

Quality of life and work ability of firefighters

Qualidade de vida e capacidade para o trabalho de bombeiros

Calidad de vida y capacidad para el trabajo de bomberos

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ABSTRACT | Duties related to dangerous activities frequently cause serious health risks, demanding attention, high cognitive skills, quick and precise decision-making and a constant alertness that can influence the work ability and the quality of life of firefighters. This work aimed at assessing the quality of life and the work ability of firefighters in a city in the state of São Paulo. Information was collected on their age, marital status, educational attainment, years on the job and physical activity, and both the SF-36 and the Work Ability Index were employed. The data were descriptively analyzed through frequencies and percentages. To study the association between variables, the correlation tests of Pearson and Spearman were used. Thirty male firefighters with an average age of 38.2 (± 5.63) years were evaluated. The highest value obtained through the SF-36 refers to physical functioning, and the lowest value to bodily pain. Work ability was low for none of the subjects, moderate for 10% of them, good for 36.7%, and excellent for 53.3%. The correlation between age and number of years on the job was very good. All quality of life sections were significantly correlated with work ability. The perception of a good quality of life was also expressed in good work ability. These assessments can help to prioritize and identify the workers who need occupational health services, as well as direct the required interventions to improve the work environment and work conditions.

Keywords | Quality of Life; Occupational Health; Firefighters.

RESUMO | As atribuições relacionadas a atividades perigosas ocasionam, muitas vezes, sérios riscos à saúde, exigindo atenção, alta carga de cognição, rápidas e precisas

tomadas de decisão e constante estado de alerta que podem influenciar na capacidade de trabalho e qualidade de vida dos bombeiros. O objetivo deste trabalho foi avaliar a qualidade de vida e a capacidade para o trabalho em bombeiros de um município do interior paulista. Foram coletadas informações sobre idade; estado civil; escolaridade, tempo na função e prática de exercícios físicos e utilizados o questionário SF-36 e o índice de capacidade para o trabalho. Os dados foram analisados descritivamente por meio de frequências e porcentagens. Para análise das associações entre as variáveis foram utilizados os testes de correlação de Pearson e Spearman. Trinta bombeiros, homens, com idade média de 38,2 ($\pm 5,63$) anos participaram deste estudo. Encontrou-se maior valor do SF-36 no domínio capacidade funcional e menor valor no domínio dor. Nenhum dos sujeitos demonstrou capacidade baixa para o trabalho, 10% deles apresentaram capacidade moderada, 36,7% boa e 53,3% excelente. A correlação entre idade e tempo na função foi muito boa. Todos os domínios da qualidade de vida correlacionaram-se significativamente com a capacidade para o trabalho. A percepção de uma boa qualidade de vida expressou-se também em uma boa capacidade para o trabalho. Essas avaliações podem auxiliar a priorização e identificação de trabalhadores que necessitam do apoio dos serviços de saúde ocupacional e direcionar intervenções para melhorias no ambiente ou nas condições de trabalho.

Descritores | Qualidade de Vida; Saúde do Trabalhador; Bombeiros.

RESUMEN | Las atribuciones relacionadas a actividades peligrosas a menudo ocasionan riesgos graves a la

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salud, exigiendo atención, alta carga de cognición, tomas de decisiones rápidas y precisas y constante estado de alerta, que pueden influir en la capacidad de trabajo y calidad de vida de los bomberos. El objetivo de este trabajo fue evaluar la calidad de vida y la capacidad para el trabajo en bomberos de un municipio del interior de São Paulo. Recopilamos informaciones sobre edad; estado civil; escolaridad, tiempo en la función y práctica de ejercicios físicos y utilizamos el cuestionario SF-36 y el índice de capacidad para el trabajo. Los datos fueron analizados descriptivamente mediante el uso de frecuencias y porcentajes. Para el análisis de las asociaciones entre las variables se utilizaron las pruebas de correlación de Pearson y Spearman. Treinta bomberos, hombres, con edad media de 38,2 ($\pm 5,63$) años participaron de este estudio. Se

encontró mayor valor del SF-36 en el dominio de la capacidad funcional y menor valor en el dominio del dolor. Ninguno de los sujetos demostró capacidad baja para el trabajo, 10% de ellos presentaron capacidad moderada, 36,7% buena y 53,3% excelente. La correlación entre edad y tiempo en la función fue muy buena. Todos los dominios de la calidad de vida se correlacionaron significativamente con la capacidad para el trabajo. La percepción de una buena calidad de vida fue expresada también en una buena capacidad para el trabajo. Estas evaluaciones pueden ayudar a la identificación y priorización de los trabajadores que necesitan el apoyo de los servicios de salud ocupacional y orientar intervenciones para la mejora del ambiente o de las condiciones de trabajo.

Palabras clave | Calidad de Vida; Salud Laboral; Bomberos.

INTRODUCTION

It is well established in the literature that the work environment and other factors directly related to professional performance can be sources of stress¹. Hence, firefighters and other professionals who deal with emergency situations in health care are more susceptible to the development of work-related stress².

In this sense, Murta and Troccoli² evaluated 22 firefighters from a prehospital rescue team of the Fire Brigade of the State of Goiás, Brazil. The sources of stress reported by them were related to work organization (time pressure and control, productivity, issues related to the rules and characteristics of the task, such as unpredictability) and work conditions such as the lack of organizational support and issues with the physical environment (as the noise of the siren), with materials (as weight lifting), with personal development (as being taken for granted), with tools and gear (hot uniform) and with compensation.

Additionally, the command of the Fire Brigade is the body in charge of putting out fires, protecting and saving lives and materials in the case of disasters, as well as planning, programming, organizing and controlling the execution of all missions that are under its responsibility³. All these duties are related to dangerous activities that often pose serious health risks to the worker, demanding attention, high cognitive skills, fast and precise decision-making and constant alertness. Moreover, if these activities are related to the work environment and organization, they can lead to

occupational stress, causing suffering and anxiety⁴ and affecting quality of life negatively.

The term quality of life (QL) is comprehensive and includes health-related factors (such as physical, functional, emotional and mental well-being) and factors not related to health, such as family, friends, work and other aspects of life⁵. Regarding work, firefighters are an example of workers that are easily exposed to situations that can cause some type of suffering that is detrimental to their QL⁶.

Some specific situations observed during the work of firefighters strongly influence their QL. They commonly face situations in which they are subject to a high level of physical and psychological exhaustion, among others, due to the intense workload, exposure to imminent danger and readiness to provide care in many environments, having to deal with difficult circumstances. While waiting for a call in the station, firefighters stay on high alert since their response must be immediate, and many times they do not know the seriousness of the situation in advance, which increases their stress and anxiety as they must always be prepared for more serious cases⁶.

All these factors can influence the work ability (WA) of an individual, as well as lifestyle, physical fitness and work environment⁷. Quality of life, in its turn, is composed of different dimensions and defined more generally as "the perception individuals have of their position in life, within the context of a culture and value system, in which they live according to their purposes, standards and concerns"^{7,8}.

Studies about quality of life adopt a multi-professional approach, being applicable in a multidisciplinary and multidimensional way. Researches involving work ability have become more comprehensive over time due to worldwide interest on the topic. In this context, the health sector, as well as other social sectors, can be influenced by external factors and needs to include in its professional performance mechanisms that support service production and at the same time preserve the WA and QL of workers^{9,10}.

In this manner, researches that assess aspects of WA and QL can provide a wider understanding of the work factors and of the more comprehensive life aspects related to the perceived losses, aiding the implementation of measures aimed at attenuating work-related hazards. However, the studies that assess both indicators together are few and were carried out for nurses¹¹⁻¹⁴ and industry workers¹⁵. No studies were found that characterize and associate the WA and QL of military firefighters in Brazil.

Therefore, this study aims to evaluate the quality of life and work ability of firefighters in a city in the state of São Paulo.

METHODOLOGY

This study is analytical, cross-sectional and exploratory and adopted a quantitative methodology. The population was composed of 30 firefighters currently working with operations, i.e., responsible for going on calls, which account for 65% of firefighters of a city in the state of São Paulo. Due to vacation, leave of absence or unwillingness to participate, 25% of the firefighters were not evaluated.

The Ethical and Research Committee of the Central Paulista University Center approved this study under no. 372,892/20013.

A semi-structured questionnaire was elaborated to collect self-reported information on: gender; age; marital status; educational attainment; number of years on the job and physical activity.

Body weight (kg) and height (m) were measured with a Welmy w110 anthropometric digital scale, with 200kg ability and variation of 0.1kg, and a portable stadiometer, to obtain the Body Mass Index (BMI)¹⁶.

Arterial Pressure (AP) was measured according to the VI Brazilian Guidelines on Hypertension¹⁷

through an indirect method with auscultation and an aneroid sphygmomanometer. For the analysis, the values of the systolic and diastolic AP were considered, respectively.

QL was assessed with the application of the SF-36 survey, constituted of 36 items, from which 35 are grouped into eight sections. The last item evaluates health changes over time. For each section, the items are coded, grouped and transformed on a scale from zero (worst state of health) to 100 (best state of health)^{18,19}.

Work ability was evaluated using the Work Ability Index (WAI), translated and validated for application in Brazil²⁰, which verifies the individual's self-assessment of his own ability. It is composed of seven items: current work ability compared with the lifetime best; work ability in relation to physical or mental demands, or both; estimated work impairment due to diseases; sick leave during the past 12 months; own prognosis of work ability 2 years from now and mental resources²¹. The scores of each item are added to determine the final score, which ranges from 7 (worst index possible) to 49 (best index possible). Based on the score, individuals are classified according to their work ability into the following categories: poor ability (7-27), moderate ability (28-36), good ability (37-43) and excellent ability (44-49).

The filling of the questionnaire and physical measurements occurred during regular hours, at the work place, in an appropriate physical space, without any salary deductions or extra work hours.

While the questionnaire was filled out, the researcher stayed in the place in case of any doubts. The next step was to measure their height and weight.

The data were analyzed through the software Statistical Package for the Social Sciences (version 19.0, SPSS Inc, Chicago). The characterization of the population of study was performed through descriptive statistics, with the presentation of means and standard deviations. The Kolmogorov-Smirnov test was applied to verify the distribution of variables. For the datasets in which normality was observed, we applied the Pearson correlation test, and for non-parametric data, the Spearman correlation was employed. According to Morrow et al., the value of r can be interpreted as an excellent correlation when $r > 0.80$; high when $0.60 < r < 0.79$; moderate when $0.40 < r < 0.59$; low when $0.20 < r < 0.39$; and very low when $r < 0.2$. A level of significance of 5% was adopted.

RESULTS

The 30 firefighters evaluated were men, with an average age of 38.2 (± 5.63) and an average of 16.2 (± 6.18) years on the job. The vast majority was married (86.6%) and had a high school degree (70%).

The physical exam revealed an average systolic pressure of 120.7 (± 5.8) mmHg and average diastolic pressure of 79 (± 4) mmHg. The average BMI (kg/m^2) was 27.3 (± 3.5), with 21 firefighters (70%) being overweight and 5 (16.67%) having level I obesity.

All volunteers reported performing regular physical activity such as swimming, soccer, running, weight

training and basketball at least three times a week. Only one volunteer reported being a smoker in the past, having quit 10 years earlier. The others had never been smokers.

Regarding the data obtained with the SF-36, the highest value referred to physical functioning, and the lowest to bodily pain.

As for the WAI, none of the individuals fitted on the low work ability category. The work ability of three (10%) firefighters was classified as moderate, 11 (36.7%) as good and 16 (53.3%) as excellent.

Table 2 shows the results of the analyses of the correlations among the variables.

Table 1. Results (means and standard deviations) and minimum and maximum value of the investigated variables

Variables	M	SD	Minimum	Maximum
Quality of life – sections				
Physical functioning (0-100)	91.5	8.63	70	100
Physical role functioning (0-100)	80.83	28.38	0	100
Bodily pain (0-100)	62.57	17.14	31	100
General health perceptions (0-100)	62.9	14.3	27	95
Vitality (0-100)	68.5	13.72	30	90
Social functioning (0-100)	80.68	19.18	25	100
Emotional role functioning (0-100)	72.7	33.43	0	100
Mental health (0-100)	77.87	15.18	24	100
WAI spheres				
Work ability (0-10)	8.1	1.3	3	10
Physical and mental demands (0-10)	8.43	1.19	5	10
Diagnosed diseases (0-7)	5.37	1.52	2	7
Work impairment (0-6)	5.23	1.07	2	6
Sick leave (0-5)	4.87	0.57	2	5
Self-prognosis (0-7)	6.7	0.92	4	7
Mental health (0-4)	3.67	0.61	2	4
Total WAI (7-49)	42.37	4.08	33	49

M= Mean; SD= Standard Deviation; WAI= Work Ability Index

Table 2. Correlations between the WAI results, Quality of Life sections, age and number of years on the job

Variables	Age		Number of years on the job		WAI	
	r	p	r	p	r	p
Age	-	-	-	-	-	-
Years on the job	0.918*	0.000	-	-	-	-
WAI	-0.054	0.775	-0.0107	0.575	-	-
Physical functioning	-0.127	0.503	-0.147	0.439	0.630	0.000*
Physical role functioning	-0.018	0.923	-0.068	0.720	0.562	0.001*
Bodily pain	-0.062	0.747	-0.075	0.693	0.492	0.006*
General health perceptions	0.107	0.572	0.112	0.562	0.640	0.000*
Vitality	-0.063	0.741	0.029	0.878	0.642	0.000*
Social functioning	-0.046	0.808	-0.024	0.898	0.687	0.000*
Emotional functioning	0.025	0.894	-0.039	0.838	0.441	0.015*
Mental health	-0.101	0.594	-0.003	0.989	0.427	0.019*

r=value of the correlation, *Pearson correlation coefficient ($p \leq 0.05$), WAI = Work Ability Index

The correlation between age and years on the job was very high, indicating that firefighters stay at their job for a long time.

The correlations between the WAI and the QL were significant for all sectors, being high for social role functioning ($r=0.687$), vitality ($r=0.642$), general health perceptions ($r=0.640$) and physical functioning ($r=0.630$); and moderate for physical role functioning ($r=0.562$), bodily pain (0.492), emotional role functioning (0.441) and mental resources (0.427).

DISCUSSION

The possibility of evaluating the QL and the WA of firefighters, the purpose of this study, allowed us to expand our knowledge about the profile of these workers and to understand the relationship they develop with their activities and how they interfere with their day-to-day lives.

The measured arterial pressure of the firefighters was within the normal limits accepted by the Brazilian Society of Cardiology²³, which is a positive data concerning their health since hypertension is a risk factor for coronary disease.

Only one volunteer reported that he used to be a smoker, and the others had never been smokers, which is another positive health-related aspect since smoking can be detrimental to physical conditioning and predispose to many chronic diseases, as well as potentially decreasing work productivity²⁴.

None of the firefighters was underweight. Nonetheless, some individuals were overweight and obese. In addition to affecting cardiorespiratory and musculoskeletal capacity and favoring the increase of morbidity related to chronic diseases such as heart disease, diabetes and depression, obesity and being overweight can represent a risk or limitation for carrying out occupational activities, especially in the case of a more physically demanding activity²³.

In a study developed by Martinez and Latorre²⁵, the BMI was inversely correlated with the WAI, demonstrating that excessive weight affects work ability negatively. Although the current study showed that the highest the body mass, the lower the WA, these results were not significant ($r=-0.424$, $p=0.152$). However, since body fat was not measured, it was not possible to define its percentage and the muscle mass percentage. Despite that, we highlight the importance of nutritional orientation and control for this category.

Regarding quality of life, the results revealed better values for the means of the scores related to physical functioning, physical role functioning and social functioning. The lowest values were obtained for bodily pain, general health and vitality, indicating that these aspects were more compromised¹⁸.

It is possible that bodily pain was most compromised due to the excessive weight of the gear and the inadequate posture firefighters have to adopt to perform procedures. However, pain is multifactorial and not restricted to physical aspects. In this sense, we should point out that the Fire Brigade has the basic mission of preserving life, the environment and properties, preserving public order, preventing and putting out fires, protecting and saving human lives and searching and rescuing in the case of drowning, floods, collapses, accidents in general, catastrophes and public calamities. As a result, they carry out many activities that are highly demanding concerning execution⁴.

Their age and the number of years on the job did not influence significantly in the results of the WA and the QL. The general health and vitality items presented very similar means of values to the bodily pain item. Consequently, we can infer that bodily pain can be related to a dysfunction, which worsens general health and consequently compromises the energy level for occupational activities. Moreover, the work of firefighters is extremely exhaustive, both physically and mentally⁴.

Hence, in the relation between work and health for firefighters, the concept of overload is fundamental to emphasize a work aspect strongly related to the conditions of the work environment and work organization. González et al.⁴ investigated the alertness of firefighters at a Fire Brigade and the relationship between occupational diseases, understanding that prolonging high alertness leads to physical and mental exhaustion in the form of burnout, sleep disorders, fear of getting sick, irritability at home and others. The intervention of health workers on these aspects would increase the comfort and vitality of firefighters.

Work-related exhaustion, however, was not associated with a decrease in physical functioning, physical role functioning and social functioning (the sectors with the highest means) for most workers, which may be related to the fact that many important actions are sporadic and non-repetitive or routine.

For the mental health section¹⁸, the mean value obtained was 77.8. The work of firefighters is very

mentally demanding since their own lives and the lives of others depend on their decisions. As a result, decision-making is extremely stressful. Additionally, anxiety is present throughout the entire work shift, as firefighters do not know the exact dimension of the problem they will face when they go on a call. Moreover, the emotional side frequently becomes relevant, especially when the call involves casualties³.

A weakness of this study was not evaluating firefighters on leave of absence and the causes behind it, which would provide a better understanding of the quality of life results.

Regarding the WAI classification, the total mean value was 42.3, which suggests good work ability. The item with the lowest score was work demands, which once again can be related to the characteristics of the work of a firefighter, as mental and physical demands are extremely high.

As part of a worldwide trend, population ageing will occur in developed and developing countries²⁶. For González et al.⁴, the amount of years on the job can be a determining factor in mental and physical health, especially for firefighters with a very demanding job, physically and mentally. In the current study, the association between age and years on the job was very high ($p=0.92$), indicating a low turnover of firefighters, who perform their job for a long time.

According to Tuomilehto²⁷, ageing causes many bodily functions to decline, especially those related to physical fitness. Sluiter et al.²⁸ state that age is a determining factor in the decline of physiological functions. However, age and the amount of years on the job did not show a significant influence on the results of the WA and QL for the participants in this study. Considering the age of the evaluated workers, this fact could be explained at least partially by the argument of Kujala et al.²⁹ that young workers, especially men, have less insecurity in the work environment and more optimism regarding the perception of their own WA. Moreover, physical activity is extremely important to maintain the physical abilities needed for the job, in addition to preventing many chronic diseases that can be detrimental to the work of a firefighter.

Other studies^{26,30} have also found a positive correlation between physical activity and the levels of WA. Souza et al.³¹ assessed the work ability and physical fitness of firefighters and found that the best scores obtained for muscular strength and endurance,

as well as for speed, were associated with higher levels of WA.

Thus, physical health is directly associated with the ability to properly perform the activities, ensuring psychological integrity, social support and work satisfaction. The latter is extremely relevant for occupational health, since ageing causes many bodily functions to decline, especially those related to physical fitness²⁷.

Additionally, Tuomi et al.²⁰ state that the WA does not stay satisfactory throughout the entire professional life, being affected by many factors. Life and work conditions, as well as a healthy lifestyle, change this prognosis.

The correlations of the WA were significant for all sectors of the QL. Other studies have found similar results, evaluating nurses^{11,12} and industrial workers¹⁵, which suggest that the perception of a good QL seems to be expressed as well in a good WA. These findings confirm the results of the systematic review of Van den Berg et al.³² on the effect work-related factors and the individual have on the WAI, affirming that factors related to life satisfaction and WA seem to possess an interactive and mutual relationship, being determined together²⁰.

The evaluation of the WA and the QL can assist in prioritizing and identifying the workers who need the assistance of occupational health services. Early attention would possibly improve the established conditions and prevent a premature decrease of these aspects. The assessment of work conditions needs to be taken into account in a more comprehensive manner in order to prevent suffering, exhaustion, disease or death, considering work as a fundamental activity for the constitution of the subject and of a dignified life³³.

In this context, it is necessary to consider the importance of Occupational Therapy in accompanying the entire process that guides the activities of a firefighter. By knowing their work, the intervention can be efficient in preventing the problems it causes, since Occupational Therapists exercise their profession in all health care levels, under a multidisciplinary perspective, with the purpose of improving the quality of life and the performance of the worker.

In a general way, the health and quality of life indicators of the evaluated firefighters showed positive results. However, these data should be analyzed cautiously since, similarly to other studies, the effect of

the healthy worker may have influenced the high values obtained for work ability and quality of life, since both were assessed only for firefighters who were working during the period of study. This is a peculiar effect of cross-sectional studies on occupational epidemiology, as they many times exclude the possibly sick person³⁴. As a result, new studies with larger samples containing all workers (including those on leave of absence) should be encouraged and compared with the results obtained in this article to improve knowledge of their WA and QL.

CONCLUSION

The results suggest that the perception of a good QL was also expressed in a good WA for the firefighters. These evaluations can be useful for prioritizing and identifying the workers who need the assistance of occupational health services and for guiding the required interventions to improve the work environment and work conditions.

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