Original Article

Effect of gender and age on the knowledge, attitude and practice regarding Hepatitis B and C and vaccination status of Hepatitis B among medical students of Karachi, Pakistan

Nazeer Khan,[1] Sheikh Munir Ahmed,[2] Muhammad Masood Khalid,[3] Sarah Hasan Siddiqui,[4] Ayesha Altaf Merchant[5]

Department of Research, Dow University of Health Sciences (DUHS),[1] PMRC,[2] Fourth Year Student,[3-5] Dow Medical College (DMC), Karachi.

Abstract

Objectives: To determine the vaccination status for hepatitis B and knowledge, attitude and practice (KAP) regarding hepatitis B and C among medical students of Karachi and to evaluate the effects of gender and age on the responses, regarding vaccination and KAP for Hepatitis B and C.

Methods: This cross sectional study was conducted in 7 medical colleges/ universities of Karachi. Convenient sampling was used to collect the information. Questionnaire regarding awareness about prevention, transmission, diagnosis, treatment and vaccination availability for hepatitis B and C was completed from each individual. In addition, vaccination status of hepatitis B and the awareness of students regarding post exposure prophylaxis was also documented. One thousand five hundred and nine students participated in this study.

Results: The mean age of medical students (1509) was 20.35 ± 1.72 years. Female participants were 1075 (71.2%) and 937 (62.1%) of the respondents were studying in public institutions. Eighty five percent of the respondents indicated that they were aware of availability of a vaccine for hepatitis B. Only 57.1% medical students showed excellent knowledge regarding the route of spread of hepatitis B and C. Students showing good knowledge of treatment procedures for hepatitis B and C were 48.2%. Half of the respondents (49.8%) showed good knowledge regarding spread of hepatitis by dental procedures. Seventy six percent of participating medical students did not have any knowledge about the post exposure prophylaxis for hepatitis B and C. Seventy four percent indicated that the hepatitis patients should not be isolated. Seventy nine percent of the students reported that they were vaccinated for hepatitis B and 70.6% of them were completely vaccinated (3 doses). About half of the respondents (49.4%) indicated that they were screened for hepatitis B and only 27.1% were screened for hepatitis C. Half of the students reported that they have had needle pricks in their students career.

Conclusion: The overall KAP of studied group showed satisfactory outcomes. However, some areas of knowledge and attitude need to be modified or changed altogether (JPMA 60:450; 2010).

Introduction

Hepatitis B and C virus infections have become a serious problem of public health and a major cause of morbidity and mortality, particularly in developing countries. Globally, two billion people (about one-third of the world's population) have been infected by Hepatitis B virus (HBV),[1] and 300 to 420 million people are chronic carriers, affecting 5-7% of the world's population.[1,2] Of these, 75% are Asians.[3] The prevalence of HBV infection varies widely, with rates ranging from 0.1% to 20% in different parts of the world.[3] Worldwide, about 100 million individuals are chronically infected with Hepatitis C virus (HCV).[4] High prevalence rates have been found in Southeast Asian countries, such as Thailand,[5] India[6] and Malaysia.[7] In Pakistan, the prevalence of HBV is reported as 10%[8] and seroprevalence of HCV is 6.7% in women and 1.3% in children.[9]

HBV and HCV are generally transmitted by unsafe use of therapeutic injections,[10] blood transfusion,[11] shaving from barbers, tattooing,[12] mother to child transmission[13] and unsafe sexual practices.[14]

Hepatitis B vaccine is the first anticancer vaccine which has outstanding record of safety and effectiveness and 95% effective in preventing children and adults from developing chronic infection.[1] WHO suggested in 1991 that all children should receive the vaccine and 116 countries have added this vaccine to their routine immunization.[1] Mass vaccination programme introduced in the late 1980s and mid1990s in most East and South-East Asian countries to combat HBV infection has resulted in a decline in HBV carrier rate and in the number of patients with hepatic decompensation or hepatocellular carcinoma.[15]

Health workers, especially physicians and medical students are always in direct contact with patients and are vulnerable to the acquisition of these infectious diseases. They are involved in blood transfusion, injections and surgical operations in their practices. They should be aware of the risk involved in the treatment procedures and should take appropriate precautions in dealing with patients. Few studies[16,17] have been conducted in Pakistan regarding vaccination status for hepatitis B and the knowledge, attitude and practice (KAP) about hepatitis B and C among medical students. Majority of the studies were conducted in private medical colleges involving one center. Therefore, this multicentre study, was conducted among students of various medical colleges of Karachi. The objective of this study was to determine the vaccination status for hepatitis B and KAP of hepatitis B and C among students of medical colleges of Karachi and to evaluate the effects of gender and age on the responses, regarding vaccination and KAP for Hepatitis B and C.

Methods

This cross sectional study was conducted among all undergraduate medical students of 7 medical colleges/ universities of Karachi. Presently Karachi has eight medical colleges in both public and private sectors. Seven medical colleges agreed to participate in this study. The institutions included were, Dow Medical College, Sindh Medical College, Baqai Medical University, Aga Khan University, Ziauddin Medical University, Karachi Medical and Dental College and Hamdard Medical and Dental University. Permission to conduct the survey in these different medical colleges was obtained through proper channel. Convenient method of sampling technique was used to collect the information. Duration of study was from October 2007 to February 2008.

Students were approached in their lecture halls and a verbal consent was taken. A pre-formed, pre-tested questionnaire was distributed and which was collected after it had been completed. It contained questions regarding awareness about prevention and transmission, diagnosis and treatment of hepatitis B and C. In addition, it also contained vaccination status of hepatitis B, awareness of students regarding post exposure prophylaxis and their observations during clinical rotations.

For brevity, the responses of knowledge about transmission of hepatitis, diagnosis, treatment procedures, preventive methods, bedside dealing and dental procedures which can transmit the viruses were grouped into different levels. Thirteen options were mentioned for the knowledge of transmission of hepatitis B and C. The answers were grouped as; correct answers 0-5 = poor; 6-10 = good and 11-13 = excellent. Five options were given for diagnosis of hepatitis B and C and they were grouped as; correct answers, 0-3 = poor and 4-5 = good. Five options were stated for different treatment procedures for hepatitis B patients and they were merged as; correct answers, 0-3= poor and 4-5 = good. Five options were mentioned for prevention of hepatitis B and C and they were grouped as; correct answers, 0-2 = poor, 3-4 = good, and 5 = excellent. Seven options were stated for the bedside dealing with the patients and they were grouped as: correct answers 0-2 = very poor, 3-4 = good and 5-7 = excellent. Four options of dental procedures which can spread hepatitis B and C were mentioned and they were grouped as; correct answers, 0-3 = poor and 4 = good.

One thousand five hundred and nine students participated in this study. The data were entered and analyzed using SPSS (ver-12) statistical software. Chi-square test was used to determine the significant difference between independent variables; gender and age-group versus other responses about vaccination of hepatitis B and KAP of hepatitis B and C.

Results

The mean age of the all the participating medical students (1509) was 20.4 ±1.7 years (range = 17-26 years). The number of female participants was 1075 (71.2%) and 937 (62.1%) of the respondents were studying in public institutions. Twenty seven percent of the subjects were attending the first year of their professional degree (Figure).

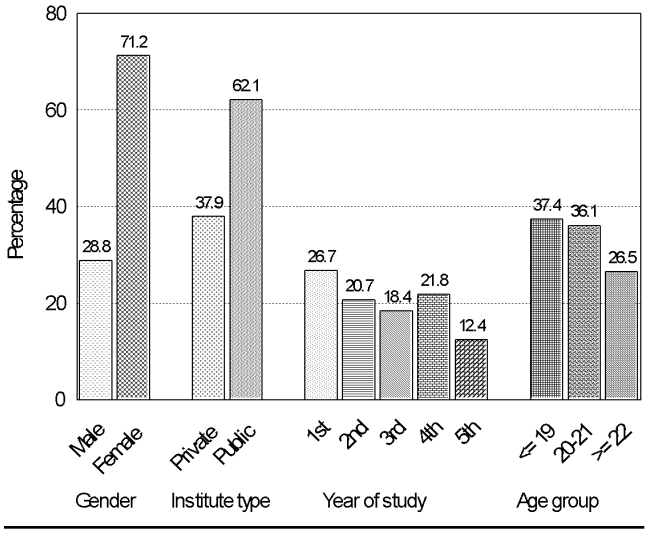

Figure: Demographic information of a cross-sectional survey, conducted at seven medical colleges of Karachi.

Table-1 shows the knowledge of availability of vaccines and the treatment methods for hepatitis B and C patients. Eighty five percent of the respondents indicated that they were aware of availability of a vaccine for hepatitis B. Female students showed significantly higher awareness in this regards than male students (p=0.023). The students above 20 years of age showed higher knowledge for this question than younger ones (P<0.0001). Nineteen percent of the respondents wrongly claimed that a vaccine is available for hepatitis C. Only 57.1% medical students showed excellent knowledge about the routes of spread of hepatitis B and C. Eighty nine percent of the students showed a 'good' level of knowledge for diagnosis of hepatitis B and C. Female students showed significantly higher level of diagnosis knowledge than the male counterpart (P=0.001). For the knowledge of route of spread and diagnosis, students of age more than 21 years showed significantly better knowledge than younger ones (P<0.0001). However, in response to treatment procedures for hepatitis B and C, only 48.2% students showed 'good' knowledge. Regarding curability of hepatitis B, 53.9% believed that it is curable up to certain level, with females showing higher percentage than male students (p=0.005). For hepatitis C, 13.1% of the students believed that it was completely curable and 39.0% indicated 'curable up to certain level'. Male students showed significantly higher percentages than females for the above two options (P=0.003). One third of the students (32.9%) indicated 'excellent' knowledge about

Table-1: Knowledge of medical students regarding hepatitis B and C infection in seven medical colleges of Karachi.

Question		Gender			Age Group				Total
		Male	Female	P-value	<=19	20-21	>=21	P-value	
Is vaccine available for?	Hepatitis B	355(81.8)	929(86.4)	0.023	443(78.4)	483(88.6)	358(89.7)	< 0.0001	1284(85.1)
	Hepatitis C	93 (21.4)	193 (18.0)	0.119	143(25.3)	100(18.3)	43(10.8)	<0.0001	286(19.0)
Knowledge of spread	Poor	20(4.6)	40(3.7)		29(5.1)	23(4.2)	8(2.0)		60(4.0)
of Hepatitis B & C	Good	173(39.9)	415(38.6)	0.611	292(51.7)	211(38.7)	85(21.3)	<0.0001	588(39.0)
	Excellent	241(55.5)	620(57.7)		244(43.2)	311(57.1)	306(76.7)		861(57.1)
Knowledge of diagnosis	Poor	69(15.9)	104 (9.7)		87(15.4)	65(11.9)	21(5.3)		173(11.5)
Of Hepatitis B & C	Good	365(84.1)	971(90.3)	0.001	478(84.6)	480(88.1)	378(94.7)	<0.0001	1336(88.5)
Knowledge of treatment	Poor	222(51.2)	559(52.0)		448(79.3)	260(49.7)	73(18.3)		781(51.8)
of Hepatitis B & C	Good	212(48.8)	516(48.0)	0.765	117(20.7)	285(52.3)	326(81.7)	<0.0001	728(48.2)
Is Hepatitis B?	Completely curable	134(30.9)	318(29.6)		160(28.3)	160(29.4)	132(33.1)	0.002	425(30.0)
	Curable up to certain level	209(48.2)	604(56.2)		315(55.8)	284(52.1)	214 (53.6)		813(53.9)
	Not curable	41(9.4)	72(6.7)	0.005	28(5.0)	52(9.5)	33(8.3)		113(7.5)
	Don't know	50(11.5)	81(7.5)		62(11.0)	49(9.0)	20(5.0)		131(8.7)
Is Hepatitis C?	Completely curable	63(14.5)	135(12.6)	0.003	73(12.9)	78(14.3)	47(11.8)	<0.0001	198(13.1)
	Curable up to certain level	186(42.9)	402(37.4)		208(36.8)	201(36.9)	179(44.9)		588(39.0)
	Not curable	120(27.6)	405(37.7)	0.003	183(32.4)	201(36.9)	141(35.3)		525(34.8)
	Don't know	65(15.0)	133(12.4)		101(17.9)	65(11.9)	32(8.0)		198(13.1)
Knowledge of prevention	Poor	57(13.1)	98(3.1)	0.031	78(13.8)	58(10.6)	19(4.8)	<0.0001	155(10.3)
of Hepatitis B & C	Good	229(52.8)	629(58.5)		343(60.7)	318(58.3)	197(49.4)		858(56.9)
	Excellent	148(34.1)	348(32.4)		144 (25.5)	169 (31.0)	183 (45.9)		496(32.9)
Can someone who appears healthy be a patient?		941(87.5)	0.368	480(85.0)	475(87.2)	355(89.0)	0.091	1310(86.8)	369(85.0)
Knowledge of Dental Procedures	Poor	239(55.1)	518(48.2)	0.015	320(56.6)	278(51.0)	159(39.8)	<0.0001	757(50.2)
causing Hepatitis B & C	Good	195(44.9)	557(51.8)		245(43.4)	267(49.0)	240(61.2)		752(49.8)
Are you aware of any post exposure prophylaxis available for	Hepatitis B	0.471	<0.0001	80(22.3)	215(24.3)	32(6.3)	114(25.9)	149(51.0)	295(23.7)

Table-2: Attitude of medical students regarding hepatitis B and C infection in seven medical colleges of Karachi.

Question	Gender			Age Group				
	Male	Female	P-value	<=19	20-21	>=21	P-value	Total
Should Hepatitis patients be allowed to work routinely? YES	285(65.7)	772(71.8)	0.062	340(60.2)	402(73.8)	315(78.9)	<0.0001	1057(70.0)
Should Hepatitis patients be allowed to do strenuous exercise? NO	199(45.9)	546(50.8)	0.021	305(54.0)	269(49.4)	171(42.9)	<0.0001	745(49.4)
Should Hepatitis patients be isolated? NO	305(70.3)	813(75.6)	0.097	384(68.0)	425(78.0)	309(77.4)	0.001	1118(74.1)
Should Hepatitis patients abandon sexual contact? YES	225(51.8)	581(54.0)	0.036	332(58.8)	280(51.4)	194(48.6)	<0.0001	806(53.4)
After being exposed to any of the possible risk factors did you consult for any post exposure treatment?	38(35.2)	67(28.8)	0.046	33(35.9)	34(27.4)	38(30.8)	<0.0001	105(30.8)
How can students be encouraged to get vaccinated?								
Organizing Hepatitis Seminars	236(54.4)	672(62.5)	0.003	344(60.9)	331(60.7)	233(58.4)	0.699	908(60.2)
Door To Door Campaigning	169(38.9)	420(39.1)	0.963	242(42.8)	211(38.7)	136(34.1)	0.023	589(39.0)
Media Awareness Programs	319(73.5)	873(81.2)	0.001	456(80.7)	433(79.4)	303(75.9)	0.191	1192(79.0)

Table-3: Practice regarding hepatitis B and C and vaccination status of medical students in seven medical colleges of Karachi.

Question		Gender			Age Group				
		Male	Female	P-value	<=19	20-21	>=21	P-value	Total
Are you vaccinated for Hepatitis B (yes)		334 (77.0)	854 (79.4)	0.248	452(80.0)	438(80.4)	298(74.7)	0.133	1188(78.7)
Are you fully vaccinated? (3 doses)		215 (66.4)	610 (77.2)	0.085	286(65.3)	306 (70.7)	233 (78.2)	0.004	825(70.6)
Have you been screened for?	Hepatitis-B	227(52.3)	518(48.2)	0.148	347(61.4)	229(42.0)	169(42.4)	< 0.0001	745 (49.4)
	Hepatitis-C	144(33.2)	265(24.7)	0.248	223(39.5)	116(21.3)	70(17.5)		409 (27.1)
Which of your family members are vaccinated for hepatitis B	Mother	221(50.9)	556(51.7)	0.779	286(50.6)	295(54.1)	196(49.1)	0.275	777(51.5)
	Father	217(50.0)	528(49.1)	0.756	277(49.0)	278(51.0)	190(47.6)	0.576	745(49.4)
	Sibling	256(59.0)	693(64.5)	0.046	355(62.8)	351(64.4)	243(60.9)	0.546	949(62.9)
	None	62(14.3)	175(16.3)	0.335	67(11.9)	93(17.1)	77(19.3)	0.004	237(15.7)
	Don't know	85(19.6)	139(12.9)	0.001	112(19.8)	63(11.6)	49(12.3)	<0.0001	224(14.8)
Bedside Practice rating	Poor	100(23.0)	221(20.6)		157(27.8)	112(20.6)	52(13.0)		321(21.3)
	Good	143(32.9)	329(30.6)	0.228	162(28.7)	175(32.1)	135(33.8)	<0.0001	472(31.3)
	Excellent	191(44.0)	525(48.8)		246(43.5)	258(47.3)	212(53.1)		716(47.4)
Have you ever had needle pricks (yes)		209(48.2)	544(50.6)	0.045	322(57.0)	269(49.4)	162(40.6)	<0.0001	753(49.9)
Have you ever had unscreened blood transfusion (yes)		18(4.1)	24(2.2)	0.054	13(2.3)	17(3.1)	12(3.0)	0.164	42(2.8)

the preventive methods of hepatitis B and C. Half of the respondents (49.8%) showed good knowledge regarding the causes of spread of hepatitis by dental procedures. Respondents of age group of more than 21 years showed significantly higher percentage than younger groups ($p<0.0001$). Seventy six percent of participating medical students did not have any knowledge about the post exposure prophylaxis for hepatitis B.

Table-2 describes the attitude of the medical students towards the hepatitis B and C patients. Seventy percent of the students believed that a hepatitis patient should be allowed to work routinely. Every three of four students (74.1%) correctly indicated that the hepatitis patients should not be isolated. The older groups (20-21 and $\geq$ 21 years) showed significantly better knowledge than the younger students ($p = 0.001$). More than half (53.4%) of the respondents correctly mentioned that hepatitis patients should not be allowed sexual contact. In this regard, the younger age-groups patients indicated correct answers than older groups ($p<0.0001$). To answer the question, 'How can students be encouraged to get vaccinated?', 4 out of 5 respondents (79%) advocated media awareness programmes, with female students showing significantly higher percentage than their male counterparts ($p=0.001$).

Seventy nine percent of the students reported that they were vaccinated for hepatitis B and 70.6 % of them were completely vaccinated (3 doses). About half of the respondents (49.4%) indicated that they were screened for hepatitis B and only 27.1% were for hepatitis C. The youngest age group ($\leq$ 19 years) screened significantly higher in percentage than older age groups for both hepatitis B and C ($p<0.0001$). The bedside practice for prevention of hepatitis B and C was excellent in half of the respondents (47.4%). Data, showed that as age increases their clinical practices improved ($p<0.0001$). Half of the students reported that they have had needle pricks sometimes in the practice. Female students showed significantly higher percentage than that of male students ($p=0.045$) for accidental needle pricks.

Three percent students reported for having unscreened blood transfusion. Twenty three percent respondents indicated that they had been exposed to one of the possible risk factors for hepatitis. Out of those, only 105 (30.8%) consulted for post exposure treatments (Table-3).

Discussion

This is a relatively large scale study among medical students covering 7 out of the total of 8 medical colleges of Karachi. Few small scale studies have been conducted among the local population to detect the KAP of hepatitis B and C and vaccination status of hepatitis B among medical students. Due to the scarcity of a large scale study, the correct picture regarding the KAP of this major health problem among medical students is not clear.

The average age of the students and the ratio of male to female in this study were almost the same in a study conducted among medical and dental students of Karachi.[18] The awareness of a vaccine for hepatitis B of this study (85%) was about the same as one other study conducted among students in a private medical college of Karachi.[16] The vaccine for hepatitis B is available in Pakistan since 1985 and incorporated in Expanded Programme on immunization (EPI) since 2000. Therefore, we were expecting higher information about this vaccine. Nevertheless, when the authors checked this information by the professional year of the students, they found that lowest percentage (75%) was among the students of 1st professional year and remaining students had a knowledge at 90%. However, the knowledge about non-existence of a vaccine for hepatitis C in the present study was almost the same for a study conducted on postgraduate surgeons[4] of Pakistani origin. This study showed less knowledge of the transmission of hepatitis B and C, compared to other studies[16,19] and not far above the general public knowledge. The older aged students (≥ 21 years) indicated significantly better knowledge in all aspects; spread of disease and treatment managements than the younger students. This is in agreement with students of Karachi[16] and Delhi[20] medical colleges. The over all knowledge about hepatitis B and C among the study population was in between 50 % to 70% in the 'good' category. These results were in agreement with Omani medical students,[21] but showed improved figures than Nigerian Surgeons.[22] About three-fourths of the respondents correctly indicated that the patients should be allowed to work routinely and should not be isolated. These attitudes are encouraging as compared to Omani medical students who showed only 58%.[21] However, the attitude is distressing regarding the consultation for any post exposure treatment after being exposed to any risk factor related to hepatitis B or C.

The percentage of a fully vaccinated figure of 70% is encouraging as compared to data reported from a Western study of only 59%.[23] However, studies published from Pakistan show a higher percentage of vaccination status[4,17] or a lower[19,24] percentage than seen in this study. However, as our subjects were medical students, a higher percentage of vaccination was expected. This study has a limitation of self-reporting hence, overestimation than actual vaccination may be documented. As a medical student it could be embarrassing to report being partially vaccinated or not vaccinated at all. Therefore, this percentage should be read with caution. About half of the respondents of this study reported that they had at least one needle stick injury (NSI) during their clinical practice, which is lower than other national[19,25,26] and international studies[27] which indicated that more than three fourth of the health care workers had had NSI. Results of this study indicated that the older students showed less frequency of NSI than the youngest age group. This suggests that the younger group showed greater carelessness than the older age groups.

The overall KAP of the studied group showed satisfactory outcomes. However, some areas of knowledge and attitude need to be corrected or modified. As recommended by Calabro et al[28] that a pre-test, lecture, a demonstration of standard precautions and infection control procedures, followed by a post-test was effective in changing the attitude and enhancing the knowledge for blood-borne diseases among medical students.

The following guide lines are suggested to minimize the risk of HBV, HCV and other blood-borne pathogens to health workers.[4] (1) Precaution is necessary when using needles, scalpels, and other sharp instruments or devices, so as to present injuries. (2) Do not recap used needles, remove used needles from disposable syringes, bend, break, and manipulate used needles by hand. Place used disposable syringes, needles, scalpels, and other sharp items in puncture-resistant containers for disposal. (3) Use protective barriers to prevent exposure to blood, body fluids containing visible blood and other fluids to which universal procedures apply. The type of protective barrier(s) should be appropriate for the procedure being performed and the type of exposure anticipated. Use gloves for performing all phlebotomy procedures. (4) Immediately and thoroughly wash hands and other skin surfaces that are contaminated with blood, body fluids containing visible blood, and other body fluids to which universal procedures apply.

Conclusion

The overall knowledge, attitude and practice of medical students showed satisfactory outcomes. Percentage of fully vaccinated medical students is satisfactory and percentage of NSI is lower than previous national and international studies. However, some areas of knowledge, such as transmission of hepatitis B and C, and attitude, such as consultation with the specialist for post-exposure, need to be corrected or changed.

Acknowledgement

The authors are grateful to Mr. Shahrukh Hussain for helping in data collection. We are indebted to Dr. Abdul Wahid Usmani, Director Quality Enhancement Cell, DUHS, for reviewing the manuscript for language and grammar. We are also thankful to Ms. Salma Arzoo Khattak for data analysis and Ms. Sumaira Naz for secretarial help.

References

1. World Health Organization. Hepatitis B Fact Sheets. (Online) 2000. Available from URL: http://www.who.int/mediacentre/factsheets/fs204/en/.
2. Alter M. Epidemiology of viral hepatitis and HIV co-infection. J Hepatol 2006; 44: 6-9.
3. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. J Viral Hepat 2004; 11: 97-107.
4. Rana JS, Khan AR, Haleem AA, Khan FN, Gul A, Sarwari AR. Hepatitis C: Knowledge, attitude and practices among orthopedic trainee surgeons in Pakistan. Ann Saudi Med 2000; 20: 477-9.
5. Suwanagool S, Tieangrim S, Ratanasuwan W, Mekanantagosol S, Luengrojanakul P, Kunasol P. Seroprevalence of anti-HCV among HIV-infected persons and general population. J Med Assoc Thai 1995; 78: 611-7.
6. Irshad M, Acharya SK, Joshi YK. Prevalence of hepatitis C virus antibodies in the general population & in selected groups of patients in Delhi. Indian J Med Res 1995; 102:162-4.
7. Duraisamy G, Zuridah H, Ariffin MY. Prevalence of hepatitis C virus antibodies in blood donors in Malaysia. Med J Malaysia 1993; 48: 313-6.
8. Yousef A, Mehmood A, Ishaque M, Yousef M. Can we afford to operate on patients with HBsAg screening? J Coll Phys Surg Pakistan 1996; 9: 98-100.
9. Parker SP, Khan HI, Cubitt WD. Detection of antibodies to hepatitis C in dried blood spot samples from mothers and their offspring in Lahore. Pakistan J Clin Microbiol 1999; 37: 2061-3.
10. Hutin Y, Harpaz R, Drobeniuc J, Melnic A, Ray C, Favorov M et al. Injection given in health care settings as a major source of acute hepatitis B in Moldova. Int J Epidemiol 1999; 28: 782-6.
11. Francisci D, Antonelli S, Preziosi R, Mecozzi F, Stagni G, Pauluzzi Sl. Risk factors for acute parentally transmitted viral hepatitis: a 20 years study. Eur J Epidemio 1993; 9: 625-8.
12. Haley RW, Fischer PR, Commercial tattooing as potentially important source of hepatitis C infection. Clinical epidemiology of 626 consecutive patients unaware of their hepatitis C serology status. Medicine 2001; 80: 134-51.
13. Gibb GM, Goodall TD, Dunn DT, Healy M, Neave P, Cafferkey M et al. Mother-to-child transmission of hepatitis C virus: evidence for preventable peripartum transmission. Lancet 2000; 356: 904-7.
14. Lauer GM, Walker BD. Hepatitis C virus infection. N Engl J Med 2001; 345: 41-52.
15. Poland GA, Jacobson RM. Prevention of Hepatitis B with the Hepatitis B vaccine. N Engl J Med 2004; 351: 2832-8.
16. Anjum Q, Siddiqui H, Ahmed Y, Rizvi SR, Usman Y. Knowledge of students regarding hepatitis and HIV/AIDS of a private medical university in Karachi. J Pak Med Assoc 2005; 55; 285-8.
17. Nasir K, Khan KA, Kadri WM, Salim S, Tufail K, Sheikh SZ et al. Hepatitis B vaccination among health care workers and students of a medical college. J Pak Med Assoc 2000; 50: 239-43.
18. Khan N, Siddiqui MU, Padhiar AA, Hashmi SAH, Fatima S, Muzaffar S. Prevalence, knowledge, attitude and practice of shisha smoking among medical and dental students of Karachi, Pakistan. J Dow Univ Health Sciences 2008; 2: 3-10.
19. Memon AR, Sheikh MA, Afsar, S, Zubairi, BF, Qadeer R, Baloch I. Hepatitis B vaccination status and knowledge, attitude, practices of health care workers (HCWs) regarding hepatitis B and C in a tertiary care setting of Karachi. Infectious Dis J Pak 2007; 16: 105-7.
20. Chhabra P, Grover VL, Agrwal K. Do our medical students have enough knowledge of Hepatitis B? A Delhi based study. J Commun Dis 2002; 34; 221-5.
21. Al-Jabri AA, Al-Adawi S, Al-Abri JH, Al-Dhahry SH. Awareness of hepatitis B virus among undergraduate medical and non-medical students. Saudi Med J 2004; 25: 484-7.
22. Adebamowo CA, Ajuwon A. The immunization status and level of knowledge about hepatitis B virus infection among Nigerian Surgeons. West Afr J Med 1997; 16: 93-6.
23. Patterson JM, Novak CB, Mackinnon SE, Patterson GA. Surgeons' concern and practices of protection against blood-borne pathogens. Ann Surg 1998; 228:266-72.
24. Ali NS, Jamal K, Qureshi R. Hepatitis B vaccination status and identification of risk factors for hepatitis B in health care workers. J Coll Physicians Surs Pak 2005; 15: 257-60.
25. Zafar A, Aslam N, Nasir N, Meraj R, Mehrah V. Knowledge, attitude, and practices of health care workers regarding needle stick injuries at a tertiary care hospital in Pakistan. J Pak Med Assoc 2008; 58: 57-60.
26. Mujeeb SA, Khatri Y, Khanani R. Frequency of parenteral exposure and seroprevalence of HBV, HCV, and HIV among operation room personnel. J Hosp Infec 1998; 38: 133-7.
27. National Institute for Occupational Safety and Health (NIOSH) DHHS. Publication No. 2000-108, Cincinnati Ohio, 1999.
28. Calabro K, Weltge A, Parnell S, Kouzekanani K, Ramirez E. Intervention for medical students' effective infection control. Am J Infect Control 1998; 26: 431-6.

Character cannot be developed in ease and quiet. Only through experience of trial and suffering can the soul be strengthened, ambition inspired, and success achieved.

Helen Keller
US blind & deaf educator (1880 - 1968)