

Nursing students' immunisation status and knowledge about viral hepatitis in Turkey: a multi-centre cross-sectional study

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Background: The aims of this multi-centre cross-sectional survey were to detect Turkish nursing students' level of knowledge on viral hepatitis, to evaluate their rates of exposure to blood and to find out their hepatitis A (HAV), hepatitis B (HBV) vaccination status.

Methods: This multi-centre cross-sectional study was conducted in 14 nursing schools located in the seven geographical regions of Turkey. A questionnaire composed of 47 questions on socio-demographic factors, level of knowledge on HAV, HBV, hepatitis C (HCV) immunisation status, exposure history and attitudes was applied to the study group.

Results: A total of 1491 third- and fourth-year nursing students participated with an 89% response rate. The mean age of the participating students was 21.4 ± 1.3 . Their mean knowledge score was 23.7 ± 4.6 (71/100) and was significantly higher in fourth-year students than third-year students. There were significant differences in mean scores among nursing schools. Among the participants, 85.3% had received HBV vaccine and 9.1% had received HAV vaccine. The percentage of students who signify themselves at increased risk of acquiring viral hepatitis was 97.3%. Of the students, 28.1% had sustained a needle-stick injury and 5.4% had experienced conjunctival exposure to blood.

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Conclusions: Curriculum differences among nursing schools have a significant effect on nursing students' level of knowledge. For this reason, nursing schools should organize HBV immunisation programmes for their students to increase vaccination coverage.

Keywords: Level of Knowledge, Needle-Stick Injury, Nursing Students, Vaccination Rate, Viral Hepatitis

Introduction

Health-care workers including nurses are potentially at high occupational risk of being infected by blood-borne diseases such as hepatitis B (HBV) or C virus (HCV) (Shin et al. 2006). The risk of pathogen transmission from infected persons to non-immune persons through injury with a sharp object has been estimated to be between 6% and 30% for HBV and between 5% and 10% for HCV (Askarian & Ghavanini 2002). The risk may be even higher in nursing students, whose experience and knowledge is limited (Shiao et al. 2002; Talas 2009). Hence, it is necessary to inform the students about viral hepatitis and for them to complete a full course of HBV immunisation (Shiao et al. 2002).

Seroprevalence of hepatitis A (HAV) infection varies not only between different countries but also between different regions in the same country. Recent studies show that there has been a shift from high to medium endemicity of HAV infection, concomitant with a shift in the peak age of infection from childhood to adulthood in Turkey (Kanra et al. 2002; Kurugöl et al. 2009).

In Turkey, there has not been a nationwide multi-centre study conducted on nursing students' level of knowledge on viral hepatitis, vaccination rates and exposure to blood and body fluids. The purpose of this cross-sectional survey was to identify Turkish nursing students' level of knowledge on viral hepatitis and to detect their rates of exposure to blood and body fluids and HAV, HBV and HCV vaccination status.

Methods

Design, participants and setting

This multi-centre study was carried out as a cross-sectional survey based on a self-administered questionnaire between September and December 2008. The target group was third- and fourth-year nursing students. A sample size of 1674 students was calculated using $N = 8010$, $P = 0.50$, $d = 0.04$, confidence level = 95% and a design effect of 3 for cluster sampling.

In order to represent the whole country, it was aimed to include at least one university from each of the seven geographical regions. Among all 47 universities having nursing schools, 37 were contacted by email and 14 accepted to participate in the study. A preliminary interview was performed with faculty members in schools to gather data regarding number of stu-

dents, curriculum details on hepatitis, clinical practice and implementation of HBV vaccination (see Table S1).

Instruments

The questionnaire was prepared by specialists in infectious diseases and clinical microbiology, public health and nursing departments. The form was based on the relevant literature. The questionnaire was evaluated by two additional independent viral hepatitis experts and revised according to their suggestions. The questionnaire achieved its final form after a pilot study conducted on 30 nursing students from third and fourth grades.

The questionnaire was composed of a total of 47 questions (including 12 questions on socio-demographic factors, 26 about level of knowledge on HAV, HBV and HCV, five about immunisation status and four about risky behaviour history. Knowledge questions were propositions to which true/false/do not know could be replied. The knowledge score of the participants was calculated by giving one point to each correct answer with a maximum possible score of 33 (nine HAV, 14 for HBV, 10 for HCV).

Two responsible faculty members were requested from each participating school to administer the questionnaire, and these formed the study group. Data for this study were collected anonymously between September and December during the 2008–2009 academic year. The students completed the questionnaire during the lectures under the supervision of a psychological advisor. Each supervisor made a brief explanation of the study before students completed the questionnaire.

The study was approved by the local ethics committee.

Data analysis

Overall and hepatitis-specific mean scores were compared according to independent variables using Student's *t*-test or Mann–Whitney U test for variables with two categories and analysis of variance (ANOVA) or Kruskal–Wallis test for variables with more categories. Correlation analysis was used to investigate the relationship between mean scores and perceived level of knowledge. The chi-square test was used to explore factors affecting HBV vaccination. Logistic regression models were constructed with overall, HAV, HBV and HCV scores as the outcome

variables. The numeric outcome variables were classified into two categories for the logistic regression: one group had higher and the other had equal to or less than the median of the relevant score (median scores were: 24 overall, 6 for HAV, 11 for HBV, 8 for HCV). Independent variables that caused a significant difference in scores in the univariate analyses mentioned earlier were included in the model, adjusting for grade and centre as confounding variables.

Results

A total of 1491 female nursing students participated in the study with a response rate of 83.2% according to the total number of students. Among these, 49.1% were third-year and 50.9% were fourth-year students. Mean age was 21.4 ± 1.4 years (minimum, 18; maximum, 33).

The responses of students to knowledge questions are shown in Table S2.

Overall knowledge scores could be calculated for 1360 students (students without any missing responses). The mean score was 23.7 ± 4.7 (range 0–33) out of a maximum of 33 points (71/100). Mean scores for HAV, HBV and HCV were 6.0 ± 1.8 , 10.8 ± 2.1 and 7.0 ± 2.4 , respectively (equivalent to 67, 77 and 70, respectively, out of 100). There was a significant difference in mean overall and hepatitis-specific scores according to participating nursing schools (ANOVA, $P < 0.001$).

No significant difference was found in overall and hepatitis-specific mean scores according to mother's and father's education, having a health professional relative and perceived level of income. As a source of knowledge, high school did not make any significant difference in mean scores. Region of origin did not affect scores after adjusting for grade and school. The effects of some other factors influencing knowledge scores are presented in Table S3, with percentage of the students having a score higher than median and odds ratios adjusted for grade and nursing school.

Among the students, 2.0% rated their own knowledge level of viral hepatitis as very good, 29.9% as good, 56.8% as intermediate, 10.5% as bad and 0.9% as very bad. The students' knowledge scores were significantly correlated with their own ratings of their knowledge level with correlation coefficients ranging from 0.272 for HBV score to 0.412 for overall score ($P < 0.001$).

The students' sources of knowledge were university education 93.7%, Internet 49.1%, high school education 41.4%, printed media 35%, television/radio 27.2% and other sources 4.4%. For most of the respondents, university education was the most important source (83.0%).

In this study, 85% of the nursing students reported that they were vaccinated against HBV, 12.6% had acquired HAV in the past and 9.1% had received HAV vaccine.

Overall, 28.1% of the students had sustained a needle-stick injury and 5.4% sustained conjunctival exposure to blood. Following these exposures, 75.1% checked the serology profile of the patient, 51% had a serological test themselves, 25.3% consulted a doctor so that serological tests could be repeated, 20.9% got vaccinated against HBV, 10.0% did nothing, 1.7% washed their hands/face with water/soap, 1.1% used an antiseptic solution and 0.5% let blood flow out. The students who examined patient records and who had a serological test had significantly higher overall HBV and HCV knowledge scores ($P < 0.01$). The students who applied to a doctor had significantly higher (7.6 ± 2.4 vs. 6.9 ± 2.4 , $P = 0.007$) and who did nothing had significantly lower (6.3 ± 2.6 vs. 7.2 ± 2.4 , $P = 0.02$) mean knowledge scores for HCV.

Discussion

This is the first nationwide multi-centre survey on nursing students' level of knowledge on viral hepatitis, vaccination rates and exposure to blood and body fluids. Fourteen nursing schools from all geographical regions of Turkey participated in the study with a good response rate (89%).

The knowledge scores of the nursing students were moderate, with better performance in questions on transmission routes and worse performance in clinical outcomes. Our results demonstrated that the relationship between hepatitis viruses and cancer and hepatitis vaccines were the lesser known fields among the students. Although Turkey is a moderately endemic area for HBV, and screening and prevention programmes for this disease have been implemented since 1998 as a government policy, it was not emphasized adequately in educational lectures (Ersoy et al. 2005).

Questions about transmission routes of HBV had similar rates of correct response compared with studies conducted on staff nurses in Ireland and Greece (82–90% in this study vs. 85–86% in Ireland and 72–94% in Greece) while the frequency of correct answers to the question whether HBV is 100 times more infective than human immunodeficiency virus (HIV) was higher than that among Irish respondents (33% vs. 82%) (McGrane & Staines 2003; Noula et al. 2002). Unexpectedly, more students in our study correctly answered the question on vertical transmission of HBV than did Taiwanese university students from non-medical faculties (79–93%) but higher than nurses in Greece (72%) (Noula et al. 2002; Wang et al. 2009). We can speculate that these characteristics might be less emphasized in nurses' education in Turkey.

Our study revealed a great difference in knowledge scores between schools. We think that this is due to lack of a standard educational programme. The first semester is classroom-based training for basic science courses during the first year of nursing education in Turkey. Generally, clinical practice begins in the

second semester. In the preparatory period of our study, we were informed that lectures about viral hepatitis were in different years and semesters in different schools. In some schools, nursing students start their clinical training without any lectures about viral hepatitis. For this reason, standard and more intensive education programmes should be directed at Turkish nursing students to increase their awareness of and compliance with universal safety precautions before commencing their practical work experience.

University education had the greatest impact on overall HBV and HCV scores with the highest odds ratios, and this was consistent with the students' replies that university was most important. However, with a smaller odds ratio, the Internet had a wider impact, significantly affecting all scores including the HAV score. The reason why the Internet had such an impact may be the presence of well-designed information sites about these diseases. The importance of university education is attested by the effect of nursing schools on scores. The media have also some impact, especially on HBV scores, which is a disease that can be considered as relatively more mediatized. The death of a famous Turkish journalist in 1998 from cirrhosis due to HBV had provoked an action in the media and the society, prompting the government to take preventive measures (Yamazhan et al. 2007).

In Turkey, children born after 1998 have been receiving HBV vaccine as part of routine vaccination programme (Van Damme 2001). In addition, vaccination of risk groups including health-care workers are covered by the state when they admit to a relevant health-care centre. As a result, nursing students receive their HBV vaccines either by themselves or via their school's vaccination programme. In this study, 85% of the nursing students reported that they were vaccinated against HBV. The vaccination rate of nursing students was much higher than some other studies including one from Turkey similar to a study from Iran and lower than a study from Canada with 95% vaccination rate among final year nursing students (Askarian & Malekmakan 2006; Ganguly & Banerji 2000; Irmak et al. 2010; McCarthy & Britton 2000; Nasir et al. 2000; Shiao et al. 2002; Talas 2009; Techasathit et al. 2005). In a multi-centre study in Greece, the HBV vaccination rate of nursing students was 56.2% (Noula et al. 2008). The target immunisation rate of the World Health Organisation is 90% for nursing students for all vaccines. Hence, Turkish nursing students' vaccination rates are close to the target.

Our study group's HAV vaccination rate was very low. HAV vaccine is not a part of routine childhood vaccination programme in Turkey. For this reason, HAV vaccination should be applied in adolescence and adulthood if serology examination results are negative.

The fact that factors influencing knowledge scores do not affect immunisation status except nursing school shows that organiza-

tion of vaccination by nursing schools are effective in increasing vaccination rates of students. In our study, 11 of the 14 nursing schools organized HBV vaccination programme before the commencement of students' clinical practice. The three other schools, which did not implement vaccination, had significantly lower rates of immunisation. In different studies, it is reported that nursing students are exposed to blood and body fluids of patients mostly during invasive procedure trainings (Shiao et al. 2002). Therefore, it is recommended to nursing school administrators that students should receive hepatitis vaccination before their first clinical rotation (Liddell et al. 2002; Smith & Leggat 2005).

We think that parents' awareness aroused by the mass media campaigns, intensive efforts of students' health centres combined with the availability of free vaccination for risk groups by the Ministry of Health had a major effect on high HBV immunisation rates of nursing students in our country. The finding by Lin & Ball (1997) that 'time' and 'money' were among the main determinants in relation to the uptake of the HBV vaccination by nursing students supports the impact of vaccine availability and organization by schools.

In our study, after the exposure, 75% of the students checked the patients' serology profile. This compares favourably with the findings of Rabaud et al. (2000) who found that only 57% checked the patients' serology profile, and only 12% rechecked their HIV, HBV and HCV markers in the third month. In our study, the rate of the students who did not report their exposure was 10.9%. In medical literature, the rates of unreported cases are variable. In the study of Smith & Leggat (2005), 39.5% of needle-stick injuries were not reported. Differently, Shiao et al. (2002) found higher rates of unreported cases (86.9%). The students who did not report their exposure stated that they did not think more prevention would be necessary if they washed their hands with antiseptic solutions after exposure.

Limitations

Our study has several limitations. The study was conducted in 14 out of 47 nursing schools in Turkey. There is a possibility of responder bias among participating and non-participating schools, but the significant differences found between knowledge scores from the different schools suggest a low risk of bias. The overall response rate was good but low in two schools. Another limitation is that data are based on self-reports. Finally, the cross-sectional design of the study limits conclusions about causality for some findings.

Conclusion

In conclusion, our data suggest that it is necessary to standardize the curricula of nursing schools. Nursing students should be enlightened on all possible risky situations during occupational

exposure such as viral hepatitis by both lectures and practical training. Extended knowledge on needle-stick injuries is required and provision of a flow chart to follow after exposure would be beneficial before clinical training.

HBV vaccine is part of national routine immunisation programme, but adolescents and adults born before 1998 (including our study population) are at risk of acquiring HBV. Our study showed that HBV immunisation of nursing students depends on the schools' own initiative. The Ministry of Health and non-governmental organizations should manage awareness-raising and vaccination campaigns for the public and health-care workers.

Author contributions

Study conception/design: TY, YT, MIT

Data collection: TY, RD, MIT, YT, HP, ORS, SU and Turkish Nursing Hepatitis Study Group

Data analysis: RD

Drafting of manuscript: TY, RD, MIT, YT, ORS

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1 Data regarding participating centres, their regional distribution, number of participating students and coverage rates, the first year in which hepatitis lectures are given, and practice approach for HBV immunization.

Table S2 Responses of students to knowledge questions on HAV, HBV and HCV (*n*, %).

Table S3 Effects of some factors on knowledge scores, with percentage of the students having a score greater than the median and odds ratios adjusted for grade and nursing school.

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