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Seroprevalence of Viral Markers at the Blood Transfusion Center of Mohammed V Military Teaching Hospital of Rabat, Morocco

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Abstract **Original Research Article**

Introduction: Blood transfusion therapy has a huge role in management of various hematological and other diseases. The prevention of transfusion-transmitted infections remains a key component of blood safety. The main objective of this study is to study the seroprevalence of viral markers on donated blood at the Blood Transfusion Center, Mohammed V Military Hospital in Rabat. ***Material and methods:*** This is a retrospective study conducted with military donors aged 19 to 50 at the Blood Transfusion Center (CTS) of the Mohammed V Military Hospital of Instruction (HMIMV), Rabat (Morocco), carried out over a period of four years from January 1, 2017 to December 31, 2020. Biological screening was carried out by a technique…. based on the principle of ***Results:*** Out of 49,703 samples tested, 48,175 were valid for transfusion and 1,528 were not valid for transfusion, among these invalid bags, 101 donations were confirmed positive for HBV (2 ‰), with an HCV seroprevalence of 1.2 ‰ (58 donations) and a seroprevalence of 0.5 ‰ (25 cases) of HIV 1 + 2 with a seroprevalence of 0.5 ‰ (25 cases)**.** ***Discussion:*** The low rates of seroprevalence of viral markers in our study show improved preventive measures with regard to donor selection and screening tests. ***Conclusion:*** This perceived prevalence encourages the maintenance of the use of the combined reagent, which is the only alternative to molecular biology for developing countries.

Keywords: Seroprevalence, HBV, HCV, HIV, blood donation, infection.

INTRODUCTION

During the last decades blood transfusion has made it possible to maintain a hemoglobin threshold of 10 g / dL, and a number of thrombocytes> 20,000 / mL, or to correct any coagulopathy [1].

However, there are three main risks of transfusion morbidity and mortality, including

1. Transfusions of incorrect blood components (70%);
2. Immunological risks (28%).
3. Transfusion-transmissible infections (2%); [1, 2]

In Morocco in the last twenty years, the safety in blood transfusion has made enormous progress with regard to the infectious and immunological risk.

Moroccan legislation on blood transfusion requires some mandatory examinations like screening for human immunodeficiency virus (HIV), hepatitis B virus (HBV) and C (HCV), syphilis and alanine aminotransferase (ALAT) assay, since infections due to HIV, HBV and HCV represent major public health problems around the world [3, 4].

Epidemiological surveillance of these infections in blood donors makes it possible to monitor the prevalence and determine the means of control and prevention of their spread by transfusion. Our work aims to study the seroprevalences of viral markers in military donors and compare them with other populations in order to take stock of the local epidemiology.

MATERIAL AND METHODS

This is a retrospective study conducted among military donors aged 19 to 50 years with predominance of men (97%) at the Blood Transfusion Center (CTS) of the Mohammed V Military Hospital (HMIMV), Rabat (Morocco) carried out over a four-year period from the first of January 2017 to the 31th of December 2020.

To select the subjects at risk, a pre-donation medical interview was drawn up. The biological

screening was carried out by an immuno-enzymatic technique in liquid medium using the antibodies and / or the antigens using the ETI – Max 3000 DiaSorin ™ automated device, based on the principle of ELISA (enzyme linked immunoassay). sorbent assay) called 4th generation combined for HIV which allows the detection of the p24 antigen and various antibodies associated with the HIV-1 and / or HIV-2 virus while for the HCV the Monolisa ™ HCV Ag Kit was used - Ab ULTRA V2 - (Bio-rad, France) for third generation ELISA.

The detection of the surface hepatitis B virus antigen (HBsAg) and sometimes the anti-HCV autoantibody is carried out using the ARCHITECT (Abbott) machine based on the "CMIA" chemiluminescence principle.

Serological tests for infection screenings which were negative were considered negative, however positive ELISA tests of the donation bags were discarded, confirmation was carried out on the same technique in duplicate at the CTS and at the virology laboratory of the HMIMV using the same reagent or a different reagent than the screening reagent. Any discrepancy between the two tests or the repeatability of the positive test led to the elimination of the donation and the treatment of the subjects concerned.

RESULTS

Between 2017 and 2020 out of 49,703 samples tested 48,175 were bags valid for transfusion and 1,528 were bags not valid for transfusion, among these invalid bags, 101 donations were confirmed positive for HBV (2 ‰), this rate was approximately twice as high as that of HCV with a seroprevalence of 1.2 ‰ (58 donations) and higher than that of HIV 1 + 2 with a seroprevalence of 0.5 ‰ (25 cases) (Table I).

Table-I: HBV, HCV and HIV seroprevalence during the 2017-2020 periods

	2017	2018	2019	2020	Total
Total number of donations	10483	12339	14431	12450	49703
Number of HBV positive donations	19	38	22	22	101
HBV prevalence	0.18‰	3‰	1.5‰	1.7‰	2 ‰
Number of HCV positive donations	14	15	24	5	58
HCV prevalence	1.3‰	1.2‰	1.6‰	0.16‰	1.2‰
Number of HIV positive donations	3	8	10	4	25
HIV prevalence	0.28‰	0.65‰	0.70‰	0.32‰	0.50‰

DISCUSSION

The population that is the subject of this study represents a specific socio-demographic character, our population is mainly composed of male adult military donors, and those young people are also volunteers and regulars. The HMIMV's CTS takes care of donor availability by collecting blood products and ensuring donor loyalty and an improved safety of blood transfusion.

Compared to studies carried out in the same establishment [5-7] (Table II) (Figure 1), from 1991 to 2020 the prevalence of HBV decreased and we also observed a decrease in the prevalence of HCV. While HIV prevalence declined over the period 1991-2012, this rate increased between 2017 and 2020 [5-7].

Table-II: The evolution of the seroprevalence of viral markers during the period 1991-2020

Viral markers	1991-1997[5]	1997-2001[8]	2008-2009[6]	2010-2012[7]	2017-2020
‰ HBV	21,7	19,9	8	3,97	2
‰ HCV	25	8,3	5	2,45	1,2
‰ HIV	0,3	0,16	0,1	0,15	0.5

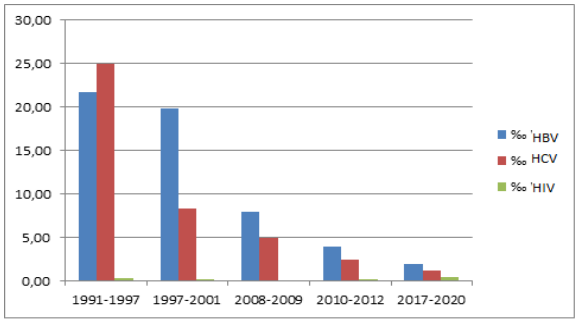

Fig-1: Evolution of the prevalence of viral markers at the Blood Transfusion Center of the Mohammed V military instruction hospital (1991-2020).

The comparison of our results with those of the general Moroccan population showed that the prevalence of HBV observed in our study is 8 times lower than that of the general Moroccan population (16.6 ‰) [9, 10], while HCV is much lower than that observed in the general Moroccan population which is between 9 ‰ to 12 ‰ [11] and the HIV seroprevalence in the general Moroccan population (1.4 ‰) [12] is much higher than that obtained in our study. These data demonstrate the improvement in the quality of blood donor screening at the HMIMV CTS and which has helped to ensure optimal blood safety. Seroprevalences in blood donors from the Maghreb are close to those of our study except Libya which has a high prevalence of HCV and HIV [13,14] and studies carried out in Tunisia have also shown a high prevalence of hepatitis B [15, 16] (Table III).

Table-III: Seroprevalence of Viral Markers in Blood Donors

Authors	Country	HBV	HCV	HIV
M. A. Daw [13] *Doro B,* [14]	Libya	__ 8‰	18 ‰ 7 ‰	__ 0 ‰
O. Bahri[15] M.Ben Hadj [16]	Tunisia	17‰	__	__
Michael P. Busch[18]	United States of America	0,002‰	0,002‰	0,002‰
Pillonel J *et al.* 2012 [17]	France	0,73‰	0,38‰	0,0037‰
Tadesse Bekele Tafessea, Addis Adera Gebrub [20]	Ethiopia	109‰	40‰	10‰
M. Seck a,c, B. Dièye at al. [19]	Senegal	128,7‰	5,8‰	17,5 ‰
Our study	Morocco	2 ‰	1.2‰	0.5 ‰

The awareness and information of the general population, as well as the military population, plays a very important role in reducing the rates of HBV, HCV and HIV infections, and consequently the risk of their transmission, something which is proven by comparing the results of our study which are markedly superior to those observed in blood donors in France, Switzerland and the United States of America [17, 18-2] (Table III). The rates obtained are generally lower than those observed in blood donors from the countries of sub-Saharan Africa [19, 20] (Table III).

There were variations in donating blood in different blood banks, which may be due to selection criteria and sensitivity of screening test kits between countries.

To ensure a safe supply of blood and blood products to recipients, all donated blood should be properly screened for transfusion-transmissible infections by applying strict donor selection criteria, using sensitive screening tests, and strictly following guidelines for blood transfusion.

The incidence of these infections has declined substantially in developed countries, but in developing countries, providing safe blood to recipients remains a major challenge due to the high prevalence of markers of infection among blood donors in some regions like sub-Saharan Africa, especially in the case of the hepatitis virus (HBV and HCV) due to limited resources which prevent the use of sophisticated, sensitive but expensive technologies or blood screening for blood products.

The low prevalence of HBV and HCV markers in our study certifies that Morocco is an intermediate endemicity zone while sub-Saharan Africa is a high endemicity zone with a high seroprevalence.

Unprotected sex, intravenous drug use, mother-to-child transmission, blood transfusion or organ transplants are all modes of transmission common to these three viruses. The preventive measures for these infections consist in strictly respecting the rules of universal hygiene such as: washing of hands, usual disinfection and sterilization measures, as well as the use of single-use materials, sex education and also vaccination against HBV.

CONCLUSION

Our study has demonstrated the improvement of preventive measures as well as the medical selection of blood donors, reflected by the low seroprevalence of viral markers, for which detection is carried out by screening tests based mainly on the use of reagents combination which represents the best alternative to molecular biology in developing countries.

To maintain a low prevalence, it is necessary to monitor the evolution of these markers and to promote awareness-raising and information actions to obtain total self-exclusion.

REFERENCES

1. Madjdpour, C., Spahn, D. R., & Weiskopf, R. B. (2006). Anemia and perioperative red blood cell transfusion: A matter of tolerance. *Critical care medicine*, *34*(5 Suppl), S102-8.
2. Buddeberg, F., Schimmer, B. B., & Spahn, D. R. (2008). Transfusion-transmissible infections and transfusion-related immunomodulation. *Best practice & research Clinical anaesthesiology*, *22*(3), 503-517.

3. Kilmarx, P. H. (2009). Global epidemiology of HIV. *Curr Opin HIV AIDS*, *4*(4); 240-6.
4. Ott, J. J., Stevens, G. A., Groeger, J., & Wiersma, S. T. (2012). Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. *Vaccine*, *30*(12), 2212-2219.
5. Nazih, M., Benkirane, M., & Nejmi, S. (1998). Prévalence des marqueurs sérologiques sur une population de 17011 donneurs de sang. *Gazette Transfus*, *125*, 60-3.
6. Zohoun, A., Hadef, R., Zahid, H., & Benkirane, M. (2011). Les prévalences des marqueurs sérologiques chez les donneurs de sang au centre de transfusion sanguine de l'hôpital militaire d'instruction Mohammed V de Rabat. *Gazette Transfus*, *226*, 4-9.
7. Uwingabiye, J., Zahid, H., Unyendje, L., & Hadef, R. (2016). Séroprévalence des marqueurs viraux sur les dons du sang au Centre de Transfusion Sanguine, Hôpital Militaire d'Instruction Mohammed V de Rabat. *The Pan African Medical Journal*, *25*.
8. Zahid, H., Hadef, R., & Sbiti, M. (2003). Prévalence des marqueurs sérologiques sur les dons de sang au centre de transfusion de l'hôpital militaire d'instruction Mohammed-V à Rabat (1er janvier 1997 au 31 décembre 2001). *Gazette Transfus*, *181*, 5-10.
9. Sbai, A., Baha, W., Ougabrai, H., Allalia, T., Dersi, N., Lazaar, F., ... & Benani, A. (2012). Prévalence de l'infection par le virus de l'hépatite B et l'évaluation des facteurs de risque au Maroc. *Pathologie Biologie*, *60*(5), e65-e69.
10. Laouina, A., Adouani, B., Alami, R., Abouyoub, A., Hajjout, K., & Benajiba, M. (2016). Prévalence des marqueurs infectieux transmissibles par transfusion chez les donneurs de sang au CRTS de Rabat (Maroc). *Transfusion Clinique et Biologique*, *23*(4), 309-310.
11. Benouda, A., Boujdiya, Z., Ahid, S., Abouqal, R., & Adnaoui, M. (2009). Prévalence de l'infection par le virus de l'hépatite-C au Maroc et évaluation des tests sérologiques de dépistage pour la prédiction de la virémie. *Pathologie Biologie*, *57*(5), 368-372.
12. Rapport national-Royaume du Maroc. (2015). Mise en œuvre de la déclaration politique sur le VIH/sida. Ministère de la sante.
13. Daw, M. A., Shabash, A., El-Bouzedi, A., Dau, A. A., Habas, M., & of Hepatitis, L. S. G. (2016). Modelling the prevalence of hepatitis C virus amongst blood donors in Libya: An investigation of providing a preventive strategy. *World journal of virology*, *5*(1), 14.
14. Doro, B., Zawia, W. M., Husien, W. M. R., Abdalla, N. M. G., Rifai, A. M., Dourou, E., ... & Aboughress, A. N. (2015). Blood donors status of HIV, HBV and HCV in Central Blood Bank in Tripoli, Libya. *International Blood Research & Reviews*, 1-8.
15. Bahri, O. (2008). Épidémiologie de l'hépatite virale B en Tunisie. *Médecine et Maladies Infectieuses*, *38*, S192.
16. Boudali, M. B. H., Hazgui, O., Bouguerra, H., Saffar, F., Hannachi, N., Bahri, O., & Alaya, N. B. B. (2019). Hépatite B en Tunisie. Épidémiologie, facteurs de risque et impact de la vaccination. *Revue d'Épidémiologie et de Santé Publique*, *67*, S158.
17. Pillonel, J., Legrand, D., Sommen, C., & Laperche, S. (2010). pour le comité de pilotage pour la surveillance épidémiologique des donneurs de sang. *Surveillance épidémiologique des donneurs de sang etrisque résiduel de transmission du VIH, de l'HTLV, du VHC et du VHB par transfusion en France entre 2008et*, 39-40.
18. Michael, P. (2019). Busch 1, 2, Evan M. Bloch3 and Steven Kleinman4 Prevention of Transfusion Transmitted Infections Blood First Edition Paper, prepublished online February 26; DOI 10.1182/blood-2018-11-833996.
19. Seck, M., Dieye, B., Guèye, Y. B., Faye, B. F., Senghor, A. B., Toure, S. A., ... & Diop, S. (2016). Évaluation de l'efficacité de la sélection médicale des donneurs de sang dans la prévention des agents infectieux. *Transfusion Clinique et Biologique*, *23*(2), 98-102.
20. Tadesse, B.T., Addis, A.G., Semgne, G., Gosaye, Degu, B., Molla, Teferi, B., Demelash, A., Belay, Ali, E., Getachew, Mekonnon, S., & Yimamh, Y. (2015). Seroprevalence and diagnosis of HIV, HBV, HCV and syphilis infections among blood donors Human Antibodies -1 (2015/2016) 1–17 1 DOI 10.3233/HAB-160304.