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Frequency of Hepatitis B and C Viral Infection among the Medical Waste Handlers

Mahamod Selim Uddin[1], Md. Nazmul Islam[2], Mohammad Ehasun Uddin Khan[3], Shamima Yeasmin[4], Faysal Ahmed[5], M. Amiruzzaman[6]

[1]Registrar, Department of Haematology, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh; [2]Resident Physician (Medicine), 250 Bedded General Hospital, Pabna, Bangladesh; [3]Officer on Special Duty (OSD), Directorate General of Health Services, Ministry of Health & Family Welfare, Dhaka, Bangladesh; [4]Officer on Special Duty (OSD), Directorate General of Health Services, Ministry of Health & Family Welfare, Dhaka, Bangladesh; [5]Medical Officer, Department of Hepatology, Banghabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh; [6]Assistant Professor, Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

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Abstract

Background: Chronic viral hepatitis is a major health problem worldwide. Medical waste handlers (MWH) are particularly vulnerable to such hepatitis due to nature of their job. **Objective:** The purpose of the present study was to see the prevalence of hepatitis B virus and hepatitis C virus infection among the medical waste handlers. **Methodology:** This cross-sectional study was done from January 2015 to June 2015 to know the frequency Hepatitis B and Hepatitis C among medical waste handlers in SSMC Mitford Hospital, Dhaka. **Result:** 96 medical waste handlers were enrolled. The mean age was 38.39 (SD ±10.057) years (range: 20 to 60 years). The leading age group was 31-40 years (32%). Most of them had little educational attainment and more than half of the respondents (53.1%) were working in the hospital for more than 10 years. Prevalence of HBV and HCV were 6.3%% and 1% respectively in MWH. More percentage of HBsAg was identified in female (8.1%), in age group between 30-39 years (17.9%), in MWH who were in the service for 7-10 years. 7.2% of the MWHs were found to have needle stick or sharp injuries while 7.7% had mucous membrane contamination. More than three-fourths of the MWHs wore thick disposable gloves, 30 (31.3%) protective gown and only 14 (14.6%) wore boots. Male MWHs were significantly more likely to wear Boots (OR: 1.505: $P < 0.002$) compared to Female. **Conclusion:** Due to needle stick puncture infectious disease like Hepatitis B & C can be transmitted to the health care workers. Health education, prophylaxis by vaccination, universal precautions and proper hospital waste management are crucial in the prevention of HBV and HCV infection. [Bangladesh Journal of Infectious Diseases 2017;4(1):3-9]

Keywords: Medical waste handlers, Hepatitis B, Hepatitis C

Correspondence: Dr. Mahamod Selim Uddin, Registrar, Department of Haematology, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh; Email: selimuddin1012@gmail.com; Cell no.: +8801716385511
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Introduction

Viral hepatitis is inflammation of liver due to viral infections. It is caused by Hepatitis A, B, C, D and E Virus and also some other viruses[1-2]. Among them chronic viral hepatitis are caused by Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV). Chronic viral hepatitis subsequently causes cirrhosis of liver, liver failure, hepatocellular carcinoma and death. Therefore, chronic viral hepatitis is a major health problem worldwide. Viral hepatitis is the tenth leading cause of death and the leading cause of hepatocellular carcinoma worldwide[3-4]. HBV and HCV can be ended with development of cirrhosis and hepatocellular carcinoma[5]. More than 500 million people worldwide are persistently infected with either of these two viruses thus presenting a major global health problem[6]. Because the two hepatotropic viruses share the same modes of transmission, co-infection with the two viruses is common, especially in areas with a high prevalence of HBV infection and among people at high risk for infection[7-8]. There are several million carriers worldwide which provide a huge reservoir for HBV and HCV. It may progress to chronic liver disease (CLD) including hepatocellular carcinoma[9-10]. According to the estimate by World Health Organization (WHO), about two billion people worldwide have been infected with HBV and about 350 million people become chronic carriers and over one million people die each year as a result of acute fulminate liver disease or HBV induced cirrhosis and liver cancer[7-8]. The burden of HBV infection is highest in the developing world particularly in Asia and sub-Saharan Africa.[9-11]WHO estimated that the prevalence of HBV infection in Africa is more than 10.0%[12-13]. WHO estimated that approximately 170 million people are infected with HCV and about 130 million are carriers and three to four million persons are newly infected each year and more than 350,000 people estimated to die from hepatitis C-related liver diseases each year worldwide[14-16]. HCV infection in the world varies from 0.3 to 13% or more with the highest prevalence recorded in Central Africa and South-Eastern Asia[17-18].

Both HBV and HCV are an important occupational hazard for medical waste handlers and chronically infected HBV and HCV carriers are able to transmit through contact with their blood and body fluids, which includes occupational exposure to their blood and body secretions. The current treatment for hepatitis B virus infection is not curable after the infection progress to chronic stage and very expensive for individuals in developing countries like Bangladesh. Thus early screening of People who are at risk including medical waste handlers is mandatory[19].

Generally, medical waste handlers (MWH) who are working in collection, transportation, cleaning and disposal of medical wastes in health institutions have been consistently shown to have higher prevalence of HBV and HCV infection than non-clinical waste handlers that directly or indirectly have no contact with medical wastes[20-21].

Study regarding prevalence of hepatitis B and hepatitis C among medical waste handlers is uncommon in Bangladesh. So this study may produce awareness among medical waste handlers working in different hospital and thus helping the management of such case in future.

Methodology

This was an observational, cross-sectional study. The study period was from January 2015 to June 2015 and was conducted in Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh. Total 96 medical waste handlers of Sir Salimullah Medical College Mitford Hospital, working for at least one year were enrolled in the study. Ethical approval from the ethical approval committee of Sir Salimullah Medical College Mitford Hospital was obtained prior to the commencement of the study. Informed written consent was taken from the participant after explaining all the facts. Primary data was collected by face to face interview of the medical waste handlers. Individual who have been previously positive for HBV and HCV ,who are vaccinated for HBV, having any history of unsafe blood transfusion, parenteral drug abusers, taking acupuncture treatment, having spouse of hepatitis B and/or hepatitis C patient. Medical waste were defined by Waste generated by health care activities includes a broad range of materials, from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials. The people who handle these waste products are medical waste handler. In this study we select medical waste handlers are as follows Sweeper working in ward, laboratory and Operation Theater, Ward boy, OT boy, Aya who works in wards. Hepatitis B virus infection is defined by hepatitis B viral infection as HBsAg and/or anti-HBc positive detected by ELISA Method. In our study we defined Hepatitis C viral infection as Anti-HCV antibody positive detected by ELISA Method. Collected data were sorted and screened for any

discrepancy. The scrutinized data was then entered on to the template of SPSS® 20. Data were presented in the form of table and graphs. Descriptive statistics was presented with frequency table. Association was done by test statistics. Chart was generated to illustrate descriptive statistics. Sampling technique and data collection process through enumerators were performed very carefully.

Result

This cross-sectional study was done to know the frequency Hepatitis B and Hepatitis C among medical waste handlers in Bangladesh. The current study was done at Department of Medicine of Sir Salimullah Medical College Mitford Hospital from January 2015 to June 2015. For this purpose 96 medical waste handlers working at Sir Salimullah Medical College Mitford Hospital were enrolled. The age ranges from 20 to 60 years. The mean age was 38.39 (SD ±10.057) years. The leading age group was 31-40 years with more than 32% presentation. More than 28% respondents' age was 30 years or less. Almost equal numbers (26) of respondents were from 41-50 years age group. Majority of respondents were male (59/96) and the remaining (37/96) respondents were female. Most of the respondents (67/96) were working in the general ward.

Table 1: Distribution of anti-HCV antibody in relation to Socio-demographic characteristics of medical waste handlers (MWH)

Socio-demographic Characteristics	N (%)	Anti-HCV antibody in MWH (n=96)		
		n (%)	OR (95% CI)	p-value
Gender				
• Male	59 (61.5)	3 (5.1)	0.565 (0.042-7.557)	0.666
• Female	37 (38.5)	1 (2.7)		
Age Group				
• 20 to 29 Years	26 (27.1)	0 (0.0)	1	
• 30 to 39 Years	28 (29.2)	2 (7.1)	5.549 (UD)	0.997
• 40 to 49 Years	24 (25.0)	1 (4.2)	3.09 (UD)	0.998
• More than 50 Years	18 (18.8)	1 (5.6)	1.126 (0.060-21.158)	0.937
Length of service				
• 1 to 3 Years	51 (53.1)	2 (3.9)	1	
• 4 to 6 Years	13 (13.5)	1 (7.6)	UD	0.999
• 7 to 10 Years	19 (19.8)	1 (5.3)	UD	0.997
• More than 10 Years	13 (13.5)	0 (0.0)	UD	0.998
Level of education				
• Primary or less	44 (45.8)	1 (2.3)	0.953 (0.027-33.387)	0.979
• Secondary or more	52 (54.2)	3 (5.7)		
Marital status				
• Married	82 (85.4)	4 (4.9)	3.377 (UD)	1.000
• Unmarried	14 (14.6)	0 (0.0)		

UD= Undefined; MWH= Medical waste handlers; OR= Odds Ratio; N = Total number of individuals in each category; n = Total number of positive individuals in each category

About 19% respondents were the employee of operation theatre. Least numbers of respondents were working at emergency department, laboratory (4.2% each) or in the labour room.Out of 96 patients 82 (85%) were married. The remaining 14 (15%) respondents were single. Majority of the respondents (52, 54%) had attained up to primary level education. Remaining forty six percent respondents at least completed secondary level education. More than half of the respondents (53.1%) were working in the hospital for more than 10 years. About 20% respondents had 4-6 years working experience.In 86.5% cases there were H/O needle prick & others sharp object injury; however, in most of the cases (86.7%) the injury occurred occasionally. In 81.3% cases splash of body fluid to the eye, nose & mucus membrane happened. In most of the case the accident occurred occasionally.

In case of needle prick & others sharp object injury 86.7% cases asked for expert consultation but most of them (96.2%) disinfected the material. Only 3

respondents did not take any action. Distribution of the MWH by the use of personal protective equipment is presented in the above table. One third of the thick gloves wearers gave history of wearing thick gloves regularly while two thirds used the gloves occasionally.

Out of 96 respondents only 6 (6.3%) patients were found to be HBsAg positive. However, most of the respondents (90, 93.8%) were not infected with hepatitis B virus. Out of 96 respondents only 1 (1.0%) patients were found to be infected with HCV. However, most of the respondents (95, 99%) were not infected with hepatitis C virus.

Bivariate analysis of HBV prevalence in MWHs indicated more percentage of HBsAg was identified in female (8.1%), in age group between 30-39 years (17.9%), in married person (7.3%), in MWH who were in the service for 7-10 years. However; none of them showed statistical significant association. Bivariate analysis in MWHs indicated more percentage of anti HBcAb was identified in female (5.4%), in age group between 30-39 years (10.7%), in married person (4.9%), in MWH whose length of service was more than 10 years. However; none of them showed statistical significant association ($p>0.5$). Bivariate analysis of HCV prevalence in MWHs showed more percentage of anti HCV antibody was identified in male (5.1%), in age group between 30-39 years (7.1%), in married person (4.9%), in MWH who were in the service for 4-6 years (7.6%). However; none of them showed statistical significant association ($p>0.05$).

Almost equal proportion of HBsAg was identified in those with a history of needle prick (including other sharp object) injury and body fluid splash in mucous membrane (7.2% and 7.7% respectively). This statement was also applicable for anti-HBcAb and For anti HCV antibody. However, none of the studied risk factors was associated with HBV or HCV markers. Table XI: Use of Personal Protective Equipment (PPE) among male & female medical waste handlers. More than three-fourths of the medical waste handlers wore thick disposable gloves, 59 (61.5%) face masks, 30 (31.3%) protective gown and only 14 (14.6%) wore boots. Male MWHs were significantly more likely to wear Boots (OR: 1.505: $P < 0.002$) compared to Female. However; use of PPE was not associated with gender ($p>0.5$).

Table 2: Use of Personal Protective Equipment (PPE) among Male & Female Medical Waste Handlers

Type of PPE	Male	Female	Total	OR(95% CI)	P value
Thick disposable glove	42 (71.2)	31 (83.8)	73 (76.0)	1.091(0.739-3.917)	0.159
Face mask	37 (62.7)	22 (59.5)	59 (61.5)	0.832(0.357-1.942)	0.671
Boots	11 (18.6)	3 (8.1)	14 (14.6)	0.385(0.100-1.485)	0.155
Protective gown	20 (33.9)	10 (27.0)	30 (31.3)	0.722(0.292-1.783)	0.482

Discussion

Medical waste poses the potential problems to health care workers, particularly to waste handlers.[23,24] Among the biohazards the occupational risks posed by hepatitis B virus (HBV), hepatitis C virus (HCV) and HIV are well documented.[36]HBV has been found to infect about 350 million people globally.[25] Hepatitis B and C are global problems mostly in the developing countries. Hepatitis B virus is one of the major public health problems globally and is the tenth leading cause of death. In a study HBsAg prevalence among the general population in Bangladesh was reported as 5.5%, which places our country in an intermediate HBV endemicity zone.[22] In Bangladesh representative population study regarding the prevalence of the HCV is lacking. Except for the work by a Japanese group, that reported 5% prevalence of HCV in Bangladesh[26], others reported extremely low prevalence of HCV in Bangladesh[27].

This current study was done to know the frequency of Hepatitis B and Hepatitis C among medical waste handlers in Bangladesh. For this purpose 96 medical waste handlers working at Sir Salimullah Medical College Mitford Hospital were enrolled. The mean age was 38.39 (SD ±10.057) years which ranged from 20 to 60 years. The leading age group was 31-40 years with more than 32% presentation. Majority of respondents were male (59/96) and the remaining (37/96) respondents were female. Most of them had little educational attainment and more than half of the respondents (53.1%) were working in the hospital for more than 10 years.

The present study shows prevalence of HBV and HCV were 6.3%% and 1% respectively in MWHs, which is comparable with other studies. Vipul et al[28] reported 2.4% prevalence of HBV while Attaullah et al[29] reported 2.18% prevalence of the same. Alam et al[30], Petrosillo et al[31] and Arankalle et al[32] reported HCV prevalence as 1.4%, 2.0% and

4.0% respectively. More percentage of HBsAg was identified in female (8.1%), in age group between 30-39 years (17.9%), in married person (7.3%), in MWH who were in the service for 7-10 years. However, none of them showed statistical significant association which is in correlation with the study of Vipul et al[28]. One study in Ethiopia reported high prevalence rate of HBsAg (6.0%) positivity among female as compared to male (1.0%)[31]. Totally opposite result reported in Libyan's study where none of female medical waste handlers were positive compared to 2.9% HBsAg positivity in male[33].

Table 2: Distribution of HBsAg, anti-HBc antibody and anti HCV antibody positivity among medical waste handlers with potential risk factors

Name of the Risk Factors	N (%)	n (%)	p-value*
For HBsAg			
Needle prick and other sharp object injury	83 (56.5)	6 (7.2)	1.00
Body fluid splash in MM	78 (81.3)	6 (7.7)	
For anti-HBcAg			
Needle prick and other sharp object injury	83 (56.5)	4 (4.8)	1.00
Body fluid splash in MM	78 (81.3)	4 (5.1)	
For anti HCV			
Needle prick and other sharp object injury	83 (56.5)	4 (4.8)	1.00
Body fluid splash in MM	78 (81.3)	4 (5.1)	

* Fisher's Exact test

Almost similar findings were noted in case of anti-HBcAb. But in case of HCV prevalence in MWHs, more percentage of anti HCV antibody was identified in male (5.1), in age group between 30-39 years (7.1%), in married person (4.9%), in MWH who were in the service for 4-6 years (7.6%), none of them showed statistical significant association. These findings are well supported by that of the Vipul et al[28] study who reported almost similar results.

Almost similar findings were noted in case of anti-HBcAb. But in case of HCV prevalence in MWHs, more percentage of anti HCV antibody was identified in male (5.1), in age group between 30-39 years (7.1%), in married person (4.9%), in MWH who were in the service for 4-6 years (7.6%), none of them showed statistical significant association. These findings are well supported by that of the Vipul et al. study who reported almost similar results.[28]

Sharps injuries & splash exposures Blood Born Virus (BBV) infection may follow needle or sharps injury, contamination of pre-existing skin lesions or splash inoculation to the eyes, nose or mucous membranes[34]. The present study reported that, 7.2% of the MWHs were found to have needle stick or sharp injuries while handling medical waste. This finding was inconsistent with the studies revealed in Nigeria where needle stick injuries among healthcare workers were the commonest forms of exposure to HBV infections[35]. The current study reported 7.7% mucous membrane contamination. In Italy, needle sticks constituted the most common source of exposure (58.4%), followed by non-intact skin and mucous membrane contamination (22.7% and 11.2% respectively), and cuts (7.7%)[36].

More than three-fourths of the MWHs used thick disposable gloves, 59(61.5%) face masks, 30(31.3%) protective gown and only 14(14.6%) used boots. This may be the result of lack of training and shortage of supply since this is a common scenario of our govt. Hospitals. This finding is consistent with other study where only 55.0% of MWH used personal protective equipment (PPE)[37]. Male MWHs were significantly more likely to wear boots (OR: 1.505: $P < 0.002$) compared to Female. However; use of PPE was not associated with gender ($p>0.5$).

Limitations of the study: Like all other research work the current study was also not flawless. The study included only a single centre with a relatively small sample size which limits generalizability. The observational study design was also weak to extract underlying information Multi-centre studies with larger sample and sound study design could bring more insight regarding this issue.

Conclusion

Medical waste chiefly infectious medical wastes are potential depot of numerous microbes, which implicates health care workers and also public health. Due to needle stick puncture infectious disease like Hepatitis B & C can be transmitted to the health care workers. In our country, among these infectious diseases hepatitis B has much more potentiality to be transmitted to the health care worker through puncture or any way contact of body fluid or blood. This study showed that 6.3%% and 1% of medical waste handlers (MWH) are infected with hepatitis B & C respectively which might be due to medical waste handling. One fourth of the MWH did not use any personal protective equipment. Health education, prophylaxis by vaccination, universal precautions and proper hospital waste management are crucial in the prevention of HBV and HCV infection.

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