Seroprevalence of Sexually Transmitted Diseases among Overseas Job Seekers in Nepal

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ABSTRACT

Objectives: Migration is one of the socioeconomic factors that contribute to the acquisition and dissemination of sexually transmitted disease/s (STDs), a long-recognized major global health issue. This study aimed to determine the seroprevalence of STDs among Nepalese overseas job seekers.

Methods: Retrospective serological data of Nepalese overseas job seekers (n=14,980), who were tested for Hepatitis B (HB), Hepatitis C (HC) and Acquired Immune Deficiency Syndrome (AIDS) with an enzyme-linked immunosorbent assay, and syphilis with Treponema pallidum hemagglutination assay, were extracted (January and December 2021) from the electronic database of a diagnostic center and analyzed using SPSS version 17.0.

Results: Syphilis seroprevalence was 0.59% among overseas job seekers, while HB, AIDS, and HC seroprevalences were 0.32%, 0.15%, and 0.11%, respectively. Unlike syphilis, which was predominated in the age group of 31-40 years, viral hepatitis and AIDS were prevalent in the age group of 21-30 years. Males had higher incidences of HB (n=48), HC (n=17), AIDS (n=23), and syphilis (n=86) compared with females. Co-prevalence of HIV-syphilis and HIV-HBV occurred in 0.020% (n=3) and 0.013% (n=2) of individuals, respectively, whereas both HIV-HCV and HBV-HCV co-prevalence was observed in 0.007% (n=1) of individuals.

Conclusion: Syphilis is the most common STD among Nepalese overseas job seekers, with the highest co-occurrence with AIDS.

Keywords: Overseas job seekers, seroprevalence, sexually transmitted diseases, Nepal

INTRODUCTION

Sexually transmitted diseases (STDs) are a group of infectious diseases spread either vertically from mothers to children or horizontally through sexual contact and blood and blood products [Ito et al, 2019; MoHP 2014; Kellerman et al, 2003]. Despite medical advancements, STDs remain a threat to the health and welfare of individuals [Gerbase et al, 2003]. In 2019, the WHO estimated that 58 million people worldwide had chronic Hepatitis C (HC) virus infection and 296 million had chronic hepatitis B (HB) virus infection [WHO, 2022].
Moreover, by the end of 2021, an estimated 38.4 million people were infected with the Human immune deficiency virus (HIV), with 0.65 million people dying as a result of the infection [WHO, 2019]. Furthermore, approximately 5.6 million new cases of syphilis are reported worldwide each year [Peeling et al, 2017]. In Nepal, the estimated prevalence of HC was 0.6% and the prevalence of HB was 0.9% [Shrestha et al, 2017]. Approximately 64000 people are living with acquired immune deficiency syndrome (AIDS) in Nepal [NCASC, 2009].

Migration for work has always been an important feature of the country’s economy and society [Seddon, 1995]. Socio-economic inequality due to economic deprivation, especially in low and middle-income countries, including Nepal, has forced adults to seek employment away from home, resulting in increased mobility, which has been linked to an increased risk of acquiring STDs [Bloom et al, 2002]. Such migrants have poor knowledge concerning safe sex practices, and even if they have, they might hesitate to implement the practice [Gurubacharya, 1996], nevertheless, leading to the acquisition of STDs.

In Nepal, the prevalence of STDs as well as on co-occurrences of such diseases among overseas job seekers is rarely understood. Therefore, this study aimed to determine the seroprevalence of major STDs, including HB, HC, AIDS, and syphilis, and investigated the co-occurrences of several STDs among Nepalese overseas job seekers in the year 2021.

MATERIALS AND METHODS

Study site and participants
This is a retrospective single-centered study conducted on Nepalese overseas job seekers attending Life Trust Medi Diagnostic, Kathmandu, Nepal, between January and December 2021.

Ethical consideration
This study was carried out after receiving approval from the Institutional Review Committee (IRC) of Shi-Gan Health Foundation, Kathmandu, Nepal.

Inclusion and exclusion criteria
This study included all Nepalese overseas job seekers attending the diagnostic center for testing STDs. Individual with missing findings and who had attended the study site beyond the study duration were excluded from the study.

Data collection
The demographic details (age, gender) and the laboratory finding of STDs (for Hepatitis B, Hepatitis C, AIDS, and syphilis) among the enrolled participants were collected from an electronic database (midas Dr. Home V 3.2). After obtaining complete information, it was rechecked, anonymized, and entered into Microsoft Excel 2010.

Laboratory diagnosis
Three milliliters of the whole blood sample were collected aseptically into a serum separating tube and centrifuged at 3,500 rpm for 5 minutes to separate the serum. In any case of delay, the serum was stored in refrigerator at 2-8°C. The HBsAg test for hepatitis B, as well as anti-HCV and anti-HIV I & II antibody tests for hepatitis C and AIDS, are performed using commercially available diagnostic enzyme linked immunosorbent assays (ELISA). Similarly, antibodies for syphilis were screened by using a rapid plasma reagin (RPR) test and confirmed by using Treponema pallidum hemagglutination (TPHA) assay.

Briefly the immunoassays were performed as;

a. Hepatitis B test: For Hepatitis B diagnosis, a solid phase HBsAg ELISA kit based on the sandwich principle was used.

b. Hepatitis C test: For in vitro qualitative detection and screening assay of Hepatitis C virus infection in human serum, a solid phase ELISA kit based on the Peroxidase conjugated Double Antibody/Antigen Direct Sandwich principle Anti-HCV ELISA kit was used.

c. HIV I and II test: For in vitro qualitative detection and screening assay of HIV infection in human serum, a solid phase ELISA kit based on the sandwich principle Anti-HIV 1+2 ELISA kit was used.

d. Syphilis test

i. RPR screening test: The RPR test is a flocculation slide test in which antigens coated with carbon particles are allowed to react with the sample. In the test, we placed one drop of serum on the slide followed by one drop of RPR antigen suspension. Then, thoroughly combine and spread the liquid over the entire area of the circle. Later, we gently rock the slide for 8 minutes and look for the appearance of carbon particle clumping under a bright light source. If syphilis antibodies are present in serum, flocculation will occur on the slide due to carbon particle aggregation indicating a positive reaction. If the sample does not contain the antibody,
there will be no flocculation and a clear background, indicating a negative reaction.

ii. TPHA confirmative test: A rapid TPHA diagnostic test kit was used for the diagnosis of syphilis from each serum sample. In this test, one drop of serum (25 microliters) followed by one drop of buffer were added to the sample port. After 15 minutes, the result was observed. Positive results were indicated by the appearance of two distinct pinks to deep purple color bands on the device.

**Statistical analyses**

Statistical analyses were done using SPSS software version 17. Descriptive statistics including, median [Interquartile range (IQR)], n, and %, were used to characterize the study variables.

**RESULTS**

A total of 14,980 overseas job seekers were tested for the presence of STDs. Majority of overseas job seekers belonged to the age group 21-30 years (n=9040, 60.51%), followed by the age group 31-40 years (n=5,049, 33.7%) and 41-50 years (n=759, 5.07%). Among the total individuals, 14,856 (98.85%) were males (Table 1).

![Q-Q plot of age of individuals with STDs](image.png)

**Figure 1: Q-Q plot of age of individuals with STDs**
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Individuals with</th>
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<tbody>
<tr>
<td></td>
<td>Hepatitis B</td>
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<tr>
<td></td>
<td>NR (n=14,932)</td>
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<tr>
<td>Median [IQR]</td>
<td>28 (24-34)</td>
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<td>Age (years)</td>
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<td>Ind. no. X₂</td>
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<td>Ind. no. X₇</td>
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<td>Seroprevalence</td>
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</table>

AIDS = Acquired immunodeficiency syndrome, NR = Non-reactive, R = Reactive, IQR = Interquartile range, STDs = Sexually transmitted diseases, Ind. no. = Individual number, + = Present, − = Absent, X₁-X₇: Anonymize individual code
The median age (IQR) for individual with HB was 25.5 years (24-30), and for HC was 26 years (22-28). Similarly, median age (IQR) for individual with AIDS was 28 years (25-38), and for syphilis was 32 years (25.25-36) (Table 1). While the Q-Q plot for both HC and syphilis was approximately normally distributed, as indicated by data points; the Q-Q plot for HB and AIDS were not normally distributed (Figure 1).

Individuals with syphilis (n=88, 0.59%) predominated the infected group, followed by individuals with HB (n=48, 0.32%), AIDS (n=23, 0.15%), and HC (n=17, 0.11%). The higher incidences of HB (77.08%, 37/48), HC (88.24%, 52/59), and AIDS (52.17%, 12/23) were observed in the individuals belonging to the age group 21-30 years. However, a higher incidence of syphilis (47.73%, 42/88) was observed in the individuals belonging to the age group 31-40 years. There were also varying incidences of co-occurrences of HIV-syphilis (0.020%, 3/14,980), HBV-HIV (0.013%, 2/14,980), HCV-HIV (0.007%, 1/14,980), and HBV-HCV-syphilis (0.007%, 1/14,980) among the overseas job seekers (Table 1).

DISCUSSION
Sexually transmitted infections (STDs) continue to be a major public health problem in most countries around the world. Co-occurrences of HB and HC in individuals with AIDS are common, presumably due to the shared route of transmission of sexually transmitted pathogens. Information on evaluation and trends in STDs prevalence among job seekers can help Nepal keep track of its STDs trends and provide specifics on the effectiveness of preventive and control efforts. This study helps to estimate the seroprevalences of HB, HC, AIDS, and syphilis in Nepalese overseas job seekers and identify the rates of co-occurrence/s of such diseases among individuals.

In this study, the seroprevalence of HBV, HCV and HIV was 0.32%, 0.11%, 0.15%, respectively among the study participants. Gurung et al. [Gurung et al, 2018] reported a higher prevalence of hepatitis B (1.65%), a lower prevalence of hepatitis C (0.03%), and a similar prevalence of AIDS (0.13%). The study conducted in Western region of Nepal reported, the seroprevalence of hepatitis B was 1.1%, hepatitis C was 0.3%, and AIDS was 0.5% [Shrestha et al, 2016]. A study conducted by Khanal et al. [Khanal et al, 2012] in two different places of Eastern part of Nepal reported the varying seroprevalence (0.52-0.64%) of HBV. Another study by Karki et al reported the seroprevalence of HCV and HIV was 0.66% and 0.19% among blood donors in Kathmandu valley, Nepal, respectively [Karki et al, 2008; Karki et al, 2009]. This study found a 0.59% seroprevalence of syphilis, which was slightly lower than a previous study of high-risk groups in Kathmandu and nearby cities, which found that 0.7% of female sex workers had active syphilis and 2.5 % had a previous infection [IBBS, 2011]. The estimated prevalence of syphilis for women in Southeast Asia is 0.37% [Newman et al, 2015]. The increase in unprotected sex is one of the causes behind the increased incidence of syphilis [Shilaih et al, 2017].

The seroprevalence of Hepatitis B, Hepatitis C, AIDS, and syphilis was higher in the male group in this study, but this could be attributed to the larger number of males migration from Nepal [NLMP, 2020], who was screened for STDs. Totally in associate to our study, higher seroprevalence of HCV infection was observed in male donors than in female donors [Karki et al, 2008]. As of 2011, male labor migrants accounted for 27% of total estimated HIV infections in Nepal. The reason behind high number of male might be males are more vulnerable to unsafe sexually active and use more injectable drugs than females.

In this study, the majority of individuals with syphilis were between the ages of 31-40, while other STDs were between the ages of 21-30. Similarly, to our study, the seroprevalence of HC was highest (0.82%) in the age group of 21-30 years [Karki et al, 2008]. Previous research found that the positive rate for Hepatitis B infection was higher among patients aged 46-55 years and that for Hepatitis C infection was higher among patients aged 36-45 years. [Pokharel, 2017]. The Joint United Nations Programme on HIV/AIDS reported that, in 2019, 50% of new syphilis infections in adult women and 30% in adult men were among those aged 15-24 years [UNAIDS, 2020]. In 2018, the highest syphilis rates among females were observed among those aged 20-24 years and 15-19 years, among males, the rate was highest among those aged 20–24 years and 25–29 years [CDC, 2018]. The causes for the increased frequency of STDs among adults are low levels of education, not being married, multiple sex partners, alcohol and drug use, and early sexual debut, males who have sex with men.

In this study, Co-occurrences of HIV-syphilis were more common, followed by HBV-HIV co-occurrences, HBV-HCV-syphilis co-occurrences, and HCV-HIV co-occurrences. Approximately 5% to 10% of people with HIV in the United States also have chronic HBV infection [Spradling et al, 2010]. The prevalence of HBV co-occurrences with HIV infection is estimated to be approximately 5% to 7% because of both HIV and the hepatitis B virus share similar transmission routes [Alter, 2006]. The prevalence of HIV co-occurrences with syphilis in this study was 16.2% higher than that observed in studies with seropositive population conducted in Rio de Janeiro (2.7%) [Signorini et al, 2007] and Londrina (8.7%) [Morimoto et al, 2005].
In the United States, approximately 5% of adults with hepatitis C virus (HCV) infection have co-occurrences with HIV [Bosh et al., 2018]. HCV–HIV co-occurrences among intravenous drug abusers were 11.3% [Ruan et al., 2004]. Co-occurrences with HIV and HCV is common (62%–80%) among injection-drug users who have HIV [Yehia et al., 2014; Spradling et al., 2010; DCd, 2017] including those who participate in unprotected anal intercourse, use sex toys, and use non-injection drugs. About 4–5 million people have HCV–HIV co-occurrences. In the United States and Western countries, HCV is found in 72–95% of intravenous drug users (IVDUs), 1–12% of men who have sex with men, and 9–27% of heterosexuals [Akhtar et al., 2022]. Co-occurrences occur because infections have comparable transmission pathways [NLMP, 2020]. This is preliminary study just to provide the glimpse of the situation, however broader study would be required to identify the most vulnerable young people acquiring the STDs, and also to determine transmission.

CONCLUSIONS
This study confirms the higher syphilis seroprevalence among 30–37 years male overseas job seekers in Nepal, as well as a higher rate of HIV-syphilis co-occurrences. Thus, scaling up of the screening of overseas job seekers for STDs and provision of health education about the risk factors, the mode of transmissions and prevention is recommended.

CONFLICT OF INTEREST
The authors declared no conflict of interest.

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