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SUBCLINICAL PULMONARY DYSFUNCTION IN RADIOLOGY TECHNICIANS

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ABSTRACT

Pulmonary function tests are widely used to assess possible injuries associated with radiation exposure. In order to answer the research question, the objective was to analyze the prevalence of subclinical pulmonary dysfunction in radiology technicians. This study is an applied research, with quantitative, descriptive, exploratory and cross-sectional approach. The main findings for the unfolding of this research would be the numbers found correlated with the prevalence of ventilatory disorders. However, in the twenty individuals analyzed, only one, corresponding to 5% of the researched population, presented spirometric findings compatible with obstructive ventilatory disorder, and the remaining 95. % with values reaching limits within normal range. From the functional parameters obtained by spirometry, no significant percentages of subclinical pulmonary dysfunction were evidenced in radiology technicians in the city of Vitória da Conquista - BA. That said, the research question that guided this academic effort was answered and all objectives met. The knowledge that this study has generated along with other existing studies, even if scarce and others to come, will provide an overview of the prevalence of subclinical pulmonary dysfunctions in radiology technicians and will contribute to the development of strategies and public policies for prevention.

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INTRODUCTION

The prior identification of risks inherent in the work, which causes damage to the health of workers is one of the main means to prevent illness and ensure the promotion of health at work. Given this, it is understood that the essential point for workers' health is to anticipate the identification of occupational risks to intervene early, in reality, thus developing safe conditions for workers (ANDERSON *et al*., 2016). In a radiology service, the risks are quite broad, as they encompass both the common risks of the hospital working environment as well as specific risks of this activity, such as exposure to ionizing radiation (ANDERSON *et al*., 2016). In living organisms, the incidence of radiation promotes damage to cells by specific mechanisms such as direct and indirect interactions of radiation with the cellular environment (CAMPOS, 2015). With the recent epidemiological transition in Brazil, chronic diseases, including interstitial lung disease (IPD), now occupy the leading position in morbidity and mortality in the country. According to Federal Government sources, a quarter of all hospitalizations for respiratory problems in adults are due to this condition, especially in adults. Given this, IPD is, therefore, a major public health problem, not only because of its high morbidity and mortality but also because it is a preventable disease in many cases (MOREIRA *et al*., 2013). Radiation-induced pulmonary effects can be varied and usually lasting. These include edema, epithelial degeneration, and subsequent regeneration, invasion of the alveoli by the bronchial epithelium, endothelial desquamation, interruption of microvasculature, and atelectasis. Some of these direct and indirect effects can begin in nanoseconds of radiation exposure through free radical induction and associated oxidative stress. In some cases, this injury fails to completely repair/resolve. The tissue enters a progressive and unregulated process that can manifest as acute and late outcomes (MORENO, 2016). Direct interaction consists of the incidence of radiation directly on biological macromolecules such as deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). This interaction causes damage that can be fatal to the cell. DNA damage that does not induce cell death due to physiological repair mechanisms can be transmitted to future cell generations, initiating the process of cell neoplasia (ALCOFORADO, 2016). Pulmonary function tests are widely used to assess possible injuries associated with radiation exposure. One of the main tests of pulmonary

function is spirometry, which is the assessment of the measurement of air that moves in and out of the lungs during several breaths and can be performed during slow breathing or during forced expiratory maneuvers, which allow diagnosis and quantification of ventilatory disorders. Such an examination requires patient understanding and collaboration, accurate equipment and the use of standardized techniques applied by a specialist (PEREIRA, 2002). In this regard, it is known that physical therapy can identify ventilatory disorders through pulmonary function testing and seek prevention strategies for interstitial pulmonary dysfunction in the health field of radiation-exposed workers. Starting from the scientific and clinical subsidies that physiotherapy has, which can be applied in different areas that include workers' health, there are little explored environments, such as hospital radiology and occupational risks of radiology technicians in the field. patient care. Given this problem and gaps in knowledge on the subject, we want through this study to increase the visibility of occupational risks of lung dysfunctions that affect the technical professionals in radiology, contributing to the adoption of measures for their promotion, prevention, and health protection. To answer the research question, the objective was to analyze the prevalence of subclinical pulmonary dysfunction in radiology technicians.

METHODS

This study is applied research, with a quantitative, descriptive, exploratory and cross-sectional approach. The research subjects consisted of a sample of 20 (twenty) radiology technicians in clinics and hospitals in the city of Vitória da Conquista / BA. The inclusion criteria of the research participants were as follows: radiology technicians, who work directly with exposure to radioactivity and exposure to developing process chemicals. Professionals who declared themselves smokers or former smokers and those with a history of pulmonary disease with previous diagnoses were excluded. The research was conducted during office hours, where participants were given a semi-structured questionnaire containing patient-specific information, as well as characteristics and clinical aspects. The evaluation to define the outcomes was performed through spirometry, with the Mini Spir MIR brand. Where in practice it includes pulmonary mechanics tests, FVC (volume and flow), FEV (forced expiratory volume in one second), FEF (forced expiratory flow) and MVV (maximal voluntary ventilation) measurements. After the conduct was fulfilled, the spirometry exam was performed, with the patient in sedation comfortably. It is important to consider that whatever position is adopted should be maintained for future evaluations with the standardization criteria of the exam. In order to perform the exam, the patient was asked to perform a deep inhalation, concomitant with this at this time the nasal clip is attached, the spirometer mouthpiece is attached to the patient's mouth, taking care to avoid air leaks and the tongue to remain under the nozzle, at this time the patient is asked to perform a strong and continuous breath (exhalation) for at least 6 seconds, the amount exhaled in this manner is the FVC. Forced expiratory volume in one second (FEV1) is the amount of air exhaled during the first second of the FVC maneuver. At the end of six seconds of exhalation, the patient is asked to perform a forced inspiration again. This procedure should be performed three times to be considered the best of three, as some patients may have better curves after greater familiarity with the exam.

After the examination, functional parameters of spirometry are obtained, among them, the forced expiratory volume in the first second (FEV1) represents the expired air volume in the first second of the FVC maneuver. FEV1 / FVC is the percentage of expired FVC in the first second. The peak respiratory flow (PEF) represents the maximum airflow during the FVC maneuver. Finally, immediate forced expiratory flow (FEF 25% to 75%) translates forced expiratory flow into the middle portion of forced vital capacity measuring between 25% and 75% of FVC. The data from this research were collected from the population of this research individually following the ethical precepts being submitted and approved by the Ethics and Research Committee (Approval Opinion No.: xxx). Patients were informed about the ethical principles of the research in which the Informed Consent Form was presented and signed. Information such as age, gender, diagnosis, were collected through the questionnaire and examinations presented, it was also clarified the research objectives, their risks, and benefits.

RESULTS

Initially, we sought to elaborate on the profile of the research subjects. In this sense, the sample composed of twenty individuals presented mean age of 34.95 ± 11.29 years, the height of 167.25 ± 8.91 centimeters, the weight of 76.55 ± 14.09 kg and BMI in 27.4 ± 4.28. Regarding gender, the sample is divided equally between males and females. The main findings for the unfolding of this research would be the numbers found correlated with the prevalence of ventilatory disorders. However, of the twenty individuals analyzed, only one, corresponding to 5% of the researched population, presented spirometric findings compatible with an obstructive ventilatory disorder (OVD), and the remaining 95. % with values reaching limits within a normal range.

Table 1. Socio demographic and clinical profile of the sample. Vitória da Conquista – BA, 2019

Variables	AVG ± SD[1]	n	%
Age, years	34,95 ± 11,29	20	—
Height, *cm*	167,25 ± 8,91	20	—
Weight, *Kg*	76,55 ± 14,09	20	—
BMI	27,4 ± 4,28	20	—
Gender			
Male		10	100,0
Female		10	100,0

[1] Sample standard deviation; Source: Research Data, Vitoria da Conquista – BA, 2019.

Table 2. Prevalence of Ventilatory Dysfunctions.Vitória da Conquista – BA, 2019

	Diagnostics	n	%
Ventilatory Dysfunctions	Normal	19	95,0
	OVD	1	5,0

Source: Research Data, Vitoria da Conquista – BA, 2019.

The respiratory cycle components are marked as lung volumes and capacities and through these, we have the definitions of the functional parameters of spirometry, where the average FEV1 of 3.37 ± 0.64, FEV1 / FVC of 82.68 ± were obtained. 3.86, PEF 6, 25% mean FEF 7.69 ± 1.68 and 75% mean FEF 2.66 ± 1.31, these results demonstrate that no significant percentages of subclinical pulmonary dysfunctions were evidenced by radiologists of the city of Vitória da Conquista – BA.

Table 3. Spirometric Values. Vitória da Conquista – BA, 2019

Variables	AVG ± SD[1]
VEF1	3,37 ± 0,64
VEF1/CVF	82,68 ± 3,86
PFE	6
PEF 25%	7,69 ± 1,68
PEF 75%	2,66 ± 1,31

[1]Sample standard deviation; Source: Research Data, Vitoria da Conquista – BA, 2019.

DISCUSSION

In general, subclinical lung disease is more prevalent in males (CARARCAS, 2017). However, in our study, there was gender homogeneity, since 50% of the patients were male, while the others were female, results that may be related to the occupation of the subjects. All respondents were health professionals, in this particular case radiologists, and there is a possibility that they may be more interested in investigating their health status than other population groups. Based on the ideas given by Caracas (2017), although age is not directly associated with subclinical pulmonary dysfunction, it should be a variable evaluated with certain clinical care, due to its biological plausibility and its insertion in the natural history of pneumological diseases. The literature is scarce about the prevalence of subclinical lung disease in radiology technicians, among other health professionals. There are few population-based studies and most of them were performed on selected samples. Lung disease is expected to occupy fifth place in 2020 in terms of the global disease burden. Moreover, this condition is not yet recognized as a major public health problem in developed or developing countries (ZONZIN, *et al*., 2017).

The relationship occupational risk and radiology is studied by authors such as Gomes (2002), Fernandes *et al*. (2005) and Machado *et al*. (2011), citing some, that address the working conditions and the risks of occupational exposure in these environments. The situation regarding the protection of risks brings concerns about the occupational health of professionals, as there are many gaps in it. It is well known that workers can suffer short, medium and long term illnesses and diseases if there are no measures to protect their safety. According to the Ministry of Health's Manual of Procedures for Health Services - Work-Related Diseases (2001), work-related diseases resulting from ionizing radiation are neoplasms, myelodysplastic syndromes, pneumonitis, pulmonary fibrosis, aplastic anemia, purpura and other hemorrhagic manifestations, male infertility, among others (BRASIL, 2001).

Even though they can be prevented, occupational diseases are still responsible in large part for the morbidity of the working population, causing disability and even death, consequences that are caused both by adverse working conditions and by the profession itself (SOUZA *et al*., 2017). Faced with vast occupational diseases among the most serious and common, are occupational diseases that affect the respiratory system. They are among the main causes of incapacity for work as well as sick leave and are characterized by direct contact of the respiratory tract with work activity. In 2008, these diseases had a prevalence coefficient of 9.92 per 10,000 employment relationships (ILDELFONSO *et al*., 2009).

Conclusion

The research question that guided this academic effort was answered and all objectives met. The knowledge that this study has generated along with other studies, even if scarce and others to come, has provided an overview of the prevalence of subclinical pulmonary dysfunctions in radiology technicians and will contribute to the development of strategies and public policies for prevention, guidance and more effective regulation of occupational respiratory diseases in Brazil. It is expected that this study contributes to other futures, where the analysis of subclinical lung disease is verified a larger number of subjects and can associate these results to specific risk controls of respiratory diseases. The vast majority of occupational diseases are predictable, but also preventable. For this, conscious intervention in the most risk-based, knowledge-based work environments that guide the application of the best strategies is increasingly needed in our country.

REFERENCES

ANDERDON, T.J.; BARROS, A.M.; COPELI, F.H.S; MELO, J.A.C. Riscos ocupacionais dos técnicos em radiologia na assistência ao portador de múltiplos traumas. *O Mundo da Saúde, São Paulo* - 2016; 40(1): 106-113.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 38, de 21 de março de 2001. Dispõe sobre a instalação e o funcionamento de Serviços de Medicina Nuclear "in vivo". Diário Oficial da União mar 2001; Seção 1.

CAMPOS, Luiz Raimundo. Investigação de Efeitos Mutagênicos em Trabalhadores Expostos à Radiação Ionizante no Brasil. Universidade Federal do Pará, 2015.

FERNANDES, G.S.; CARVALHO, A.C.P; AZEVEDO, A.C.P; Avaliação dos riscos ocupacionais de trabalhadores de serviços de radiologia. Radiol. Bras. 2005; 38(4): 279-281.

GOMES, R.S. Condições do meio ambiente de trabalho e riscos da exposição aos raios X no serviço de radiodiagnóstico de um hospital público. Fundacentro. Ministério do Trabalho e Emprego. 2002. [acesso em: 11 de ago de 2019] Disponível em: http://www.fundacentro.gov.br/dominios/ctn/anexos/AcervoDigital/dissert.RobsonRaios_X.pdf.

ILDEFONSO, S. A.G; BRANCO, A.B; OLIVEIRA, P.R.A. Prevalência de benefícios de seguridade social temporários devido a doença respiratória no Brasil. J Bras Pneumol, Brasília, 2009.

MACHADO MAD, MENEZES VO, QUEIROZ CC, SILVA DC, SAMPAIO LJL, ALMEIDA A. Revisão: radioproteção aplicada a Medicina Nuclear. Revista Brasileira de Física Médica. 2011; 4(3): 47-52.

MOREIRA, G. L.; MANZANO, B. M.; GAZZOTTI, M. R.; NASCIMENTO, A. O.; PEREZ-PADILLA, R.; MENEZES, A. M. B. et al. PLATINO, estudo de seguimento de nove anos sobre DPOC na cidade de São Paulo: o problema do subdiagnóstico. Jornal Brasileiro de Pneumologia, v.40, n.1, p.30-37, 2013.

MORENO, Carolina dos Santos. Avalição dos efeitos da Radiação Ionizante e do Resveratrol na cultura de células tumorais do pulmão. Instituto de Pesquisa Energética e Nucleares. Autarquia associada à Universidade de São Paulo, 2016.

PEREIRA, C.A.C. Espirometria. J Pneumol 28(Supl 3) – outubro de 2002

SOUZA, M. C.; SOUZA, J. N.; CAMELIER, F. W. R.; CAMELIER, A. A. Produção do cuidado e a rede de atenção a pessoa com doença respiratória crônica: um estudo de revisão. *Revista Pesquisa em Fisioterapia*, v.7, n.4, p.574-582, 2017.

ZONZIN, G. A.; CLEMENTE, R. S. G.; CORREIA, J. V.; SILVEIRA, J. C. D. F.; COSTA, A. F. O que é importante para o Diagnóstico da DPOC? Diretoria da SOPTERJ – Biênio 2015/2017, v.26, n.1, p.5-14, 2017.

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