

## **Seroprevalence of hepatitis B and C in the blood donor in Kolwezi , Democratic Republic of Congo**

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## **ABSTRACT**

**Introduction:** the transmission of infectious agents such as hepatitis B (HBV), hepatitis C (HCV) is the biggest threat to blood safety in developing countries. This study has set a goal to determine the seroprevalence of hepatitis B and C among blood donors from the town of Kolwezi in general and particularly those of the Kolwezi Staff hospital.

**Methods:** A retrospective cross-sectional descriptive study of seroprevalence of hepatitis B and C among blood donors over a period of 3 years period from 1 January 2014 to 31 December 2016 was performed.

**Results:** The prevalence of hepatitis B and C was 3.9% and 0.7% respectively. We found a high prevalence in the age group between 20-45 years (4.2%) followed by those over 45 years (2.3%) and this difference was statistically significant ( $p = 0.047$ ).

**Discussion:** These results confirm that the town of Kolwezi is in a highly endemic area and give a first idea of the circulation of hepatitis C in the blood donor population.

**Conclusion:** Therefore, selection and rigorous screening of blood donors are highly recommended to ensure blood safety for the recipient.

## **1. INTRODUCTION**

Blood transfusion is a step of infusing blood or its derivatives to an individual by intravenous infusion. According to WHO, blood transfusion is indicated for replacement therapy and partially compensate transiently deficiency of one or more components of the blood tissues that would jeopardize patient survival (Brah, Chefoo, Djibrilla, Andia & A, 2016).

Blood transfusion is characterized in most sub-Saharan countries with a high prevalence of infectious agents (Tagny CT, Owusu-Ofori S, Mbanya D 2010) A chronic shortage of blood bag and a lack of financial resources and trained personnel (Allain JP, 2011).

Every year more than 90 million units of blood are collected worldwide. Blood transfusion is responsible for 5-10% of HIV infection in sub-Saharan Africa and the risk of

post-transfusion hepatitis was 12.5% in transfused patients. Like other low-income countries, the Democratic Republic of Congo (DRC) is not immune to these problems related to blood safety(Christian Ngama Kakisingi et al, 2016).

Of all the world, some 240 million people have chronic hepatitis B and 130 to 150 million chronic HCV. If the response is not expanded and accelerated, projections show that the number of people with hepatitis B will remain at current high levels over the next 40-50 years, and the total deaths between 2015 and 2030 s' be 20 millions. The number of people with hepatitis C is currently rising, despite the existence of an effective cure(WHO, 2016).

Viral hepatitis B and C infections are transmitted by blood, the transmission is performing especially early in life and during injections or medical procedures performed in unsanitary conditions, and less frequently by contact sexual. The prevalence of hepatitis B is highest in sub-Saharan Africa and East Asia, where between 5 and 10% of the adult population is infected with chronic hepatitis B(WHO, 2016)

HBV is endemic with a different prevalence in different parts of the world. The seroprevalence of hepatitis markers of infection with B virus is an indicator that has been enjoyed in various ways from the blood donor in the world: 20% in Tanzania; In Nigeria 14.0% in 2000-2013, 11.1% in Kano; 10.01% in Equatorial Guinea; 10.0% in Cameroon; 4.7% in Ethiopia; 2.8% in Rwanda; 1.2% in Nepal; 1.1% and 0.6% India Namibia(Kabemba et al., 2017).

In the Democratic Republic of Congo, the seroprevalence of hepatitis B among blood donors is 1.6% to 8.01%: 8.01% Lubumbashi(Christian Ngama Kakisingi et al., 2016)Bukavu 4.2% (JM Kabinda, Miyanga SA Misingi P., 2014)Moba 3.9% (Kabemba et al., 2017), Lubumbashi 2.3% (Michel et al., 2015), Mbuji mayi 2.2% (Paul et al., 2017) and 1.6% to Kamina (Nzaji & Ilunga, 2013)

As against the hepatitis C virus (HCV) also remains a major public health problem. Epidemiological data dénombrent almost 130 to 170 million chronic carriers of this virus in the world, with an average HIV prevalence estimated at 2.2%. The rate is variable depending on the country it is very low in Europe, higher in Southeast Asia and Africa, particularly in Egypt where she reached both levels exceeding 20%. The World Health

Organization (WHO) estimated the prevalence to 0.32% in developed countries against 3.96% in developing countries (Blaise Matondo Manzambi Sumbu et al., 2016).

This study aimed to determine the seroprevalence of hepatitis B and C among blood donors in the city of Kolwezi and particularly those of the Kolwezi Staff hospital.

## **2. PATIENTS AND METHODS**

This is a descriptive cross retrospective study of prevalence of hepatitis B and C among blood donors. The study took place over a period of 3 years period from 1 January 2014 to 31 December 2016.

Our target population consisted of all voluntary blood donors, family and paid the hospital who viewed the Kolwezi staff. Consisting of 4018 donors, our sample is comprehensive. Were included in the study all blood donors (volunteers, family, pay) recorded the blood bank of the said hospital for first donation.

The serological screening of individual donations was made by the following reagents: Determine™ HBsAg Abbott HBV and Hepatitis HCVSCAN C. Nous Data were collected from the records collection of preset data, records, monthly reports routine blood bank's activities in the Kolwezi hospital staff.

The variables used are: blood donors categories (volunteers, family), sex and the tests (HBV, HCV). For quantitative variables, only age of donors has been considered.

The collected data were coded, entered, processed and analyzed using SPSS 23. Descriptive analysis was performed through the calculation of proportions for categorical variables and the different frequency comparisons were encrypted using Pearson Chi-square test and Fisher's exact test when necessary. We set the p statistical significance <0.05.

### 3. RESULTS

**Table I. Distribution of blood donors by age**

Age in years	Effective	Percentage
<20	124	3.1
20-45	3375	84.0
>45	519	12.9
Total	4018	100.0

It appears from this table that the majority of blood donors were aged between 20-45 years is 84%, while 3.1% were age less than 20 years.

**Table II. Distribution of blood donors by sex**

Sex	Effective	Percentage
Female	225	5.6
Male	3793	94.4
Total	4018	100.0

This table shows that 94.4% of donors were male and 5.6% female. The sex ratio is about 16.8 Male / Female.

**Table III. Distribution of blood donors by Category**

Categories	Effective	Percentage
volunteer	1367	34,03
family	2650	65.95
paying	1	0.02
Total	4018	100.0

It appears from this table that 65.95% of blood donors were family-type and 34.03% were volunteers.

**Table IV. Seroprevalence of hepatitis B infection in blood donors**

seroprevalence	Effective	Percentage
negative	3862	96.1
positive	156	3.9
Total	4018	100.0

In connection with hepatitis B in the three years of study, the prevalence was around 3.9%.

**Table V. seroprevalence of hepatitis C in blood donors**

seroprevalence	Effective	Percentage
negative	3990	99.3
positive	28	0.7
Total	4018	100.0

It appears from this table that the seroprevalence of hepatitis C was 0.7% during the three years of study.

**Table VI. Seroprevalence of hepatitis B according to the characteristics of the donor blood**

donor Features	seropositivity		OR [95% CI]	p
	Yes	No		
<b>Age in years</b>				
<20	2 (1.6%)	122 (98.4%)		
20-45	142 (4.2%)	3233 (95.8%)	-	0,047
> 45	12 (2.3%)	507 (97.7%)		
<b>Sex</b>				
Female	17 (7.6%)	208 (92.4%)	2.15 [1.27 to 3.62]	0,003
Male	139 (3.7%)	3654 (96.3%)		
<b>Categories</b>				

Family and paying	42 (3.1%)	1325 (96.9%)	0.71 [0.49 to 1.01]	0,056
Volunteer	114 (4.3%)	2537 (95.7%)		

It is apparent from this table that the seroprevalence of hepatitis B was 1.6% in donors under 20 years, 4.2% of those whose age is between 20-45 years and 2.3% in donors over 45 years. And this difference is statistically significant ( $p = 0.047$ ). In relation to gender, HIV prevalence was 7.6% among female donors and 3.7% among male donors. The female donors had 2.15 times the risk of being HIV-positive to hepatitis B. It is noted that voluntary donors had a prevalence of 4.3% against 3.1% among family donors and without paying this being statistically significant ( $p = 0.056$ ).

**Table VII. Seroprevalence of hepatitis C according to the characteristics of the donor blood**

donor Features	seropositivity		OR [95% CI]	p
	Yes	No		
<b>Age in years</b>				
<20	0 (0.0%)	124 (100.0%)		
20-45	26 (0.8%)	3349 (99.2%)	-	0.394
> 45	2 (0.4%)	517 (99.6%)		
<b>Sex</b>				
Female	3 (1.3%)	222 (98.7%)	2.04 [0.61 to 6.80]	0.238
Male	25 (0.7%)	3768 (99.3%)		
<b>Categories</b>				
Family and paying	14 (1.0%)	1353 (99.0%)	1.95 [0.93 to 4.10]	0.073
Volunteer	14 (0.5%)	2637 (99.5%)		

In relation to hepatitis C, HIV prevalence is 0.8% in donors aged 20-45 years and 0.4% among those aged over 45 years without this difference was statistically significant ( $p = 0.394$ ). Seroprevalence is around 1.3% in female donors and 0.7% for male donors,

whereas it is 1.0% in family donors and 0.5% among the volunteers without this being statistically significant.

#### 4. DISCUSSION

Blood transfusion is a medical procedure whose purpose is to bring the patient who needs blood to correct a defect induced by its deficiency, but at the same time it remains a clear risk of transmission of certain infections. Infections HIV, HBV and HCV are major communicable infections regarded as public health problems in low-income countries. They are transmitted parenterally, vertically or through sex. Blood transfusion is, therefore, a potential means of transmission(Christian Ngama Kakisingi et al., 2016).

In this study, all 2650 (65.95%) blood donors was family donors and 0.02% of paid donors. Indeed, several previous studies worldwide have shown that replacement donors were remarkably prevalent. In the study by Singh et al, 82.4% were replacement donors(Singh, B. Verma, M., Kotru, M., 2005), 94.7% in the study by Kakkar et al.(Kakkar, N. Kaur, R. Dhanoa, 2004) while Sangeeta Pahuja et al found 99.48%(Pahuja, Sharma Baitha, & Jain, 2007). At the Provincial Blood Transfusion Center of the Province of Katanga, trends appear to be identical to our results(Christian Ngama Kakisingi et al., 2016)and also those obtained by Noubiap in Cameroon(Jacques et al., 2013). This indicates that many things must be done to motivate and closer through awareness campaigns voluntary donors on the importance of blood donation, expect conditions to meet the objectives that WHO is assigned.

The majority of donors were male or 94.4% and 5.6% female. These results are consistent with the fact finding by Tagny et al(Tagny CT, Owusu-Ofori S, Mbanya D 2010)that one of the common characteristics among blood donors in sub-Saharan Africa is the predominance of young adult men. The low proportion of women among blood donors is explained by many cons-indications for blood donation including among others, pregnancy, anemia, menstruation, breastfeeding etc.(Mavenyengwa RT Mukesi M, Chipare I, 2014).

The seroprevalence of hepatitis B in our study was 3.9%. It is located within the range of seroprevalence reported by studies in our country(Christian Ngama Kakisingi, et al, 2016. Kabemba et al, 2017. Kabinda JM, Miyanga SA Misingi P., 2014; Paul et al, 2017). but much lower than that found by Kabamba Nzaji et al in Lubumbashi(Michel et al., 2015).



Kabinda Maotela J et al (2015) analyzing reporting data CNTS show that the proportion of donors with hepatitis B decreased from 7.1% in 2001 to 3.5% in 2012. The higher rates reported in countries such as Nigeria (18.6%), Guinea Bissau (16.2%), Burkina Faso (14.96%). The rate of HIV prevalence observed in our country are also considered high because the country is in a highly endemic area(John Uwingabiye, Hafidi Zahidi Loubet Unyendje, 2016). Ngama KC et al (2016) attempt to explain this by the absence of a vaccination policy against HBV in our country, we also espouse this view in the context of the town of Kolwezi.

We noticed that the female donor had a seroprevalence of hepatitis B high compared to male donors, these results are consistent with those reported in a study conducted in 2017 in Moba (Kabemba et al., 2017). As against our results contrast with those reported in the literature of Ntonga et al in 2017 in Gabon, and with those of Kabinda et al in 2014 in the eastern DRC.

## 5. CONCLUSION

At the end of our study, we note that a majority of blood donors were aged between 20-45 years is 84%, while 3.1% were aged less than 20 years, 94.4% were male, 65.95% were composed of family donors and 34.03% were voluntary donors. The seroprevalence of hepatitis B was around 3.9%. While it was 0.7% for hepatitis C during the three years of study. Note that the seroprevalence of hepatitis B was 1.6% for donors under 20 years, 4.2% among those whose age is between 20-45 years and 2.3% in donors over 45 years. And this statistically significant difference was observed ( $p = 0.047$ ). In relation to sex, 7.6% of female donors and 3.7% of males had HIV to hepatitis B. benefits noted that no statistical difference was found between the characteristics of blood donors and hepatitis C.

The prevalence of both infectious markers in our midst denotes that transfusion remains a major public health problem in developing countries in general and in Kolwezi in particular and warrants routine screening in all blood donors to reduce the risk transfusion.

## 6. REFERENCES

- Allain JP. (2011). Moving on from voluntary nonremunerated Donors: who is the best blood donor? *Br J Haematol*, 154, 763-769.
- Blaise Matondo Manzambi Sumbu Benjamin Longo Mbenza Mireille Nganga Nkanga Jeremiah Muwonga Masidi, Donatien Kayembe Nzongola Nkasu, Mbayo Kalumbu Ferdinand Teke Apalata SAM (2016). Seroprevalence of Hepatitis C Virus in Blood Donors In the University Clinics of Kinshasa: 2005--2006 and 2008 - 2013 *Journal of Innovation and Research in Health Sciences & Biotechnology*, 1 (4), 216-224. doi: 10.18644 / jires-
- Brah, S., Chefoo, ME, Djibrilla, A., Andia, A., & A, MSM (2016). The Infectious Risk Post Transfusion: A Comparative Study of the seroprevalence of HIV, hepatitis B and C and syphilis in 202 patients at the National Hospital of Niamey. *Health Sci. Dis*, 17 (March), 1-4.
- Christian Ngama Kakisingi Olivier Mukuku Serge Matanda Kapend Michel Muteya Manika, Veronique Kabila Kyabu Eric Ilunga Kasamba Paul Makan Mawaw Claude Mwamba Mulumba, LK (2016). Epidemiological Profile and prevalence of blood donors in the university clinics in Lubumbashi, Democratic Republic of Congo Seroprevalence and epidemiological profile of blood donors at the University Clinics in Lubumbashi, Democratic Republic. *Pan African Medical Journal*, 23 (175) 1-9. doi: 10.11604 / pamj.2016.23.175.8480
- Jacques, J., Noubiap, N., Yvonne W. Joko, A. Richie, J., Nansseu, N., & Gae, U. (2013). Sero-epidemiology of human immunodeficiency virus, hepatitis B and C viruses, and syphilis infections Among first-time blood donors in Edea, Cameroon. *International Journal of Infectious Diseases*, 17, 832-837. doi: 10.1016 / j.ijid.2012.12.007
- Jean Uwingabiye, Hafidi Zahidi Loubet Unyendje, RH (2016). Seroprevalence of viral markers in blood donations in Blood Transfusion Center, Military Hospital of Instruction Mohammed V in Rabat. *Pan African Medical Journal*, 8688, 1-5. doi: 10.11604 / pamj.2016.25.185.6266
- Kabemba, BH, Kasendue, EP, Shiku, MA, Mukena, TS, Kasolva, TC, & Kabingie, NG (2017). Seroprevalence of Hepatitis B Virus infection (HBsAg) in Rural Blood Donors, Moba Tanganyika Province, Democratic Republic of Congo (2014 to 2016), 4. doi: 10.4236 / oalib.1103434
- Kabinda JM, Miyanga SA Misingi P., RS. (2014). Hepatitis B and C among volunteer blood donors and unpaid from the eastern Democratic Republic of Congo. *Transfusion Clinique et Biologique*, 21 (September), 111-115. doi: 10.1016 / j.tracli.2014.04.001
- Kakkar, N. Kaur, R. Dhanoa, J. (2004). Voluntary Donors-need for a second look. *Indian J. Pathol. Microbiol*, 47, 381-383.
- Mavenyengwa RT Mukesi million Chipare I, SE (2014). Prevalence of human immunodeficiency virus, syphilis, hepatitis B and C in blood donations in Namibia. *BMC Public Health*, 14, 424.

- Michel KN Ignatius, BK, Elijah, KNU, Deddy, KC, Kabyala, I., & Oscar, LN (2015). HIV and HBV Seroprevalence in Volunteer Blood Donors in Lubumbashi.
- Nzaji, MK, & Ilunga, BK (2013). Prevalence of infectious markers rural blood donors. If the general hospital Kamina Reference A study of the prevalence of infectious markers in blood donors in rural areas. The case of Kamina hospital.
- WHO. (2016). THE VIRAL HEPATITIS 2016-2021. Global Hepatitis Program. Retrieved July 11, 2017, from <http://apps.who.int/iris/bitstream/10665/250577/1/WHO-HIV-2016.06-fre.pdf>
- Pahuja, S. Sharma, M., Baitha, B., & Jain, M. (2007). Prevalence and Trends of Markers of Hepatitis C Virus, Hepatitis B Virus and Human Immunodeficiency Virus in Blood Donors Delhi: A Hospital Based Study, 215, 389-391.
- Paul, CM, Moses, KK, Ndala, B., Blood, D. Kennedy, NM, Mukendi, J., ... Michel, KN (2017). Seroprevalence of Hepatitis B Among Blood Donors in Mbuji-Mai, "Case of Dipumba General Hospital" (DRC), 4, 1-7. doi: 10.4236 / oalib.1103503
- Singh, B. Verma, M., Kotru, M., et al. (2005). Prevalence of HIV and VDRL seropositivity in blood donors of Delhi. Indian J. Med. Res, 122, 234-236.
- Tagny CT, Owusu-Ofori S, Mbanya D, DV (2010). The blood donor in sub-Saharan Africa: a review. Transfus Med, 20, 1-10.