EVALUATION OF THE QUALITY OF LIFE OF WORKERS WITH POTENTIAL RISK TO IONIZING RADIATION

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RESUMEN

Los objetivos de este estudio es evaluar la calidad de vida (CV) en muestreo de los trabajadores del IPEN-CNEN/SP, con riesgo potencial a la radiación ionizante; identificar los factores sociodemográficos relacionados con los trabajadores y su influencia en la CV y trazar el perfil de los trabajadores que manipulean materiales radiactivos. Es un estudio cuantitativo, descriptivo y exploratorio realizado entre marzo-abril, 2009 en la Planta de Radiofarmacia. Los datos fueron recogidos por un cuestionario dividido en dos partes: La primera parte contiene preguntas sobre las características sociodemográficas y las condiciones laborales de los participantes y la segunda parte corresponde al instrumento WHOQOL-Bref. El muestreo corresponde 103 trabajadores y resultó en un total de 86 cuestionarios regresados, representando 83,5% del muestreo estudiada, siendo que 80,2% de los individuos son del género masculino. La edad promedia de los individuos fue 47,8±7,0 años y el nivel educacional es considerado alto. Ya el estado civil, 74,4% son casados, 17,4% son solteros, 7,0% son divorciados y viudos son 1,2%. La puntuación promedia en cada dominio del WHOQOL-Bref fueron: físico (75,2), psicológico (75,9), relaciones sociales (72,8) y ambientales (62,5). Las variables demográficas, sociales y de comportamiento han contribuido para el perfil de los trabajadores del IPEN-CNEN/SP. El WHOQOL-Bref demostró ser un instrumento adecuado de fácil aplicación para la evaluación de la CV de los trabajadores expuestos a radiaciones ionizantes. El estudio proporcionó un panorama general de la percepción de la CV del grupo estudiado a partir de las entrevistas según lo informado por los trabajadores.

Palabras claves: Calidad de vida, instrumento WHOQOL, individuos ocupacionalmente expuestos

ABSTRACT

The main objective of this study is to evaluate the Quality of Life (QOL) in a sample of workers of the IPEN-CNEN/SP, with potential risk to ionizing radiation; It aims also identify the social-demographic factors related to the workers and its influence on QOL as well to draw the profile of workers handling radioactive material. A quantitative study, descriptive and exploratory was carried out from March to April, 2009 at Radiopharmacy Department of IPEN. The data were collected by a questionnaire divided into two parts. The first part contains questions about social-demographic characteristics and working conditions of the participants and the second part corresponding to the WHOQOL-Bref tool. The sample resulted in a total of 86 questionnaires answered; representing 83.5% of the population studied which 80.2% of individuals were male. The mean age of individuals was 47.8±7.0 years and the educational level is high, 55.8% with graduation and 44.2% with high school. Regarding marital status, 74.4% were married, 17.4% are single, 7.0% are divorced and 1.2% widowed. The average score on each domain of the WHOQOL-Bref was: physical (75.2), psychological (75.9), social relations (72.8) and environmental (62.5). The demographic, social and behaviour variables have contributed to the profile of the IPEN workers. The WHOQOL-Bref showed to be an adequate instrument with easy application for evaluation the QOL of workers exposed to ionizing radiation. The study provided an overview of the perception of quality of life of the studied group based on the interviewees as reported by workers.

Keywords: Quality of life, WHOQOL tool, occupationally exposed individuals.

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1. Introduction

The Radiopharmacy Department – DIRF is a radioactive facility of Instituto de Pesquisas Energéticas e Nucleares - IPEN-CNEN/SP that produces and supplies radioisotopes and radiopharmaceuticals used in nuclear medicine for diagnosis and therapy of various diseases, between them, radioisotopes primary, molecules labeled and lyophilized reagents (for ready labeling with technetium-99m) [1].

The production of radioisotopes and radiopharmaceuticals by IPEN, have been increasing since the late 1980s. From the year 2001 this growth was around 10% per year. But in 2009 there was a 25% decrease in this production because of the global crisis in the supply of molybdenum-99, the raw material for the technetium-99m generators. However, despite the crisis, there were approximately 600 TBq of radioisotopes and radiopharmaceuticals produced for more than 300 clinics distributed throughout the country that operate in nuclear medicine [2, 3, 4].

To meet this demand, the DIRF has a specialist team, which includes researchers, technologists and technicians. The professionals are involved in activities of cyclotron accelerator operation, production, quality control, quality assurance, research and development, infrastructure and support. It is important to remember that these professionals work with radioactive materials and are considered occupationally exposed individuals, OEI, to ionizing radiation.

Therefore, considering the specific characteristics of the working process of these professionals, the main objective of this study is to evaluate the Quality of Life (QOL) in a sample of workers with potential risk to ionizing radiation; It aims also identify the social-demographic factors related to them and its influence on QOL as well as to draw on the profile of workers handling radioactive materials.

2. Methods

2.1 Type of study and location

This is a descriptive study of exploratory character, with quantitative approach, carried out at the Radiopharmacy Department, DIRF, of Instituto de Pesquisas Energéticas e Nucleares, IPEN-CNEN/SP.

2.2 Population and sample

The total population of DIRF is 103 employees; however this study covered only 86 employees that agreed to participate and signed the term of voluntary and informed consent, TVIC [5].

2.3 Criteria of inclusion / exclusion

The inclusion criteria were: have a job contract with IPEN (40 hours per week), be working in the DIRF and sign the TVIC. The workers who were absent in the data collection period due to ill health, vacations, and those who did not wish to participate in answering the questionnaire were excluded from the study. Besides these, it was excluded students, trainees and contractors, because they do not have an employment contract with IPEN.

2.4 Procedures for data collection

After the approval and research authorization by the heads of DIRF, the data collection took place between the months of April and May, 2009.

The workers were interviewed in their workplace and after the information about the purpose of research, data reliability and the possibility of withdrawing their consent at any time, they agreed to participate by signing the TVIC. One copy was delivered to the worker and the other was retained by the person in charge of the research.

The data collection was performed through a self-applied questionnaire compound of two parts. The first part (respondent information form), contains social-demographic characteristics and working conditions questions of the participants and the second part is one abbreviated version of the QOL assessment specific instrument, World Health Organization Quality of Life Instrument Bref, WHOQOL-Bref [5, 6].

The WHOQOL-Bref contains a total of 26 questions concerning to the last two weeks experienced by the respondent. The first two questions evaluate the QOL in general and their health satisfaction and the remaining 24 are divided into four domains: Physical, Psychological, Social relations and Environmental. For each aspect of QOL express in the WHOQOL-Bref, the workers can present their response by means of scores that vary from 1 to 5. The final scores of each domain are calculated by the syntax, available on the site of the WHOQOL Group [7].

2.5 Analysis statistics of the data

The data were analyzed using the software Statistical Package for Social Sciences (SPSS) version 16, Office Excel 2007 and Minitab 15 [8, 9].

The questions of the WHOQOL-Bref have been recodified following the steps recommended for scores punctuation [7]. The statistical analysis included descriptive statistics for socio-demographic characterization of the sample, through of central tendency, position and dispersion measurements.

The Coefficient of Spearman Correlation was used to verify the relation between the quantitative variable. For interpretation of the correlations between the variable, it was used a scale classification: Very Bad (0-20), Bad (20-40), Regular (40-60), Good (60-80) and Very Good (80-100).

The reliability and internal consistency of instrument for this sample was verified using the Cronbach's alpha coefficient. This statistic has a maximum value of 1 (one) and as higher as is its value, greater is the internal consistency of the data. For this study, it was used a significance level of 5% ($p < 0.05$) with 95% of statistical confidence range.

3. Results and discussion

The total number of DIRF workers is 103. However, the sample was 86 questionnaires answered, representing 83.5% of the population. The 17 workers who did not participate of the research among them 9 did not agreed to answer the questionnaire, 5 were absent for reasons of illness and 3 were on vacation.

Table 1 represents the socio-demographic characteristics and working conditions of the sample, corresponding to the first part of the questionnaire. It was observed that the sample had a mean age of 47.8±7.0 years, and the age range varied from 23 to 70 years old. The data showed a predominance of the male gender, representing 80.2% of the sample. Regarding to marital status, 17.4% were single, 74.4% married, 7.0% divorced and 1.2% widowed. The educational level is high, 55.8% are graduated and 44.2% have average education.

Also, it was evidenced an extensive professional career, 52.3% of the participants have between 16 to 25 years of working time, and the average was (22.8±6.7) years. The higher number of workers was observed in the radioisotopes and radiopharmaceuticals production and in the quality control sections, totalizing 55.8% of the sampling. From 86 workers who participated in this study, 53.5% are satisfied with the working in the presence of ionizing radiation.

Table 1: Socio-demographic characteristics and working conditions of the sample.

Variable	**N=86**
Age (mean ± SD)	(47.8±7.0)
Gender: Male / Female	69 / 17
Marital status	**Frequency (%)**
Single	15 (17.4)
Married	64 (74.4)
Divorced	6 (7.0)
Widowed	1 (1.2)
Scholarity	
Basic education	--
Average education	38 (44.2)
Graduation	48 (55.8)
Working time in the presence of the IR (years)	
< 1	2 (2.3)
1-5	5 (5.8)
6-15	10 (11.6)
16-25	45 (52.3)
> 25	24 (27.9)
Job description	
Administration	8 (9.3)
Quality control	14 (16.3)
Packing	3 (3.5)
Quality assurance	8 (9.3)
Operation and Maintenance of Cyclotron	9 (10.5)
Research and development	3 (3.5)
Production	34 (39.5)
Radioprotection	7 (8.1)
Satisfaction with work in the presence of the IR	
Very unsatisfied	4 (4.7)
Unsatisfied	8 (9.3)
Neither satisfied nor unsatisfied	20 (23.3)
Satisfied	46 (53.5)
Very satisfied	6 (7.0)
Not answered	2 (2.3)

N: Total of the sample; **SD:** Standard Deviation; **IR:** Ionizing Radiation

3.1 Relation between the studied variables and the domains of WHOQOL-Bref

The internal consisntecy of WHOQOL-Bref was considered adequate (0.832) for all 26 questions.

The complete descriptive analysis of quantitative variables of age, working time and domains of the WHOQOL-Bref are shown in Table 2. For all variables the sampling was low, as indicated by the coefficient of variation (CV) that is less than 50%, which demonstrates homogeneity in the data.

Table 2: Complete descriptive analysis of the quantitative variables.

Descriptive	Age	Working time	Physical	Psychological	Social Relations	Environmental
Average	47.8	22.8	**75.2**	**75.9**	**72.8**	**62.5**
Median	46.0	23.0	75.0	79.2	75.0	62.5
SD	7.0	6.7	13.5	12.4	15.1	11.4
CV	15%	29%	18%	16%	21%	18%
Q1	44.0	22.0	65.2	67.7	66.7	56.3
Q3	51.0	26.0	83.0	83.3	83.3	71.1
Minimum	23.0	3.0	35.7	37.5	25.0	37.5
Maximum	70.0	38.0	100.0	100.0	100.0	100.0
N	86	81*	86	86	86	86
CI	1.5	1.5	2.9	2.6	3.2	2.4

SD: Standard Deviation; **CV:** Coefficient of variation; **Q1 and Q3:** First and third quartiles; **N:** Total of the sample; **CI:** Confidence interval; ***** 5 workers did not answer the question working time.

The average obtained in each domain of WHOQOL-Bref, analyzed by the scale of assessment of QOL, is also showed in Table 2. The lowest score among the domains was achieved by the Environmental domain, averaging 62.5 ± 11.4, followed by the Social Relations with a mean of 72.8 ± 15.1. The Physical domain and Psychological domain had similar results, with averages of 75.2 ± 13.5 and 75.9 ± 12.4, respectively. All domains showed higher maximum score, achieving 100.0.

The analysis of the data shows that the aspects that influenced the workers satisfaction in the environmental domain (62.5 ± 11.4) were related to salubrity in the physical ambient (climate, noise, pollution), 44 workers (51.1%) answered that their physical environment is *More or Less* healthy. Other factor that contributed to the low score was on the monetary satisfaction, 13 (15.1%) reported having *Very Little* money to get their needs and 44 workers (51.1%) chose the *Medium* option. When was asked about leisure opportunities, 60 workers (69.8%) chose the *Very Little* and *Medium* response; regarding the availability of information in their day by day, the options *Very Little* and *Medium* totaled 41 workers (47.7%) [6].

The Spearman correlation coefficients between quantitative variables - age, length of service and domains of WHOQOL-Bref are presented in Table 3.

Table 3: Spearman correlation coefficients among quantitative variables.

		Age	Working time	Physical	Psychological	Social Relations
Working time	Corr	**49.8%**				
	P-valor	**<0.001**				
Physical	Corr	6.2%	10.6%			
	P-valor	0.568	0.346			
Psychological	Corr	0.6%	-8.0%	**69.3%**		
	P-valor	0.960	0.480	**<0.001**		
Social Relations	Corr	-2.7%	-4.0%	**61.0%**	**73.2%**	
	P-valor	0.807	0.725	**<0.001**	**<0.001**	
Enviromental	Corr	2.9%	3.2%	**44.9%**	**39.2%**	**50.7%**
	P-valor	0.793	0.778	**<0.001**	**<0.001**	**<0.001**

It was observed that there is a statistically significant correlation ($p<0.001$) between the variables of age, service time and inter-domains. The highest correlation coefficient is between the Psychological and Social Relations domains, which the value of 73.2% indicates that as higher is the Social score, higher is the Psychological score. According to the rating scale mentioned at the (2.5) item, this correlation can be classified as good.

4. Conclusion

The WHOQOL-Bref showed to be an adequate instrument of easy and fast application, as well as its ability to evaluate the QOL of the individuals occupationally exposed to ionizing radiation.

This study supplied a good perception of overall QOL in the sample analyzed, based on the first two questions of the WHOQOL-Bref. In the first question “How would you rate your QOL?" it was obtained a total of 70.9% of the answers as good, and in the second question "How satisfied are you with your health?" 65.1% reported that they are satisfied. Thus, it is hoped that this study can help the health surveillance program at the institution.

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