ORIGINAL ARTICLE

Occupational Exposure to Blood and Body Fluids among Post-graduate Students in Tamilnadu: A Cross-sectional Study

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Abstract

Objectives: Post Graduate students are exposed to blood and body fluids due to occupational accidents because of the environment in which they work. This study is to calculate the incidence of such events among the junior residents of medical colleges in Tamilnadu, various factors responsible, the circumstances under which they occur and the response of the junior residents after such injury.

Methods: A cross sectional study was conducted among 6 medical colleges in Tamilnadu in July 2016. A pretested questionnaire was used to collect data from 752 junior residents after informed consent. Data was analyzed using SPSS v20.0 p value <0.05.

Results: The response rate was 88.5% with mean age of the doctors being 28.4(SD 2.94). Most of them were from medical specialty 64%. The prevalence of exposure in the preceding 1 year was calculated to be 68.35% with significant male preponderance 75.31%. The average incidence was 1.85/year/PG.Only 81% of residents were fully immunized against HBV. Most common source of exposure was mucocutaneous splash 50.4% followed by needle prick injury 31.3%. Emergency room and IMCU had the highest source of exposure (two-thirds). Admission day 24 hours duty was the most common cause of exposure 69.65% and the reasons given were fatigue, lack of concentration, work overload, insufficient paramedic employment and lack of basic materials like gloves in the emergency department. High risk exposures were seen in 16% with only 51% of reported cases taking PEP. The reporting rate was only 30.5%. After an interval only 36.6% of the residents had their blood screened.

Conclusion: There is a high prevalence of exposure among junior residents. Efforts should be made to decrease the incidence of occupational exposure, increase the working standards, increase the reporting of such events and to ensure appropriate PEP is taken post exposure.

Introduction

Post Graduate students are exposed to blood and body fluids due to occupational accidents because of the environment in which they work. These include needle prick or other sharp injury, mucocutaneous splash of blood and other body fluids (in eyes, nose or mouth) or blood contact with damaged skin. These percutaneous injuries expose the junior residents to more than 20 different blood-borne pathogens. According to WHO Report 2002, 40% of HBV and HCV cases and 2.5% of HIV cases among health care workers worldwide are the result of occupational exposure. These result in 500 cases of HIV infection, 15000 HCV infections and 70000 HBV infections annually. The risk of infection for health care workers from occupational exposure depends on the nature and frequency of exposure and the prevalence of pathogens in the community.

These occupational exposures are often under reported. So, the injuries reported through standard reporting systems are often the tip of the iceberg. The occupational exposure among post graduates is not well documented. Therefore the aim of this study is to examine the epidemiology of occupational exposures in the main medical colleges in Tamilnadu, circumstances leading to such accidents and the response of the Doctors to such exposures.

Material and Methods

A cross sectional study was conducted among the junior residents working in the clinical departments from six medical colleges in Tamilnadu (Coimbatore, Chennai, Salem). A convenient sampling technique was used. Ethical Committee clearance was obtained from Coimbatore Medical College Hospital. Participation of the junior residents was voluntary and anonymous after informed consent. Based on the previous published studies and WHO guidelines a self-administered questionnaire was developed. It was first pretested among 10 post graduates as a pilot study to determine if the questions were clear, the comfort level to answer them, the choices given were compatible with the experience and necessary changes were made to it. The result of the pilot study was not included in the study proper.

The prevalence of occupational exposure among post graduates in the last one year was calculated. Data was coded and entered into the database and analysis was done using IBM SPSS v.20.0 software. Significance level was taken as $p<0.05$.

Results

Out of 850 Postgraduate students 752 responded, thereby the response rate was 88.5%. Mean age of the post graduates was 28.4 (SD 2.94). The sex ratio was almost equal (M-380, F-372)

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with most of them being unmarried 61.2%. The post graduates working in medical specialties were 64% and surgical specialties were 36%. The overall full course HBV vaccination was also calculated to be low 81% (609/752). The demographic characters of the residents are shown in Table 1.

Among the 752 respondents, 514 PGs had at least one exposure in the last 12 months, thus the prevalence rate was 68.35%. There was a significant sex ratio difference with male preponderance(M = 302,75.31%, F = 212,24.69%). Odds ratio was 1.24 with CI 0.99 to 1.56 (p <0.05). (Figure 1) The average incidence of occupational exposure was 1.85 per year per PG.

An overview of the nature of activity leading to occupational exposure is listed in Figure 2. Mucocutaneous splash was the most common source of exposure 50.4% p<0.05, followed by needle prick injury 31.3%.Other causes were contact with blood through damaged skin 10.5% and during needle recapping 5.7%.

The place of work in the hospital leading to exposure is categorized in Figure 3. Emergency room (medical casualty and trauma ward) had the highest exposure rate with 35% p<0.05 , followed by Intensive medical care unit (IMCU) 29.8% p<0.05. General ward had 15.6% incidence followed by operation theatre 13.8% and labour ward 5.8%.

Relation between the duty timings and the incidence of occupational exposure and the reason given for the occurrences was calculated Figure 4. Admission day duty (24 hour) reported the highest incidence with 69.65%, OR=3.60 p<0.0001 compared to day duty 22.18% and night duty 8.17 %. This suggests statistically much significance when residents are subjected to continuous 24 hours duty. The reasons suggested by them for such incidences was estimated with the main reason stated being fatigue and lack of concentration 63.42% followed by case overload 24.12% and patient aggression during procedures 12.45%.

Standard Precautions (SP) include a group of infection prevention practices that apply to all patients, regardless suspected or confirmed infection status, in any setting in which healthcare is delivered. SP at the time of exposure was taken only by 31.71% of the doctors. Reason cited for not practicing SP was non-availability 46.7% (of materials like gloves), followed by overloaded work and lack of time 32.5%, while 20.8% residents felt it wasn't necessary to use SP on all patients Figure 5.

Among the exposures, 82 (16%) reported as having been from a high-risk patient which includes patients or their spouses with history of HIV, HBV, HCV, iv drug abuse or unknown no-attender patients brought to the hospital by government free ambulance service.

Out of 82 residents, only 42 (51.22%) took complete course of post exposure prophylaxis. The number of reported cases to the medical officer in-charge in the hospital was only 25 (30.48%). Only 30 residents 36.59% had their blood screened for infectious diseases 3 months later (Figure 6).

Table 1: Socio-Demographic variables of the study population

Socio-Demographic variables	Nos.	(%)
Age group		
24-27	314	41.76%
27-30	236	31.38%
>30	202	26.86%
Sex		
Male	380	50.53%
Female	372	49.47%
Marital Status		
Married	292	48.8%
Single	460	61.2%
Department		
Medical	481	64%
Surgical	271	36%
Hepatitis B Vaccination		
Yes	609	81%
No	142	19%

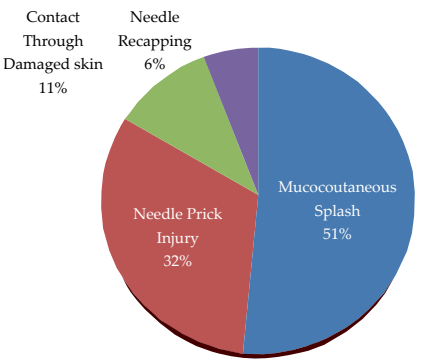

Fig. 2: Nature of activity leading to occupational exposure

Discussion

The prevalence rate of occupational exposure among post graduates was 68.35%. This is much high compared to the previous studies conducted in other parts of the country.[4,5] There was a significant male preponderance with male being at more risk than female. (OR = 1.24) The average incidence of occupational exposure was 1.85 per annum per PG. This is in accordance with the WHO Report which showed an average of 0.2 to 4.5%.[1] In contrast to the previous studies, needle stick injury was not the leading cause of occupational exposure.[2-5] Mucocutaneous splash was the most common source 50.4% followed by needle prick injury 31.3%. Most common mechanism of injury was during needle re-capping after usage. According to OSHA guidelines (Occupational Safety and Health Administration) needle recapping practice should not be done in hospitals.

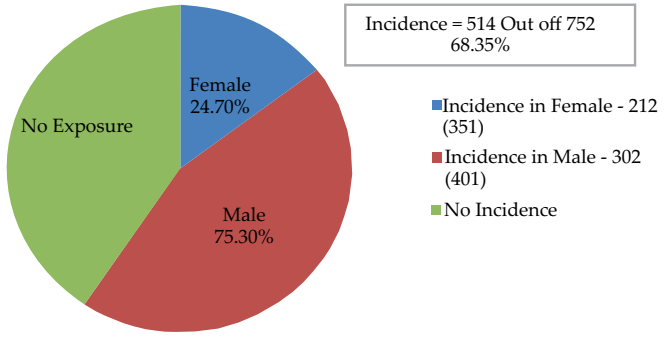

Fig. 1: Prevalence of occupational exposure

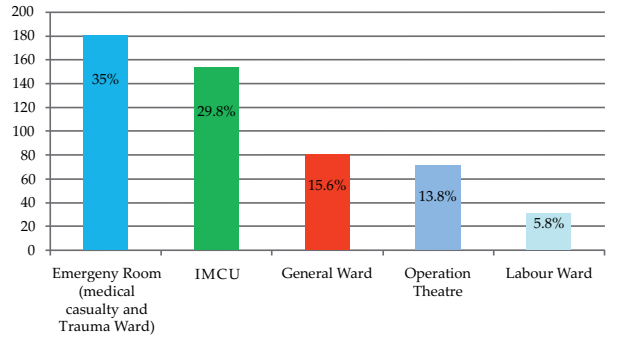

Fig. 3: Place of occupational exposure

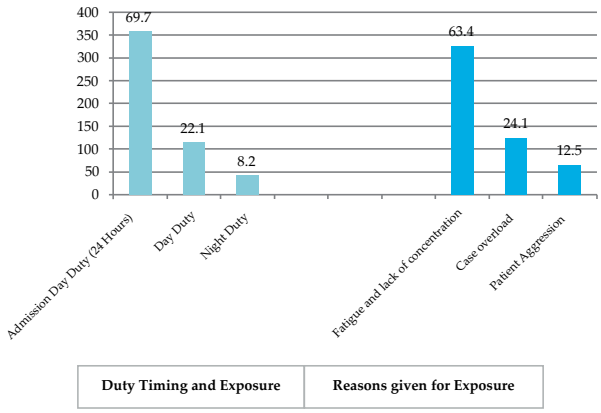

Fig. 4: Relation between duty timings and reasons given for occupation exposure

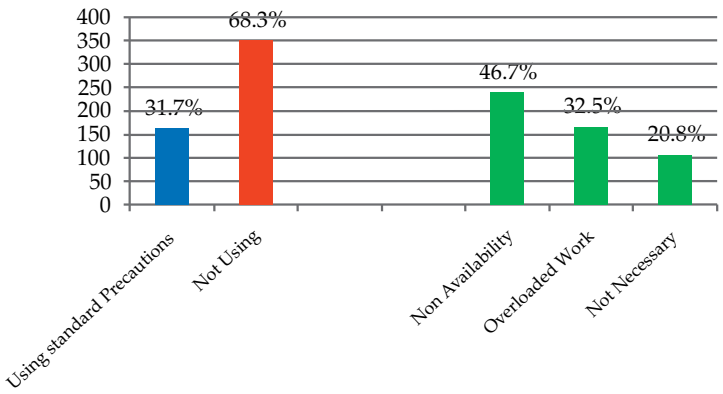

Fig. 5: Use of standard precautions

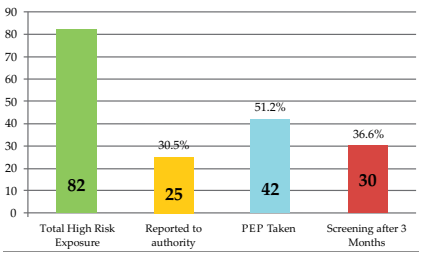

Fig. 6: Exposure from high – risk patient

But most of the residents were not aware that needle re-capping should not be done.

Majority of accidental exposures occurred in emergency department (medical casualty and Trauma ward) followed by IMCU in accordance with the previous studies.[1,4,5] The reason for this is probably the work load, low doctor-patient ratio and time constraints. This can be reduced by employing more paramedical workers in the Emergency department. There was a significantly high incidence of exposure during the admission day duty (24 hours) with Odds ratio 3.60 compared to day and night duties. The reasons stated being fatigue, lack of concentration and work pressure. Avoiding the continuous 24 hours duty would probably help in decreasing the incidence of occupational exposure among the junior residents. Taking short breaks in between the duty hours and refreshing might decrease the exposure.

Surprisingly, standard precautions were used only by 31.7% of the Doctors. Reasons cited being non availability of the materials, overloaded work and lack of time. The difference between knowledge, attitude and practice (KAP gap) was significantly high among the junior residents. It was seen that in spite of high risk exposure, only 51% of the residents took a complete course of post exposure prophylaxis, but this was found to be high compared to other studies conducted.[4,5] PEP can prevent the risk of HIV infection by 90%. The use of more intense educational programmes by the hospital administration in sensitizing the residents and easy approach to the reporting authority for starting PEP can reduce the risk of infection.

In our study too there was a gross under reporting of high risk exposures incidents to the official medical authority (30%).[1,4,5] The screening of their blood after 3 months was done only by 36.6% which is a worrisome attitude. The most likely reasons given were incidents being forgotten, under estimation of the risk, a wide KAP gap, and fear of a positive serological test, overloaded work and restricted time.

The overall full course HBV vaccination rate among the post graduates was also found to be low (81%). The risk of HBV transmission is 95% preventable by immunizing. The administration authorities in the medical colleges should make sure that the junior residents are fully immunized.

Conclusion

College administration should emphasize and make adequate measures to safeguard the junior residents from such occupational hazards. Hence there is an urgent need for establishing a state wise surveillance system for monitoring of occupational exposure to achieve infection control among the health care workers. These exposures can result in risk of infection and can cause serious mental ill-health.

References

1. World Health Organization: Health care worker safety: AIDE-MEMOIRE for a strategy to protect health workers from infection with bloodborne viruses. 2013. http://www.who.int/injection_safety/toolbox/en/AM_HCW_Safety_EN.pdf (accessed August 16, 2013).
2. Rapiti E, Prüss-Üstün A, Hutin Y: Sharps injuries: assessing the burden of disease from sharps injuries to health-care workers at national and local levels. WHO Environmental Burden of Disease Series, No. 11. Geneva, World Health Organization, 2005.
3. Centers for Disease Control and Prevention. Workbook for designing, implementing and evaluating a sharps injury prevention program. 2004.
4. Singru SA, Banerjee A. Occupational exposure to blood and body fluids among health care workers in a teaching hospital in Mumbai, India. *Ind J Comm Med* 2008; 33:26–30.
5. Ayas NT, Barger LK, Cade BE, Hashimoto DM, Rosner B, Cronin JW, et al. Extended work duration and the risk of self-reported percutaneous injuries in interns. *JAMA* 2006; 296:1055–62.
6. Memish ZA, Almuneef M, Dillon J. Epidemiology of needlestick and sharps injuries in a tertiary care center in Saudi Arabia. *Am J Infect Control* 2002; 30:234–41.
7. Kermode M, Jolley D, Langkham B, Thomas M, Crofts N. Occupational exposure to blood and risk of blood borne virus infection among health care workers in rural North Indian settings. *Am J Infect Control* 2005; 33:34–41.
8. Prüss-Ustün A, Rapiti E, Hutin Y: Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med* 2005; 48:482.
9. Markovic-Denic LN, Mihajlovic B, Cemerlic-Adjic N, et al: The effect of training programs to reduce needlestick injuries. *BMC Proc* 2011; 5(suppl 6):P217.