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Risk Behaviors, Occupational Risk and Seroprevalence of Hepatitis B and A Infections among Public Cleansing Workers of Bangkok Metropolis

Pipat Luksamijarulkul [1*], Dusit Sujirarat [2], Phitaya Charupoonphol [3]

[1] Department of Microbiology, Faculty of Public Health, Mahidol University, Bangkok, Thailand
[2] Department of Epidemiology, Faculty of Public Health, Mahidol University, Bangkok, Thailand
[3] Department of Family Health, Faculty of Public Health, Mahidol University, Bangkok, Thailand

Background and Aims: **Public cleansing workers, especially public garbage collectors are probably at risk for hepatitis B virus (HBV) and/or hepatitis A virus (HAV) infections. This study was designed to assess risky behaviors, occupational risk and seroprevalence of HBV and HAV infections in this group.**

Methods: **354 public cleansing workers of Bangkok Metropolis (185 cleaners and 169 garbage collectors) were randomly selected by multi-stage sampling. The subjects were interviewed and their blood specimens were collected to investigate HBV seromarkers (HBsAg, anti-HBs and anti-HBc) and anti-HAV by voluntary participation.**

Results: **Out of 354 workers, 22.6% had tattoos, 15.8% had a history of regular alcohol consumption, and 6.8% had a history of extramarital sex without using condoms in a previous year. Public garbage collectors had relatively higher percentage than public cleaners. Also, public garbage collectors had significantly higher percentage of occupational risks including a history of contact with blood, a history of contact with used condom, syringe or needle, and a history of needle stick or sharp puncture than public cleaners (P= 0.0018, 0.0067 & 0.0012, respectively). Results from blood screening revealed 49.4% of HBV seropositivity, 5.9% of HBsAg, 37.3% of anti-HBs, 6.2% of anti-HBc only, and 85% of anti-HAV antibody. Public garbage collectors had significantly higher HBV seropositivity than public cleaners (P=0.0058), while there was no statistical significance in anti-HAV positivity between groups. Risk factors for HBV seropositiveness after multivariate analysis were occupation (adjusted OR=1.76, P=0.0027), a history of contact with used condom, syringe or needle (adjusted OR=3.02, P<0.0001), and a history of needle stick or sharp puncture (adjusted OR=4.21, P<0.0001).**

Conclusions: **This study supported public cleansing workers; especially public garbage collectors were at risk for HBV and/or HAV infections. The risk reduction programs including a 100% condom use, life skills education, hygienic practice, use of safer equipment for collecting garbage, and HBV vaccination should be provided for this group.**

Keywords: **Hepatitis B, Hepatitis A, Risk Behaviors, Occupational Risk, Public Cleansing Workers**

Introduction

Hepatitis B virus (HBV) is one of the major causes of sexually transmitted and blood-borne hepatitis and is an important public health problem in many countries, including Thailand [1-5]. More than 350 million HBsAg carriers are estimated worldwide [2-6]. Although most infected individuals will develop immunity after infection, 6-10% will develop chronic hepatitis and gradual progression to liver cirrhosis and hepatocellular carcinoma (HCC) [6-8].

**** Correspondence:***
Pipat Luksamijarulkul, PhD., Department of Microbiology, Faculty of Public Health, Mahidol University, 420/1 Ratchavithi Road, Bangkok 10400, Thailand.

Tel: *+66 02 3548528*
Fax: *+66 02 3548538*

E-mail: *luksamijarulkul@yahoo.com*

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Both sexual and parenteral routes are the predominant modes of HBV transmission [1-3, 6]. Known risk behaviors for acquiring HBV infection, such as tattooing, ear piercing in females, sharing scissors for haircutting, direct contact with wound, blood or blood products from other persons, sharing toothbrushes, sexual activities and searching things in the garbage have been previously reported [2, 6, 9-12].

While hepatitis A virus (HAV) infection is a significant cause of morbidity and attendant economic loss in many parts of the world, including Thailand [13-15]. HAV infection is transmitted from person to person by the fecal-oral route or ingestion of contaminated food or water; sexual and blood-borne transmissions are minor routes in the spread of HAV [14, 15]. Lower public hygiene and lower socioeconomic levels are associated with the increasing prevalence of HAV infection [13, 14, 16]. Garbage may be a source of HAV infection because it is a breeding place for flies, rats and cockroaches which cause HAV contamination in food and water [13]. These evidences support that public cleansing workers, especially garbage collectors are probably at risk for HBV and/or HAV infections.

The objective of the present study was to assess risky behaviors and occupational risk exposures towards HBV and HAV infections and to investigate seroprevalence of HBV seromarkers and anti-HAV antibody among public cleansing workers. This is valuable for epidemiological surveillance and for integrating a health promotion program to improve the health and well-being of this group.

Materials and Methods

Study design and samples

The design was a cross-sectional study of 354 public cleansing workers of Bangkok Metropolis (185 cleaners and 169 garbage collectors). The sample size was calculated by using a formula, $n=Z^2_{\alpha/2}PQN/Z^2_{\alpha/2}PQ+Nd^2$; $Z_{\alpha/2}=1.96$, P=the probability of average HBV seromarker positivity from previous studies=0.6 [3, 17], Q= 1-P=0.4, d=0.05, N=13,400 workers, therefore, n=354. These study samples were randomly selected by multi-stage sampling. The first step was district selection using simple random technique representing 3 groups of districts in Bangkok. Phranakhon district represented the district group of Wangluang, Dindaeng district represented the district group of Burapha and Thawiwatthana district represented the district group of Krungthon. The second was sample selection using random sampling by size of workers in each selected district, approximately 159 workers from Phranakhon district, 113 from Dindaeng district and 82 from Thawiwatthana district were selected.

The studied workers were interviewed about socio-demographic information, risky behaviors and occupational risk exposure towards blood-borne and sexually transmitted hepatitis. Their blood specimens were collected to investigate HBV seromarkers (HBsAg, anti-HBs and anti-HBc) and anti-HAV by using enzyme immunoassays. Before interviews and blood collection, participants had received the study information, after that, they were required to fill the informed consent forms (this study protocol was approved by the Research Committee of Bangkok Metropolis). The response rate was about 81% because most participants would like to know their HBV status for HBV vaccination after this study.

Data analysis

Data from interviews and laboratory screening were analyzed and presented by descriptive statistics including percentage, mean and standard deviation. To test the homogeneity of the distribution of occupational risk or seroprevalence, we used the chi-square test. Risk factors for HBV seropositiveness among studied participants were analysed by univariate and multivariate analysis. The critical level of P=0.05 was considered to indicate statistical significance.

Results

Socio-demographic characteristics

Of 354 public cleansing workers, 42.7% were 30-39 years of age. The mean (X) ± standard deviation (SD) of age was 39.5±7.7 years. Approximately 55.7% were female and 74.6% were married. About 77.7% had completed primary school and only 2% had completed higher than secondary education. About 48% were public garbage collectors. Working experience ranged from less than 1 year to 30 years (X±SD=8.1±5.7 years). Details are shown in Table 1.

Risk behaviors towards sexually transmitted and blood-borne hepatitis

The results showed that 22.6% had tattoos, 15.8% had a history of regular alcohol drinking, 13.6% had a history of receiving blood or hemodialysis, 6.8% had a history of extramarital sex without using condom in a previous year, and 2.3% had a history of sex service. For most of the risky behaviors, public garbage collectors had

relatively higher percentage than public cleaners (Table 2).

Table 1. Socio-demographic characteristics of studied workers (n=354).

Socio-demographic characteristics	N (%)
Age	
<30	29 (8.2)
30-39	151 (42.7)
40-49	135 (38.1)
50-59	39 (11.0)
Sex	
Male	197 (55.7)
Female	157 (44.3)
Marital status	
Single	36 (10.2)
Married	264 (74.6)
Widowed/Divorced	54 (15.2)
Education	
Primary level	275 (77.7)
Secondary level	72 (20.3)
Vocational and undergraduate	7 (2.0)
Occupation	
Public cleaner	185 (52.3)
Public garbage collector	169 (47.7)
District	
Phranakhon	159 (44.9)
Dindaeng	113 (31.9)
Thawiwatthana	82 (23.2)
Working experience	8.1±5.7 (range: ≤1-30)
Family income	9,987.2±5,393.4 Baht/month (range: 1,000-50,000)

Table 2. Percentage of studied workers with risk behaviors towards sexually transmitted and blood-borne hepatitis (one could answer more than one item).

Risk behaviors	Cleaner (n=185)	Garbage collector (n=169)	Total (n=354)
Hx of receiving blood and/or hemodialysis	17.3	9.5	13.6
Hx of contact with blood products	6.0	5.3	5.7
Hx of tattooing	11.4	34.9	22.6
Hx of injection drug use	0.5	0.6	0.6
Hx of jaundice	3.2	4.1	3.7
Hx of STDs in previous year	1.6	1.8	1.7
Hx of alcohol consumption (≥5 days/week)	10.8	21.3	15.8
Hx of extramarital sex in previous year	4.3	9.5	6.8
Hx of sex service	1.6	3.0	2.3

Occupational risk towards blood-borne hepatitis

This study emphasized 3 items of occupational risk towards blood-borne hepatitis including a history of contact with blood or blood products, a history of contact with used condom and syringe or needle, and a history of needle stick or sharp puncture. The results showed that 23.2% of studied workers had a history of contact with blood or blood products, 46% had a history of contact with used condom and syringe or needle and 77.4% had a history of needle stick or sharp puncture. Public garbage collectors had significantly higher percentage of occupational risk than public cleaners (P=0.0018, 0.0067 & 0.0012, respectively). Details are presented in Table 3.

Table 3. Occupational risk towards blood-borne hepatitis among studied workers.

Public cleansing workers	No (%) of workers with occupational risk history		
	Contact with blood products	Contact with used syringe or needle	Needle stick or sharp puncture
Public cleaners (n=185)	30 (16.2)	72 (38.9)	130 (70.3)
Garbage collectors (n=169)	52 (30.8)	91 (53.8)	144 (85.2)
P value	0.0018	0.0067	0.0012

Seroprevalence of HBV markers and anti-HAV

Of 354 studied public cleansing workers, 49.4% were positive for one or more HBV seromarkers (HBV seroprevalence). Almost 6% were HBsAg positive, 37.3% were anti-HBs positive and 6.2% were anti-HBc positive only. Eighty-five percent were positive for anti-HAV antibody. The prevalence of HBV seromarkers or anti-HAV antibody was significantly higher percentages by age group (P=0.0304 & P<0.0001). Males had significantly higher HBV seropositivity, but had significantly lower anti-HAV positivity than females (P=0.0284 & P=0.0356). Public garbage collectors had significantly higher HBV seropositivity than public cleaners (P=0.0058), while there was no statistical significance in anti-HAV positivity between groups (P=0.0645). Details are presented in Table 4.

Risk factors for HBV seropositiveness

To study some risk factors for HBV seropositiveness among studied public cleansing workers, studied variables of participants with HBV seromarkers and those without HBV seromarker were compared and analysed. The results revealed that significant risk factors were (a)

gender (OR=1.63; P=0.0305), (b) occupation (OR=1.85; P=0.0058), (c) a history of contact with used condom and syringe or needle (OR=3.18; P<0.0001), and (d) a history of needle stick or sharp puncture (OR=4.62; P<0.0001). Details are shown in Table 5. After analysis by multiple logistic regression, studied factors of occupation, a history of contact with used condom, syringe or needle, and a history of needle stick or sharp puncture were significant [adjusted OR=1.76 (95% CI=1.09-3.14; P=0.0027), 3.02 (95% CI=1.78-6.33; P<0.0001), and 4.21 (95% CI=2.12-8.47; P<0.0001), respectively].

Table 4. HBV and HAV seroprevalence among studied public cleansing workers.

Variables	No.	HBsAg + Anti-HBc (%)	Anti-HBs ± Anti-HBc (%)	Anti-HBc only (%)	Overall (%)	Anti-HAV (%)
Age (yr)						
<30	29	1(3.5)	9 (31.0)	0 (0.0)	10 (25.6)	16 (55.2)
30-39	151	9 (6.0)	57 (37.8)	5 (3.3)	71 (47.0)	122 (80.8)
40-49	135	8 (5.9)	49 (36.3)	10 (7.4)	67 (49.6)	126 (93.3)
50-59	39	3 (7.7)	17 (25.6)	7 (18.0)	27 (69.2)	37 (94.9)
P value					0.0304	<0.0001
Sex						
Male	197	13 (6.6)	92 (46.7)	3 (1.5)	108 (54.8)	160 (81.2)
Female	157	8 (5.1)	40 (25.5)	19 (12.1)	67 (42.7)	141 (89.8)
P value					0.0284	0.0356
Occupation						
Public garbage collector	185	9 (4.9)	51 (27.6)	18 (9.7)	78 (42.2)	164 (89.2)
Public cleaner	169	12 (7.1)	81 (47.9)	4 (2.4)	97 (57.4)	137 (81.1)
P value					0.0058	Non significant
Total	354	21 (5.9)	132 (37.3)	22 (6.2)	175 (49.4)	301 (85.0)

Table 5. Risk factors for HBV seropositiveness among studied public cleansing workers.

Studied variables	HBV seropositive	HBV seronegative	OR (95% CI)	P value
Age (yr)				
>40	94	80	1.44 (0.92-2.23)	0.1116
≤40	81	99		
Sex				
Male	108	89	1.63 (1.04-2.54)	0.0305
Female	67	90		
Occupation				
Public garbage collector	97	72	1.85 (1.19-2.88)	0.0058*
Public cleaner	78	107		
Hx of risk behaviors				
Tattooing	42	38	1.17 (0.69-1.99)	0.6198
Jaundice	9	5	1.89 (0.55-7.31)	0.3891
Extramarital sex without condom	15	8	2.00 (0.77-5.23)	0.1770
Hx of occupational exposure				
Contact with blood products	42	40	1.10 (0.65-1.85)	0.8082
Contact with used syringe or needle	107	56	3.18 (1.99-5.06)	<0.0001*
Needle stick or sharp puncture	157	117	4.62 (2.51-8.59)	<0.0001*

After multivariate analysis, significant risk factors were occupation (adjusted OR=1.76; 95% CI=1.09-3.14; P=0.0027), history of contact with used syringe or needle (adjusted OR=3.02; 95% CI=1.78-6.33; P<0.0001), and history of needle stick or sharp puncture (adjusted OR=4.21; 95% CI=2.12-8.47; P<0.0001)

Discussion

HBV infection is one of important blood-borne and sexually transmitted infections throughout the world [1-5]. Both sexual and parenteral routes were the predominant modes of HBV transmission [1-3, 6]. It has been found that prevalence of HBsAg among the general population varied in different geographic areas, as well as in different populations. Previous studies demonstrated that the HBsAg positive rates varied from approximately 1.9% in Europe and America to 4.6-15% in Asian countries [2, 6, 17-19].

In this study, the prevalence of prior HBV infection tended to significantly increase by age, (P=0.0304) which agreed with previous studies [12, 20]. Males had significantly higher positive rate of any HBV seromarkers than females (P=0.0284). This evidence might be due to some risky behaviors of male, i.e. outside socialization, extramarital sex relation and alcohol consumption. Having more sexual partners allowed for greater exposures and risks [10, 21]. The factor of alcohol consumption was an indirect risk factor because, after consumption, the participant was more likely to have an unsafe sexual relationship. Individuals who drank alcohol were more prone to have extramarital sex without condom use [22].

When we compared between public cleaners and public garbage collectors, the prevalence of positive HBsAg in public garbage collectors (7.1%) was higher than that in public cleaners (4.9%). Also, the positive rate of any HBV seromarker or prevalence of prior HBV infection in public garbage

collectors (57.4%) was significantly higher than that in public cleaners (42.2%) (P=0.0058). Data from interviews showed that garbage collectors had higher percentage of important risky behaviors including histories of tattooing, injecting drug use, STDs in a previous year, regular alcohol consumption, extramarital sex without using condom, and sex service than public cleaners (Table 2).

These risky behaviors are known important risk factors for HBV and HIV infections [3, 6, 10, 23]. Additionally, garbage collectors had higher percentage of occupational risk exposures including a history of contact with blood or blood products, used condom and syringe or needle, and a history of needle stick or sharp puncture than public cleaners (P<0.05). These occupational exposures, especially a history of needle stick or sharp puncture are significantly associated factors with HBV, HCV and HIV infections [1-3, 5, 12, 17]. A previous study showed that one of the risky behaviors for HBV infection in school-age children in a low socio-economic community was searching for things in garbage [11]. It is supported that garbage collectors probably received HBsAg through skin sores or injury from a contaminated needle or the sharp objects or blood or blood products in the garbage. After analyzing some risk factors for HBV seropositiveness among this studied group by multiple logistic regression, it was revealed that significant risk factors were occupation (adjusted OR=1.76; 95% CI=1.09-3.14; P=0.0027), a history of contact with used condom, syringe or needle (adjusted OR=3.02; 95% CI=1.78-6.33; P<0.0001), and a history of needle stick or sharp puncture (adjusted OR=4.21; 95% CI=2.12-8.47; P<0.0001).

HAV infection is an acute, necro-inflammatory infection of the liver. The major transmission is via fecal-oral route or ingestion of contaminated food or water and the minor spread is via closed contact and parenteral route [14, 15]. In Thailand, HAV infection causes 60-70% of acute hepatitis in children aged less than 15 years. Most adults have become seropositive for anti-HAV antibody [13, 24]. The results of the present study demonstrated a high prevalence of anti-HAV (85%) among studied public cleansing workers. The high prevalence might be due to the living style of the subjects in unsatisfactory hygienic condition [13, 14, 16, 24]. This study found high anti-HAV prevalence likely a previous study in hill-tribe adults [13]. The prevalence tended to a significant increase by age (P<0.0001) and females had a significantly higher positive rate of anti-HAV than males (P=0.0356). However, this study revealed no significant difference in anti-HAV prevalence between public cleaners and public garbage collectors, which may be due to the living style of both groups in unsatisfactory hygienic condition.

Conclusions

The present study showed high percentage of risky behaviors and occupational risk exposure for HBV infection in public cleansing workers, especially in public garbage collectors. Also, the high positive rates of HBsAg, any HBV seromarkers and anti-HAV antibody were found in this group. To reduce their risky behaviors and occupational risks, integrated preventive program, such as a 100% condom use policy, life skills education, hygienic practice, use of safer equipment for collecting garbage, and HBV vaccination should be emphasized.

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