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Sero-prevalence of Hepatitis C infection among the Municipal Waste collectors in Aden, Yemen

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ABSTRACT

Hepatitis C virus infection is major global health problem. The present study was aimed to determine the prevalence of Hepatitis C infection among municipal waste collectors and to identify clinical findings and risk factors associated with HCV infection among those collectors in Aden, Yemen. A cross-sectional study was conducted on 100 municipal waste collectors. The blood samples were collected from all MWCs, then the clotted blood was separated by centrifuge and the sera were tested for presence of HCV antibodies (Anti-HCV) by Cobas technique that based on ECLIA. Out of 100 municipal waste collectors, majority was males 89(89/100). The total mean age of those members was 36.74±10.98years. The range of ages was 16 and 60 years. Only 1(1/100) had HCV infection. This case was male, married and within age group ≥ 45years which comprised; 1.1%, 1.2% and 4.5%, respectively. The positive case was illiterate and had low economic status and had duration of work as municipal waste collector from 10-20years and alone accommodation which comprised 1.1%, 1.6% 2.4% and 9.1%, respectively. This 1(7.8%) HCV infected patient infection lives in Al-Muallhe. Significant associations found between HCV infection and exposing to blood transfusion, catheterization and needles stick as risk factors (p=0.002,0.0001 and 0.080), respectively and liver cirrhosis as complicated clinical finding (p=.0001),but the association was not significant between HCV infection and sources of waste (0.620). It can be concluded from this study that the municipal waste collectors in Aden, Yemen had lower rate of HCV infection than most studies globally. The males, married and MWCs in age group≥ 45years, and those had illiterate education and live alone had highest percentages of HCV infection. Blood transfusion, needles stick and catheterization may increase the risk of HCV infection.

Keywords: Sero-prevalence, Hepatitis C infection, Municipal Waste collectors, Aden, Yemen.

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Introduction

Hepatitis C virus (HCV) is one of serious live disease that outcome by cirrhosis and liver carcinoma [1]. Hepatitis C virus infection is major global health problem [2]. This enveloped virus has ribonucleic acid (RNA) genome that surrounds by icosahedral capsid and belonging to Flaviviruses family [3]. Recently, World Health Organization (WHO) estimated that the patients who had HCV chronic infection are over 50 million [2].

The route of transmission of this virus including; sexually, vertically (from pregnant women to their newborns), horizontally after exposure to blood and body fluids of infected persons [4,5]. They are transmitted via exposing to sharp items as needles and syringes and shaving tools as razors that are contaminated with blood and other body fluids [6]. The risk of HCV is increased among waste handlers especially municipal waste collectors (MWCs) and waste pickers through injuring by contaminated waste materials [7,8]. They exposed to different types of wastes from different sources including domestic, hospital and other medical centers wastes [1]. They always contacts with contaminated wastes containing infected blood and other secretions and injury by sharp objects as needles and glasses [9].

The domestic (houses) wastes from houses may also contain sharps medical tools such as needles that may be used by diabetic or chronic disease patients at home [10]. Several factors for increasing the rates of HCV among MWCs include: socio-economic status, education level, low knowledge, awareness, attitude and practice related to HCV transmission routes and preventive measures where they work bare-handed without any protective tools [11].

The prevalence rate of HCV among MWCs globally ranges from 0% to 43.3% [7,8,9,11,12]. The lowest HCV rate among general Yemeni population was 0.07% and highest rate was 8.5% [13]. No previous studies were performed estimate the HCV infection among municipal waste collectors in Yemen, except one study conducted among medical waste handlers in Sana'a that demonstrated 5% of those workers had HCV infection [14]. Therefore the present study was aimed to determine the prevalence of Hepatitis C infection among municipal waste collectors and to identify clinical findings and risk factors associated with HCV infection among those collectors in Aden, Yemen.

Subjects and Methods

A cross-sectional study was conducted on 100 municipal waste collectors who accepted to participate in the our study during a period from May to October , 2024. The questionnaire was previously designed and undergone to some modifications. It contained socio-demographic data as age, sex, marital status, economic status, and level of education and some risk factors that may associate with infection as blood transfusion, cupping, catheterization, acupuncture, dental procedures, tattooing, sharp items and needle stick and splash of body fluid to eye, duration of work as waste, sources of waste. It also includes: the some clinical feature related to HCV infection such as fever, vomiting, nausea, loss of appetite, abdominal pain, jaundice and liver cirrhosis [2, 15]. The blood samples were collected from all MWCs, then the clotted blood was separated by centrifuge and the sera were tested for presence of HCV antibodies (Anti-HCV) by Cobas technique (Roche company) that based on Electrochemiluminescence immunoassay (ECLIA). Those municipal waste collectors who are directly contact with waste are enrolled in this study. Other workers who not directly contact with waste such as managers, drivers, ect were excluded.

Statistical analysis

Analysis of the data was done by using Statistical Package for the Social Sciences (SPSS) (Version 21). The quantitative data that was normally presented as mean ±standard deviations (SD. The qualitative data was presented as percentage and the chi-square ($\chi 2$) test was used to

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detect the association between two variables. P-value (<0.05) was statistically significant.

Results

Out of 100 municipal waste collectors, majority was males 89(89/100). The total mean age of those members was 36.74±10.98years. The range of ages was 16 and 60 years. Only 1(1/100) had HCV infection (Figure 1). This case was male, married and within age group ≥ 45years which comprised; 1.1%, 1.2% and 4.5%, respectively. The positive case was illiterate and had low economic status and had duration of work as municipal waste collector from 10-20years and alone accommodation which comprised 1.1%, 1.6% 2.4% and 9.1%, respectively (table 2). This 1(7.8%) HCV infected patient infection lives in Al-Muallhe (figure 2). Significant associations found between HCV infection and exposing to blood transfusion, catheterization and needles stick as risk factors (p=0.002,0.0001 and 0.080), respectively and liver cirrhosis as complicated clinical finding (p=.0001),but the association was not significant between HCV infection and sources of waste (0.620), (tables 3 and 4).

Table 1: The age and sex distribution of municipal waste collectors in Aden-Yemen

Age groups/years	Male (n=89)		Female (n=11)		Total (n=100)	
	No.	%	No.	%	No.	%
< 25 (n=17)	16	94.1	1	5.9	17	17.0
25–35 (n=30)	28	93.3	2	6.7	30	30.0
36–45 (n=31)	28	90.3	3	9.7	31	31.0
≥ 45 (n=22)	17	77.3	5	22.7	22	22.0
Total	89	89.0	11	11.0	100	100.0
Mean/years	36.03		42.45		36.74	
SD/years	10.88		10.58		10.98	
Min/years	16		21		16	
Max/years	60		56		60	

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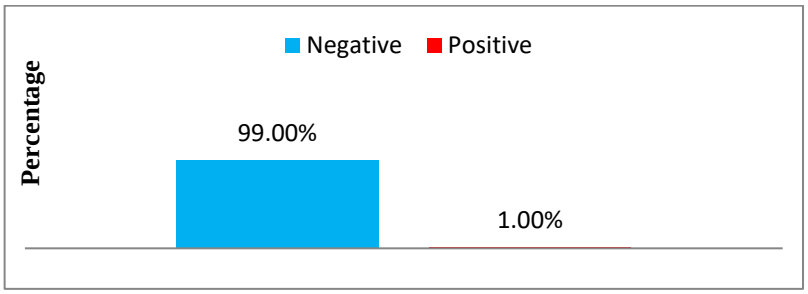

Figure 1: The prevalence of HCV infection among municipal waste collectors in Aden-Yemen

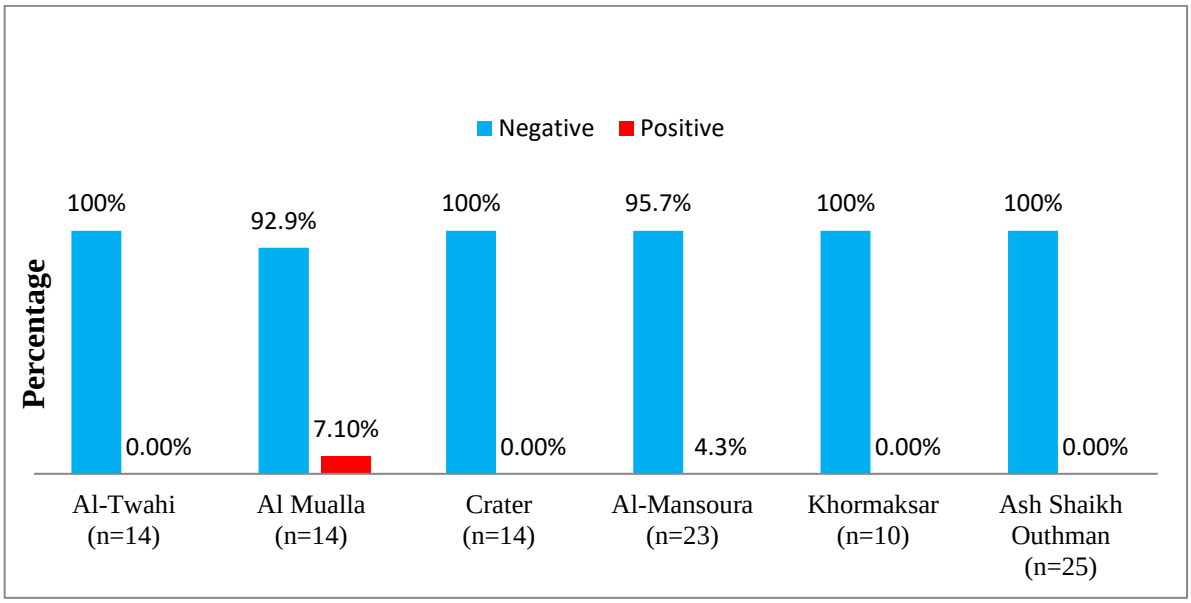

Figure 2: Clustering of HCV infection among municipal waste collectors according to distracts in Aden-Yemen.

Table 2: Variables associated with HCV infection among municipal waste collectors in Aden-Yemen

Variable	HCV		p	Variable	HCV		p
	No	%			No	%	
Age group				**Marital status**			
< 25 (n=17)	0	0.0	----	Single (n=17)	0	0.0	0.830
25–35 (n=30)	0	0.0	----	Married (n=83)	1	1.2	
36–45 (n=31)	0	0.0	----	Economical status			
≥ 45 (n=22)	1	4.5	0.220	Low (n=62)	1	1.6	0.620
Sex				Medium (n=38)	0	0.0	
Male (n=89)	1	1.1	0.890	Accommodation			
Female (n=11)	0	0.0		Alone (n=11)	1	9.1	0.110

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Variable	HCV		p	Variable	HCV		p
	No	%			No	%	
Age group				**Marital status**			
Education level				Not alone (n=89)	0	0.0	
Illiterate (n=94)	4	43.0	0.309	Duration of work as waste			
Secondary school (n=5)	1	20.0	0.116	>10 (n=34)	0	0.0	----
University (n=1)	0	0.0	----	10-20 (n=41)	1	2.4	0.410
				<20 (n=25)	0	0.0	----

Table 3: Association between risk factors and HCV infection among municipal waste collectors in Aden-Yemen.

Risk factors	HCV +ve		*p*	Risk factors	HCV +ve		*p*
	No.	%			No.	%	
Blood transfusion (n=8)	1	12.5	0.002	Exposed to broken glass (n=44)	0	0.0	-----
Cupping (n=12)	0	0.0	-----	Splash of body fluid to eye (n=40)	0	0.0	-----
Acupuncture (n=9)	0	0.0	-----	Exposed to needle stick (n=8)	1	12.5	0.080
Dental procedures (n=13)	1	7.7	0.130	Sources of waste			
Tattooing (n= 5)	0	0.0	-----	Houses (n=35)	0	0.0	----
Catheterization (n=6)	1	16.7	0.0001	Biomedical (n=3)	0	0.0	----
Exposed to sharp items (n=35)	0	0.0	-----	Mixed (n=62)	1	1.6	0.620

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Table 4: Distribution of clinical findings and complications of HCV infection among municipal waste collectors in Aden-Yemen

Symptoms	HCV +ve		*p*	Symptoms	HCV +ve		*p*
	No.	%			No.	%	
Fever (n=22)	1	4.5	0.220	Loss of appetite (n=21)	1	4.8	0.210
Vomiting (n=22)	1	4.5	0.220	Abdominal pain (n=25)	1	4.0	0.250
Nauea (n=24)	1	4.2	0.240	Jaundice (n=36)	1	2.8	0.360
Liver cirrhosis (n=6)	1	16.7	0.0001				

Discussion

Our study demonstrated that the prevalence of HCV infection among municipal waste collectors was 1%. This result was agreed with that conducted in Ethiopia and Bangladesh [12,16]. Research performed in Egypt noticed that 1.3% of MWCs had HCV infection [15]. Amsalu et al. demonstrated that 0.7% of medical waste handlers had HCV infection [17]. Two studies were done in Malaysia and Iran revealed 0% HCV antibodies [11,18]. Tsovili et al. revealed that the prevalence of HCV among MWCs was 2% [19]. Other research carried out among Pakistani and Brazilian waste handlers and pickers showed that rate of HCV infection was 3.3% [7,8]. Edrees, found that 5% of medical waste handlers were HCV positive [14]. One of the highest rates among MSWs was recorded in Egypt which was 43.3% [9]. The main reasons for increasing of HCV infection among MWCs include socio-economic and awareness about the transmission and preventive measures where they dealing with harmful waste bare hands and feet [11,15]. Our rate was in the minimum limit of HCV rate among general Yemeni population which ranged from 0.07% and 8.5% [13]. The present study demonstrated that the HCV infection was 1.0 % in age group ≥ 45years. Two studies were done in Egypt and Brazil reported that MWCs in age group ≥ 40 years had highest anti- HCV rates [9,20]. Uddin et al. found that the highest HCV percent was in age group 30 to 39 Years [12]. Report from Yemen detected that the highest HCV rate was in age group 21-30 years [14]. A study from Ethiopia found those municipal waste workers in age group ≥31 years had high HCV infection [15]. The age of MWCs had significant association with HCV positive cases [9]. This is attributed to that old MWCs who work for collection and transportation of waste for long duration of time. This increases the time of exposing to contaminated tools, thereby increasing HCV infection.

In this study, the high prevalent rates of HCV infections among MWCs were found among males 1.1%. Similarly, various studies demonstrated that males had high ant-HCV antibodies [9,12,14,20,21].

Study from Ethiopia revealed opposite result [15]. Both males and females workers may be susceptible to infection with increased risk over time [7]. Despite women are more sensitively to infectious diseases, working as MWCs requires a lot of effort and hard work which is an advantage for many males. They are more tolerant to hard work than females (22,23).

In the current data, about 1.2% of positive HCV MWCs was married. This was agreed with that conducted in Egypt and Bangladesh [12,21]. Edrees showed the highest anti-HCV antibodies among singles [14].

Regarding education level, the illiterate members had high prevent rates of HCV infections which was 1.1%. Different studies reveal different results as Illiterate/ read & write and primary Education in Egypt [9,21], High-primary school [14] and secondary school levels & above Bangladesh and Ethiopia [12,15]. Mol et al. showed the MWCs whose education levels basic and medium had the highest HCV rates [7]. Awareness to the route of HCV infection among MWCs is increased by increasing of their education levels which render them using of suitable personnel prevention measures thereby decreasing the rate of HCV infection.

The current data noticed that those members whom their economic status was low had 1.6% highest HCV rate. This agreed with that conducted in Egypt [21]. Low economic status may be risk factor for increasing of HCV as well as worse outcome of HCV infected cases [13].

The present data showed that 2.4% of MWCs whose duration of work from 10-20years had HCV infection. Different results showed globally as in Egypt ≥ 15 years [9], in Yemen ≥11 [14], in Brazil > 10 [20], in Ethiopia > 5 years [15] and in Bangladesh 4 to 6 Years [12]. Long duration for working as MWCs means exposure to harmful pathogenic infections such as HCV via injuries with contaminated needles and other sharp instrument which occasionally occur with any protective tools [9].

Related to sources of waste, there was no statistical significant association between HCV infection and sources of waste. El-Gilany et al. reveals high HCV positive cases among MWCs who exposed to biomedical waste. MWCs are at a higher risk of HCV infection due to their exposure to contaminated sharp medical tools from biomedical waste without any protective measures [9].

Regarding to risk factors, there were significant associations found between HCV infection and exposing to blood transfusion, needles stick and catheterization (p=0.002,0.0001 and 0.080), respectively. Report from Brazil noticed a significant association among MWCs who previously exposed to previously blood transfusion and positive HCV [20]. Research conducted among Egyptian MWCs showed that there was no any association between exposed to blood transfusion and needles stick and HCV infection [9]. The transmission of HCV by exposing contaminated needles stick is more commonly than transmission of HBV [24].

Regarding the complicated clinical finding, there was significant associations between HCV and those who had liver cirrhosis (p=.0001). There was no any previous study that agreed or disagreed this result.

As regard to accommodation 1(9.1%) of members who live alone had HCV infection. No previous studies that studied this variable among MWCs. Two studies from Yemen revealed that clustering of HCV and HBV infections among family members who live with infected patients (index cases) in Yemen were occur [1,25,26].

According to frequency of HCV infection in the Aden districts, 7.8% HCV infected patient infection lives in Al-Mualla while there no HCV infected case in other distracts of Aden governorate. There was no any literature that in agreement or disagreement with ours.

There are several limitations of the current study include: small sample size, short period of study, and confirm the HCV positive results and viral load) using

real time polymerase chain reaction (RT-PCR) were not done.

Conclusions

It can be concluded from this study that the prevalence of HCV infection among Yemeni municipal waste collectors was relatively low in comparison with most studies globally and lower than that found among Yemeni general population. The males, married and MWCs in age group≥ 45years, and those had illiterate education and live alone had highest percentages of HCV infection. Blood transfusion, needles stick and catheterization may increase the risk of HCV infection.

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Ethical clearance and informed consent

The ethical approval of this study was obtained from the Ethics Committee of College of Medicine and Health Sciences at University of Science and Technology, Aden; MEC No. (MEC/AD042).

Conflict of interest

The author declares that no conflict of interest.

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