



Prevalence of HIV-1, HIV-2, Hepatitis C and Co-Infection in The Gambia

Prévalence du VIH-1, HIV-2, l'hépatite C et co-infections en Gambie

C. I. Mbotto[†], M. Fielder[‡], A. Davies-Russell[‡], A. P. Jewell^{*‡}

ABSTRACT

BACKGROUND: In most West African countries, the distribution and risk factors for co-infection with Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) is unknown despite the current HIV epidemic and evidence of increasing prevalence of HCV in the region.

OBJECTIVE: This study aimed to evaluate the distribution and the risk factors for the transmission of co-infection between HIV and HCV in The Gambia.

METHODS: A total of 1500 persons referred for HIV serology at the Royal Victoria teaching Hospital were interviewed following informed consent to obtain information on their demographic variables, knowledge of sexually transmitted diseases and their prevention, and patterns of risk behavior. Blood was collected and tested for anti-HIV and anti-HCV antibodies by Enzyme Linked Immunosorbent Assay (ELISA).

RESULTS: In the general population, the prevalence of HIV was 6.7%, while that of HCV was 2.1%. Both infections occurred more frequently in males than in females. HIV and HCV co-infection rate was 0.6%. Co-infection was significantly more common in males than females. All types of infection – HIV, HCV and HIV/HCV co-infections occurred much more in polygamous settings than in monogamy.

CONCLUSION: This study has demonstrated the extent of co-infection with HIV and HCV in The Gambia. The prevalence of female circumcision may be a contributory occurrence factor in the transmission of HIV but not in that of HCV. *WAJM* 2009; 28(1): 306–309.

Key words: HIV, Hepatitis C, co-infection, West Africa.

RÉSUMÉ

CONTEXTE: Dans la plupart des pays d'Afrique de l'Ouest, la distribution et les facteurs de risque pour la co-infection par le virus de l'immunodéficience humaine (VIH) et le virus de l'hépatite C (VHC) est inconnu en dépit de l'actuelle épidémie de VIH et la preuve de l'augmentation de la prévalence du VHC dans la région.

OBJECTIF: Cette étude visait à évaluer la distribution et les facteurs de risque pour la transmission de la co-infection entre le VIH et le VHC en Gambie.

METHODES: Un total de 1.500 personnes visées pour la sérologie du VIH, au Royal Victoria Teaching Hospital suivants ont été interrogés en connaissance de cause pour obtenir des informations sur les variables démographiques, la connaissance des maladies sexuellement transmissibles et leur prévention, et des modes de comportement à risque. Le sang a été recueilli et testé pour les anticorps anti-VIH et des anticorps anti-VHC par l'enzyme linked immunosorbent assay (ELISA).

RÉSULTATS: Dans la population générale, la prévalence du VIH était de 6,7%, tandis que celle du VHC était de 2,1%. Ces deux infections se sont produites plus fréquemment chez les hommes que chez les femmes. VIH et VHC co-infection était de 0,6%. Co-infection a été significativement plus fréquentes chez les mâles que de femmes. Tous les types d'infection - le VIH, le VHC et le VIH / HCV co-infections ont eu lieu beaucoup plus polygames que dans les paramètres de la monogamie.

CONCLUSION: Cette étude a démontré l'ampleur de la co-infection avec le VIH et le VHC en Gambie. La prévalence de l'excision mai être un facteur contributif dans la transmission du VIH, mais non dans celui du VHC. *WAJM* 2009; 28(1): 306–309.

Mots clés: VIH, hépatite C, co-infection, de la Gambie

[†]Royal Victoria Teaching Hospital, Banjul, The Gambia. [‡]School of Life Science, Kingston University, Surrey KT1 2EE, UK.

Correspondence: A. P. Jewell, Faculty of Health and Social Care Sciences, Kingston University & St George's Hospital Medical School, Penrhyn Road, Kingston-Upon-Thames, Surrey KT1 2EE. UK. Telephone: 0208 547 2000 x62468

Fax : 0208 547 7562 Email: a.jewell@kingston.ac.uk

Abbreviations: ELISA, Enzyme Linked Immunosorbent Assay; HCV, Hepatitis C Virus; STD, Sexually Trasmitted Disease.

INTRODUCTION

Co-infection with Hepatitis C Virus (HCV) may be common in subjects infected with Human Immunodeficiency Virus (HIV)^{1,2} in developed countries; however, its magnitude globally is not yet clearly defined.³ Studies conducted mainly in industrialized countries have shown co-infection between HIV and HCV to be almost exclusively limited to intravenous drug abusers, haemophiliacs³ and homosexuals;⁴ groups believed to be uncommon in the West African region.

In the West African region studies of HIV and HCV co-infection have become necessary because of the emerging evidence of a high HCV prevalence^{1,5} along with a concurrent HIV epidemic.⁶ Infection with HIV is often associated with risk factors and demographic variables which in most parts of Africa are further compounded by local taboos and cultural practices, such as polygamy, wife inheritance, scarification and circumcision^{7,8,9}. Above all, in most Sub-Saharan African countries, despite the increasing report of high HCV prevalence^{1,5} amidst a current HIV epidemic⁶ the respective contributions of parenteral and non-parenteral routes of transmission are unknown as are the potential roles of sexual transmission⁹ in a region where sexually transmitted diseases (STD) are frequent.^{8,9} In the Gambia, baseline data on HCV prevalence and the risk factors are lacking. This present study on HIV and HCV co-infection therefore aimed to contribute generally to our understanding of the natural history of co-infection between HIV and HCV.

SUBJECTS, MATERIALS AND METHODS

Venous blood was collected from 1500 persons aged 11 months-76 years consecutively referred to the serology unit of Royal Victoria Teaching Hospital between July and December 2002 following informed consent and systematic interview in which information on their demographic variables, health history, knowledge of sexually transmitted diseases, prevention and patterns of risk behavior (such as number of wives, wife inheritance, knowledge of and use of condoms) where relevant was obtained. In the case of minors, consent of

accompanying adults was obtained.

Samples were screened individually for HIV antibodies using Enzyme Linked ImmunoSorbent Assay (ELISA) kits Murex HIV-1, 2, 0 (Murex Biotech, UK)¹⁰ following the manufacturers instruction. Samples reactive to Murex HIV 1, 2, 0 were tested further with PEPTI LAV 1-2.¹⁰ Persons with positive results from both Murex HIV1, 2, 0 and PEPTI-LAV were confirmed as having HIV. Similarly the ORTHO HCV 3.0 ELISA test system (Ortho-Clinical Diagnostics, Inc, U.S.A) was used to screen all the samples for antibodies to HCV on an individual basis. Persons reactive to ORTHO HCV 3.0 ELISA test¹¹ were considered anti-HCV positive.

Frequency distributions for qualitative data were determined using standard descriptive statistical analysis methods. HIV and HCV prevalence rates were calculated to reflect the relative frequency of each disease, with corresponding 95% CI, while Odds Ratio (OR) was calculated using Fisher's exact test to estimate the strength of the association between each infection and

possible risk factors.¹²

RESULTS

Age, Sex and Clinical History of Participants

The overall mean age of the participants was 30.2, 31.9 and 28.7 years for all subjects, males, and females respectively. (928 out of 1500) (61.9%) were women and 780 (84.1%) of these were aged between 13 and 40 years. The men had a comparatively higher percentage aged 41 years and over (25.2% versus 14.2%).

Over 70 percent (693/928) of the female participants were antenatal cases. Other participants included blood donors, (30.7%; 460/1500) in patients and out patients with various conditions (19.3%; 290/1500), apparently healthy individuals for family planning, (1.9%; 28/1500) and medical examination for employment and educational purposes (1.9%; 29/1500). All the participants had no previous knowledge of their HIV or HCV status. A summary of the classification of the participants based on their clinical history or clinic is presented in Table 1.

Table 1: Distribution of Subjects with Co-infections of HIV and HCV and Statistical Association in Relation to Clinical History

Clinical History	Number (%)	N(%) Seropositive	p	OR	95% CI
Ante-natal	693 (46.2)	2 (0.2)	0.1	0.33	0.07-1.59
Blood donors	460 (30.7)	2 (0.4)	0.26	0.64	0.13-3.09
Family planning	28 (1.9)	0 (0.0)			
Hepatocellular carcinoma	13 (0.9)	1 (7.7)	0.07	15.4	1.93-106
Other patients	277 (18.4)	4 (1.4)	0.05	3.56	0.95-13.1
Others	29 (1.9)	0 (0.0)			

Table 2: Distribution of Subjects according to Age, Sex and History of STDs

Variable	Number (%)	N(%) seropositive	p	OR	95% CI
Age (years)					
≤26	669 (44.6)	1 (0.15)	0.03	0.162	0.03-0.85
≥27	831 (55.4)	8 (1.0)	0.03	6.49	0.81-51.4
Sex					
Male	572 (38.1)	7 (1.2)	0.01	5.74	1.18-27.2
Female	928 (61.9)	2 (0.2)	0.01	0.17	0.04-0.85
History of STD					
Females	11 (1.2)	1 (9.1)	0.02	91.6	5.56-1249
Males	11 (1.3)	1 (12.5)	0.11	10.4	0.02-0.88

HIV Prevalence

The prevalence rates were 78/928 (8.4%) (CI, 6.7–10.4) and 23/572 (4.0%) CI, 2.8–6.0) in women and men respectively. The numbers of positive individuals progressively increased with increasing age until age 55 years. The overall prevalence of HIV in this study was 101/1500 (6.7%), (95% CI, 5.6–8.2). The peak age of infected patients was 55 years and above (6.9%; 95% CI, 0.8–22.8) in men and 27–33 years (12.4%) (95% CI, 8.3–17.7) in women. HIV-2 prevalence rates were 8/572 (1.4%) (CI, 0.6–2.7) for the men and 20/928 (2.2%) (95% CI, 1.3–1.33) for the women, while the mean age of HIV-2 infected patients was 28.6 years in women and 35.3 years amongst the men. Anti-HIV ($p < 0.001$) was significantly associated with the age and sex of participants. All the HIV sero-positive persons other than eight participants (7.9%) were in WHO clinical stage 1.¹³

HCV Prevalence

The HCV prevalence rate for this study population was 31/1500 (2.1%) (95% CI, 1.4–2.9). Antibodies to HCV were observed mainly in those aged 20 years and above. The men accounted for 22/31 (71%) of the infections detected with a comparatively higher prevalence rate than in the females (3.8%; 95% CI, 2.4–5.8 versus 1.0%; 95% CI, 0.4–1.8). The peak age of infection for both sexes was in those aged 41–47 years: 10/431 (6.0%) (95% CI, 2.8–11.1) for men and 3/150 (2.9%) (95% CI, 0.4–10.2) for the women. Anti-HCV was highly significantly associated ($p = 0.0001$) (OR: 4.08; 95% CI, 1.83–8.55) with the male patients. A similar association was found between HCV prevalence and the women (OR: 0.24; 95% CI, 0.117–0.544) but at significantly lower odds ratio.

HIV and HCV co-infection

Co-infection between HIV and HCV was observed in nine out of the 1500 (0.6%) participants with the men accounting for 7 (77.7%) of the cases. Co-infection with HIV-1 and HCV was observed in seven participants (0.5%) (95% CI, 0.2–1.0) and was detected only in those aged 20 and above with the peak in those 34 years or above. Similarly, there was a progressive increase with

increasing age in HIV-1/HCV co-infection rates in males ranging from 0.9% in 20–26 years old to 3.4% in 55 years and over. Co-infection between HIV-2 and HCV was observed in two participants (0.1%) (95% CI, 0.0–0.5). Co-infection between HIV-1 and HCV was significantly associated ($p < 0.05$) with the age and sex of the participants. A significantly higher association was found with those aged 27–33 years and 55 years and over.

Selected Risks and Demographic Factors of Participants and their HIV/HCV Status

Analyses of the data on selected risk factors and demographic variables showed that HIV-1, HIV-2 HIV and HCV rates were generally higher for those involved in polygamous relationships as compared to those in monogamous relationships. There was a marginally significant relationship ($p < 0.05$) between HIV and marriage but not with the duration of marriage.

HIV was significantly associated ($p = 0.033$) (OR: 8.9474; 95% CI: 1.93–25.004) with men with a history of urethral discharge and among those who claimed never to have had STD ($p = 0.005$) (OR: 0.035; 95% CI: 0.04–0.33), however, no such association ($p > 0.05$) was found with HCV or HIV/HCV co-infection. HIV and HCV rates were not statistically significant in women with previous history of STDs and STD related symptoms. Similarly, though more than one third (341/938) of the women admitted having been circumcised, HIV rates (not HCV and or HIV/HCV) was significantly associated ($p < 0.05$) with both the circumcised and uncircumcised.

None of the male participants admitted involvement in wife inheritance, in which the dead husband of a widow may be replaced by a brother or cousin. Similarly the participants HIV or HCV status was not associated with history of jaundice or hepatitis since birth, sex during menses, history of skin tattoo and alcohol consumption. There was a significant relationship ($p = 0.0198$; OR: 0.1611; CI, 0.0226–1.1203) between those who have never heard of HIV/AIDS and HCV prevalence but not with HIV or HIV/HCV co-infection. However, no anti-HIV was detected in all the 12 men who claimed

regular use of the condom, while the occasional users had the lowest prevalence (3.7%; OR: 0.9494; 95% CI, 0.2277–3.9738) as compared to the non-users (4.1%; OR: 1.3861). Similarly, HCV rates were marginally higher among the men who had never heard of condoms than those who had (4.5%, OR: 1.088 versus 4.2%, OR: 0.9188).

DISCUSSION

The HIV sero-prevalence of 6.7% observed in the current study population is three-fold higher than United Nations AIDS programme report documented as the HIV national prevalence for the country⁶ and five-fold that reported in studies conducted among pregnant women in nationwide sentinel surveillance.¹⁴ This difference could have resulted from the inclusion of all categories of patients and children who were not included in the national sentinel surveillance. However, the overall HCV prevalence of 2.1% (95% CI, 1.4–2.9) observed in this study is below the estimated worldwide prevalence of 3%.³ Earlier studies by Coursaget *et al.*,¹⁵ have reported an anti-HCV prevalence of 4.2% in apparently healthy adult population in Senegal, a country that shares an extensive border, language and similar culture with The Gambia. The rate of 0.9 percent found among pregnant women in this study is similar to the overall prevalence of 1.0% found among all the females. It is however, among the lowest in the region.⁵

The observation of a higher prevalence of HCV antibodies in persons aged 34–47 years, the lower prevalence rates found in men 55 years or above its absence in women aged 48 years and above may be suggestive of sex as a possible transmission mode. This is because intravenous substance abuse, which is the principal route of transmission of the virus in most developed countries,^{2,3,4} is a rare event in the Gambia. This assertion is supported by the non-detection of the virus in participants less than 20 years.

The HIV and HCV co-infection rate of 0.6% found among all the subjects sampled is quite low when compared to the reports of rates of up to 10% reported in the United States¹ and 2.5–4.9% of the

general population in Brazil¹⁶ and far below the estimate of a worldwide prevalence of 30% to 50% in HIV infected persons.¹⁷ The finding of a co-infection rate of 0.4% (2/460) and 0.3% (2/693) among blood donors and pregnant women respectively is a major public health concern, most importantly as all the four HIV/HCV sero-positive persons reported no previous history of blood transfusion, surgery or sharing of injection needles, thus suggestive of sex as the possible route of transmission. The potential role of sexual transmission of these infections, where HIV infections are frequent, is suggested by the fact that in this study HCV infection was not found in infants and young adolescents, but increases with age, and decreases also with increased age.

In the Gambia, documented high-risk practices include circumcision rites,⁸ multi-partner sex,^{8,9} prostitution on the part of young rural wives to supplement family income,⁸ men having sex with their dead brothers' wives in keeping with the tradition of wife inheritance^{8,9} and polygamy.⁸ In this study no male participant admitted involvement in wife inheritance,⁸ suggestive of a decline in the practice, while skin tattoo, alcohol consumption, sex during menses were found not to be popular practices in the Gambia and were not associated with HIV/HCV co-infection among the study participants. Similarly, the finding of a higher level of condom awareness among the males than the females may be due to the higher number of educated men than women found in this study, while the revelation of a poor condom use by the males despite the high level of awareness may also be suggestive of lack of behavioral change. Furthermore, the observation that HIV (not HCV and or HIV/HCV co-infection) was significantly associated ($p < 0.05$) with both circumcised and uncircumcised women may suggest a non-contributory role of female circumcision in HIV transmission in the region. Several studies have previously shown that female circumcision may play a significant role in facilitating the transmission of HIV infection.^{7,8,9}

The observation that HIV prevalence was significantly associated ($p < 0.001$) with illiteracy, the educated and marginally ($p < 0.05$) with the employed, while infection with HCV was associated ($p = 0.003$) with illiteracy and the educated may be suggestive of an unresponsive behavioral change, neglecting the educational or employment status of the participants and supports the report of DaCosta,⁸ of non-motivation to change behavior in The Gambia.

In conclusion, this study has documented our findings on anti-HCV and co-infection between HIV and HCV and their associated risk factors in the country.

ACKNOWLEDGEMENTS

Dr. Sam Omar, Director of Medical Services, Department of State for Health and Social services for approval of the work, the Chief Medical Director, Dr (Mrs.) Esangbedo and the Head of the Pathology Department Mr. Jaye for use of laboratory facilities, Baldeh and Tijani for some of the counseling work, Emmanuel Ogenekun, Batchilly, Faal, Jobarteh – all colleagues in the laboratory who gave generously their time, Dr Alabi of MRC Fajara for his advise on the project and Dr Mark Egbe for some reagents and material support.

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