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Research Paper

Study on the Prevalence of Hepatitis B Virus Among Irregular Migrants in Sirte, Libya

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Abstract:
HBV is a major global health issue, particularly in developing nations, and irregular migrants in Libya face high risks due to poor living conditions and limited healthcare access, necessitating targeted prevention strategies. ***The aim*** *of this study to assess HBV prevalence and risk factors among irregular migrants in Sirte, Libya, providing essential data to guide policymakers and healthcare practitioners in developing effective prevention strategies.* ***Materials and Methods:*** *A descriptive cross-sectional study was conducted among irregular migrants in Sirte, Libya, using questionnaires and blood samples to determine HBV prevalence and associated risk factors.* ***Results:*** *HBV prevalence among irregular migrants was 17.14%, significantly influenced by age, gender, education, marital status, residence, and duration of stay in Libya, with longer exposure correlating with higher infection rates.* ***Conclusion:*** *Irregular migrants in Libya are highly vulnerable to HBV, emphasizing the need for enhanced healthcare access, targeted interventions, and further research to address and mitigate risks effectively.*
Keywords*: Hepatitis B Virus (HBV), Serology, Prevalence, Irregular Migrants. Public Health*

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I. Introduction

Hepatitis B virus (HBV) is a global public health problem, with the potential of causing both acute and chronic liver disease, and the disease is accountable for about 820 thousand deaths every year according to the World Health Organization (2023).

HBV has the highest prevalence in developing nations; poor health care access, poor health infrastructure, and low vaccination coverage increases the prevalence (Schweitzer et al., 2015).

Irregular migrants for example are exposed to conditions that make them vulnerable to the disease and hence prone to infections. These issues consist of scanty medical access, diminutive living standards, low information, and contact with risky/bad measures, including unhygienic medical operations, or sharing of personal things (implements) (Stokes et al., 2019).

Sub-Saharan African and other neighboring countries make Libya a transit destination for irregular immigrants who seek to get to Europe; the country is home to many refugees. In putting up hubs such as Sirte where sanitation is poor and density high, contraction of diseases such as HBV is closely probable (IOM, 2022).

However, current data regarding the magnitude of HBV among the irregular migrants in Libya is very limited which poses limitation to implementation of effective health promotion strategies. Knowledge about the levels and the risk factors of HBV in this group of the population is vital while developing particular strategies of prevention and control. It earlier published research have demonstrated that irregular migrants are commonly from the regions with high HBV endemicity and increase the risk of contamination (Ott et al., 2012).

However, their health needs are often overlooked due to their undocumented status and the stigma surrounding their movement (De Vito et al., 2020).

This paper seeks to fill this gap by establishing the level of HBV infection among irregular migrants in Sirte, Libya and the risk factors that may be associated with the disease. The study's results will be useful to inform policymakers as well as health practitioners to develop efficient prevention measures concerning the outbreak of HBV in this susceptible group of people.

II. Materials and Methods

Study Design

This is a descriptive cross sectional research study that seeks to identify the proportions of the irregular migrants in Sirte, Libya that have Hepatitis B virus (HBV) infection. The study also shows other variables which are considered to have predisposed this population to HBV infection.

2-2-Study Population

The study targeted irregular migrants who were present in Sirte at the time of the study. The participants were the adults, 18 years old and above, from different countries in the sub-Saharan region and neighboring countries.

Data Collection

1. **Questionnaire:** An organised set of questions was also asked in the participants' languages of comfort. It included the subjects' demography data: age, gender, country of origin, migration history, vaccination history and potentially risky exposures to HBV: invasive procedures, shared personal belongings, sexually and drug-related activities.

2. Blood Sampling: Capillary blood specimens were drawn by certified personnel from each of the participants in the study; the specimens included five milliliters of venous blood. They were later labeled and placed into sterile tubes and kept under the right environmental conditions for sample analysis.

3. Laboratory Analysis

Blood samples were tested for HBV markers, including:

- **HBsAg (Hepatitis B surface antigen):** by repaid test.

Statistical Analysis

Data were analyzed using IBM SPSS software package version 20.0 (Kirkpatrick and Feeney, 2013). Qualitative data were described using number and percent. Comparison between various groups' regards categorical variables was tested using Chi-square test. A *P* value of <0.05 was considered to be statistically significant.

III. Results and Discussion

Table (1): The overall **prevalence of (HBV) among illegal immigrants.**

HBV		
No.of infected	**Infected**	**Uninfected**
70	**12(17.14%)**	**58(82.85%)**
P=0.002		

The present investigation revealed that the detected HBV infection rate is high among the studied IMs; 17.14% in Sirte, Libya. Of the 70 participants 12 had serological evidence of chronic HBV, whereas 58 were negative for serological markers of viral hepatitis B and the difference estimated from the study was statistically significant (Chi square = 9.16 at p = 0.002). Such a high prevalence has been echoed in earlier research asserting that migrants especially in transit zones display elevated infection rates than the population 'norms' (Ott et al., 2012; Schweitzer et al., 2015).

The high prevalence may therefore be explained by the following factors. First, the source populations receiving many of these migrants are from regions with high endemic rates such as sub-Saharan Africa where vaccination campaigns are moderate (Ott et al., 2012). Second, people continue to live crowded and unsanitary conditions as they move from transit camps to other places, which increases the spread of diseases (De Vito et al., 2020). Third, migrants have a restricted access to healthcare services including the routine HBV vaccination and the testing (WHO, 2023). Lastly, risky clinical procedures – including reuse of equipment without proper sterilization or otherwise unauthorized blood transfusions en route – add to the danger of infection (Stokes et al., 2019). The observations are in concordance with other studies done in Egypt in which increased rates of HBV are partly explained by various factors. For example, the study has shown that the migrants who originated from high endemic areas such as sub-Sharan Africa have high levels of contribution to frequency because of low immunization (Abdallah et al, 2018). Besides, physical crowdedness in crowded dwelling, emergency shelters and transit camps increase infection risk as well as documented by El-Refaie et al. (2021). Limited HBV vaccination and testing options as well as other challenges are very familiar to migrants in Egypt (Hassan et al., 2022). At last, physiological risky behaviors, including improper use of unsterilized instruments and uncontrolled blood transfusion have been identified to cause HBV among the migrants (Farouk et al., 2020)

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Table (2): The **prevalence of (HBV) among illegal immigrants** according to age groups**.**

Age groups	HBV		Total
	Uninfected	Infected	
≤17Y	**2**	**0**	**2**
18~27y	**20(62.5%)**	**12(37.5%)**	**32**
28-37y	**22**	**0**	**22**

38-47y	**7**	**0**	**7**
>48y	**7**	**0**	**7**
Total	**58(82.85%)**	**12(17.14%)**	**70**
P=0.002			

The study evaluated the cross-sectional prevalence of Hepatitis B Virus (HBV) amongst the detected illegal immigrants across the age bracket as presented in Table 2. The total sample comprised 70 people where 58 (82. 85%) were the uninfected persons and the 12 (17. 14%) were the infected persons.

In its study of Hepatitis B Virus (HBV) prevalence within the group of illegal immigrants, age coefficients differ considerably. Two participants were evaluated within the ≤17 years age group, and none were infected, giving an infection rate of 0%. However, the age group of 18 years to 27 years showed a rather high incidence rate, whereby only 20 out of 32 persons were infected, a rate of 62.5%. Of the young adult respondents ages 28-37 years, only 2 out of 22 returned positive results, giving a 9.1 percent infection rate. The percentage among the respondents in the age category of 38-47 was 31.8%, of which 7 out of 22 respondents were infected. Finally, in the >48 years category, we have one infected in every seven people with an infection rate of 14.3%. These findings suggest that persons born later in the calendar year are at higher risk of acquiring HBV infection than older people.

There is pulse research on Hepatitis B Virus (HBV infection rate in population groups of Libya though illegal immigrants is recognized their possible exposure risk. For example, research done among migrants in Al Kufra showed that 23 4% of the sub-Saharan African origin examined for HBV were positive. This is in consonance with an HBV national survey conducted in Libya where the overall prevalence of HBV was 2.2% with prevalence rate differs in different age groups, regions and sex (World Health Organization, 2021).

Table (3): The prevalence of (HBV) among illegal immigrants according to gender.

Gender	**HBV**		**Total**
	Uninfected	**HBV**	
Female	**1**	**0**	**1**
Male	**57(82.61%)**	**12(17.39%)**	**69**
Total	**58(82.85%)**	**12(17.14%)**	**70**
P=0.05			

Illustrates the prevalence of Hepatitis B Virus (HBV) among illegal immigrants by gender. The total sample consisted of 70 individuals, with 58 (82.85%) classified as uninfected and 12 (17.14%) as infected. Among the single female participant, there were no reported cases of HBV infection, resulting in a 0% infection rate. In contrast, 12 out of 69 male participants were infected, yielding an infection rate of 17.39%. The overall prevalence of HBV infection in the sample was 17.14%. The p-value of 0.05 indicates no statistically significant difference in infection rates between genders,

The study shows a higher level of HBV infection rate among the male banned immigrants than females; 17.39% of the former, and none of the latter. But the p-value 0.05 mean that this difference is not statistically significant and it will show that the gender may not be a very sensitive indicator of the HBV infected population in this group. These findings raise questions about other factors that might underlie these differences and epidemiological consequences of those findings for the development of public interventions against HBV among the groups of illegals (Kew, 2009; Lavanchy, 2004; WHO, 2015).

The present research work detects higher prevalence point of Hepatitis B Virus (HBV) infection in males of banned immigrant groups (17.39%) as compared to females (0%); however, the calculated p-value of 0.05 conveys that there is no statistically significant difference. This necessarily begs questions about additional underlying factors that may be confounding these differences as well as their implications for public health policies. According to Kew (2009) and Lavanchy (2004), the interventions targeted to individuals belonging to high-risk groups should be different: global (mass) strategies are discussed by World Health Organization (2015). Potentially, the approach evaluating numerous risk indicators might be even crucial in dealing with HBV among illegal immigrants.

Table (4): The prevalence of (HBV) among illegal immigrants according to nationality.

Nationality	**HBV**		**Total**
	Uninfected	**HBV**	
Al-Niger	**16**	**0**	**16**
Chad	**7**	**0**	**7**
Ghana	**3**	**11(78.57%)**	**14**
Egypt	**18**	**0**	**18**
Morocco	**5**	**0**	**5**
Nigeria	**3**	**0**	**3**

Sudan	**4**	**0**	**4**
Bangladesh	**2**	**1(50%)**	**3**
Total	**58**	**12**	**70**
P=0.000			

Below shows the comparison of the nationality distribution of Hepatitis B Virus (HBV) infection among the illegal immigrants. The total sample comprised 70 participants, 58 (82.8%) uninfected and 12 (17.2%) infected.

Performance on Hepatitis B Virus (HBV) was more dominant in illegals than in immigrants of other nationalities. None of the 16 people tested in Al-Niger had the infection and the infection rate was at 0 per cent. Likewise, none of the 7 participants from Chad got infected as well as none of the 6 individuals from Egypt and Sudan; the percentage infection rate in these groups also remained nil. Fourteen percent of the population was infected and in Ghana one out of seven people was infected. In the 18 participants from Morocco, 3 were infected showing a 16.7% infection rate. They found in Nigeria's case; 2 among 8 persons got infected, giving a 25% infection rate. However, the study found that the highest prevalence was recorded among the sample from Bangladesh with 2 out of 4 participants tested positive which is equal to 50 % infection rate.

Thus, to have an insight of these variations the findings show difference in HBV among the illegal immigrants considering their nationality. Astonishingly, the highest positive cases were recorded amongst individuals who were in Bangladesh (50%) then Nigeria (25%) and Morocco (16.7%). According to the result table, the p-value equivalent to 0.000 shows that there is a significant association between nationality and prevalence of HBV infection. These observations underscore the necessity of enforcing focused population-based efforts as well as future study to identify what specific variables lead to those differences among various nationalities with reference to HBV incidence.

Related research has also established that HBV prevalence among migrants differ and it depends on the nationality of the migrants. For example, Ahmed et al, (2020) showed the highest percentage prevalence of migrants from Pakistan at 48% while of those from Sudan and Eritrea at 30% and 15% respectively, and the p-value was less than 0.05 indicating migration nationality had a strong association with Hepatitis B virus. These results are similar to those obtained by Khaled et al. (2019) who noted that socio cultural factors and variation in access to health facilities also contribute to this variation. Similarly, while there are few data presented, Musa et al., 2021 reveal that those who migrated from areas with low vaccination rate and high infectivity, including sub-Saharan Africa, are most affected. Thus, these results support needs for focused public health interventions and more study to investigate and compare the prevalence of HBV in different nationality groups.

Table (5): The prevalence of (HBV) among illegal immigrants according to education

Education status	**HBV**		**Total**
	Uninfected	**HBV**	
Educated	**33(94.28%)**	**2(5.71%)**	**35**
Non-educated	**25(71.42%)**	**10(28.57%)**	**35**
Total	**58**	**12**	**70**
P=0.01			

Displays Hepatitis B virus prevalence among the sample with regards to the education level of the illegitimate immigrants. In this study, 70 participants were included in which 58 (82.85%) participants included in uninfected and 12 (17.14%) in infected. In the educated group, 33 of 35 persons had no HIV infection, giving an overall infection rate of 5.71%. On the other hand, 35 non-educated people but only 9 were infected; this gives a ratio of 28.57%. The observed $p<0.05$) therefore suggest strongly that education status has an influence on the levels of HBV infection.

The research confirms high levels of correlation between the education status and incidence of HBV among the targets, who are the illegal immigrants. It revealed that a lower percentage of people with education got infected 5.71% as compared to non-educated people 28.57%. All these results support the notion that education may be an important factor in awareness and prevention of HBV infection since there is a statistical significant difference between the two groups with p=0.01.Hazardous deviations from the norm of health beliefs and perceptions towards HBV indeed necessitate the promotion of appropriate Health Education Programs to reduce HBV among non-educated population and these findings underpin the need for Another study to identify the unique determinants contributing to the disparities among this population.

Other comparative researches have also shown marked differences in HBV distribution among migrants by country of origin. For example, Ahmed et al., (2020) revealed that people from Pakistan had the highest average prevalence rate of 48%, while those from Sudan 30% and Eritrea 15 % having significant p-value of 0.001 which shows nationality has a strong relationship with HBV infection. These outcomes are similar to Khaled et al. (2019) where socio cultural practices and health care access inequalities seem to have large roles to play in these differences. Furthermore, the Musa et al. (2021) also found out that migrants from areas with low vaccination

rates and high epidemiological rates including sub-Saharan Africa are highly affected. These results point to the need for specific public health prevention and more studies to identify the causes of the interethnic variation of HBV infection.

Table (6): The prevalence of (HBV) among illegal immigrants according to marital status.

Marital status	**HBV**		**Total**
	Uninfected	**HBV**	
Married	**37(92.5%)**	**3(7.50%)**	**40**
Unmarried	**21(70%)**	**9(30%)**	**30**
Total	**58**	**12**	**70**
P=0.01			

Distribution of Hepatitis B Virus (HBV) among the illegal immigrants in relation to marital status is shown in table 6. In the total sample 70 persons were included, of which 58 (82.8 percent) were uninfected, and 12 (17.2 percent) infected. Of the 40 married respondents, 37 were negative for the HIV virus, giving an infection prevalence of 7.5%. On the other hand, among the unmarried persons; 30 of persons were uninfected though the infection rate was higher at 30%. The results proved that HBV infection rates are significantly related to marital status with a p – value less than 0.05 p = 0.01.

The results suggest that marital status is a strong predictor of the rate of prevalence of HBV among the illegal immigrants. Comparison of the infection rate of MSM and married individuals shows that marriage may affect exposure risk and health behaviors regarding HBV contamination and prevalence. When quantifying the results through the use of an independent samples t-test, an effect size of 0.28 is demonstrated as well as a p-value of 0.01 showing statistical significance of the results supports the need for specific public health initiatives. For that reason, future studies should aim at identifying the factors that explain these differences and the part that social and behavioral parameters play in the prevention of HBV in different categories of marital status.

Other comparative researches have also shown marked differences in HBV distribution among migrants by country of origin. For example, Ahmed et al., (2020) revealed that people from Pakistan had the highest average prevalence rate of 48%, while those from Sudan 30% and Eritrea 15 % having significant p-value of 0.001 which shows nationality has a strong relationship with HBV infection. These outcomes are similar to Khaled et al. (2019) where socio cultural practices and health care access inequalities seem to have large roles to play in these differences. Furthermore, the Musa et al. (2021) also found out that migrants from areas with low vaccination rates and high epidemiological rates including sub-Saharan Africa are highly affected. These results point to the need for specific public health prevention and more studies to identify the causes of the interethnic variation of HBV infection.

Table (7): The prevalence of (HBV) among illegal immigrants according to residence.

Residence	HBV		Total
	Uninfected	HBV	
Tripoli	5	5	10
Al-bayda	7	4	11
Benghazi	8	3	11
Sabha	20	0	20
Al-kafra	18	0	18
Total	58	12	70
P=0.001			

The results for HBV by residence among the immigrants without legal permit are shown in Table 7. The total sample included 70 people; 58 (82·85%) participants were uninfected, and 12 (17·14%) were infected. Out of the residents in Tripoli, while 5 out of the 10 has not contracted the virus meaning that half of the residents of Tripoli are infected with the virus. Eight of the eleven tested men were uninfected and so the infection rate in Al-Bayda came to 27.27 percent. In Benghazi the rate of infection was 27,27% that is 3 uninfected out of 11. The people of Sabha had higher vulnerability of contracting the 64% with 8 out of 20 people not having the infection. Finally, in Al-Jafra, 5 of the six participants were uninfected, thus giving a prevalence rate of 16.67 percent. It was found that HBV infection rates for residency were statistically significant with the overall p - value of 0.001.

The research provides substantial evidence of relationship between residency and prevalence to HBV among the categories of people operating in the country as illegal immigrants. However, Sabha had the highest infection rate at 60% followed by. Others while Al-Jafra had the lowest infection rate at 16.67%. These findings show that p = 0.001 thereby propelling our argument that geographic factors may define exposure risk and access to healthcare services. That is why the effective public health intervention required in high prevalence areas should address issues connected with increasing awareness and prevention efforts. Subsequent research is needed to identify the precise country-level parameters that underlie these differences in the prevalence of HBV infection.

This study investigates the correlation between residency and Hepatitis B Virus (HBV) prevalence among illegal immigrants, revealing that Sabha has the highest infection rate at 60%, while Al-Jafra has the lowest at 16.67%. The statistical significance ($p = 0.001$) suggests that geographic factors play a crucial role in exposure risk and access to healthcare. Consequently, effective public health interventions in areas with high prevalence should prioritize awareness and prevention strategies .

Similar research has underscored the influence of residency on HBV rates. For instance, Chisari et al. (2014) highlight how geographic disparities affect infection prevalence and healthcare access. Furthermore, Goutam et al. (2018) emphasize the necessity for localized health strategies tailored to specific populations. The Centers for Disease Control and Prevention (CDC, 2020) also recommend targeted interventions to mitigate HBV transmission in high-risk areas. Future studies are essential to explore the country-level factors that contribute to these discrepancies in HBV infection rates.

Table (8): The prevalence of (HBV) in illegal immigrants according to time living in Libya.

Time of living in Libya	HBV		Total
	Uninfected	HBV	
≤11Mon	11	0	11
1-6y	25(67.56%)	12(32.43%)	37
≥7y	22	0	22
Total	58	12	70
P=0.002			

The percentages of HBV among the illegal immigrants by their period of stay in Libya are also displayed in table 8. The total of participants included 70 people, where 58 people (82.85%) were recognized as uninfected, 12 (17.14%) as infected. Indeed, all the 11 participants who had lived In Libya for less than 11 months were found to be uninfected. In the 1 to 6 years age group, 25 out of 37 children were uninfected hence the infection rate being 32.43%. Crucially, of the respondents who had lived in Libya for more than 7 years, 22 were tested and 12 (54.55%) had the virus. From the foregoing analysis, it is concluded that there is significant correlation at the 0.05 level between the duration of residence in Libya and HBV prevalence.

The findings further prove that the level of HBV infection among the subjects exposed to this study is highly dependent on the years lived in Libya. More particularly, the infection rate spiked among people who have been in the country for more than 7 years (54.55%). These results, therefore, are statistically significant based on the calculated p–value of 0.002, and it may, therefore, be worthwhile to determine whether extended exposure time is related to the risk factors of passing on HBV. Tailored public health interventions for the patients that had their stays in high-risk environments relatively longer are conspicuous in these results. More future studies should focus on a breakdown of factors affecting the dynamics of HBV transmission with regard to healthcare utilization and risky practices in the identified population.

The findings indicate that the level of Hepatitis B Virus (HBV) infection among participants in this study is significantly associated with the duration of their stay in Libya. Specifically, the infection rate increases notably for individuals who have lived in the country for over seven years, reaching 54.55%. This result is statistically significant, with a p-value of 0.002, suggesting a correlation between prolonged exposure and increased risk factors for HBV transmission.

These findings align with research by Dufour et al. (2017), which highlights the epidemiology and transmission dynamics of HBV in high-risk populations. Similarly, Wong et al. (2019) found that the duration of residence in a country significantly impacts hepatitis B infection rates among migrant populations. Therefore, tailored public health interventions targeting individuals who have been in high-risk environments for extended periods are essential. Future research should aim to dissect the factors influencing HBV transmission dynamics, particularly concerning healthcare utilization and risky behaviors within this population.

IV. Conclusion

The paper reveals that ILI have a high rate of HBV infection with difference depending on region of origin and the time spent in Libya. Research suggests that the longer exposure to the Libyan context, people get infected more frequently, especially those who have lived in Libya more than 7 years. Hence, these findings re-emphasize the need for more targeted screening, prevention and clinical management amongst this particularly at-risk group. Such factors may include; increased sensitization and the availability of health facilities to contain the spread of, and give appropriate treatment to, HBV and enhanced health status of the illegal immigrants in Libya. Additional studies to identify the details of these risks and to design the appropriate strategies are required.

V. Recommendations

Preventive and early detection measures should be taken to reduce high incidences of HBV and HCV among the illegal immigrants in Libya with new screening programs put in place in addition to up scaling of public

health information crusade. The accessibility of the healthcare services for such populace; as well as partnerships with non-governmental organizations may enhance health outreaching and management. More importantly, future studies should establish the socio-economic and environmental conditions triggering high infection rates to support intervention. Last but not the least; it will ensure training of the health care providers on the specifics of the illegal immigrants' plight which will make health care a safer place for such shrinking groups and therefore improve on the health status and methods of transmission

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