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Ocular manifestations in port workers: prevalence and associated factors

Manifestações oculares em trabalhadores portuários: prevalência e fatores associados

Manifestaciones oculares en trabajadores portuarios: prevalencia y factores asociados

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Keywords

Eye manifestations; Public health nursing; Occupational health nursing; Nursing assessment

Descritores

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Abstract

Objective: To understand the prevalence of ocular manifestations in port workers and identify associated factors.

Methods: Cross-sectional study carried out in a seaport in southern Brazil. A total of 232 workers participated in the study. Structured interviews were applied for data collection. Student's t-test was used for independent samples to compare the means of workers with ocular manifestations, applying qualifiers with a moderate minimum level (presence of ocular manifestations) and with a low level or without ocular manifestations (lack of ocular manifestations). The Mann-Whitney test was used for cases of asymmetry. Pearson's Chi-square and Fisher's exact test were carried out to compare the rates, whereas Poisson Regression was used to control the confounding factors.

Results: The prevalence of self-reported ocular manifestations was 92.2%. Ocular manifestations were: itching/pruritus (49.1%), rash (41.4%), burning (39.2%), lacrimation (34.9%), fatigue (32.3%), change in ocular pigmentation (26.7%), pain (17.7%), eye dryness (14.2%), and pressure sensation behind the eyes (9.9%). The use of film for wrapping goods contributed to a higher prevalence of ocular manifestations. The use of gloves as personal protective equipment led to a lower prevalence of these manifestations.

Conclusion: The findings of the current study may contribute to the clinical assessment of nurses in approaching port workers, as well as to guide the planning and implementation of social and environmental care in line with the health needs of these or other workers.

Resumo

Objetivo: Conhecer a prevalência de manifestações oculares em trabalhadores portuários e identificar fatores associados.

Métodos: Estudo transversal em um Porto marítimo do extremo Sul do Brasil. Participaram 232 trabalhadores. Para coleta dos dados utilizou-se entrevista estruturada. Foi utilizado teste t de Student para amostras independentes, a fim de comparar as médias dos trabalhadores com manifestações oculares, por meio dos qualificadores em grau no mínimo moderado (presença de manifestações oculares) e aqueles sem manifestações oculares ou grau leve (ausência de manifestações oculares). O teste de Mann-Whitney foi utilizado no caso de assimetria. O teste do qui-quadrado de Pearson ou o teste exato de Fisher foram usados para comparar proporções e a análise de Regressão de Poisson foi usada para controlar os fatores de confusão.

Resultados: A prevalência de manifestações oculares autorreferidas foi 92,2%. As manifestações oculares foram: coceira/prurido (49,1%), irritação (41,4%), ardor (39,2%), lacrimejamento (34,9%), sensação de cansaço (32,3%), alteração na pigmentação ocular (26,7%), dor (17,7%), ressecamento dos olhos (14,2%) e sensação de pressão atrás dos olhos (9,9). A utilização de filme para envolver mercadoria contribuiu para maior prevalência de manifestações oculares. Já a utilização de luvas como equipamento de proteção individual auxiliou na menor prevalências dessas manifestações.

Conclusão: Acredita-se que os achados do presente estudo possam subsidiar a avaliação clínica do enfermeiro na abordagem de trabalhadores portuários, assim como direcionar o planejamento e a implementação de cuidados socioambientais condizentes com as necessidades de saúde desses e de outros trabalhadores.

Resumen

Objetivo: Conocer la prevalencia de manifestaciones oculares en trabajadores portuarios e identificar factores asociados.

Métodos: Estudio transversal en un puerto marítimo del extremo sur de Brasil. Participaron 232 trabajadores. Para la recolección de los datos se utilizó una entrevista estructurada. Se utilizó la prueba t de Student para muestras independientes, para comparar las medias de los trabajadores con manifestaciones oculares, a través de los calificadores en grado como mínimo moderado (presencia de manifestaciones oculares) y aquellos sin manifestaciones oculares o grado leve (ausencia de manifestaciones oculares). La prueba de Mann-Whitney fue utilizada en el caso de asimetría. La prueba del Chi-cuadrado de Pearson o la prueba exacta de Fisher se utilizaron para comparar proporciones y el análisis de Regresión de Poisson se utilizó para controlar los factores de confusión.

Resultados: La prevalencia de manifestaciones oculares autorreferidas fue del 92,2%. Las manifestaciones oculares fueron: picazón / prurito (49,1%), irritación (41,4%), ardor (39,2%), lagrimeo (34,9%), sensación de cansancio (32,3%), alteración en la pigmentación ocular (26,7%), dolor (17,7%), sequedad de los ojos (14,2%) y sensación de presión detrás de los ojos (9,9). La utilización de una película para embalar mercancías contribuyó a una mayor prevalencia de manifestaciones oculares. La utilización de guantes como equipo de protección individual ayudó en la menor prevalencia de esas manifestaciones.

Conclusión: Se cree que los hallazgos del presente estudio pueden subsidiar la evaluación clínica del enfermero en el abordaje de trabajadores portuarios, así como dirigir la planificación y la implementación de cuidados socioambientales que estén de acuerdo con las necesidades de salud de esos y de otros trabajadores.

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Introduction

The Brazilian National Workers' Health Policy (PNSTT, as per its acronym in Portuguese), as a cross-sectional, interdisciplinary, and inter-institutional practice, considers labor as one of the determinants of the health-illness process. It involves an organized set of guidelines for promotional and health care practice for varied workplaces. In this set, the valorization of the relationship between work conditions and possible organic changes undertaken, as a care planning process based on clinical evidence, allows to detect the risk of morbidities and associated factors noticed and measured by workers who experience them. In addition, it values the knowledge and the subjectivity of workers in their respective institutional practices, and personal and collective needs for the promotion and surveillance of healthcare in the workplace, from the standpoint of the extended clinic.⁽¹⁾

The set of causes capable of producing organic changes that affect workers include those of ocular origin. Its prevalence is 4% of work-related accidents in developing countries.⁽²⁾ In developed countries, it represents more than 20,000 occupational ocular injuries a year, which shows that it is a significant public health problem.⁽³⁾

Ocular manifestations can be key signs and symptoms of changes in visual acuity, and may manifest as a substantial part of occupational injuries,⁽⁴⁾ such as eye dryness, rash, burning, lacrimation, foreign body sensation, and redness. They are clinical evidence that allows nurses and other health professionals to detect the risk of morbidities and associated factors noticed and measured by workers who experience them.

Occupational exposure in the ports related to workplace characteristics, such as work conditions, professional activity, time and working-shift, use of working tools, and the sociodemographic profile of each worker, may increase the prevalence of ocular manifestations. A study carried out in a port area in Nigeria showed that ocular exposure is a health problem that affects mostly workers with little professional experience, including young

male workers between 25 and 34 years of age, who work as welders, bricklayers, miners, carpenters, and locksmiths.⁽⁵⁾

In addition, ocular manifestations in port workers may be related to the handling of hazardous tools, such as chainsaws, steel cables, and containers associated with environmental factors, such as temperature, humidity, wind, fumes, pollution, and light intensity which trigger clinical ocular manifestations, such as infectious processes, photokeratitis, and pterygium.⁽⁶⁾ Similar studies reported the same ocular manifestations.^(6,7) A finding related to workers exposed to open-air, wind, and sun using dangerous working tools, as the case of port workers, showed ocular symptoms, such as blurred vision, pruritus, burning, and photophobia. They resulted from foreign bodies; chemical agents, such as acids, alkaline, and detergents; and physical agents, such as acute exposure to optical radiation.⁽⁸⁾

Ocular manifestations may be related to the failure to wear ocular protective devices. A study with the aim to assess awareness on ocular health hazards, related to work and use of personal protective equipment (PPE), showed an absence of these devices, high prices for personal acquisition or by the employer and, as for the few who wore the equipment, use was irregular due to discomfort, maladaptation, and vision impairment by haziness.⁽⁹⁾

Ocular manifestations in port workers may be intrinsically related to the work process that needs to be reviewed. In this regard, it becomes relevant to the health staff to invest in tools for social and environmental health monitoring of port workers, in a way that would allow the identification of work-related factors that lead to illnesses or disabilities.⁽¹⁰⁾

The lack of self-efficacy to prevent risk behaviors to the ocular health of port workers still needs to gather further study evidence. Facing this reality, it becomes relevant for nurses to understand the work process with its social and environmental characteristics, and the clinical practice as well, to identify signs and symptoms associated with ocular manifestations and, as a result, to promote specific interventions to the needs of workers, related

to work conditions and the workplace where they perform their labor activities. The objective of this study was to understand the prevalence of ocular manifestations in port workers and to identify associated factors.

Methods

This is a cross-sectional study carried out with port workers. It was developed in a seaport in the southern of Brazil. The studied population consisted of 723 port workers. On this basis, sample size calculation was carried out using the Stat Calc tool, Epi Info program, version 3.5.2. Out of the study population, 53 laid-off participants (with no information regarding their return to work during the research period) were excluded, totaling 579 port workers. A random sample with a 95% confidence interval (95% CI) was considered, resulting in a minimum number of 232 participants. Workers included in the study were those who showed up to apply for a job opportunity for the early, afternoon, or night shift.

Structured interviews were conducted with the port workers to collect data, once they signed the free and informed consent form. The workers were approached at their workplace in the seaport area of the South region, between January and November 2014. Independent sociodemographic variables (age group, ethnicity, level of education, and monthly income) and work conditions (professional activity, time working in the area, shift hours, robust variable – hours versus years of work, work shift, working tools – use of needles for sewing bags, side-cutting pliers, steel cables, wheelbarrows, hooks, chains, containers, forklifts and hydraulic jacks, service scales, films for wrapping goods, tool kits, sledgehammers, cleaning materials, painting materials, chainsaws, pallets, communication radios, hoists – and use of personal protective equipment – gloves, safety goggles, boots, facemasks, earplugs, safety belts, raincoats, helmets, and uniforms). The dependent variable was the occurrence of ocular signs and symptoms (itching/pruritus, rash, burning, lacrimation, fa-

tigue, pain, eye dryness, pressure sensation behind the eyes).

In the data analysis, the quantitative variables were described by mean and standard deviation or median and interquartile range values. The categorical variables were described by absolute and relative frequencies. Student's T-test for independent samples was used to compare the means among groups, namely, to compare workers with ocular manifestations through qualifiers in a moderate minimum level (presence of ocular manifestations) and those without ocular manifestations or with a low level (lack of ocular manifestations). The self-reported qualifiers were: moderate minimum level, which referred to ocular manifestations that had an impact on work performance; and without ocular manifestations or low-level manifestations that did not have an impact on work performance.

The Mann-Whitney test was used for the asymmetry cases. Pearson's Chi-square or Fisher's exact tests were used to compare the rates, whereas a Poisson regression analysis was performed to control confounding factors. For a variable to be included in the model, it should have a p-value <0.20 in the bivariate analysis; and p-value <0.10 in the final model to remain in the model. The measurement used was the prevalence ratio along with a 95% confidence interval. The significance level adopted was 5% ($p \leq 0.05$), and analyses were carried out using the Statistical Package for the Social Sciences software, version 21.0.

The study design met the national research ethical rules of Resolution 466/12, for research involving human beings. The research project was approved by the Research Ethics Committee of the Federal University of Rio Grande/FURG (CAAE 23116.004481/2013-53), linked to the National Research Ethics Council (CONEP).

Results

The 232 temporary port workers who were interviewed had a mean age of 48 years, 130 (56%) were predominantly white, 141 (60.8%) were

married, and 86 (37%) had completed elementary school. Out of these, 214 (92.2%) workers self-reported possible work-related ocular manifestations. The port workers indicated the following signs and symptoms: itching/pruritus (49.1%), rash (41.4%), burning (39.2%), lacrimation (34.9%), fatigue (32.3%), change in ocular pigmentation (26.7%), pain (17.7%), eye dryness (14.2%), and pressure sensation behind the eyes (9.9%).

Due to the small number of workers who did not report ocular manifestations, 18 workers (7.8%), and taking into consideration the workers who expressed ocular manifestations as an injury that affects work performance, this outcome was qualified as follows: no change/light degree, changes in moderate/severe/full degree. After sorting it out, the outcome was associated with the other study variables (Table 1).

The bivariate analysis of the sociodemographic variables and work conditions of port workers, with presence/lack of ocular manifestations, showed that age, ethnicity, marital status, level of education, monthly income, occupation, daily working hours, work shift variables with the robust variable (hours versus years) were not statistically significant. Regarding the use of working tools, workers had a diversity of them available, used for loading and unloading cargo, including: containers (86.6%), hooks (86.6%), steel cables (77.6%), pallets (77.2%), chains (57.8%), side-cutting pliers (55.2%), sledgehammers (54.3%), cleaning materials (50%), and films to wrap goods (21.1%). As for PPE, workers self-reported the use of a uniform (98.3%), helmets (98.3%), gloves (95.3%), safety goggles (95.3%), raincoats (94.8%), facemasks (83.2%), and filter masks (44.4%). Regarding the use of PPE and working tools, there was no statistical significance ($p>0.05$). However, for the control of confounding factors, the variables (age group, robust variable, film, goggles, helmet) that showed a $p<0.20$ value in the bivariate analysis were added to the multivariate Poisson regression model. In the final model, only variables with a $p<0.10$ value remained. After the adjustment, the use of films

Table 1. Study variables and presence or lack of ocular manifestations

Variable	Presence of ocular manifestations (n = 146)	Lack of ocular manifestations (n = 86)	p-value
Age (years)	48.2 ± 9.9	49.7 ± 11.2	0.272
Age group			0.098
<40 years	30 (20.5)	30 (23.3)	
40 to 59 years	95 (65.1)	45 (52.3)	
≥ 60 years	21 (14.4)	21 (24.4)	
Ethnicity			0.959
White	82 (56.2)	48 (55.8)	
Black	33 (22.6)	21 (24.4)	
Brown	21 (14.4)	13 (15.1)	
Indigenous	4 (2.7)	2 (2.3)	
Asian	6 (4.1)	2 (2.3)	
Marital status			
Single	31 (21.2)	18 (20.9)	
Married	91 (62.3)	50 (58.1)	
Widowed	2 (1.4)	5 (5.8)	
Separated/divorced	22 (15.1)	13 (15.1)	
Level of education			0.244
Illiterate/incomplete elementary school	47 (32.2)	23 (26.7)	
Elementary school	22 (15.1)	13 (15.1)	
Incomplete high school	10 (6.8)	12 (14.0)	
High school	56 (38.4)	30 (34.9)	
Incomplete higher education	4 (2.7)	6 (7.0)	
Higher education or more	7 (4.8)	2 (2.3)	
Monthly income (Brazilian Reais)	3600 (2775 – 5000)	4000 (2800 – 5000)	0.279
Occupation			0.630
Storage	89 (61.0)	47 (54.7)	
Stevedore	40 (27.4)	32 (37.2)	
Freight conference	12 (8.2)	5 (5.8)	
Freight repair	1 (0.7)	1 (1.2)	
Vessel guards	1 (0.7)	0 (0.0)	
Maintenance workers	3 (2.1)	1 (1.2)	
Length of work in the sector (years)	23.6 ± 11.2	25.3 ± 11.7	0.274
Work hours	7.09 ± 2.37	7.31 ± 2.54	0.509
Robust variable (hours*years)	144 (120 – 204)	156 (120 – 219)	0.132
Work shift			0.769
Daytime only	20 (13.7)	12 (14.0)	
Night only	12 (8.2)	4 (4.7)	
Night/Daytime	110 (75.3)	68 (79.1)	
Other	4 (2.7)	2 (2.3)	

*variables described by mean ± standard deviation, median (25 – 75 percentage) or n (%); values; ** statistical significance by adjusted residual test set at 5%

to wrap goods ($p=0.009$) and the use of gloves as PPE ($p<0.001$) remained statistically associated with ocular signs and symptoms, according to table 2.

The Poisson regression showed that port workers who used films to wrap goods had a 31% higher probability for ocular manifestations. Likewise, port workers that used gloves as PPE showed a 37% reduction in the probability of having ocular manifestations.

Table 2. Poisson regression analysis to assess independent factors associated with ocular signs and symptoms

Variables	PR (95% CI)	p-value
Use of films to wrap goods	1.31 (1.07-1.61)	0.009
Use of gloves as PPE	0.63 (0.51-0.79)	<0.001

PR – prevalence ratio; 95% CI - 95% confidence interval

Discussion

Of the 232 interviewed workers, 214 (92.2%) showed ocular signs and symptoms. Studies on ocular work-related manifestations found a rate of approximately 43% in China and 50% in Thailand.^(11,12) A higher rate of work-related ocular manifestations was reported in lower-income economies, especially in India (56%), Singapore (56%), and Malaysia (44%).^(13,14) A study carried out in Nigeria with port welders showed that all 40 studied workers presented physical evidence of local ocular signs and symptoms in the cornea, conjunctiva, and anterior chamber of the eye.⁽¹⁴⁾ Although the current study could not identify statistical significance for the use of PPE, such as goggles, it is important to intensify adherence to PPE use because the study showed a high level of awareness on the risk of being injured by welding (n=490; 98%). As a result, the authors reported that 46 (15.3%) welders did not use PPE at the time of the injury, which showed that low adherence to PPE use may have a major impact on ocular injuries in these workers.

Despite not being a variable with statistical significance, the age group from 40 to 59 years, which represents the mean age of the sample included in the current study, may be a risk factor for the development of ocular manifestations. Other studies have found conflicting data after reporting that workers from 20 to 40 years of age showed a higher risk for occupational ocular manifestations, compared to older workers,^(15,16) which may be explained by the fact that younger port workers have little professional training and less working time. In contrast, studies showed a higher risk of ocular manifestations for older workers.^(8,11,17)

In addition, the current study found that port workers who performed their work activities

in daytime shifts showed more ocular manifestations, with a 75.3% rate. A study carried out in China corroborated this finding, indicating a high prevalence of occupational ocular manifestations between 4 pm and 6 pm. This study implies that this time is the closest to the end of the shift, which suggests that activities have been rushed to finish the shift, including the fatigue attributed to closing the shift, and subsequent increase in dangerous workflows carried out during this time period.⁽¹¹⁾

In this study, among the set of tools workers used, only the handling of films/plastic materials for wrapping goods showed a 31% higher probability (p = 0.009) of ocular manifestations, as a result of hand-to-eye contact with no gloves. A study in a seaport in China found that 2% of occupational ocular manifestations resulted from improper handling of films/plastic.⁽¹¹⁾

Biochemical field researchers suggest that companies should prioritize workers' contact with sustainable plastic, rather than cheaper ones, because these generally present higher toxicity due to many contained additives, such as bisphenol-A and di-(2-Ethylhexyl) phthalate that may cause allergies, rash, pruritus, and ocular burning.⁽¹⁸⁾ They also emphasized the difficulty in implementing strict safety rules, which may contribute to higher rates of ocular manifestations in occupational scenarios.

Another important aspect in this study refers to port workers that wore gloves, because their use reduced the probability of developing changes in ocular mucosa. A study in India showed that workers that did not wear gloves had a higher number of injuries.⁽¹⁹⁾ Compared to the current study, the use of this piece of PPE was higher, but the probability remained the same; namely, the occurrence of manifestations was higher for those who did not wear it. The focus is particularly on the PPE gloves because it was maintained in the analysis model with statistical significance, which allowed to link it to ocular manifestations and to demonstrate its protective efficacy.

The prevention of occupational injuries involves PPE training and provision by the companies, besides raising workers' awareness. Although the current study did not relate the use of PPE

to the reasons for not using them, other studies revealed that ocular injuries were especially related to the distraction of workers, lack of adequate PPE supply, demand for agility to perform the activities, and lack of safety measures by workers.⁽⁴⁾ In addition, poor PPE maintenance, the performance of unknown tasks, failure to adopt efficient safety standards, lack of informative and educational campaigns on PPE use and prevention methods were the factors that contributed to ocular manifestations in the workplace.⁽²⁰⁻²³⁾

It is important to emphasize that nursing practice in public health focuses on the promotion of quality of life of individuals and covers the evaluation of the aspects related to lifestyle, beliefs, values, and tradition, including work conditions to which they are exposed (workplace, tools, activities, and workload). This social and environmental approach helps to promote nursing commitment in actions for health protection through health education, injury prevention, health surveillance, and health support to workers with an aim at communication about the risks.⁽²⁴⁻²⁶⁾ Nursing performance in occupational health care may prevent problems that arise from inadequate work conditions,⁽²⁴⁾ as the current study has indicated by clinical evidence of ocular injuries, which could result in increased absenteeism rates, reduced productivity, and changes in the quality of life of workers.

The limitation of this study is related to the methodological design content which was objectively perceived by means of a single subjective source, namely the self-report of research participants. In contrast, it is also acknowledged that subjective sources represent a considerable benchmark for developing diagnosis and care actions, through the establishment of a link between ocular manifestations and port work. These characteristics necessarily demand a coordinated set of individual and collective actions provided by public healthcare nursing, which in turn relies on theoretical and operational tools, such as risk communication process to follow-up the health and safety conditions of the workers. Therefore, this study, carried out in Brazil, provides an analysis of the

prevalence and factors associated with ocular signs and symptoms in port workers.

Conclusion

The prevalence of signs and symptoms of ocular manifestations reported by port workers was significant and associated with working tools (use of film to wrap goods and use of PPE gloves), with no statistical significance with the other study variables. The findings of the current study may help the clinical assessment of nurses in approaching port workers, and guide the planning and implementation of social and environmental care consistent with the health needs of these and other workers.

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Collaborations

Cezar-Vaz MR contributed with the project concept and orientation, research implementation, data analysis and interpretation, writing of the article, and critical review of its intellectual content. Xavier DM collaborated with data interpretation, writing of the article, and relevant critical review of its intellectual content. Bonow CA and Mello MCVA contributed with data collection and relevant critical review of its intellectual content.

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