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Original research

The incidence of needle stick and sharp injuries and their associations with visual function among hospital nurses

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Abstract

Purpose: To determine the one-year incidence of needle stick and sharp injuries (NSIs and SIs) and their associations with visual function among Iranian nurses.

Methods: In this cross-sectional study, 278 nurses working at one hospital were selected through stratified random sampling. After applying the exclusion criteria, the final analysis was performed on the data of 267 nurses. The data of occupational injuries were collected through a researcher-administered questionnaire. Visual function indices including distance and near best corrected visual acuities (BCVAs), color vision, stereoacuity, distance and near heterophorias, accommodative amplitude and facility, contrast sensitivity (CS) for high and low spatial frequencies, near point of convergence (NPC), saccadic and pursuit eye movements, distance and near convergence and divergence fusional reserves and peripheral vision were evaluated through optometric examinations using standard protocols.

Results: The one-year incidence of NSIs and SIs was 41.2% (95% CI: 35.3–47.1) and 19.1% (95% CI = 14.4–23.8), respectively. Color vision deficiency, pursuit deficiency, abnormal near heterophoria, and decreased CS for high spatial frequency (SF) had a significant association with the increased incidence of NSIs with odds ratios of 3.26, 2.32, and 1.35, respectively. Moreover, saccadic deficiency, abnormal near heterophoria, and decreased near fusional divergence reserve were significantly associated with the increased incidence of SIs with odds ratios of 2.42, 2.40, and 1.27, respectively.

Conclusions: Our findings showed a relatively high incidence of NSIs and SIs in Iranian nurses and their associations with some visual function indices. Therefore, pre-employment and periodic visual examinations are recommended to detect and remove the corresponding visual risk factors. Moreover, preventive strategies should be adopted to decrease the occurrence of the aforementioned injuries.

Keywords: Needle stick injuries; Sharp injuries; Visual function; Nurses

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Introduction

Needle stick injuries (NSIs) and sharp injuries (SIs) are among the most common occupational injuries in healthcare workers (HCWs) that comprise about 12% of all working people worldwide.[1,2] It is estimated that of 35 million HCWs worldwide, 3 million experience these injuries every year.[3] Among HCWs, the highest incidence of these injuries has been reported among nurses.[4,5]

NSIs and SIs in nurses are important from two aspects. The first aspect is the impact(s) of these injuries on the affected person since these injuries can lead to the transmission of bloodborne diseases like HIV, hepatitis B and C, and other dangerous bloodborne infections.[6,7] According to a World Health Organization's (WHO) report, NSIs and SIs are responsible for 16,000 new cases of hepatitis C, 66,000 new cases of hepatitis B, and 1000 new cases of HIV infection among HCWs worldwide, 1100 of whom die or become significantly disabled every year.[8] The second aspect is the economic effects of these injuries on the health system.[9] The estimated annual costs of tests and treatments resulting from NSIs and SIs range from USD 6.1 million in France to USD 118–591 million in the USA.[10]

Considering the high prevalence of NSIs and SIs in nurses and their important outcomes, researchers have emphasized the importance of reducing these injuries through recognizing the related risk factors.[2,11,12] Most studies in this regard have assessed the incidence of these injuries and their associations with some factors mainly demographic and occupational characteristics.[13–18] To the best of our knowledge, no study has evaluated visual function as a predisposing factor in the occurrence of NSIs and SIs.

Some studies have investigated the association between visual function and the occupational performance and accidents in some occupations like drivers and computer users, and it has been proved that visual system disorders can decrease efficiency, increase errors and accidents, and therefore, decrease job productivity.[19,20] Accordingly, standard protocols have been developed for visual screening examinations and interventions.[21] However, to the best of our knowledge, no study has been performed on nurses despite the sensitivity of their occupation and there is no standard relevant protocol to date. It should be mentioned that the protocols related to visual standards cannot be generalized to different occupations since the involvement and importance of various visual function indices vary in different occupations. Considering the aforementioned, the present study was conducted to determine the incidence of NSIs and SIs and their associations with visual function indices among nurses.

Methods

Study setting and sampling

This cross-sectional study was conducted at Baqiyatallah Hospital, Tehran, Iran in 2016. Baqiyatallah Hospital is a subspecialty hospital and tertiary referral center managing all types of medical and surgical diseases. The target population of the study was all nurses working at different wards of the hospital (a total of 32 wards) with at least 1 year of work experience. The study was approved by the Ethics Committee of Baqiyatallah University of Medical Sciences. Informed consent was obtained from all nurses prior to the study, and their data were kept confidential.

Power analysis was used to determine the sample size. According to the results of the pilot study on 30 nurses, an effect size of 0.3 was obtained; then considering an alpha of 0.05 and power of 80%, the estimated sample size was 278. To calculate the effect size, we determined the difference of all visual indices between injured and non-injured participants in the pilot group and determined the effect size based on the visual index that gave the largest sample size. The G Power software version 3.1.9.2 (Heinrich-Heine University, Dusseldorf, Germany) was used to calculate the sample size. The samples were selected using stratified random sampling. Each hospital's ward was considered a stratum, and in each stratum, sampling was done with regards to the proportion of the number of the nurses in the stratum to the total number of the nurses (proportion to size). After determining the number of samples in each ward, a list of all nurses working in the ward was used to select the samples using a random number table.

Questionnaire

The data of occupational injuries (NSIs and SIs) were collected using a researcher-administered questionnaire which included 2 parts. The first part contained questions on demographic and occupational variables like age, sex, work experience, work hours per week, number of night shifts per week, academic degree, and type of employment. The second part contained 4 questions on occupational injuries in the past year. The first question addressed the occurrence of NSIs as "Did you experience NSIs by yourself in nursing practice in the past year?" with yes and no as answers. The second question was about the frequency of NSIs in the past year with once, twice, three times, and more than three times as answers. The third question was about the occurrence of SIs as "Did you experience any cuts or lacerations in any parts of the body by blades or other sharp objects (other than needle stick) by yourself in nursing practice in the past year?" with yes and no as answers. The fourth question was related to the frequency of SIs in the past year with once, twice, three times, and more than three times as answers. The comments and viewpoints of occupational medicine and optometry experts were used to confirm the content validity of the questionnaire. Moreover, the test–retest method with an interval of one week was used to determine the reliability of the questionnaire ($R = 0.92$).

Eye examination protocol

In each section of the hospital, ocular examinations were performed in an environment with normal room illumination in the mesopic level by an experienced optometrist. First, distance and near uncorrected visual acuities (UCVAs) were measured

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