

Prevalence of hepatitis B surface antigen infection and associated factors among health care workers in Moshi Municipality's primary health facilities

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ABSTRACT

Hepatitis B virus infection remains a major public health problem across the globe. Health care workers are at highest risk than other groups due to frequent contact with body fluids. Despite efforts made by the Tanzanian government since 2014 towards universal immunization of healthcare workers, still, the coverage has not been explored. The study was done to determine the prevalence of Hepatitis B surface Antigen carriage on Hepatitis B infection and associated factors among Health care workers in Moshi Municipality's Primary Health facilities. An analytical cross-sectional study was conducted in 30 primary health care facilities located in Moshi Municipality. The study included 197 Health Care workers who were present during data collection. A pre-tested and standardized questionnaire was used to assess the associated factors on Hepatitis B infection. Proportions and frequencies were used to summarize categorical variable while Measure of central tendency and associated measure of dispersion was computed for variables. The prevalence of Hepatitis B surface Antigen carriage was 3.6%. Factors such as education level, occupation, marital status, vaccination, surgery history, skin contact with body fluids seemed to have contributed to HBV seropositivity but none of them had a significant association. The prevalence of Hepatitis B surface Antigen carriage among healthcare workers in Moshi Municipals is relatively low. This low prevalence may be because primary health facilities are exposed to a smaller number of patients who are not critically ill, also may be a low sample size used. Therefore continued education on Hepatitis B control should be provided.

Keywords: Hepatitis B surface antigen, Health care workers, Primary health facilities.

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INTRODUCTION

Hepatitis B virus (HBV) infection is a global public health problem. The global prevalence of HBV infection in the general population is estimated to be at 3.5% with about 257 million people living with chronic HBV infection (WHO, 2017). More importantly, HBV is highest in the western pacific region and African region with 6.2 and 6.0% adult infection, respectively (WHO, 2017). An estimate of 780,000 HBV deaths each year worldwide are attributed to its complications namely liver cirrhosis and hepatocellular carcinoma (WHO, 2017).

The risk of developing the chronic liver disease is high when the infection is acquired in early childhood (about

90%) but less risk if the infection is acquired in late childhood or adult age (6 to 10%), if the subjects didn't get HBV vaccine (WHO, 2017). Healthcare workers are at high risk of occupational hazards, and may further transmit this virus to patients and their close relatives and their patients (WHO, 2017).

Hepatitis B virus is mainly transmitted through body fluids contact. HBV infectivity is very high, through body fluids contacts, the risk of acquiring HBV infection is estimated to be ten (10) times the risk of acquiring HIV infection (WHO, 2017). Factors such as sexual, needle sticky accidents, blood splash, blood transfusion,

tattooing, and teeth extraction activities contribute to HBV transmission since they perpetuate body fluid transfer from one individual to another.

There is a safe and effective vaccine for HBV infection which is normally given to children and adults who did not receive vaccines. The vaccine is scheduled for three doses with an interval of 0, 1, and 6 months (WHO, 2017). After completing the doses, the vaccinated individual must perform antibody titration in which individuals with an antibody titer of more than 10 International units (IU), are considered protected against hepatitis B (WHO, 2017).

To control the infection, we need first to have information on the infection status (the prevalence) in different facilities especially the health care workers since health care workers fall under the high-risk group (Mueller et al., 2015). The outcomes from this study will help to have the basic findings of the prevalence and associated factors on HBV infection so as we will be able to generalize the findings when compared to the results from major health facilities (Shao et al., 2018).

Nevertheless, no formal survey and measures of occupational exposures for hepatitis B infection have been done among primary health care workers in Tanzania. Therefore, this study has been done to determine risk factors associated with HBV infection among primary healthcare workers.

METHODOLOGY

Study design and settings

This was a health facilities-based cross-sectional study conducted between April and July of 2019. The study was conducted in primary healthcare facilities located in Moshi Municipal. The municipal has a total of 51 primary health facilities of which 39 are dispensaries, 8 health centers, and 4 clinics (OpenData, 2014). A total of 30 health facilities were randomly selected.

Study population and eligibility criteria

The study population comprised of all HCWs with direct contact with patients or patients' samples because they are likely to be at risk of being contaminated with different patient's body fluids while providing health services.

Sample size and sampling technique

A non-probability convenience sampling technique was used. A total of 197 Health care workers participated in the study, out of about 350 health care workers from 51 primary health facilities within Moshi municipal.

Data collection tools

A pre-tested and standardized questionnaire was used to collect information. The questionnaire consisted of three sections; Section I contained Introduction, section II contained Socio-demographic and academic characteristics, Section III contained participant's

Medical History.

Laboratory assays

Also, Laborex HBsAg rapid test kits with a sensitivity of 98% made from Piazzale Milano-2 Italy were used to assess the HBsAg marker after performing quality control to ensure they give true positive and negative results.

Data analysis

Data were analyzed using Statistical Package for social sciences (SPSS) version 20. Descriptive statistics such as a measure of central tendency and measure of dispersion were computed for continuous variables. Cross-tabulations of categorical variables were calculated using chi-square tests (χ^2) while Fisher's exact test was used in cases when expected counts were less than 5 counts per cell. Predictors significantly associated with seropositivity in the bivariate analysis were selected for multivariable analyses to test for statistically significant ($p < 0.05$) associations in a final model. A significance level of ≤ 0.05 was used throughout.

Ethical consideration

Ethical approval to conduct a study was obtained from the Kilimanjaro Christian Medical University College Research and Ethics Review Committee (CRERC), and the permission to conduct a study was obtained from the District Medical Officer of Moshi municipality before starting a study. Informed consent was obtained from all participants and they signed a consent form. Confidentiality was maintained throughout the study; code numbers were used instead of names.

RESULTS

Demographic characteristics of the study population

A total of 197 Health care workers were involved in the study. The majority of them were females 168 (85.3%), aged between 20 and 29 years 146 (74.1%). The majority of participants had College/University education 172 (87.3%) most of them are nurses 93 (47.2%). More than half were married, 116 (58.9%), and had only 1-5 years of job experience 90 (45.7%), (Table 1).

Prevalence of Hepatitis B infection

The prevalence of HBsAg was 7 (3.6%). Women were more affected 6 (85.7%) than males 1 (14.3%). Participants 29-39 years were more affected 5 (71.4%) as compared to others. All participants who were infected with Hepatitis had college/university education 7 (100%). Infection was also more among married workers 5 (71.4%) as compared to single workers 2 (28.6%). Nurses had a higher prevalence 4 (57.1%) followed by laboratory personnel 2 (28.6%), and 1 doctor (14.3%). Workers who had work experience of at least 5 years were observed to be more affected 6 (85.7%) than workers with less than five years of work experience 1

Table 1. Socio-demographic Characteristics (N = 197).

Variable		N	%
Gender	Males	29	14.7
	Females	168	85.3
Age categories	20-39	146	74.1
	40-59	43	21.8
	60-70	8	4.1
Education level	No formal education	1	0.5
	Primary school	4	2
	Secondary school	20	10.2
	College/university	172	87.3
Marital status	Single	81	41.1
	Married	116	58.9
Occupation	Doctor	15	7.6
	Nurse	93	47.2
	Laboratory personnel	28	14.2
	Administration staff	11	5.6
	Others	50	25.4
Years of experience	1-5 years	90	45.7
	5-10 years	49	24.9
	>10 years	58	29.4

(14.3%) it may be due to more years of exposure.

Factors associated with Hepatitis B surface antigen infection

In the analysis of factors associated with Hepatitis B infection, none of the independent variables were associated with the outcome (Hepatitis B infection), such factors include Vaccination, Years of job experience, History of attending known HBV patients, Participant's occupation, History of surgery, Marital status, History of accidental skin contact with patient's body fluids, therapeutic skin injection, and needle sticky injury (Table 2).

DISCUSSION

The prevalence of hepatitis B infection was found to be 3.6%, this prevalence was low as compared to the study conducted in northern Tanzania which reported a prevalence of 5.7% (Shao et al., 2018). Also among laboratory workers 7.0% (Mueller et al., 2015). But it is a higher prevalence as compared to results from Sierra Leone 4.7% (Qin et al., 2018), Ethiopia 4.52% (Gebremariam et al., 2019), Rwanda 2.9% (Kateera et al., 2015) and Ethiopia 2.6 (Yizengaw et al., 2018). It was

also even far lower than another study conducted in Asia, 2.18% (Attaullah et al., 2011).

Reasons for differences in the findings could be due to lower sample size or might be biased in the sense that the majority of participants had previously negative results hence felt more confident to be re-tested knowing that their results will come out as negative, so this less fear contributed to massive response of negative individuals to participate in the study than individuals who never tested fearing to disclose their serostatus and lowers the prevalence.

On the other hand, the prevalence is higher as compared to the settings from other countries possibly because other countries have succeeded to control the disease by a massive screening of asymptomatic individuals and vaccinating those who have no disease, hence providing herd immunity to the community and lowering the prevalence, in contrast to our country whereby the knowledge of the disease is still very low even to health care workers themselves and therefore the disease is less controlled.

Factors

None of the factors shows significance, this is in contrast to two studies conducted in Tanzania that reported that

Table 2. Factors associated with HBsAg infection.

Variable		HBV n (%)		P-value
		Positive	Negative	
Gender	Males	1 (14.3)	28 (14.7)	>0.05
	Females	6 (85.7)	162 (85.3)	
Age categories	20-39	5 (71.4)	141 (74.2)	>0.05
	40-59	2 (28.6)	41 (21.6)	
	60-70	0 (0.0)	8 (4.2)	
Education level	No formal education	0 (0.0)	1 (0.5)	>0.05
	Primary school	0 (0.0)	4 (2.1)	
	Secondary school	0 (0.0)	20 (10.5)	
	College/university	7 (100)	165 (86.8)	
Marital status	Single	2 (28.6)	79 (41.6)	>0.05
	Married	5 (71.4)	111 (58.4)	
Occupation	Doctor	1 (14.3)	14 (7.4)	>0.05
	Nurse	4 (57.1)	89 (46.8)	
	Laboratory	2 (28.6)	26 (13.7)	
	Administration staff	0 (0.0)	11 (5.8)	
	Others	0 (0.0)	50 (26.3)	
Years of experience	1-5 yrs.	1 (14.3)	89 (46.8)	>0.05
	5-10 yrs.	3 (42.9)	46 (24.2)	
	>10 years	3 (42.9)	55 (28.9)	
Vaccination	No	7 (100)	138 (72.6)	>0.05
	Yes	0 (0.00)	52 (27.4)	
History of attending HBV patient	No	5 (71.4)	131 (68.9)	>0.05
	Yes	2 (28.6)	59 (31.1)	
Blood transfusion history	No	7 (100)	176 (92.6)	>0.05
	Yes	0 (0.0)	14 (7.4)	
Surgery	No	6 (85.7)	125 (65.8)	>0.05
	Yes	1 (14.3)	65 (34.2)	
Body fluids skin contact (saliva, sweat, blood, etc)	No	1 (14.3)	92 (48.4)	>0.05
	Yes	6 (85.7)	98 (51.6)	
Skin injection	No	2 (28.6)	43 (22.6)	>0.05
	Yes	5 (71.4)	147 (77.4)	
Needlestick injury	No	4 (57.1)	120 (63.2)	>0.05
	Yes	3(42.9)	70 (36.80)	

unvaccinated and blood transfusion history were the only factors for HBV seropositivity (Mueller et al., 2015; Shao et al., 2018). HCWs are at high risk of contracting HBV infection due to their frequent occupational contact with

infected body fluids and contaminated tools. The risk is four times higher than in non-HCWs (Ciorlia and Zanetta, 2005). In the case of vaccination, this discrepancy was possibly due to the small sample size obtained.

Surprisingly all seropositive cases had no history of blood transfusion while those with a history of blood transfusion were HBV negative, this possibly due to selection bias, also a small sample size might have been contributed to this discrepancy.

Also, vaccination history was contrary to the study done in Ethiopia, where among other factors, vaccination history had a significant association (Yizengaw et al., 2018). This also may be due to the small sample size obtained.

In Pakistan, blood transfusion, wound care accidents, and needle stick injury had a significant association with HBV infection (Gorar et al., 2014), but none of them shows significant association possibly as explained above due to small sample size and selection bias.

A study conducted in Europe reported that nurses who worked in the surgical department had a higher significant association with HBV infection as compared to other departments as well as other occupations, but in our study, although the majority of our participants were nurses with no specific departments, and were more affected than others shows no significant association with HBV infection possibly due to small sample size used.

Moreover, in other Tanzanian settings, knowledge on HBV among HCWs is still very low whereby 34% HCWs are unaware of the availability of vaccines. Hence, hindering the effort of the disease control.

Strengths and limitation

The study highlights the baseline data on the prevalence of HBV among healthcare workers in primary health facilities in Moshi Municipality. Nevertheless, the study has the advantage of being the first one to be done in primary health facilities in Northern Tanzania to examine the epidemiological and laboratory/ evidence-based findings to determine the prevalence and factors associated with hepatitis B surface Antigen carriage infection. One of the major weaknesses of this study is the small sample size which was not sufficiently powered to identify potential associations between variables of interest. As this study carried out only primary health care facilities in Moshi municipality the results cannot be generalized. Moreover, the assessment of risk factors might have been prone to recall bias due to the time between an event and the time of the study.

CONCLUSION

The prevalence of HBV infection was low among HCWs in primary Health facilities. Studies that will include a larger sample size are needed in other parts of Tanzania to broaden our understanding of HBV and promote awareness programs about HBV among HCWs.

REFERENCES

- Attaullah S, Khan S, Naseemullah, Ayaz S, Khan SN, Ali I, Hoti N, Siraj S, 2011.** Prevalence of HBV and HBV vaccination coverage in health care workers of tertiary hospitals of Peshawar, Pakistan. *Virology*, 8(1), p. 275. doi: 10.1186/1743-422X-8-275.
- Ciorlia LAS, Zanetta DMT, 2005.** Hepatitis B in Healthcare Workers : Prevalence, Vaccination, and Relation to Occupational Factors. *Braz J Infect Dis*, 9: 384–389.
- Gebremariam AA, Tsegaye AT, Shiferaw YF, Reta MM, Getaneh A, 2019.** Seroprevalence of Hepatitis B Virus and Associated Factors among Health Professionals in University of Gondar Hospital, Northwest Ethiopia. *Adv Prev Med*, 3; 2019:7136763. doi: 10.1155/2019/7136763.
- Gorar ZA, Butt ZA, Aziz I, 2014.** Risk factors for bloodborne viral hepatitis in healthcare workers of Pakistan : a population-based case-control study. *BMJ*, 4, 1–6. doi: 10.1136/bmj.open-2013-004767.
- Kateera F, Walker TD, Mutesa L, Mutabazi V, Musabeyesu E, Mukabatsinda C, Bihizimana P, Kyamanywa P, Karenzi B, Orikiiriza JT, 2015.** Hepatitis B and C seroprevalence among health care workers in a tertiary hospital in Rwanda. *Trans R Soc Trop Med Hyg*, 109(3):203-8. doi: 10.1093/trstmh/trv004.
- Mueller A, Stoetter L, Kalluvya S, Stich A, Majinge C, Weissbrich B, Kasang C, 2015.** Prevalence of hepatitis B virus infection among health care workers in a tertiary hospital in Tanzania. *BMC Infect Dis*, 15: 386. doi: 10.1186/s12879-015-1129-z.
- OpenData, 2014.** Operating Health Facilities with locations and Available Skilled Health Staff-2014.
- Qin YL, Li B, Zhou YS, Zhang X, Li L, Song B, Liu P, Yuan Y, Zhao ZP, Jiao J, Li J, Sun Y, Sevalie S, Kanu JE, Song YJ, Jiang JF, Sahr F, Jiang TJ; Chinese Military Medical Experts Group in Sierra Leone, 2018.** Prevalence and associated knowledge of hepatitis B infection among healthcare workers in Freetown, Sierra Leone. *BMC Infect Dis*, 18(1): 315. doi: 10.1186/s12879-018-3235-1.
- Shao ER, Mboya IB, Gunda DW, Ruhangisa FG, Temu EM, Nkwama ML, Pyuza JJ, Kilonzo KG, Lyamuya FS, Maro VP, 2018.** Seroprevalence of hepatitis B virus infection and associated factors among healthcare workers in northern Tanzania. *BMC Infect Dis*, 18(1): 474. doi: 10.1186/s12879-018-3376-2.
- WHO, 2017.** Global hepatitis report. <https://www.who.int/publications/i/item/global-hepatitis-report-2017>.
- Yizengaw E, Getahun T, Geta M, Mulu W, Ashagrie M, Hailu D, Tedila S, 2018.** Sero-prevalence of hepatitis B virus infection and associated factors among health care workers and medical waste handlers in primary hospitals of North-west Ethiopia. *BMC Res Notes*, 11(1): 437. doi: 10.1186/s13104-018-3538-8.

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