 44 hours a week (59.2%, n=29), in just one job (n=93.9%, n=46), with direct contact with patients (89.8%, n=44).

In relation to Covid-19, 63.3% (n=31) had not had the disease, 93.9% (n=46) had already been vaccinated, had not lost a close friend or family member due to Covid-19 (65.3%, n=32), did not live with people in the risk group for the disease (65.3%, n=32), but a close family member had already been infected (69.4%, n=34).

Some of the employees had already been diagnosed with a psychological disorder before the pandemic (22.4%, n=11), but were not currently undergoing psychological or psychiatric care. The majority also had no anxiety or depression at the time of data collection (51.1%, n=25 and 71.4%, n=35, respectively). However, 20.4% (n=10) had moderate to severe anxiety and 22.5% (n=11) mild to moderate depression. No participants had severe depression.

The average resilience score was 68.78 (± 16.09), with 87.8% (n=43) showing moderate to high levels. When assessing quality of life, the average score was 3.68 (± 0.60), within a total score ranging from 0 to 5.

The results of the univariate analysis indicated that marital status married/stable union and currently undergoing psychological/psychiatric care were possible indicators for lower depression *scores*; and marital status married/stable union and having children were significant for having high resilience, all at a significance level of 20%.

For the multivariate model, using the backward method, the variables that were significant in the univariate analysis were tested. Thus, employees who underwent psychological/psychiatric care were 0.15 times more likely to have a depression *score* greater than 9 points ($p < 0.05$) (table 1).

Table 1 - Multivariate regression analysis of factors associated with depression *score*. Barretos, 2021.

<i>Variables</i>	Depression Score 0 to 8 points		Depression Score > 9 points		OR	CI (95%)	<i>p</i>
	n	%	n	%			
Marital status							
Single	11	31,4	8	72,7	1	-	-
Married/Stable Union	22	62,9	3	27,3	0,263	0,05-1,30	0,102
Separated/Divorced	2	5,7	0	0,0	0,00	0,00	0,999
Psychological/psychiatric follow-up							
Yes	4	11,4	5	45,5	0,17	0,03-1,00	0,050
No	31	88,6	6	54,5	1		

In addition, employees who have children are 3.57 times more likely to have high resilience (table 2). For anxiety and

quality of life, there were no statistically significant variables.

Table 2 - Multivariate regression analysis of factors associated with resilience. Barretos, 2021.

<i>Variables</i>	None or Moderate Resilience		High Resilience		OR	CI (95%)	<i>p</i>
	n	%	n	%			
Marital status							
Single	15	53,6	3	17,6	3,02	0,53-17,04	0,457
Married/Stable Union	13	46,4	12	70,6	2,08	0,43-10,03	0,210
Has children							
Yes	8	28,6	10	58,8	3,57	1,01-12,67	0,049

DISCUSSION

In this study, we investigated the profile and potential factors that may be associated with levels of anxiety, depression, resilience and quality of life in radiotherapy workers. We found that the professionals had high levels of resilience, moderate to high quality of life and the presence of anxiety and depression in less than half of the participants. Marital status was the most relevant variable for lower levels of anxiety and higher levels of quality of life and resilience, corroborating the literature.¹⁴

Regarding their emotional state after the pandemic, we observed that almost half of the employees had anxiety, had a moderate to high level of resilience and rated their quality of life with an average score of 3.68, on a scale of 0 to 5. These results are similar to other studies carried out internationally, in which the rates of workers with anxiety and depression ranged from 30 to 32% and 17% to 34%, respectively.¹⁵⁻¹⁶

However, a similar study carried out to verify the impact of the COVID-19

pandemic on the mental health of workers in a radiotherapy department, one year after the Lockdown in Italy, showed that up to 33% of participants reported post-traumatic symptoms and up to 50% experienced high levels of burnout.¹⁷ Although in this study we didn't assess the presence of post-traumatic stress and burnout, the lower frequency of anxiety and depression and greater resilience and quality of life may be associated with the support that the employees of the three institutions had, such as support groups for psychological therapy and integrative therapy with *mindfulness*. Another study of medical residents in clinical oncology and radiotherapy in France showed that 32% were classified as anxious and 17% as depressed, according to the HADS scale. In addition, radiotherapy residents were called in less frequently for Covid shifts, worked fewer hours and fewer night shifts and had more free time for their private lives compared to clinical oncology residents.¹⁸

In oncology, workers face suffering, sadness, the uncertainty of a cure and death

on a daily basis. Over the years, international research has shown that professionals in this field suffer more from stress and burnout than other professionals.¹⁹⁻²⁰ This daily exposure to negative factors ends up generating higher levels of resilience, which may explain the findings of this study.

In addition, good working conditions, with access to adequate personal protective equipment, are directly linked to lower levels of stress, anxiety and burnout.¹¹ The centers studied are regional treatment references, with a high daily flow of cancer patients, as well as a humanized relationship between the team and the patient. These factors may have been decisive for the development of resilience and low levels of depression among the staff during the period evaluated.

One of the limitations of the study was the low level of participation among employees in the sector, making it impossible to compare professional groups. Another limitation was the lack of information on the initial state of mental health of the professionals, making it impossible to assess the impact of the pandemic on anxiety, depression, resilience and quality of life. However, the research could stimulate discussions that lead to the development of personalized interventions based on real-life snapshot data.

CONCLUSION

Despite the limitations of the study (sample size and lack of data prior to the COVID-19 pandemic), these data are interesting. When assessing the mental health of radiotherapy workers after the start of the pandemic, high levels of resilience, moderate to high quality of life and the presence of anxiety and depression could be observed in less than half of the participants. Employees who were married or in a stable union were significant for lower levels of anxiety and higher levels of quality of life and resilience. In addition, participants who had children were more likely to have high resilience. These results may reflect the daily exposure to negative factors that oncology itself brings to their routine, generating higher levels of resilience, as well as good working conditions, support groups for psychological therapy and integrative therapy with *mindfulness*.

Actions aimed at continuous evaluation and improvement of the mental health of radiotherapy workers are necessary to avoid new cases of burnout and an increase in the number of sick leaves among these professionals. Future studies involving a greater number of multidisciplinary participants are also needed in order to investigate the main factors triggering states of resilience, quality of life, anxiety and depression in this group.

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