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Prevalence and risk factors associated with Syphilis at the Copperbelt University Riverside campus, Kitwe Zambia

Chris Machila[1*], Herbert Tato Nyirenda[1], Chikuli K. Mulele[2]

[1]Department of Public Health, Copperbelt University, School of Medicine, Ndola Campus, P. O. Box 71191, Zambia

[2] Department of Pathology, Copperbelt University, School of Medicine, Ndola Campus, P. O. Box 71191, Zambia

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ABSTRACT

Background: Syphilis among other sexually transmitted diseases is a major health concern among college and university students. Studies have proven that university students in Africa comprise of sexually active population and hence the need to determine the prevalence of syphilis. With little evidence based data on prevalence of syphilis in Universities prompted this study to be undertaken. **Method:** It was a cross-sectional study. The objectives of the study were to determine the prevalence of syphilis and its associated factors. Participants were randomly selected and data was collected using a standardized questionnaire and 12.5% out of total 384 participants were tested using Rapid Plasma Reagin screening test.Data was entered and analyzed using SPSS version20.For the associated risk factors of Syphilis, we used bivariate, cross tabulations, Chi square, and binary logistic regression analysis to calculate adjusted odds ratios (AORs) and their 95% C.l. A p-value less than 0.05was considered as significant. **Results:** A total of 384 students participated in the survey, of which 215 (56%) were males, 169(44%) were females and 193 (50.3%) were in their First years and 191 (49.7%) were in their Final years. Also 48(12.5%) students out of 384 participants were tested for Syphilis and the prevalence was at 16.7%. The prevalence of syphilis at The Copperbelt University was 6.5%. Binary logistic regression showed that, the number of students who had sex under influence of alcohol was independently associated with syphilis[AOR 0.346 95%C.I (0.210, 0.571)] and also the number of partners was independently associated with syphilis [AOR 0.475 95%C.I (0.250, 0.899)]**Conclusion:** This study demonstrates the existence of syphilis among students at the Copperbelt University and there is need for introduction of comprehensive strategies such as health education programs that will help in reducing the prevalence of syphilis.

Key words: Condom, Student,Syphilis, Unprotected sex,Youth

Introduction

Syphilis or lues is a chronic systemic disease, which is acquired or congenital. It is caused by*T. pallidum*, which is a fastidious spirochete whose only natural hosts are humans. The usual source of infection is an active cutaneous or mucosal lesion in a sexual partner in the early (primary or secondary) stages of syphilis. The organism is transmitted from such lesions during sexual intercourse across minute breaks in the skin or mucous membranes of the uninfected partner. In cases of congenital syphilis, *T. pallidum* is transmitted across the placenta from mother to fetus, particularly during the early stages of maternal infection [1].It has been estimated that about 12 million people are affected by syphilis worldwide each year infection [2]A report by Euerle in 2014 suggested that the highest rates of syphilis are in Southeast Asia, followed closely by Sub-Sahara Africa[3]. In Zambia Powell reported that the prevalence of syphilis in men stood at 7.4% while in women it stood at 6.5% with the Copperbelt

**Correspondence*
Chris Machila
Department of Public Health, Copperbelt University, School of Medicine, Ndola Campus, P. O. Box 71191, Zambia.
E Mail: chrismachila05@gmail.com

province recording the highest levels in both men and women. The Copperbelt was closely followed by, Eastern, Luapula, Lusaka, North-Western and Western Provinces presenting significantly higher risk for women, and Copperbelt, Eastern and Lusaka Provinces presenting significantly higher risk for men [4]. Todd and Hayes reported that the disease affects mostly those between the ages of 15 and 40 years (mostly youths) who are sexually active, have multiple sexual partners, engage in unprotected sex and are living in poverty[5]Similarly, Powell and Seage in 2005 reported that having paid for sex to FCSWs is a risk factor in the spread and contraction of syphilis among youths in tertiary learning institutions around the world[4]There are several adverse effects of this disease in the affected population.

Syphilis if not treated early has serious complications/consequences in infants, New-borns and adults. According to Kumar, infants who are conceived by syphilitic mothers, have the highest chances of acquiring syphilis known as congenital syphilis and these infants present with hepatomegaly, bone abnormalities, pancreatic fibrosis, and pneumonitis[1]. While Kaneshiro reports that New-borns born of syphilitic mothers present with blindness, deafness deformity of the face and nervous system problems and the author adds on to say, that in adults syphilis complicates to aneurysms of the proximal aorta, myocardial ischemia, meningo vascular disease and tabes dorsalis [6].Muzala reports that measures have been put in place by Governments and NGOs to combat syphilis and these measures include; regular risk reduction counseling, provision of health education in learning institutions and on television, radio, Health magazines and newspapers. In addition to the above stated, the Government of Zambia has provided an initiative in issuing of free condoms [7].Despite these preventive measures put in place, syphilis still remains a global health problem. Therefore it is the purpose of this study to determine the prevalence and identify the risk factors associated with syphilis at CBU.

Material and methods

Study area and population

The study area was the Copperbelt University (CBU),Riverside campus Kitwe. CBU is one of the Public universities in Zambia and it is located in the Copperbelt province of Zambia in Kitwe District. It has a several other Campus around Zambia but with Riverside campus being the largest with a student population of about 10,000 with several schools both postgraduate and undergraduate, but only undergraduate schools were included in the study namely school of Business, Engineering, Mining and Mineral Sciences, Natural Resources, Mathematics and Natural sciences, and school of Built Environment and this is the reason why Riverside campus was chosen as a study area.

Study design

The study design was a cross-sectional study looking at the prevalence rate and some of the factors affecting the prevalence rate of Syphilis among students at the Copperbelt University. The study was quantitative in nature.

Eligibility Criteria

Registered students in 2016/2017 academic year on Full-Time(between 18-40 years) and in their First and Final year. The reason why students only in their First and Final year were eligible to participate in the study was to determine which students are more infected with syphilis between those that have been in school a long time (Final Years) or those that just joined the institution (First years) and also to asses which group had risk behaviors.

Sample size

The sample size was determined by using A Statcalc program in EPI INFO version 6.04 with the following parameters at CBU (total sample population size of 10,000 students. level of confidence (z) 1.96 at 95% confidence level, marginal error of 5% and baseline levels of indicators 50% as no estimates existed) of the 10,000 participants 370 were selected.

Sampling

Using the list of all registered First and Final year students, a Systematic random sampling technique was used to select participants, in which at least 60 students were selected per school from the 6 undergraduate schools and among the 60 students, at least 30 were in their first year and the other 30 were in Final year. The reason for this selection was to make sure that each school had an equal representation.

Data collection

The primary technique of collecting quantitative data was a self-developed questionnaire complied from the world health organization (WHO) questionnaire and New York State Health Department questionnaire. The 22-question questionnaire was used to collect the data and the first part of the questionnaire focused on age, sex, school and year of study. The other part solicited inquiries related to the participants' sexual-behavior experiences. Within the sample of 384 participants there was a sub-sample of 48 participants that were subjected to Rapid Plasma Reagin (RPR)screening

tests. The reason for some participants to be subjected to RPR screening tests was for result validation, that is to validate results from the questionnaire with the RPR screening tests results.

Data entry and Data analysis

Data was entered and analyzed using SPSS version 20 and it was double checked for validity**.** The analysis included running frequencies, cross-tabulations, Chi square and logistic regression. Adjusted odds ratios (AOR) and their 95% CIs were calculated and only those results that yielded a p value less than 0.05 were considered statistically significant.

Ethical consideration

The research proposal was reviewed and approved by Tropical Disease Research Center (TDRC) Ethics Committee at Ndola Teaching Hospital. Then authorization document was obtained from the Dean of students Copperbelt University, Riverside campus Kitwe Zambia.

Only persons who consented were enrolled into the study and further information was given to participants after consenting that participating in the study was purely voluntary, no names were used and participants were free to withdraw at any time without any explanation. All questionnaires were strictly confidential documents.

Results

Prevalence and risk factors associated with syphilis in bivariate analysis

This prevalence was based on the responses given by the participants when answering the 22-question questionnaire. Overall the prevalence of syphilis was 6.5%. The most affected were single students in their final year between the ages of 21-30. The most affected schools were school of Built environment with 1.8%, then school of Engineering with 1.6% and school of Natural resources. Using cross tabulation and Chi Square the prevalence of syphilis on the 48 (12.8%) students out of 384 subjected to RPR screening tests was determined. It was found to be 2(4.2%) by the responses from the questionnaire, while by RPR tests it was found to be 8(16.7%). The RPR based Prevalence was higher than the questionnaire based prevalence by 4(12.5%).The results are shown in **tables 1.**

Table1: Showing the distribution of prevalence by quesionnaire and RPR based results

	Questionnaire Results				RPR Results			
FACTOR	Total (%)	YES (%)	NO (%)	P Value	TOTAL (%)	Positive (%)	Negative (%)	P Value
Gender				0.999				0.895
Male	56	56	56		60.4	62.5	60	
Female	44	44	44		39.6	37.5	40	
Age Group				0.107				0.883
18-20	13	0	13.9		14.6	12.5	15	
21-30	85.7	100	84.7		83.3	87.5	82.5	
31-40	1.3	0	1.4		2.1	0	2.5	
Marital Status				0.743				0.833
Single	94.8	92	95.8		89.6	87.5	90	
Married	4.9	8	4.8		10.4	12.5	10	
Divorced	0.3	0	0.3		0	0	0	
Year Of Study				0.59				1
First	50.3	32	51.5		50	50	50	
Final	49.7	68	48.5		50	50	50	
School				0.111				0.945
Business	16.7	0.5	16.1		16.7	12.5	17.5	
Engineering	16.7	1.6	15.1		16.7	12.5	17.5	
Built Environment	16.7	1.8	14.8		16.7	12.5	17.5	

Mines & Mineral Sciences	16.9	1.3	15.6		16.7	25	15	
Mathematics And Natural Sciences	16.7	0	16.7		16.7	25	15	
Natural Resources	16.4	1.3	15.1		16.7	12.5	17.5	
Had Sex Before In 6-9months				0.001				0.581
Had Sex	64.1	96	38.2		95.8	100	95	
Never Had Sex Before	35.9	4	61.8		4.2	0	5	
No= Partners				<0.001				0.51
One	64.3	36	67.4		56.2	57.5	50	
Two	21.7	48	22.3		31.2	35	12.5	
More Than Two	14.1	16	10.3		12.5	7.5	37.5	
Used Condoms				0.441				0.584
Used	63.1	56	63.8		66.7	75	65	
Didn't Use	36.9	4	36.2		33.3	25	35	
Type Of Sex				0.001				0.739
0ral	7.2	0	8		4.2	0	5	
Vaginal	69.9	48	72.3		77.1	75	77.5	
Both Oral And Vaginal	21.7	44	19.2		18.8	25	17.5	
Anal	1.2	8	0.5		0	0	0	
Sex With Fcsws				<0.001				0.62
Yes	14.3	44	12.3		18.8	12.5	20	
No	85.7	56	87.7		81.2	87.5	80	
Sex Under Influence				<0.001				0.23
Yes	18.8	76	14.8		29.2	62.5	22.5	
No	81.2	24	85.2		70.8	37.5	77.5	
Sharing Of Needles				0.001				0.651
Yes	3.1	16	2.2		97.9	0	2.5	
No	96.9	84	97.8		2.1	100	97.5	
Sample (N)	384	25	359		48	8	40	

The risk factors associated with syphilis in bivariate analysis that were statistically significant included the following; those that had sex in the last 6-9 months P value=0.001, number of partners p value <0.001, type of sex p value=0.001, sex under influence of alcohol/drugs p value<0.001 and sharing of needles p value=0.001 and these results were run into logistic regression.

The risk factor associated with syphilis in binary logistic regression

A binary logistic regression was done and only number of partners and those that had sex under influence of alcohol/drugs were independently significant. AOR at 95% Cl students who had sex under influence of alcohol were 0.346 less likely to contract syphilis compared to those that did not. The number of partners 0.475 times likely to contract syphilis compared to those that did not. The results are in table 2 below.

Table 2: Risk factors associated with syphilis in Binary Logistics

FACTOR		AOR(95% C.L)	P Value
Had sex before		0.726(0.120,4.378)	0.727
	Yes		
	No		
Number of partners		0.475(0.250,0.899)	0.02
	One		
	Two		
	More than two		
Sex under influence		0.346(0.210,0.571)	0.001
	Yes		
	No		
Sharing Needles		0.796(0.354,1.790)	0.581
	Yes		
	No		
Type of sex		0.573(0.30,11.022)	0.712
	oral		
	Vaginal		
	both oral and vaginal		
	Anal		

Discussion

We found the Overall prevalence of syphilis at The Copperbelt University to be at 6.5% (males accounted for 3.6% while females accounted for 2.9% and the reason why the prevalence was high in men it might be do the fact that they were more males than female participants) based on the prevalence from the questionnaire.

The implications of our findings would suggest that students at CBU do not make necessary efforts to get screened for Syphilis and other related sexually transmitted infections. In addition, government strategies on combating sexually transmitted infections might not be sufficient enough or the government focuses on carrying out health campaigns in lower education like high schools and the general public while overlooking the students at tertiary institution. Students also might not be well informed on the need for use of condoms when having sex. Furthermore, our findings could also be attributed to the fact that, Syphilis in its initial phase might somewhat be asymptomatic if the soft chancre does not appears might be asymptomatic and students might not see the need for testing think they are healed.

Comparing our findings with a similar study done in china among college students with a prevalence of 5.7% [8] with men affected more than females, our findings were higher. Our findings were also higher than another study done at five large Universities [9] in Kampala,Uganda (in which they found the prevalence of syphilis to be at 1.7%). However the prevalence of syphilis in this survey was lower than the study done in Beijing in which the prevalence was 7.43% [10].

The prevalence from the 48 students that consented to RPR tests was found to be at 16.7% while the prevalence from answered questionnaire was 4.2% showing a 12.5% difference indicating that students might not have known they had syphilis or they didn't answer the questionnaire truthfully. To our knowledge there was no evidence based data on RPR tests on students to compare with.

In addition, we found that the prevalence of syphilis was higher in males than females, 3.6%, 2.9% respectively. This agrees with a study done in Uganda in which they also found that the prevalence was higher among males than females furthermore our study also determined the prevalence of syphilis according to year of study in which we found that First years were less affected than the final years by 2.1%, 4.1% respectively.

Concerning marital status we were able to determine that the prevalence of syphilis was much higher in single students accounting for 6.0% out of the 6.5% overall prevalence and this was in conformity of a study in Europe [11]

In our study students that had sex under the influence of alcohol and those that had one partner were independently associated with syphilis which is in conformity of a similar study done in chin [12]a however gender, age, marital status, year of study, type of sex, having sex with a Sexworker and sharing of needles were not independently associated with syphilis.

Limitations

There was lack of enough funding to acquire enough Rapid Plasma Reagin (RPR) screening tests to test for all the participants. Despite the full turn up of respondents, the results cannot be generalized to other Universities in the country, as places may differ in terms of knowledge, traditions and living conditions.

Recommendations

The recommendations are

1) Provide student awareness on dangers of syphilis and other sexually transmitted infections
2) Enhance the issuing out free condoms and other barrier methods at CBU Riverside campus
3) Provide sufficient diagnostic tools and treatment for syphilis and other sexually transmitted infections
4) Encourage students who are sexually active to be routinely screened for sexually transmitted infections.

Conclusion

This study demonstrates existence of syphilis among students at the Copperbelt University and there is need for introduction of comprehensive strategies such as health education programs that will help in reducing the prevalence of syphilis.

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Acronyms

CBU The Copperbelt University
FCSWs Female Commercial Sex Workers
NGOs Non-Governmental Organizations
STIs Sexually Transmitted Infections
TDRC Tropical Disease Research Centre
T.Pallidum Treponema Pallidum
RPR Rapid Plasma Reagin

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