

Subtypes of the Human Immunodeficiency Virus Circulating in Professional Sex Workers Community: A Different Epidemiology

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Abstract

Background: HIV-1 has a genetic diversity that is equal to the complexity of its management. Professional Sex Workers (PSW) have always been considered as a key population for Sexually Transmitted Infections around the world. They are often incriminated for transporting and introducing cosmopolitan subtypes into populations.

Objective: The objective of this review was to present the different strains of Human Immunodeficiency Virus type 1 (HIV-1) which circulate in the population of Professional Sex Workers in Kinshasa, Democratic Republic of Congo (DRC) and their evolution.

Methods: Various publications related to the identification of the different variants of HIV-1 among PSW in Kinshasa-DRC were the subject of this literature review. The research for these different works on the different variants of type 1 HIV was done on the internet from websites using specific keywords. The search was limited to published work and abstracts presented from 2000 to date. The manuscripts were selected according to the relevance of the methodology, the results as well as the representativeness of the samples. The socio-demographic information of the populations studied, the measurement methods and the objectives were taken into account in the evaluation of the articles.

Results: From 2000 to 2021, 2 works were documented carried out mainly on the PSWs for Kinshasa-DRC meeting the various selection criteria. In 2012, according to the IBBS, subtype A was dominant with 4 PSWs (30.8%), followed by subtypes G with 2 PSWs (15.4%) and C with 1 PSW (7.7%). In 2014, according to Kamangu NE et al, the dominant subtype was K in 5 patients (25%), followed by subtypes A and G in 3 patients each (15%).

Conclusion: It emerges from this work that this key population is a group with a complex and special epidemiology. The prevalence of subtype A has been declining over the years while other subtypes are on the rise.

Key words: sub-types; HIV-1; professional sex worker; kinshasa-drc

INTRODUCTION

Human Immunodeficiency Virus type 1 (HIV-1) infection is one of the most destructive epidemics of our time and remains a major public health problem around the world even though remarkable progress has been made in treatment and management [1]. Around 37.7 [30.2 - 45.1] million people are living with HIV across the world and Sub-Saharan Africa (SSA) is the most affected region, with two-thirds (67%) of those infected. [1].

HIV-1 has a genetic diversity that is equal to the complexity of its management. The subtype designations have been powerful molecular epidemiological markers for tracking the course of this epidemic. The different data indicate a disparate distribution and dominance of the different

subtypes according to the countries and documented regions [2]. Analysis of the genomic sequences of the viral strains of HIV-1 revealed that the virus is divided into 4 groups: the M (Major), the N (Non-M / non-O), the O (Outlier) and recently the P.

Group M (Major) is the dominant group in Central Africa. The distribution of this group in Africa and in the Democratic Republic of Congo (DRC), in particular, is very heterogeneous; it follows a complex and specific algorithm. This distribution is very dynamic, evolving and unpredictable; it will continue to diversify as long as the virus is circulating. There is a very high genetic diversity of the M group in the sub-Saharan region of Africa [3].

Professional Sex Workers (PSW), and their clients, have always been viewed as a key population for Sexually Transmitted Infections (STIs) around the world along with military and police, truck drivers, and men who have sex with men [1]. In 2020, these key populations (PSWs and their clients, gay men and other men who have sex with men, people who inject drugs, transgender) and their sexual partners accounted for 65 % of all new HIV infections [1]. The World Health Organization (WHO) has since recommended close monitoring of these populations to control the spread of infection in an uncontrolled manner [4]. These key populations are often responsible for the high molecular diversity of HIV in general populations and are often incriminated for transporting and introducing cosmopolitan subtypes into populations [1,4].

There is little data on the molecular epidemiology of key populations in DRC and Kinshasa. Hence the objective of this literature review was to present the different strains of type 1 HIV circulating in the population of Professional Sex Workers in Kinshasa-DRC and their evolution.

Methods

Literature review

Various publications and review articles published and presented during scientific conferences on the identification of the different variants of HIV type 1 in PSW in Kinshasa, Democratic Republic of Congo (DRC), have made the subject of this literature review. The search for these different works on the different variants of HIV type 1 was carried out on the Internet from the following websites: (i) MEDLINE/Pub Med; (ii) electronic POPLINE database of published documents; (iii) Public access to data on conference documents; (iv) Scientific report published on the Internet; (v) Google Scholar; (vi) Cochrane Library. This online search was based on the following keywords: "HIV, subtype, Professional Sex Workers, Kinshasa, Democratic Republic of Congo", "genotype, HIV, Professional Sex Workers, Kinshasa, Democratic Republic of Congo" and "strains of HIV among Professional Sex Workers in Kinshasa, Democratic Republic of Congo". Data were independently extracted by two authors and consolidated by a third author. A manual search was carried out to verify the articles found so as not to omit data.

Selection criteria for publications

The search was limited to published work and abstracts submitted from 2000 to date (2021). The manuscripts were selected according to the relevance of the methodology, the results as well as the representativeness of the samples (Figure 1). The socio-demographic information of the populations studied, the measurement methods and the objectives were taken into account in the evaluation of the articles. Reading the various articles made it possible to exclude articles which did not directly concern strains of HIV-1 in the population of Professional Sex Workers in Kinshasa-DRC. Studies on general populations, migrant populations, and non-specific populations as well as studies without original data were not retained for this review. Works that did not present data for the different populations included were not retained either.

Results

From 2000 to 2021, several studies presented the molecular epidemiology of HIV-1 in our environment of different populations in a non-specific way, nevertheless two (2) works were documented carried out mainly on the Professionals Sex Workers (PSW) for Kinshasa-DRC meeting the various selection criteria.

In 2012, the Integrated Biological and Behavioral Surveillance Survey on Human Immunodeficiency Virus and Sexually Transmitted Infections (IBBS 2012) revealed a heterogeneous geographic distribution of HIV-1 infections among PSWs across the country. Kinshasa was included in the IBBS survey with 13 PSWs, or 9.8% of the total cohort. Subtype A was dominant with 4 PSWs (30.8%), followed by subtypes G with 2 PSWs (15.4%) and C with 1

PSW (7.7%). Six PSs (46.1%) had CRF of which 1 (7.7%) had CRF02_AG [5].

In 2014, Kamangu NE et al. carried out work on PSW's population and their partners at the Matongo Sexually Transmitted Infections Care Center (IST-Matonge) in Kinshasa-DRC. Twenty (20) patients were included in this work. The dominant subtype in this population was K in 5 patients (25%), followed by subtypes A and G in 3 patients each (15%), subtypes C, J and U in 2 patients each (10%), subtype H in 1 patient (5%) and CRF02_AG in 2 patients (10%) [6].

Table 1 shows all the data mentioned above. Figure 2 shows the different HIV-1 subtypes by year of study. Figure 3 shows the evolution of the different subtypes with the different trends.

Discussion

The objective of this literature review was to present the different strains of HIV type 1 that circulate in the population of Professional Sex Workers (PSW) in Kinshasa, Democratic Republic of Congo, and their evolution from 2000 to 2021. During this period, many studies have been published presenting the molecular epidemiology of HIV-1 in different populations in a non-specific manner in Kinshasa and the Democratic Republic of Congo. According to the criteria selected for this review, two studies were documented carried out mainly on the populations of PSW for Kinshasa-DRC meeting the various selection criteria.

In 2012, for Kinshasa, samples from 13 PSWs were sequenced for HIV-1 through the Integrated Biological and Behavioral Surveillance Survey on Human Immunodeficiency Virus and Sexually Transmitted Infections (IBBS 2012). Subtype A was dominant with 4 PSWs (30.8%), followed by subtypes G with 2 PSWs (15.4%) and C with 1 PSW (7.7%). Six PSWs (46.1%) had Circulating Recombinant Forms (CRFs) of which 1 (7.7%) had CRF02_AG [5]. The wild subtypes H, J and K have not been identified on this population while some non-specific recombinant forms have been found. The high prevalence of subtypes A and G in this population is justified by the historical presence of these subtypes in the epidemiology of this infection in our environment [7,8].

In 2014, in a population of PSWs and their partners followed at the Matongo Sexually Transmitted Infections (STI-Matonge) treatment center in the city of Kinshasa, samples from 20 patients were sequenced for HIV-1. The dominant subtype in this population was the subtype K in 5 patients (25%), followed by subtypes A and G in 3 patients each (15%), subtypes C, J and U in 2 patients each (10%), subtype H in 1 patient (5%) and CRF02_AG in 2 patients (10%) [5]. The same year, Kamangu NE et al. worked on a heterogeneous population of 153 treatment-naïve HIV positive patients across the 4 districts of Kinshasa. In this population, subtype A was predominant with 22.9% followed by CRF02_AG (11.1%), subtypes C (9.8%), G (9.8%), K (9.8%), D (7.8%), J (5.9%), U (5.2%), F (3.9%), CRF01_AE (3.3%) and subtype B (2%) [9]. These data confirm the molecular difference within the populations.

Through these data, it emerges that the PSWs breed strains of HIV-1 which are different from the general population infected with the same virus. In 2012, only 3 wild strains (A-30.8%, G-15.4% and C-7.7%) are found in this specific population while 46.1% are recombinant forms. The other wild strains (B, D, F, H, J and K) were not found in that population. In 2014, almost all strains are present in this specific population but in a very different order and prevalence. The K subtype which was dominant in the PSW population comes fifth in the general population.

The attached figures show the prevalence of the different strains by year of study (Figure 1) as well as the evolution trends of these strains compared to the two years (Figure 2). These figures show an inequality in the prevalence of subtypes in the same specific population in Kinshasa in two different periods.

Subtype A which was at 30.8% in 2012 dropped to 15% in 2014 ($y = -15.8x + 46.6$; $R^2 = 1$) thus giving the only downward trend of all strains. This supports the hypotheses which advocate the reduction of wild strains in favor of recombinant strains [2,7]. All the other strains showed upward trends from 2012 to 2014: subtype C from 7.7% in 2012 to 10% in 2014 ($y = 2.3x + 5$; $R^2 = 1$), subtype G from 15.4% in 2012 to 15% in 2014 ($y = -0.4x + 15.8$; $R^2 = 1$), subtype H from 0% in 2012 to 5% in 2014 ($y = 5x - 5$; $R^2 = 1$), subtype J from 0% in 2012 to 10% in 2014 ($y = 10x - 10$; $R^2 = 1$), subtype K from 0% in 2012 to 25% in 2014 ($y = 25x - 25$; $R^2 = 1$), and the CRF02_AG from 7.7% in 2012 to 10% in 2014 ($y = 2.3x + 5$; $R^2 = 1$). These trends paint a new picture of molecular epidemiology as seen as a whole. Through the data trends of this population, it emerges that the subtype A which has always been dominant for years is declining and risks losing the place of the dominant subtype in the near future.

Conclusion

Through the data presented in this revue, it emerges that this key population is a group with a complex and special epidemiology. The prevalence of subtype A has been declining over the years while other subtypes are on the rise. This calls for a reassessment of the care policy in relation to the complexity of the new strains.

Conflicts of interest

The authors declare that they have no conflict of interest in the publication of this work.

List of abbreviations

ART: AntiRetroViral Treatment; **ARV:** AntiRetroViral; **CV:** Viral Load; **DRC:** Democratic Republic of Congo; **HIV:** Human Immunodeficiency Virus; **IBBS:** Integrated Biological and Behavioral Surveillance Survey; **PSW:** Professional Sex Worker; **RNA:** Ribonucleic Acid.

References

1. Organisation des Nations Unies pour la lutte contre le VIH/SIDA (ONUSIDA). Fiche d'information 2021 – Dernières statistiques sur l'état de l'épidémie du SIDA. consulté le 15 septembre 2021.
2. Kamangu E. Diversité Génétique du VIH à Kinshasa. (2020). République Démocratique du Congo : Le Défi d'une dynamique évolutive. Editions Universitaires Européennes. 978-620-2-54680-5
3. Bulanda B.I., Bongonya B.I., Chatte A., Kateba E.T., Kabasele J.-Y.D., Omakoy M.O., Chuga D., Tshibumbu C., Mwanaut I. and Kamangu E.N. (2020), Molecular Diversity of the Human Immunodeficiency Virus Type 1 in Metropolitan Cities in Central Africa: An Update of Data. World Journal of AIDS. 10,80-93.
4. Organisation Mondiale de la Santé (OMS). Prévention et traitement du VIH et des autres Infections Sexuellement Transmissibles chez les travailleuses du sexe dans les pays à revenu faible ou intermédiaire : Recommandations pour une approche de santé publique. Décembre 2012. ISBN 978-92-4 250474-3.
5. Kwon EH, Musema GMA, Boelter J, (2020). Townsend S, Tshala DK, Kayembe PK, West J, Wood C. HIV-1 subtypes and drug resistance mutations among female sex workers varied in different cities and regions of the Democratic Republic of Congo. PLoS ONE. 15(2): e0228670.
6. Kamangu EN, Bongonya BI, Bulanda BI, Kalume AA, Mabanza PM, Kalala RL. (2018). Molecular and Virological profile of Professional Sex Workers (PSW) and their Partners at the beginning of ARV Treatment at IST Matonge in Kinshasa. J HIV Retrovirus. Vol. 4 No. 2:10.
7. Kamangu EN, Bon.a BI, Bulanda BI. (2017). Evolution of Subtypes of the Human Immunodeficiency Virus Type 1 in Kinshasa over the Last 30 years: Documentary Review from 1985 to 2015. M J HIV. 2(1): 014.
8. Kamangu EN, Kabututu Z, Mvumbi GL, Kalala RL, Mesia GK. (2013), Genetic Diversity of Human Immunodeficiency Virus Type 1 in the Democratic Republic of Congo: a review of available data. International Journal of Collaborative Research on Internal Medicine & Public Health. 5 (5): 295-309
9. Kamangu EN, Wumba RM, Situakibanza HNT, Lukusa PT, Kapend LK, Mvumbi GL, Hayette MP, Kalala RL. (2018), Molecular epidemiology of human immunodeficiency virus type 1 and therapeutic monitoring of patients treated in Kinshasa/Democratic Republic of the Congo. Int J HIV AIDS Res. 2(1): 6-11.



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