Original Article

Sexual behaviour: human papilloma virus and cervical cancer risk among university students in cameroon

Mogtomo ML Koanga PhD [1], Ngane A Ngono PhD [1], Adonis Wandjis MS [1], Nana RR Dongang MS [1], Tenankem H Donfack MS [1], G Nganwa MD, PhD [2], M Wankam MD [3], Zollo PH Amvam PhD [4].

[1]Department of Biochemistry, University of Douala, P.O. Box 24157, Douala, Cameroon
[2]Department of medical sciences, University of Dschang, P.O. Box 67, Dschang, Cameroon
[3] Bonassama Hospital, Douala, P.O. Box 3787, Douala Cameroon
[4]Department of Biochemistry, University of Yaoundé I, P.O. Box 812 Yaoundé, Cameroon

Corresponding author: **Koanga Mogtomo Martin Luther,** Department of Biochemistry, Viral oncology Unit, University of Douala, P.O. Box 24157, Cameroon. Phone: 00 237 99 50 34 44. E-mail: koanga@yahoo.com

ABSTRACT

AIM To determine sexual risk for Human Papilloma Virus (HPV) infection among students in order to delineate possible points of intervention in Cameroon among the youth in the fight against cervical cancer.

METHODS The study group consisted of 1,166 students aged 16-24 years attending first year studies at the University of Douala-Cameroon. They completed a self-administered questionnaire intended to assess sexual risk for HPV and cervical cancer. High risk was defined as at least one of the following: early sexual activity; history of STIs and HIV testing; multiple partners and/or non-use of condoms; and low level of HPV knowledge and its relationship to cervical cancer.

RESULTS Female students (FS) were younger and more likely to be virgins than male students (MS), (27.2% vs 50.9%, P< 0.0001). FS in the age range 20-22 and MS in the age range 23-24 had contracted STIs the most during the previous three months. A higher proportion of MS than FS reported having had one or more partners during the previous three months. There was a significant difference in condom use between FS and MS (48.2% vs. 61.4%, P< 0.0001). Sex related risk attitudes were significantly associated with the use of condoms. The students demonstrated a low level of HPV related knowledge. All students in the study had no knowledge of the relationship between HPV infection and cervical cancer.

CONCLUSION High sexual risk for HPV and cervical cancer is prevalent among adolescents in Cameroon. Early interventions are required to reduce this risk; and these should include information about the relationship between sexual behaviour, HPV infection and cervical cancer.

Keywords: Cameroon; Gammapapillomavirus; Cancer of Cervix; High-Risk Sex; Sexually Transmitted Diseases; HIV.

INTRODUCTION

Studies on risk factors for pre-cancerous lesions of the uterine cervix have shown strong association with sexual practice. [1-5] There is a consensus that the main risk factor for cervical cancer development is persistent infection with high-risk group Human Papilloma viruses (HPVs); together with other factors like smoking, and reproductive history.

Women with multiple sexual partners and those who start intercourse at an early age are at high risk.

Women with multiple sexual partners are at high risk of cervical cancer because the sexual behaviour of men is an important determinant of Human Papillomavirus (HPV) transmission. [3,6] HPV causes benign and malignant lesions of cutaneous and mucosal epithelial tissues [7] leading to significant morbidity and mortality worldwide. [8-9] Mucosal HPV causes genital warts in men and women and has been linked to cancers of the cervix, vulva, vagina, anus and penis. [10-11] HPVs are classified according to their oncogenic potential into low risk oncogenic HPV types and high risk oncogenic HPV types, the latter being the main cause of cancers and precancerous intraepithelial lesions of the uterine cervix. [12-13]

It is possible that the cervical transformation zone is particularly vulnerable to infection between menarche and the age of sixteen, [13-14] thereby increasing the risk of HPV infection in women who start intercourse at an early age. During this phase there are large numbers of undifferentiated cells at the periphery of the metaplasia, especially at the surface of the cervix. It seems that this area is particularly susceptible to HPV infection. There are also indications that there is no secondary immune response to HPV in case of early first intercourse, making the immune response to HPV less efficient. [15-16]

The sexual behaviour of men and women is a determining factor in the transmission of oncogenic HPV and the risk of cervical cancer. Therefore, factors that reduce the probability of HPV acquisition or transmission by men and women are likely to reduce the risk of HPV related disease among men and women. [3,6] Education appears important to encourage responsible sexual behaviour in young people. We sought to determine the sexual risk for HPV among students in order to delineate possible points of intervention in Cameroon among the youth in the fight against cervical cancer.

METHODS

High sexual risk for HPV and cervical cancer was defined as at least one of the following:- (a) early

sexual activity among the youth (16-24 year age group); (b) history of sexually transmitted infections (STIs) and HIV testing; (c) multiple partners and/or non-use of condoms; and (d) low level of HPV knowledge and its relationship to cervical cancer. Data was collected through a self-administered questionnaire comprising structural and open-ended questions on the foregoing sexual risk factors. The study was performed according to the guidelines for human experimentation in clinical and biomedical research stated by the Cameroon Ministry of Public Health.

The study group consisted of 1,166 students of both sexes aged 16-24 years attending first year studies at the University of Douala-Cameroon. Eligible students were enlisted and the subjects for the study were randomly chosen in a systematic manner. Verbal consent was obtained.

Data were verified for consistency, coded, and computerised. Results are given as mean ± SD. Comparison was done using a two tail Z-test for two proportions. Statistical analysis was conducted using the XLSTAT-Pro software, version 6.1.9. A p value of 0.05 or less was considered statistically significant. Appropriate probabilities were calculated. [18]

RESULTS

Of the 1166 students who responded to the questionnaire, female students (FS) were younger and more likely to be virgins than male students (MS), (27.2% vs 50.9%, P< 0.0001) as shown in Table 1.

STIs AND HIV TEST DISTRIBUTION IN PREVIOUS THREE MONTHS ACCORDING TO SEX AND AGE

The correlation analysis between STIs and HIV testing during the previous three months is shown in Figure 1. Positive correlation occurred only to positive responses of MS having an HIV test during the previous three months. The analysis of the graph gave three homogenous groups. The first group was constituted by students with ages ranging 16-19 years. It was characterised by a lower percentage

Table 1: Sexual characteristic of cohort and age distribution

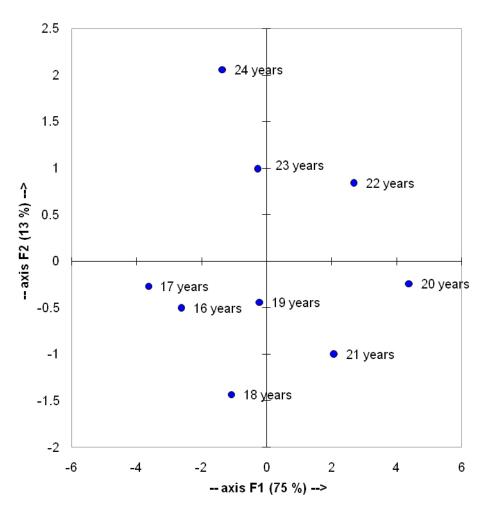|	Male Students			Female Students			Total Students			P value
	No	%	Mean Age (SD)	No	%	Mean Age (SD)	No	%	Mean Age (SD)	
Sexuality										
Virgin	129	27.2	19.1 (0.1)	352	50.9	18.8 (0.1)	481	41.3	18.9 (0.1)	**< 0.0001**
Active	345	72.8	20.5 (0.1)	340	48.1	19.9 (0.1)	685	58.7	20.2 (0.1)	**< 0.0001**
Total	**474**	**100**	**20.2 (0.1)**	**692**	**100**	**19.3 (0.0)**	**1166**	**100**	**19.7 (0.1)**	**-**

Figure 1: Correlation analysis between STI and HIV testing during the previous three months.
The chart represents coordinate variables (positive or negative response) and person (age) for principal components F1 and F2. F1 and F2 gave 88% of the total information of the responses to the questionnaire. F1 gave 75% of the information measuring positive and negative responses of all students for having done an HIV test during the previous three months; positive and negative responses of female students (FS) and only negative responses of male students (MS) for having STI during the previous three months. These parameters are positively correlated. F2 gave 13 % of the information link to positive responses of only MS for having STI infection during the previous three months.

than the mean for STIs or HIV testing during the previous three months. The second group was constituted by students within the age range 20-22 years. The percentage of students who did not have an STI and did not do an HIV test within the previous three months was higher than the mean. FS of this age range had contracted STIs the most during the previous three months (positive F1 in figure 1) among all the FS. More MS aged 22 years old contracted STIs during the previous three months than those of 20 and 21 years of age (positive F2 in Figure 1). The last group was made up of students of 23-24 years of age. MS of this age range and particularly those aged 24 years had the highest STIs among all the MS during the previous three months. In this group, the percentage of students who did not do an HIV test and FS who were infected during the previous three months was lower than the mean. In

the same light, the percentage of students who did not contract STIs was lower than the mean.

NUMBER OF SEXUAL PARTNERS AND CONDOM USE ACCORDING TO SEX

There were gender differences in the number of sexual partners and a significant correlation when comparing the risk attitude of MS and FS having one partner (46.4% vs. 65.6%, P < 0.0001), Table 2. The majority of sexually active FS reported having had one or no sexual partner during the previous three months. A higher proportion of MS reported having had one or more partners during the same period. As regards the frequencies of condom use among youths who experienced sexual intercourse, there was a significant difference in condom use in all acts of sexual intercourse between FS and MS (48.2% vs. 61.4%, P< 0.0001). In this context FS are at higher risk than MS for STIs. When analysing how the youths use condoms, independently of gender, the risk attitude was high and there were differences in risk attitude related to gender. MS used condoms with occasional partners while there was a highly significant difference between FS and MS on the use of condoms with regular partners (40.6% vs. 16.5%, P< 0.0001) and on the use of condoms with all partners (35.9% vs. 64.6%), Table 2. Sex related risk attitudes were significantly associated with the use of condoms during premarital sex.

HPV AND CERVICAL CANCER KNOWLEDGE RELATED TO SEX AND SEXUAL ACTIVITY

In general, the students demonstrated a low level of HPV related knowledge independent of gender and sexual activities (P< 0.0001), Table 3. All students in the study (100%) had no knowledge of the relationship between HPV infection and cervical cancer.

DISCUSSION

There is a high prevalence of HIV infection in Cameroon. [17-19] High levels of sexual activity expose the youth to the risk of HIV and HPV infections, and cervical cancer development. [20] Some studies out of Cameroon have highlighted the negative consequences of STIs on adolescent women and extended families. [21-22] The literature obtained so far in Cameroon is however not definite about such negative consequences and especially for HPV infection and cervical cancer.

This is the first study to assess awareness, knowledge, and beliefs about HPV in Cameroon. The results of this study, carried out among Cameroonian university students attending first year studies, have revealed high risk behaviour. Adolescents are engaging in sexual activity early. As such, prevention campaigns must not be based exclusively on the promotion of condom use, but should aim to stop the decline in age of sexual debut and to reduce the degree of excessive sexual promiscuity. "Abstinence" is a reasonable programme goal for adolescents and should be based on the balance between environmental, contextual factors and individual choices in determining why and how adolescents have sex.

High risk sexual behaviour includes unprotected sex and the number of sexual partners. Our findings indicate that although MS were more likely to use condoms with all partners, while FS used condoms on only a few partners, the students in general did not use condoms consistently. This increases the risk of both HIV and HPV infections. Studies out of Cameroon have indicated that the lack of condom use is often the result of social stigma or lack of knowledge, as well as the inability of women to negotiate the use of condoms with their partners. In Cameroon, more emphasis is placed on the promotion of condoms as either protection against pregnancy or protection against diseases like HPV infection as separate components. [23] In most instances, there is failure to accommodate the changing sexual and reproductive health needs of clients by not becoming more integrated and not adequately recognising the necessity of referral between the different components. It is commonly noted that limited condom discussions between partners are associated with inconsistent use. This suggests that part of the solution to increase the use of condoms lies in the involvement of male partners and working with young people as early as possible on the development of their communication skills in sexual relationships. The importance of early intervention is shown by the cross sectional analysis of HIV-infection and STI during the previous three

Table 2: Risk attitude distribution according to gender

	Male Students		Female Students		Total Students		P value
	No	%	No	%	No	%	
A. Number of partners in the previous three months							
0	108	31.3	95	27.9	203	29.6	0,5968
1	160	46.4	223	65.6	383	55.9	<0,0001
≥2	77	22.3	22	6.5	99	14.5	0,0942
Total	345	100	340	100	685	100	
B. Condoms use							
In all sexual encounters	212	61.4	164	48.2	376	54.9	<0.0001
In some sexual encounters	119	34.5	143	42.1	262	38.2	0.2084
Do not use condoms	14	4.1	33	9.7	47	6.9	0.5182
Total	345	100	340	100	685	100	
C. Use Condom with							
Occasional partner	65	18.8	80	23.5	145	21.2	0.4924
Regular partner	57	16.5	138	40.6	195	28.4	<0.0001
All partners	223	64.6	122	35.9	345	50.4	<0.0001
Total	**345**	**100**	**340**	**100**	**685**	**100**	

The table shows the risk attitude of students. About 14.5% of youths reported having more than two partners; 55.9% had one partner and 29.6% did not have any sexual intercourse within the previous three months. On condom use, 6.9% of them did not use condoms while 38.2% had never used condoms. The majority of the students (54.9%) used condoms in all sexual encounters. There was a gender difference in condom usage, 9.7% of female students vs. 4.1% of male students did not use condoms while 42.1% of the former vs. 34.5% of latter did not use condoms. The risk attitude is high. 21.2% and 28.4% for occasional and usual partners respectively and only 50.4% use condoms with their sexual partners.

Table 3: HPV knowledge related to sex and sexual activity

	Virgins				P value	Sexually Active				P value	Total Students			
	YES		NO			YES		NO			YES		NO	
	No	%	No	%		No	%	No	%		No	%	No	%
Male	26	20.1	103	79.9	<0.0001	70	20.3	275	79.7	<0.0001	96	20.3	378	**79.7**
Female	83	23.6	269	76.4	<0.0001	76	22.3	264	77.7	<0.0001	159	23.0	533	**77.0**
Total	109	22.7	372	77.3	-	146	21.3	539	78.7	-	255	21.9	911	78.1

In general, the majority (78.1%) of the participants had no knowledge of HPV. This lack of knowledge persisted irrespective of gender and sexual activity.

months. There is a correlation between age and both STIs and HIV testing. It is therefore, clear that there is a great need for the integration of services for young people on reproductive health.

All the students who took part in the study did not know the link between HPV infection and cervical cancer. This result is very important in the context of cervical cancer. [24-25] In this context, sexual behaviour becomes a determining risk factor. Sexual behaviour needs to be addressed and explored to prevent contact with HPVs and other sexually transmitted diseases (STD), including cervical cancer.

The results of this study also have implications for future HIV prevention programs. Today, there are possibilities to improve immune protection against HPV infection through the use of a preventive vaccine. [26] This should not negate the importance of education in encouraging responsible sexual behaviour in young people.

CONCLUSION

This study suggests that high risk sexual behaviour is prevalent among adolescents in Cameroon. The education of early teens is important not only for the avoidance of HIV and AIDS, but also for prevention

of cervical cancer. This education should include information about the relationship between sexual behaviour, HPV infection and cervical cancer. Adolescents should be targeted with preventive interventions when they are in secondary schools to discourage early initiation of intercourse. This is likely to remain important even when primary prevention of cervical neoplasia through HPV immunisation of populations is effected.

ACKNOWLEDGEMENTS

FOOTNOTES

Competing interests: Authors declare no competing interests.

Authors' contributions: All authors were responsible for the conception and design of the study protocol, and approved the final version of the manuscript. In addition KMML conceived the study, participated in the acquisition of data, performed the statistical analysis, and drafted the manuscript; WA and DNR participated in data acquisition; NNA participated in data analysis, statistical analysis and critically read the manuscript.

REFERENCES

1. López-Revilla R, Martínez-Contreras LA, Sánchez-Garza M. Prevalence of high-risk human papillomavirus types in Mexican women with cervical intraepithelial neoplasia and invasive carcinoma. Infect Agent Cancer. 2008;3:3-10.
2. Ho GYF, Bierman R, Beardsley L, Chang CJ, Burk RD. Natural history of cervicovaginal papillomavirus infection in young women. N Engl J Med 1998;338:423-428.
3. Bosch FX, Castellsague X, Munoz N et al. Male sexual behavior and human papillomavirus DNA: key risk factors for cervical cancer in Spain. J Natl Cancer Inst 1996;88:1060-1067.
4. Baay MF, Verhoeven V, Avonts D, Vermorken JB. Risk factors for cervical cancer development: what do women think? Sex Health 2004;1(3):145-149.
5. Murthy NS, Mathew A. Risk factors for pre-cancerous lesions of the cervix. Eur J Cancer Prev. 2000;9(1):5-14.
6. Ng'ayo MO, Bukusi E, Rowhani-Rahbar A et al. Epidemiology of human papillomavirus infection among fishermen along Lake Victoria Shore in the Kisumu District, Kenya. Sex Transm Infect. 2008;84:62-66.
7. Bosch FX, Lorincz A, Muñoz N, Meijer CJ, Shah KV. The causal relation between human papillomavirus and cervical cancer. J Clin Patho 2002;55:244-265.
8. Walboomers JM, Jacobs MV, Manos MM et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. J Pathol 1999;189:12-19.
9. Parkin DM, Bray F, Ferlay BJ, Pisani P. Global cancer statistics 2002. CA Cancer J Clin. 2005;55: 74-108.
10. Nielson CM, Flores R, Harris RB et al. Human papillomavirus prevalence and type distribution in male anogenital sites and semen. Cancer Epidemiol. Biomarkers Prev. 2007;16:1107-1114.
11. Melbye M, Frisch M. The role of human papillomaviruses in anogenital cancers. Semin Cancer Biol. 1998;8:307–313.
12. Kreimer AR, Alberg AJ, Viscidi R, Gillison ML. Gender differences in sexual biomarkers and behaviors associated with human papillomavirus-16, -18, and -33 seroprevalence. Sex Transm Dis. 2004;31:247-256.
13. Moscicki AB, Ellenberg JH, Farhat S, Xu J. Persistence of Human Papillomavirus Infection in HIV-Infected and -Uninfected Adolescent Girls: Risk Factors and Differences, by Phylogenetic Type. J Infect Dis 2004;190:371-45
14. Moscicki AB, Shiboski S, Broering J et al. The natural history of human papillomavirus infection as measured by repeated DNA testing in adolescent and young women. J Pediatr 1998;132(2):277–284.
15. Passmore JS, Milner M, Denny L. Comparison of cervical and blood T-cell responses to human papillomavirus-16 in women with human papillomavirus-associated cervical intraepithelial neoplasia. Immunol 2006;119:507-514.
16. de Jong A, van Poelgeest MIE, van der Hulst JM et al. Human Papillomavirus Type 16-Positive Cervical Cancer Is Associated with Impaired CD4+ T-Cell Immunity against Early Antigens E2 and E6. Cancer Res 2004;64:5449-5455.
17. Thompson WD. Statistical analysis

of case-control studies. Epidemiol Rev. 1994;16(1):33-50.

18. Lydie N, Robinson NJ, Ferry B et al. Mobility, sexual behavior, and HIV infection in an urban population in Cameroon. J Acquir Immune Defic Syndr. 2004;35(1):67-74.

19. Da Ros CT, Schmitt Cda S. Global epidemiology of sexually transmitted diseases. Asian J Androl 2008;10(1):110-114.

20. Winer RL, Feng Q, Hughes JP, O'Reilly S, Kiviat NB, Koutsky LA. Risk of female human papillomavirus acquisition associated with first male sex partner. J Infect Dis 2008;197(2):279-282.

21. Manlove JS, Ryan S, Franzetta K. Risk and protective factors associated with the transition to a first sexual relationship with an older partner. J Adol Health 2007;40:135-143.

22. Richardson H, Kelsall G, Tellier P et al. The natural history of type-specific human papillomavirus infections in female university students. Cancer Epidemiol Biomarkers Prev. 2003;12(6):485-490.

23. Plautz A, Meekers D. Evaluation of the reach and impact of the 100% Jeune youth social marketing program in Cameroon: findings from three cross-sectional surveys. Reprod Health 2007;4:1-15.

24. Shew ML, Fortenberry JD, Tu W. Association of condom use, sexual behaviors and sexually transmitted infections with the duration of genital human Papillomavirus infection among adolescent women. Arch Pediatr Adolesc Med. 2006;160(2):151-156.

25. Denny-Smith T, Bairan A, Page MC. A survey of female nursing students' knowledge, health beliefs, perceptions of risk, and risk behaviors regarding human papillomavirus and cervical cancer. Journal of the American Academy of Nurse Practitioners 2006;18(2):62-69.

26. McLemore MR. Gardasil: Introducing the new human papillomavirus vaccine. Clin J Oncol Nurs 2006;10(5):559-560.