

Seroprevalence of HIV, Hepatitis B, Hepatitis C and Syphilis at the Abidjan NBTC From January 2018 To December 2020 (Ivory Coast)

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Abstract

The objective of this study is to analyze the seroprevalence of HIV, hepatitis B, hepatitis C and syphilis at the National Blood Transfusion Center (NBTC) in Côte d'Ivoire from January 2018 to December 2020 in order to contribute to transfusion safety in Ivory Coast.

Materials and Methods : This is a retrospective study that took place at the NBTC in Abidjan. This is a three year review covering the period from January 2018 to December 2020. Biological analyzes (AgHbs, anti-HCV Antibodies, HIV serology, syphilitic serology and blood group testing) were carried out on 469,863 blood donations. These were donors volunteers whose age was between 18 and 60 years old. The data was entered and analyzed on Excell 2012. The statistical tests used were Chi square. A value of $p < 0.05$ was considered statistically significant.

Results : The prevalence of hepatitis B was the highest with 65.5%, syphilis 1.6%, HIV with 8.6% and Hepatitis C with 19%. HIV prevalence was higher for new donations than for repeat donations. The difference was statistically significant.

Conclusion : It would be important to make blood donors more aware of the modes of transmission of HIV, hepatitis C and syphilis. Blood donors should also be encouraged to vaccinate against hepatitis B.

Keywords : HIV seroprevalence- Hepatitis B, C- Syphilis - Blood donor

Introduction

Infections due to the Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) constitute a worldwide public health problem [1]. The modes of transmission of the Acquired Immunodeficiency Virus (HIV) are the sexual route, the blood route and from mother to child [2]. The hepatitis B virus is transmitted from mother to child during childbirth; sexually in case of contact with an infected sexual partner and through blood [3]. As for the Hepatitis C virus, it is transmitted through blood [4]. And finally for syphilis, the transmission is sexual and blood [5].

According to the World Health Organization (WHO), about 2 billion people are carriers of the hepatitis B virus (HBV) and 170 million people are chronic carriers of the hepatitis C virus (HCV) [6]. Also in the world according to the WHO, 33.4 million people are infected with HIV [7]. In sub-Saharan Africa, women and girls accounted for 63% of all new HIV infections in 2020 [8].

In Côte d'Ivoire, the National Blood Transfusion Center (NBTC) collected 158,539; 159,551 and 151,773 blood bags respectively in 2018, 2019 and 2020. Due to blood-borne diseases, all the bags collected are subject to biological analyses, namely the HIV screening test, the search for AgHbs, of Anti-HCV, syphilis and blood group testing, in accordance with WHO standards [6].

The objective of this study is to analyze the seroprevalence of HIV, hepatitis B, hepatitis C and syphilis at the CNTS in Cote d'Ivoire from January 2018 to December 2020, in order to contribute to the safety transfusion in Ivory Coast.

1- Materials And Methods

This is a retrospective study that involved voluntary blood donors at the National level. The inclusion criteria for these donors were as follows: be voluntary, be in apparent good health, be between 18 and 65 years old and weigh at least 50 kg.

After the blood donation, biological analyzes were carried out on samples sent to the NBTC laboratory. These analyzes concerned the HIV screening test by the Elisa technique with the diapro reagent; HCV serology by the Elisa technique with the diapro reagent and HCV Antibody (Biorad); HBS serology by the Elisa technique with the diapro reagent; syphilitic serology with VDRL-charcoal and ABO Rhesus blood group. A first positive HIV test result was considered definitive.

Based on data extracted from the NBTC medical-technical software, for the period from 2018 to 2020; Depending on the number of bags collected per year, we have determined the seroprevalence of the various serological markers.

The data was entered and analyzed on Excell 2012. The statistical tests used were Chi square. A value of $p < 0.05$ was considered statistically significant.

2-Results

1- Demographic data

Table 1. Breakdown of pockets collected per year according to age group

Age range	Year 2018 N(%)	Year 2019 N(%)	Year 2020 N(%)
18-24 years old	36544 (32.02%)	39525 (24.77%)	39258 (25.88%)
25-30 years old	21824 (19.12%)	30020 (18.82%)	27137 (17.90%)
31-44 years old	40616 (35.59%)	64361 (40.34%)	61304 (40.35%)
45-65 years old	15139 (13.27%)	25645 (16.09%)	24076 (15.87%)
Total	114123 (100%)	159551 (100%)	151773 (100%)

The age group of 31 to 44 years predominated with 35.59%, 40.34% and 40.35% respectively in 2018, 2019 and 2020.

2- Biological data

Table 2. Prevalence of the different serological markers according to the bags collected by year (2018, 2019, 2020).

	Year 2018	Year 2019	Year 2020	Global total
Total number of donations	158539	159551	151773	469863
Number of HIV positive donations	1210	1743	1097	4050
HIV prevalence	7.6 ‰	10.9 ‰	7.2 ‰	8.6 ‰

Number of HCV positive donations	3473	2698	2772	8943
Hepatitis C prevalence	21.9 ‰	16.9 ‰	18.3 ‰	19 ‰
Number of HBV positive donations	11010	10696	9145	30851
Hepatitis B prevalence	69.4 ‰	67‰	60.2‰	65.5‰
Number of positive VDRL donations	312	220	222	754
Syphilis prevalence	1.9 ‰	1.3 ‰	1.4 ‰	1.6 ‰

In general, the prevalence of hepatitis B predominated among the biological markers with 65.5‰; that of HIV was 8.6‰.

The prevalence of hepatitis C was 19‰ and finally the prevalence of syphilis was 1.6‰.

Table 3. Breakdown of types of donations according to HIV serology by Year (2018, 2019, 2020)

Year/Type of donations	New donations	Regular donations	Total	Chi-square	P
Year 2018					
VIH Positif	5‰	2.6‰	7.6‰	336	P < 0,0000001
VIH Négatif	395.8‰	596.5‰	992.3‰		
Sous total 1	400.8‰	599.1‰	1000‰		
Year 2019					
VIH Positif	7‰	3.9‰	10.9‰	405	P < 0,0000001
VIH Négatif	399.6‰	589.5‰	989.1‰		
Sous total 2	406.6‰	593.4‰	1000‰		
Year 2020					
VIH Positif	4.8‰	2.5‰	7.2‰	252	P < 0,0000001
VIH Négatif	415.2‰	577.5‰	992.8‰		
Sous total 3	420‰	580‰	1000‰		

In general, the rate of HIV was higher in new donors than in regular donors. The difference was statistically significant.

Discussion

The age group of 31 to 44 years predominated with respectively 35.59% in 2018, 40.34% in 2019, and 40.35% in 2020.

This value differs from that of Ehoussou et al. in 1997 [9] which found a predominance for the 25-29 age group with 38.9% of cases during a study among military blood donors in Abidjan.

In general, the prevalence of hepatitis B predominated among the biological markers during this three-year assessment with 65.5‰ of donations. This result is superimposable to that of Ehoussou et al. [9] in 1997 who found for hepatitis B, a prevalence of 12.5%. It differs from that of Josiane Pillonel et al. [10] in 2018, which found a low positive donation rate of around 0.47% for hepatitis B during a study on the epidemiological surveillance of blood donors in France from 1992 to 2018. This rate, although low compared to ours was at the top of the causes of marker positivity in France for blood donation in 2018. It is important to note that this low rate is due to the fact that France is a developed country so the emphasis is more on disease prevention. Also according to Berrajah in 2004[11], 300 million people are chronic carriers for hepatitis B in the world.

It would be interesting for the CNTS to educate blood donors on the prevention of viral hepatitis B through vaccination.

Concerning the prevalence of HIV, the three-year balance sheet in our study showed a prevalence of 8.6‰ of donations. This rate, although lower, is superimposable on that of Tessema et al. in Ethiopia in 2010 [12], which found during a study a prevalence of 38‰ for HIV. However, it differs from that of Uwingabiye [13] who, during a three-year study in Morocco in 2016, on the seroprevalence of viral markers in blood donations, found an HIV prevalence of 0.15‰. This prevalence found in our study could be explained by the fact that the majority of CNTS donors are young and therefore sexually active.

Regarding the prevalence of hepatitis C, our study found a value of 19‰ of donations. This rate can be superimposed on that of Ymele et al. [14] in 2012 in Cameroon, which found a rate of 14.4‰. On the other hand, it differs from that of Zou et al. [15] in 2012 in the United States which found a prevalence of 0.33‰ for hepatitis C. The rate found in our study could be explained by the fact that there is no vaccine against hepatitis C [16] and that the mode of transmission of the disease is mostly unknown. It would be interesting for the CNTS to focus on the prevention of the disease through communication for behavior change with blood donors.

Concerning syphilis, we found in our study a rate of 1.6‰.

This rate is lower than that of Doungous [17] who noted in a study in Chad a prevalence of 49‰. The value found in our study could be explained by the fact that syphilis is a rare disease.

In general, the rate of HIV was higher in new donors than in regular donors. In the present study, the difference was statistically significant.

This could be explained by the fact that they are new candidates for blood donation and therefore have not yet benefited from the usual awareness policy against HIV, blood donors by the NBTC.

This result can be superimposed on that of Josiane Pillonel et al. [9] in 2018, which found a positivity rate of 0.36% for new donors compared to 0.04% for known donors, during a study on the epidemiological surveillance of blood donors in France from 1992 to 2018.

On the other hand, it differs from that of koumpingnin[18] in 1997, who noted during a study in Burkina faso among blood donors, a prevalence of HIV which was higher among regular donors for all donations. with 14.2% of cases than that of donations from new donors with 4.6% of cases. The difference was statistically significant.

It would also be important to note that in Côte d'Ivoire, a study conducted by Seri et al.[19] among blood donors found a drop in HIV prevalence among new donors from 7.1% from 1992-1994 to 1.1% from 2010-2012.

The prevalence of HIV found in the present study among new donors is below those noted by Seri et al. [19] in his study.

This demonstrates the effectiveness of the HIV/AIDS policy adopted by the Ivorian government.

Conclusion

At the end of our study, we can retain during this three-year assessment that the blood donors at the NBTC in Côte d'Ivoire are young.

The prevalence of hepatitis B was the highest among the biological markers with a prevalence of 65.5%. HIV prevalence was higher for new donations than for regular donations. The difference was statistically significant. It would be important to make blood donors more aware of the modes of transmission of HIV, hepatitis C and syphilis. Blood donors should also be encouraged to vaccinate against viral hepatitis B.

Further studies should be conducted to measure the impact of increased donor awareness of the seroprevalence of the various serological markers studied.

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References

1. Kilmarx PH. Global epidemiology of HIV. *Curr Opin HIV AIDS*. 2009 Jul;4(4):240–6. [*PubMed*] [*Google Scholar*]
2. Syndrome d'immunodéficience acquise- Wikipédia consulté le 26 juillet 2022.
3. Disponible sur https://fr.wikipedia.org/wiki/syndrome_d'immunodéfici...
4. Principaux repères sur l'hépatite B consulté le 26 juillet 2022.
5. Disponible sur https://www.who.int/.../Principaux_repères_Détail
6. Principaux repères sur l'hépatite C
7. Disponible sur https://www.who.int/.../Principaux_repères_Détail
8. Syphilis / gouvernement du Québec
9. https://.quebec.ca/sante/problème_de_sante/itts.
10. Flichman DM, Blejer JL, Livellara BI, Re VE, Bartoli S, Bustos JA, Ansola CP, Hidalgo S, Cerda ME, Levin AE, Huenul A, Riboldi V, Treviño EM, Salamone HJ, Nuñez FA, Fernández RJ, Reybaud JF, Campos RH. Prevalence and trends of markers of hepatitis B virus, hepatitis C virus and human Immunodeficiency virus in Argentine blood donors. *BMC Infect Dis*. 2014;14:218. [*Article PMC gratuit*] [*PubMed*] [*Google Scholar*]
11. Dons du sang et sécurité des transfusions- WHO—world Health Organization du 10 juin 2020 consulté le 05 Mai 2022. Disponible sur <https://www.who.int/.../Détail>
12. ONUSIDA (2021). Dernières statistiques sur l'état de l'épidémie de sida. Disponible sur www.unaids.org/fact-sheet consulté le 24/10/2021.
13. EHOUSSOU K et al. Evaluation de la séroprévalence de l'infection à VIH et à VHB chez les donneurs de sang militaires à Abidjan, *Médecine d'Afrique noire* : 1997,44(12).
14. Pillonel J. et al. (1991).
15. Le dépistage du VIH et de la syphilis dans les établissements de transfusion sanguine.
16. Bulletin Épidémiologique Hebdomadaire 1991, 14 : 55-58.6.
17. 11- L. FKI BERRAJAH, H. KARRAY HAKIM
18. Les virus transmissibles par le sang
19. J.I.M. Sfax Vol.1 N°5/6 ; Dec03/Mars 04 : 9-14. Disponible sur www.medecinesfax.org consulté le 08 :10 :2021.

20. 12. Tessema B, Yismaw G, Kassu A, Amsalu A, Mulu A, Emmrich F, Sack U. Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: declining trends over a period of five years. *J Infect Dis.* 2010;10:111. [Article PMC gratuit] [PubMed] [Google Scholar]
21. 13. J Uwingabiye et al. Séroprévalence des marqueurs viraux sur les dons du sang au Centre de Transfusion Sanguine, Hôpital Militaire d'Instruction Mohammed V de Rabat. Disponible sur <https://www.ncbi.nlm.nih.gov/articles/PMC5326047>.
22. 14. Fouelifack Ymele F, Keugoung B, Hortense Fouedjio J, Kouam N, Mendibi S, Dongtsa Mabou J. High Rates of Hepatitis B and C and HIV Infections among Blood Donors in Cameroon: A Proposed Blood Screening Algorithm for Blood Donors in Resource-Limited Settings. *J Blood Transfus.* 2012;2012:458372. [Article PMC gratuit] [PubMed] [Google Scholar]
23. 15. Zou S, Stramer SL, Dodd R Y. Donor Testing and Risk: Current Prevalence, Incidence, and Residual Risk of Transfusion-Transmissible Agents in US Allogeneic Donations. *Transfus Med Rev.* 2012;26(2):119–28. [PubMed] [Google Scholar]
24. 16- OMS du 27 juillet 2020. Principaux repères sur l'hépatite C
25. Disponible sur [https://www.who.int/.../Principaux repères](https://www.who.int/.../Principaux%20rep%C3%A8res/D%C3%A9tail%20consult%C3%A9%20le%2010%20juillet%202022) > Détail consulté le 10 juillet 2022.
26. 17. DM Doungous et al. · Prévalence de la syphilis chez les donneurs de sang à la Banque du Sang d'Abéché au Tchad. Disponible sur <https://www.ajol.info/ijbcs/article/view> consulté le 10 Juillet 2022.
27. 18- koumpingnin Y N (1997). Seroepidemiologie des virus de l'immunodéficience humaine (VIH), de l'hépatite b(VHB), de la syphilis chez les donneurs de sang et impact de la prescription des produits sanguins sur la sécurité de la transfusion au centre hospitalier Sourou Sanou Bobo Dioulasso (Burkina Faso) .thèse doctorat en méd. n°18 année 1997.
28. 19. Seri B et al. Twenty-Year Evolution of Hepatitis B Virus and Human Immunodeficiency Virus Prevalence and Incidence in Voluntary Blood Donors in Côte d'Ivoire. In *Open Forum Infectious Diseases* Année 2018.