Prevalence of HIV among blood donors in western region of Libya: comparison between three major western cities before and after Libyan incidences.

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Abstract

Acquired immune deficiency syndrome (Hereafter: AIDS) is a devastating infectious disease caused by the human immunodeficiency virus (HIV). HIV test is one of the obligatory tests on blood donors in Libya and worldwide. The study of the of HIV among blood donors on an area may give a good indication on the prevalence of the virus in the general population on the area. As such, the current study aims to estimate and compare the prevalence of HIV in three major Libyan cities: Tripoli, Misurata and Zleetin, located in the western region of Libya. In addition, it explores the effect of Libyan incidences in 2011 on the prevalence of the infection. A retrospective study was carried out on 72146 nationwide voluntary blood donors in four blood banks, covering the three

cities over a period of four years (2009-2013). Enzyme linked immunosorbent assay (ELISA) was performed to screen blood donors for HIV. Results showed that Misurata has the highest mean prevalence of HIV among the three cities over the period mentioned. The difference in the mean prevalence was statistically significant ($P<0.05$) between Misurata and Zleetin and between Misurata and Tripoli, but not ($P>0.05$) between Tripoli and Zleetin. The difference in the prevalence before and after the incidences was statistically significant ($P<0.05$) in Misurata and not significant ($P>0.05$) in Zleetin and Tripoli. Further study is required among the general population using sensitive tests, such as nucleic acid amplification, for better evaluation of the HIV-infection prevalence in the region. Moreover, prevention strategies should be implemented to diminish and stop the spread of this alarming infection.

Introduction

Blood transfusion, globally, saves millions of lives each year. However, it may associate with risks of transmitted infections that can lead to serious complications on health and causes death instead of saving life (1, 2). Since the early nineteen sixties, blood banks have followed many strategies to reduce transmission of infections, through blood transfusion, which was unavoidable in the past and accepted by patients and physicians (3). The human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) are the most common readily blood transmitted agents that may cause serious chronic clinical consequences and obligatorily tested on blood donors worldwide (3, 4, 5). HIV has been known as the causative agent to one of the most devastating infectious diseases in recent history (6, 7, 8) and termed acquired immune deficiency syndrome (AIDS). This virus belongs to a Retroviridae family, Orthoretrovirinae subfamily and genus Lentivirus (9). The core of the virus encloses two identical single-stranded RNA molecules (10). In 2015, it is estimated that there were globally 2.1 million people newly infected with HIV, approximately 36.7 million people were living with the virus and 1.1 million people died of illnesses related to autoimmune deficiency syndrome caused by this virus (11). The aim of the current study is to determine and compare the prevalence of HIV in Tripoli, Zleetin and Misurata, three

major western Libyan cities. The study also attempts to explore the effect of Libyan incidences on the trend of the infection with the virus. The prevalence was determined among blood donors because of the large sample size needed, which is not feasible and difficult to collect in the general population. Further, findings of this study may display a good indication to the overall prevalence and the epidemiology of HIV in Libya, since the cities where this study was conducted represent nearly half of the Libyan population. Moreover, the results can help the government to manage the burden of infection and to develop strategies that may stop the spread of this destructive virus.

Material and Methods

This retrospective study was carried out in three major western cities in Libya, Tripoli, Misurata and Zleetin, over a period of 4 years between January 2009 and December 2013. The year 2011 was not included because of inaccurate records due to the Libyan incidences. The area of the study comprises more than two third of the western cities and nearly half of the population of Libya. A total of 72146 voluntary blood donors who were declared physically fit for transfusion were screened for HIV using enzyme linked immunosorbent assay (ELISA). The assay was done using Anti-HIV ELISA kit (BioTek, USA), which based on the two-step sandwich method, according to the manufacturer's

instructions. In Tripoli, 89023 blood volunteers were screened at the blood bank of Tripoli Medical Centre (TMC), and in Zleetin, 18431 screened at the Central Hospital of Zleetin, while in Misurata, 19836 at the National Cancer Institute (NCI) and Misurata Medical Centre (MMC).

Statistical Analysis

Statistical package for social sciences (SPSS-PC version17.0, computer software) and Minitab statistics package version 16.1 (Minitb Inc., USA) were used for data analysis. The overall prevalence rates of HIV were expressed in percentages and reported with 95 % confidence intervals (95 % CI). The overall prevalence among the three cities was compared using ANOVA test. Cities with statistically significant difference in prevalence were addressed using Post Hoc tests, Tukey HSD and LSD. The difference in the prevalence before and after Libyan incidences was compared by z-test. Statistical significance was defined as $P < 0.05$.

Results

The mean prevalence of HIV through the period of the study in the whole area was found to be 0.04% (0 - .09)with a mean prevalence of 0.006% (95% CI: 0 – 0.019%) , 0.11% (95% CI: 0 – 0.25%) and 0.007% (95% CI: 0 – 0.03%) in Tripoli, Misurata and Zleetin, respectively (Fig. 1). In Tripoli, there were no

positive cases for HIV among blood donors in years 2009 and 2010 while only one positive case in 2012 and one positive case in 2013 with a prevalence of 0.014% and 0.013, respectively. The number of blood donors found to be positive for HIV in Misurata was two in 2009, two in 2010, ten in 2012 and nine in 2013 with a prevalence of approximately 0.04%, 0.05%, 0.23% and 0.14%, respectively. In Zleetin, only one blood donor was found in year 2009 with HIV positive result, showing a prevalence of 0.03%. The city was shown with no blood donors positive for HIV in the other three years of the study. The differences in the overall prevalence of HIV between Misurata and Zleetin, and between Misurata and Tripoli were statistically significant ($P<0.05$) while the difference between Tripoli and Zleetin was statistically not significant ($P>0.05$).

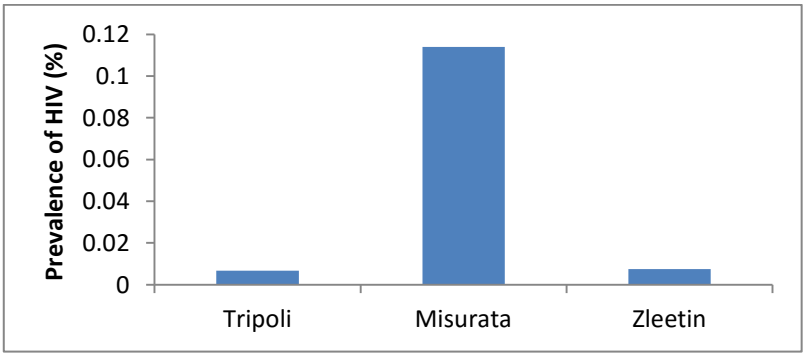

Fig.1– The mean overall prevalence of HIV over four years of the study.

The x-axis represents the percentage of prevalence while y-axis represents cities of the study.

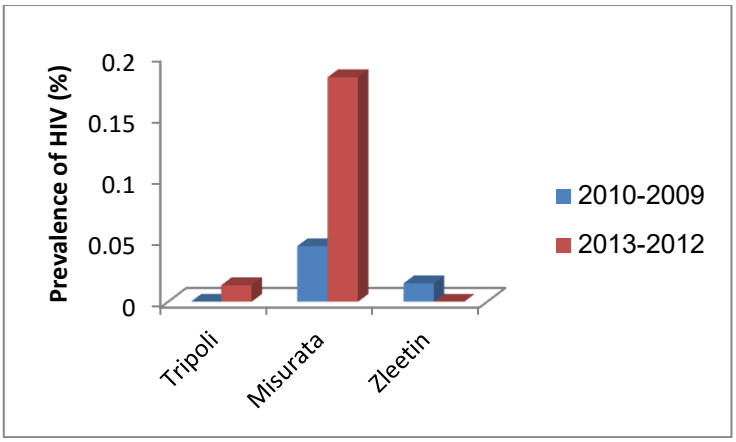

Fig.2– The mean overall prevalence of HIV in the three cities before and after Libyan incidences in 2011.

The x- axis represents the percentage of prevalence while y-axis represents cities of the study. The blue colour represents the mean prevalence before the incidences and the red colour represents the prevalence after the incidences.

The mean overall prevalence of the infection was found to be increased in Tripoli and Misurata` while decreased in Zleetin, when comparing two years after Libyan incidences in 2011 with two years before (Fig. 2). However, the change in the prevalence was statistically significant in Misurata ($P<0.05$) but not in Zleetin and Tripoli ($P>0.05$).

Discussion

HIV has to be tested among the blood donors in all over Libya. The mean prevalence of HIV infection among blood donors in these three major western cities was determined by ELISA. The mean prevalence in the whole region of the study was found to be 0.04%. This result might, to some extent, give a good indication to the mean prevalence of the virus in Libya, due to the big population of the three cities and the big number of volunteer blood donors included in the current study. The results have shown that the mean prevalence of HIV in the whole region of the study is relatively low. The mean prevalence of HIV infection among blood donors was reported higher than the site of this research in White Nile State-Sudan (12), Bioko Island - Equatorial Guinea (13), Ile Ife – Nigeria (14), Darjeeling – India (15), Sanna-Yemen (16), nine regions of Namibia (17), Zhejiang – China (18) and Eastern Ethiopia (19), with prevalence of 7.9%, 7.83%, 0.96%, 0.42%, 0.39%, 0.3 %, 0.15% and 0.1 %, respectively. However, lower prevalence than the current study was reported in Al-Baha-Saudi Arabia 0.07% (20), 0.08% in Shiyan-Central China (21) and 0.004% in South of Iran (22).

In respect to the prevalence of the virus among the cities in the region of the study, Misurata was found with the highest

prevalence while Zleetin with the lowest. The larger number of wounded people and urgent blood transfusions in Misurata in the absence of medical support and low hygiene during the Libyan war in 2011 might have contributed to the higher prevalence of the virus than Zleetin and Tripoli. Moreover, the geographically smaller size and low population of Zleetin city, the restricted sexual activities beyond marriage and limited drug trafficking, in addition to confining illegal immigrants, who are likely to be infected by HIV may also attributed to the statistically significant difference in the prevalence of the virus compared with Misurata. The current study has also shown a statistically significant ($P<0.05$) increase of the virus in Misurata after Libyan incidences in 2011. This may confirm the contribution of urgent blood transfusions and low hygiene during the Libyan incidences in the high prevalence of the virus in Misurata. The prevalence of the HIV in Tripoli was also found to be increased after Libyan incidences. However, this increase was found to be statistically not significant ($P>0.05$). The increase of HIV prevalence in Tripoli after Libyan incidences might be due to illegal immigrants who are infected with the virus and the absence of law enforcement, which instigated sexual violence and rape.

The results of HIV prevalence in the current study might be less than real since in case of using antibody screening tests the virus

can be detected usually after 4-5 weeks of the infection (23). Sensitive tests such as application of nucleic acid amplification (NAT), which shorten the window period to less than 11 days post infection (10), should be implemented for more accurate results. Moreover, the nearly absence of female blood donors and pre-selection of healthy donors may affect the reliability of the virus prevalence among the general population. Finally, further studies are required among the general population for better evaluation of the HIV-infection prevalence and intervention strategies should be implemented by the country to stop the spread of this infectious alarming disease.

Conclusion

The blood donors-based results of the current study showed that the prevalence of HIV in the western region of Libya is low, with the highest prevalence of the virus in Misurata. The results also showed that the Libyan incidences have played a role in the significant increase of HIV prevalence in Misurata. Although the reflect a general overview of the HIV prevalence in the region and cities of the study, they cannot be , and in fact should not be considered as an exact statement among the general population.

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