

Ergonomic risks on the operational activities of firefighters from Rio de Janeiro

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Abstract. The Fire Brigade of the State of Rio de Janeiro (CBMERJ) is Brazil's most ancient and is one of the military forces of the state. It has the primary function of activities related to civil defense of the state. This study aims to contribute to the improvement of the current situation by proposing a solution of eliminating totally or at least mitigating risks of ergonomic injury, since all operating activities are based on the performance of man, applying techniques and equipment with intensive use of hands, teamwork, extended shifts and living with stressful situations, which enhance the occurrence of awkward postures among other ergonomic risk factors. This is a quantitative study. The fields of study were five operational units with the highest statistical service of the Corporation. The following items were analyzed: profile of the firemen, work environment, activity performed, adequacy of training received and epidemiological assessment of pain. In total, 208 questionnaires were answered. Data analysis was performed by frequency and presented in tables, charts and graphs. It is important to implement procedures aimed at occupational health and safety of firefighters in the light of ergonomic concepts, so that crews activities are carried out with increased safety and quality.

Keywords: Occupational, Health; Occupational Safety; Personal Protective Equipment, work environment,

1. Introduction

The Fire Brigade of the State of Rio de Janeiro (CBMERJ) is Brazil's most ancient and is one of the military forces of the state. It has the primary function of activities related to civil defense of the state. There are 105 units and 17,000 military personnel throughout the state of Rio de Janeiro. It presents a favourable potential for the development of an ergonomics program in order to contain the ergonomic risk in operational activities, considering that individuals who are recruited to activity by anthropometric default values are subjected to preliminary tests, accepting thus, the existence of equilibrium in the population of firefighters. This study aims to contribute to the improvement of the current situation by proposing a solution of eliminating totally or at least mitigating risks of ergonomic injury, since all operating activities are

based on the performance of man, applying techniques and equipment with intensive use of hands, teamwork, extended shifts and living with stressful situations, which enhance the occurrence of awkward postures among other ergonomic risk factors.

2. Method

It is a quantitative study

The fields of study were five operational units with the highest statistical service of the Corporation. A number of 695 self-reported questionnaires were distributed, containing 17 closed and 2 open questions.

The following items were analyzed: profile of the firemen (age, gender, education, BMI, length of service, frequency of health exams, physical

activity), work environment (comfort in vehicles, the level of safety equipment in general and safety and comfort of PPE used, terms of relationship and satisfaction with colleagues), activity performed (physical and mental stress, level of attention); adequacy of training received and epidemiological assessment of pain. In total, 208 questionnaires were answered.

Data analysis was performed by frequency and presented in tables, charts and graphs

service; 26% practice physical activity; 32.69% are in recommended weight, 44.71% are overweight and 22.60% are obese.

Considering the epidemiological assessment of pain: 81.73% said they have some kind of pain. Of these, 35,10% moderate; 37,50% intense and 27,40 very intense. The location of the pain: the lowest part of the back was the most referenced, followed by knees, head, arms and legs. Only 58,17% said they do not attend periodic medical examinations.

Table 1
Military profile of CBMERJ, Rio de Janeiro, Brazil

Variable	F	%
Gender		
Male	208	100
Female	0	0
Age group (years)		
18 a 30	17	,17
> 30	191	91,82
Scholarity		
Basic	20	9,61
High school	158	75,97
Technical	10	4,81
Higher	20	9,61
Service time (years)		
< 10	48	23
11 a 20	122	59
21 a 30	38	18
> 30	0	0
Total	208	100

In Table 4, psychological risks results reported by the military are shown with the following results: 58% had problems related to mental workload; judged the work stressful; 70% felt the level of attention of the tasks high; 57% claimed to have been injured in service. 81% considered the training suitable.

Table 5 shows data on the relationship and satisfaction with their colleagues: 90.38%

3. Results

Tables 1 and 2 show data on the profile, habits and health related complaints, with the following results 100% are male, 91.82% are over 30 years old, 85,58% have schooling between primary and secondary education, 59% have 10 to 20 years of

Table 2
Military habits and health statements on complaints, CBMERJ, Rio de Janeiro, Brazil

Variable	F	%
Regular physical activity		
Yes	54	26
No	154	74
Anthropometric (BMI)		
Underweight	0	0
Normal weight	68	32,69
Overweight	93	44,71
Obesity	47	22,60
Complaint of pain		
Yes	170	81,73
No	38	18,27
Epidemiologic assessment of pain		
Moderate	73	35,10
Intense	78	37,50
Very intense	57	27,40
Periodic medical examination		
Yes	87	41,83
No	121	58,17
Total	208	100

considerations: 32,69% considered the comfort of the vehicle good, 61,53% regular and 28.91% bad. On the level of safety equipment: 34.90% judged safety as good, 51.80% regular and 13.30% bad. As for PPE: 26.44% judged them good, 58% regular and 15.56% bad.

Table 3
Military work environment statements CBMERJ, Rio de Janeiro, Brazil

Variable	Good		Regular		Bad		Total	
	F	%	F	%	F	%	F	%
Comfort in vehicles	68	33	128	62	12	5	208	100
Safety equipment	73	35	108	52	27	13	208	100
Personal protective equipment (PPE)	55	27	120	58	33	15	208	100

equipment, 69.88% the EPP, 61.44% the vehicles and division of tasks.

Table 4
Statement on the military's psychological risks, CBMERJ, Rio de Janeiro, Brazil

Variable	F	%
Problems related to mental burden of work		
Yes	120	58
No	88	42
Stress at work		
Yes	133	64
No	75	36
Level of attention in tasks		
Low	62	30
High	146	70
Work accidents		
Yes	119	57
No	89	43

4. Discussion

For the ergonomic risk assessment more attention should be given to issues relating to weight and to the practice of physical exercises, since there is a close relationship between physical fitness and the operational activities of firefighters, and the age group which is also an important factor in the development of activities.

It is a fact, that vehicles are designed to carry the crew and equipment, in some cases there are no space limits having even ventilation problems.

Although the majority deems the protection offered by PPE regular, the follow up of the activities of the surveyed units showed little use.

The vehicles and the EPIs were the leaders of dissatisfaction within the firefighters, also

prominent, was the division of tasks, leaving the interpretation that the lack of a better organization

Table 5
Statement regarding the perception of CBMERJ environment and labor relations. Rio de Janeiro, Brazil

Variable	F	%
Coaching		
Suitable	168	81
Unsuitable	40	19
Relationship with fellow service		
Good	188	90,38
Regular	20	9,62
Bad	0	0
What would you change the environment of service		
Rota	98	46,99
Machinery an equipment	105	50,60
Personal protective equipment (PPE)	145	69,88

5. Conclusion

The correct application of ergonomics in the activities of firefighting and other operational services of the Fire Department can have a significant impact on the reduction of the number of injuries that occur during such activities.

It is important to implement procedures aimed at occupational health and safety of firefighters in the light of ergonomic concepts, so that crews activities are carried out with increased safety and quality.

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