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Needle stick injuries, knowledge, attitude and practice of medical students in Umm Al-Qura University

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ABSTRACT

Background and aim: Approximately 3 million Health Care Workers are exposed to needle stick injuries (NSIs). Although the majority of these accidents have no sequela, at least 20 distinct pathogens, such as hepatitis B and C viruses or human immunodeficiency virus have been reported to be transmitted by NSIs. This study was conducted to determine medical students' knowledge, attitudes, and practices of NSIs in Umm AL-Qura University. *Methods:* This descriptive cross-sectional study was conducted based on an electronic survey formed by Google Forms in April 2022. The survey was distributed to all medical students from the second-year to intern level who is studying at Umm-AL-Qura University. *Results:* Overall, 359 students were enrolled in this study. Most of the students' age ranged from 21-23 age groups (63.5%), and most of the participants were males (86.6%). The majority of our participants (64.1%) were aware about NSIs, blood and exposure to body fluid. The majority of students had no previous history of NSI (88.3%), compared with students with positive history (11.7%). Most students completed their three HBV vaccination doses (60.77%). *Conclusion:* Our study reported NSIs' knowledge level, attitudes, practices and preventable methods. Medical students would at Umm Al-Qura university benefit from proper education and training to control and limit the incidence of NSIs.

Keywords: needle sticks injuries, knowledge, Prevention, medical students, Saudi Arabia

1. INTRODUCTION

Occupational exposure can be described as any accidental contact with blood and/or body fluids during a medical procedure (Marusic et al., 2017).

Approximately 3 million Health Care Workers (HCWs) experienced percutaneous exposure to blood-borne infections annually owning to NSIs, according to the World Health Organization (WHO) (World health organization, 2003). Although the majority of these accidents have no adverse implications, at least 20 distinct blood-borne pathogens, such as hepatitis B and C viruses (HBV and HCV) or human immunodeficiency virus (HIV) have been reported in literatures to be transmitted by NSIs or other sharp injuries (Rapiti et al., 2005; Serdar et al., 2013). Medical students, especially the undergraduates, are at a higher risk of being exposed in the course of their clinical practices while studying primarily to NSIs and injuries of sharp objects due to their underdeveloped skills, limited clinical experience, lack of knowledge and risk perception (Lee & Hassim, 2005; Sharma et al., 2009; Swe et al., 2014; Souza-Borges et al., 2014; Garima et al., 2015; Camacho-Ortiz et al., 2015).

During work or training hours, there is a high risk of being exposed to a potentially contagious injury or a splash of blood or body fluid, since the prevalence of HBV and HCV, as well as HIV, is significantly greater among hospitalized patients than in the general population (Wicker et al., 2008; Salzer et al., 2011; Wicker et al., 2008; Hofmann et al., 2002; wicker et al., 2008). Up to 20% to 38% of non-rural hospitalized patients test positive for a blood-borne pathogen. As NSIs can cause persistent illness, social stigma, psychological stress, and long-term impairment, it is critical to take potential exposures seriously (Weiss et al., 2007; Makary et al., 2007; Cervini & Bell, 2005). In Palestine, Germany and United States of America, the lifetime incidence of NSIs was estimated to be over 60% at the completion of medical college. In addition, these studies have highlighted a high level of underreporting (Sharma et al., 2009; Al-Dabbas & Abu-Rmeileh, 2012).

Nevertheless, as previous studies have demonstrated, there is a deficit in risk awareness among HCWs and undergraduate medical students, as well as a significant prevalence of underreporting (Wicker et al., 2008; Blitz et al., 2008). Several studies have found that there is a high rate of unreported exposure, which is a serious concern (Varsou et al., 2009; Moon et al., 2010). Under-reporting has been attributed to a variety of factors, including a lack of risk perception and incognizance of the reporting system, fear of being trivialized and humiliated (Sharma et al., 2009; Salzer et al., 2011).

This study is considered to be one of the few studies to assess the knowledge, attitudes, and practices of medical students regarding occupational accidents, particularly in the Middle East. Therefore, this study was conducted to assess medical students' knowledge level, attitudes, and practices of NSIsat Umm AL-Qura University.

2. MATERIALS AND METHODS

This is a cross-sectional descriptive study based on an electronic survey formed by google forms that was conducted in April 2022 after obtaining ethical approval by the biomedical ethics committee in university of Umm Al-Qura, College of Medicine, Makkah, Saudi Arabia. Ethical approval number is: (HAPO-02-K-012-2022-03-1030). OpenEpi website version 3.0 (AG, KM, 2013) used to calculate the study sample, in consideration of the following: the population size of Umm Al-Qura university medical students (from 2nd year to 6th year) and interns is about 1440 students and interns, keeping the confidence interval (CI) level at 95% and considering 50% prevalence of the sample size. The calculated sample size was 304 participants. The study tool was adapted based on a previously published study (Saleem et al., 2010). It was distributed to the students via social media applications.

Informed consent was obtained from all participants; first author's email was attached with the massage to answer any inquiries. We enrolled second to sixth year students and interns, both males and females at medical college of UQU. Students who study in preparatory year and who refused to participate were excluded. The questionnaire included two sections; the first section contained the demographic data such as: age, gender, and academic year. Second section evaluates the knowledge, attitudes, and practices of NSIs (Saleem et al., 2010). The obtained data was initially gathered in excel sheet to be checked. Afterward, we used SPSS software version 23 for the data analysis, the mean, standard deviation and significance utilizing the Chi-square test, with <0.05 p-value to be considered statistically significant.

3. RESULTS

This is an investigating electronic survey among Umm Al-Qura University medical students. Overall, 359 students were enrolled in this survey. Their demographical profiles are shown in Table 1. Students mean age was 22.07 (SD=1.67), with predominant responding among 21-23 age group (n=228, 63.5%). Most of the responses were from males (n=311, 86.6%) compared to females (n=48, 13.4%). Moreover, students from the 5th- medical year represented the majority, followed by students from the 4th- medical year (n=108, 30.1%), (n=70, 19.5%), respectively. Furthermore, students with GPAs ranging from 3.5-4 were the predominant group (n=254, 70.8%) (Table 1).

Table 1 Students' demographical profiles

Category		N.	Responds %
Age groups	18-20	65	18.1%
	21-23	228	63.5%
	24-26	66	18.4%
Gender	Male	311	86.6%
	Female	48	13.4%
Academic year	2nd year	66	18.4%
	3rd year	50	13.9%
	4th year	70	19.5%
	5th year	108	30.1%
	6th year	27	7.5%
	Intern	38	10.6%
Grade point average (GPA) out of 4	2.74 - 1.75	2	0.6%
	3.49 - 2.75	103	28.7%
	4 - 3.5	254	70.8%
Age (Mean) (Standard deviation)	Mean=22.07 (SD=1.67)		

Regarding students' responses related to needle/sharp injuries was described in (Table 2); Most of the respondents (n=230, 64.1%). from each academic year were aware that NSIs, blood and exposure to body fluid include splash on intact skin, injuries from sharps contents, injuries from needles or syringes, and exposure to fluids to mucous membranes. The majority of students had no previous history of needle/sharp stick injury (n=317, 88.3%), compared with students with positive history (n=42, 11.7%). Moreover, hepatitis-B-virus vaccination completion profiles were described in Table 2. Most students had been previously vaccinated (n=260, 72.4%), while about (n=99, 27.6%) of students haven't been vaccinated (Table 2).

Table 2 The knowledge, prevalence and vaccination of participants

Category		N.	Responds %
What does needle stick injury/blood and body fluid exposure include?	Splash on intact skin	5	1.4%
	Injuries from sharps contents	14	3.9%
	Injuries from needles or syringes	82	22.8%
	Exposure of fluids to mucous membranes	7	1.9%
	All answers are correct	230	64.1%
	Don't know	21	5.8%
Ever get needle/sharp content stick injury	Yes	42	11.7%
	No	317	88.3%
Hepatitis-B-virus vaccination completion	Yes	260	72.4%
	No	99	27.6%

Students who have been once (n=23, 54.76%), and twice (n=11, 26.19%) had been previous exposed to needle/sharp injuries before (Figure 1). Most exposed students report an injury during a patient procedure. Followed by when recapping a needle (n=15, 35.71%), (n=13, 30.95%), respectively (Figure 2). Furthermore, the infection source of the infected needle was known in most

participants' reports (n=32, 76.19%) (Figure 3). Most participants had inquired about the needle of the infected patient after the injury (n=19, 59.38%) (Figure 4).

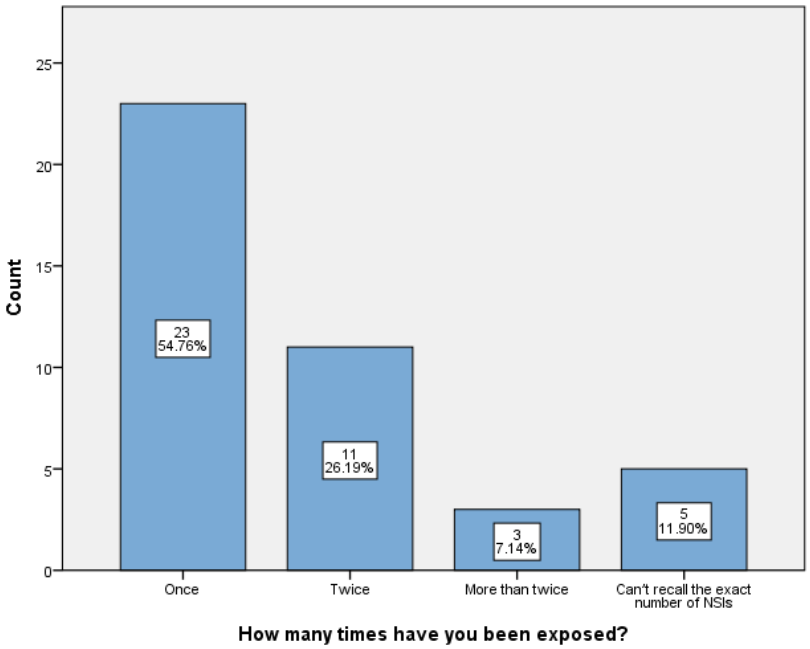

Figure 1 Previous exposure to needle/sharp content injury (N.42).

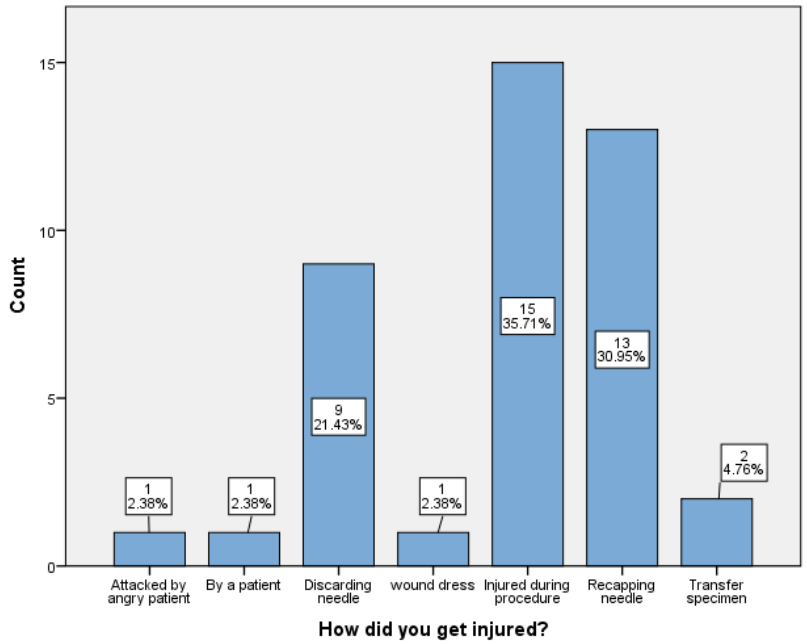

Figure 2 Mechanism of previous reported injury (N.42).

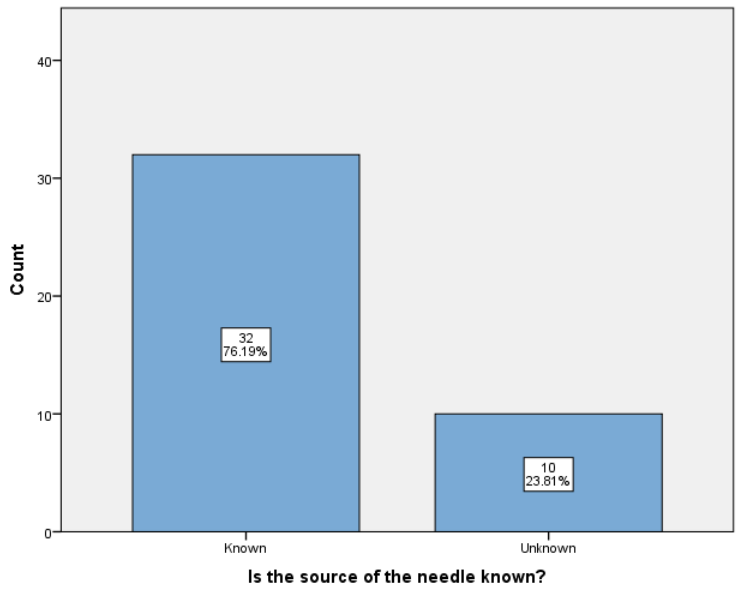

Figure 3 Source of infected needle (N.42).

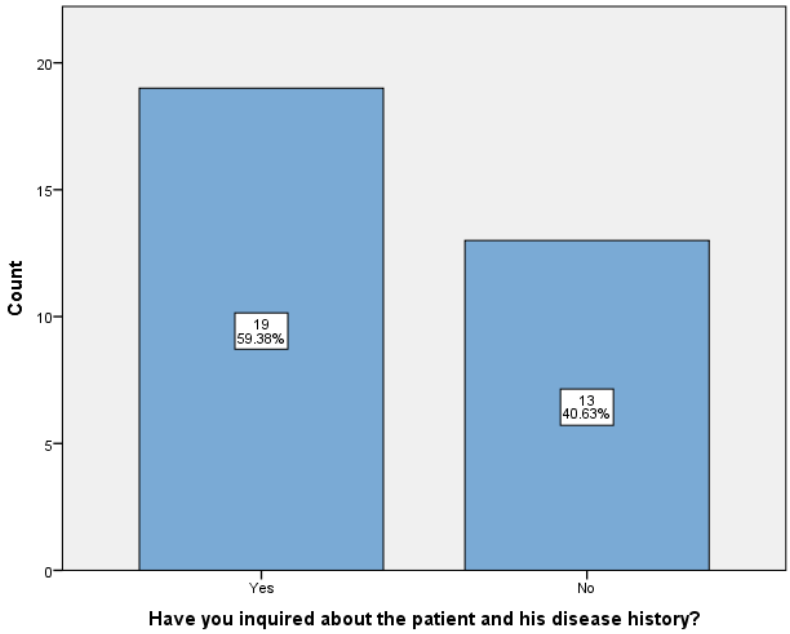

Figure 4 Inquired about needle of the infected patients among participants (N.32).

Regarding participants' HBV vaccination profiles, most students completed their three vaccination doses (n=158, 60.77%) (Figure 5). On the other hand, most participants did not check the antibodies titer after vaccination (n=178, 68.46%) (Figure 6). The correlation between the previous needle stick injury and what the exposure contained is addressed in Table 3. The exposure which contained needles or syringes corresponded significantly with a history of previous needle/sharp content stick injury (n=11), (P-value, 0.002). Simultaneously, Injuries from needles or syringes corresponded significantly with negative history of previous needle/sharp content stick injury (n=71), (P-value, 0.002). Finally, an insignificant association between hepatitis-B-virus vaccination completion profiles and history of previous needle/sharp stick injury (P-value, 0.105) (Table 3).

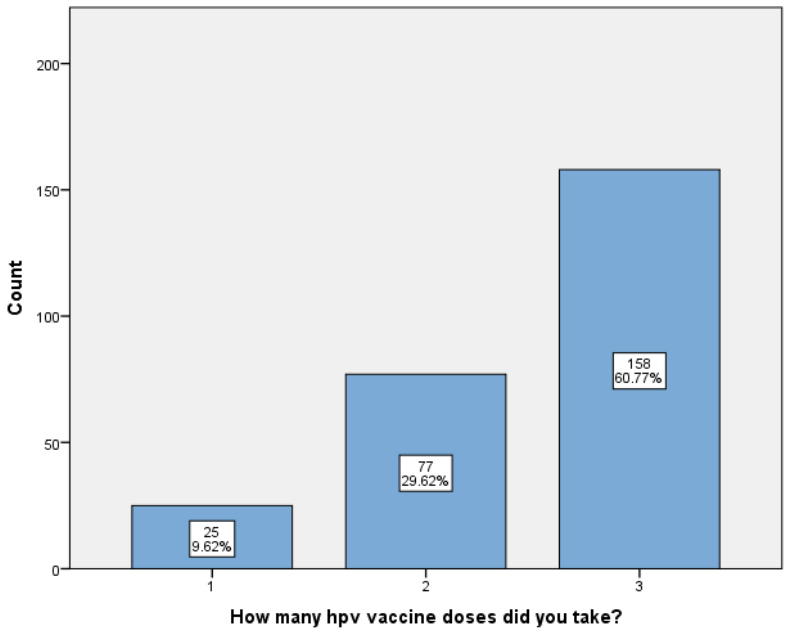

Figure 5 HBV vaccine doses that participants take (N.260).

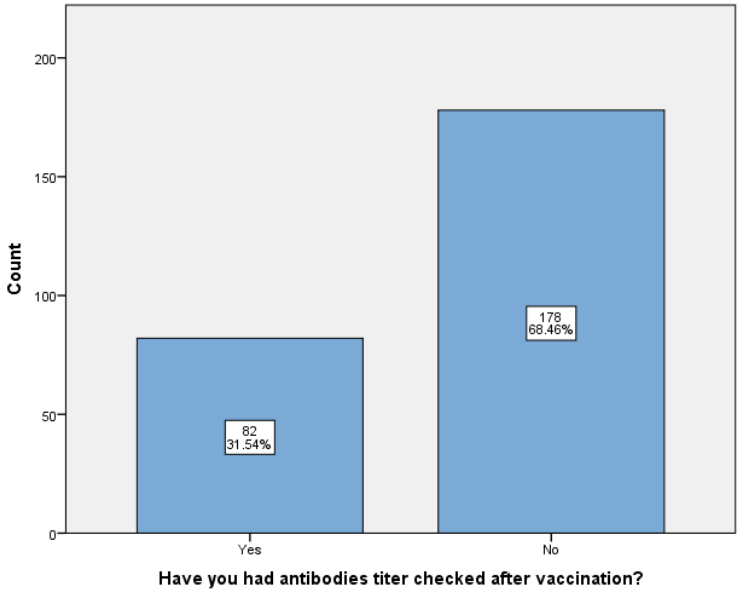

Figure 6 Previous HBV' antibodies titer checking after vaccination among participants (N.260)

Table 3 The association between history of previous needle/sharp content stick injury and content of infected source of injury and hepatitis-B-virus vaccination completion profiles

Category		Ever get needle/sharp content stick injury		P-value
		Yes (N.)	No (N.)	
What does needle stick injury/blood and body fluid exposure include?	Splash on intact skin	1	4	0.002*
	Injuries from sharps contents	0	14	
	Injuries from needles or	11	71	

	syringes			
	Exposure of fluids to mucous membranes	4	3	
	All answers are correct	22	208	
	Don't know	4	17	
Hepatitis-B-virus vaccination completion	Yes	26	234	0.105

A statistically significant variation was detected among students with ages ranging from 21-to 23, and negative history of previous needle/sharp content stick injury (n=216), (P-value, 0.002) (Table 4). Furthermore, students with ages ranging from 24-26 corresponded significantly with a positive history of previous needle/sharp content stick injury (n=27), (P-value, 0.002) (Table 4). Moreover, participants' gender, academic year, and GPA show no significant association with the history of previous needle/sharp content stick injury (P-value, 0.766, 0.298, and 0.091, respectively) (Table 4).

Table 4 The association between history of previous needle/sharp content stick injury and participants' demography

Category		Ever get needle/sharp content stick injury		P-value
		Yes (N.)	No (N.)	
Age groups	18-20	3	62	<0.001*
	21-23	12	216	
	24-26	27	39	
Gender	Male	37	274	0.766
	Female	5	43	
Academic year	2nd year	11	55	0.298
	3rd year	4	46	
	4th year	8	62	
	5th year	8	100	
	6th year	4	23	
	Intern	7	31	
Grade point average (GPA)	2.74 - 1.75	1	1	0.091
	3.49 - 2.75	8	95	
	4 - 3.5	33	221	

Students from 5th-year show a significant correlation with all types of exposure (n=78) (P-value, 0.002). Respectively, students in the 5th year also show a significant association with completion of HBV vaccination profiles (n=91), while 2nd-year students show a significant correlation with uncompleted HBV vaccination profiles (P-value, <0.001) (Table 5).

Table 5 The association between academic year and content of infected source of injury and hepatitis-B-virus vaccination completion profiles

Category		Academic years						P-value
		2nd year (N.)	3rd year (N.)	4th year (N,)	5th year (N,)	6th year (N,)	Intern	
What does needle stick injury/blood and body fluid	Splash on intact skin	2	1	2	0	0	0	0.002*
	Injuries from	0	5	0	8	0	1	

exposure include?	sharps contents							
	Injuries from needles or syringes	19	12	18	17	10	6	
	Exposure of fluids to mucous membranes	4	1	1	1	0	0	
	All answers are correct	34	25	45	**78**	17	31	
	Don't know	7	6	4	4	0	0	
Hepatitis-B-virus vaccination completion	Yes	32	23	50	**91**	26	38	<0.001*
	No	34	27	20	17	1	0	

4. DISCUSSION

The result of the present study highlights the knowledge, attitude, and practice of NSIs among medical students at UQU. Our findings show that 64.1% of the survey respondents have high level of knowledge regarding needle stick injury/blood and body fluid exposure, which is comparatively lower than a cross-sectional study done at a teaching hospital in Karachi, Pakistan. In that study 77.3 % of medical students have similar level of knowledge in the same aspect (Saleem et al., 2010). However, the knowledge regarding needle stick injuries have been generally seen to improve in the final years of medical school. Out of 359 respondents, a total of 42(11.7%) have reported being exposed to a NSI. Most exposed students report an injury during a patient procedure followed by when recapping a needle in comparison to a study conducted in Pakistan among medical students 26.1% had been exposed to a NSI, and most of the injuries had occurred while recapping a needle followed by drawing blood specimens (Saleem et al., 2010). Another study conducted in Serbia (Marusic et al., 2017), found that the prevalence rate of NSIs among medical students was 29.5%, NSIs were the commonest type of accidents, while in the USA (Shen et al., 1999), and a study reported that 35 (33%) students in the fourth year had sustained one or more injuries. In 34% of cases, the injury was caused by a needle.

Regarding participants' HBV vaccination profiles, 60.77% of students completed their three vaccination doses, which is relatively lower than a study done among medical students in Australia (deVries & Cossart, 1994) that shows more than 98 % of the participants completed their vaccination, whereas another German study (Deisenhammer et al., 2006) reported that 86% of medical students were fully vaccinated. Controversial to a study from Nigeria (Okeke et al., 2008), the results show a very low HBV vaccination status only 12.1% of medical students completed three doses. Henceforth we recommend further studies investigating medical students' Hepatitis B Vaccination status in our region. Since medical students are at an increased risk of being exposed to Needle stick injuries. Despite of vaccination completion, most participants did not check their antibodies titers after vaccination, therefore antibody titers should be regularly checked among all medical students who had received all 3 doses because of the probability of non-response to the first series of vaccinations.

Strengths and limitations

Despite using a concise and valid questionnaire in our study, there were inadequate female participants, unlike the male participants, which lead to reduced results accuracy. Also, this study might benefit from a larger study sample, which will provide more significant results.

5. CONCLUSION

Our study shows high level of knowledge regarding NSIs, body fluid exposure, and preventable methods. We recommend sustained theoretical and practical education to decrease the incidence of NSIs. Additionally, we advocate raising the perception regarding the importance of hepatitis B virus vaccination.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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