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Permalink
https://escholarship.org/uc/item/9ks914bh

Journal
PloS one, 5(12)

ISSN
1932-6203

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Publication Date
2010

DOI
10.1371/journal.pone.0015552

Peer reviewed
Male Circumcision in the General Population of Kisumu, Kenya: Beliefs about Protection, Risk Behaviors, HIV, and STIs

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Abstract

Using a population-based survey we examined the behaviors, beliefs, and HIV/HSV-2 serostatus of men and women in the traditionally non-circumcising community of Kisumu, Kenya prior to establishment of voluntary medical male circumcision services. A total of 749 men and 906 women participated. Circumcision status was not associated with HIV/HSV-2 infection nor increased high risk sexual behaviors. In males, preference for being or becoming circumcised was associated with inconsistent condom use and increased lifetime number of sexual partners. Preference for circumcision was increased with understanding that circumcised men are less likely to become infected with HIV.

Methods

This report utilizes a sub-set of questions included in the antiretroviral therapy impact study (ARTIS) conducted in the Municipality of Kisumu between July and October of 2006. Complete details of the sample, study design, and methodology are published elsewhere[5].

In brief, Kisumu is Kenya’s third largest city with a population of approximately 400,000 residents[6]. The majority of Kisumu’s population belongs to the Luo ethnic group, one of Kenya’s largest and the only major group that does not traditionally practice circumcision. The study sample was selected by multi-stage random sampling with cluster definition and systematic sampling followed by random household selection. All men and women aged 15 to 49 years who slept in a selected household the night before the first study visit were eligible for study participation.

The final study protocol, consent and questionnaire were approved by the ethical committees of the Kenya Medical Research Institute and the University of California San Francisco. Written informed consent was obtained for all participants followed by face-to-face interview regarding sociodemographic characteristics, sexual health, and MC/HIV related knowledge attitude and belief (KAB) with questions based on those developed in prior studies in this population[7]. Consenting participants provided venous blood for herpes simplex virus 2 (HSV-2) and HIV testing. Male participants were asked to consent to a visual genital exam to check circumcision status and the presence of genital ulcers. All study procedures were conducted in a private location in or near the home.
Data analysis was performed using SAS (Version 9.1.3, SAS Institute; Cary, NC, USA). Descriptive summaries were based on frequencies and proportions. Associations between variables and HIV seroprevalence are summarized using odds ratios. Non-parametric tests for the differences between groups were used, as appropriate, based on the distribution of continuous variables. To ensure comparability with ARTIS primary study results [5] and the Kisumu arm of the ‘multicentre study’ completed by Buye and colleagues in 1998[8], we used a similar overall analytic approach and did not adjust for sampling weights in analyses.

Self reported circumcision status is used throughout, unless specified. All reported odds ratios are adjusted for age, number of sexual partners, ethnic group, and marital status using logistic regression techniques. Any factor showing significant association with a given outcome was assessed for confounding through the comparison of crude and adjusted measures. Any additional factors controlled for are stated in text and tables as appropriate. Analysis of sexual outcomes was limited to participants reporting a history of sexual intercourse.

Results

Out of 1,050 households visited, 864 (82.3%) had inhabitants eligible for enrollment, resulting in the identification of 2,794 eligible individuals. Of these, 1,833 (65.6%) were contacted and asked to enroll with 178 (9.7%) refusing to participate. The final sample included a total of 1,655 individuals, 749 (45%) men and 906 (55%) women aged 15–49, with 1,508 (91%) giving blood for HIV testing and 1,525 (92%) reporting ever having had sexual intercourse. Just over half (53%) of participants were between the ages 15–24 years and the majority described themselves as Luo (77%) and Christian (95%). Approximately 53% had no more than a primary school education, 36% had some post primary education (e.g. vocational training or secondary school), 6% had attended college or university, and 2% had no formal education.

Seven hundred and fourteen (95%) men provided self reported circumcision status and 262 (37%) consented to confirmatory visual genital exam. By self-report, 355 (75%) men were uncircumcised and 179 (25%) circumcised. By clinical exam, 180 men (69%) were medically defined as uncircumcised, 73 (28%) circumcised, and 9 (3%) were considered ‘abnormally’ or partially circumcised. Twelve men (7%) who self-reported as circumcised were clinically defined as uncircumcised. Two men self-reporting as uncircumcised were clinically defined as circumcised. Considering the classification of ‘abnormally circumcised’ as circumcised, the sensitivity of self-reported circumcision status in this population was 96% and specificity was 99%.

Of participants providing blood for testing, 1,393 (92%) reported having had sexual intercourse. Of these, one hundred and eight males (17%) and 202 females (26%) tested positive for HIV. Two hundred and fifty-two men (41%) and 528 females (68%) tested positive for HSV-2. Three participants reporting no previous sexual intercourse tested HIV positive (1 male and 2 female). All individuals, including these three, reporting no sexual history were excluded from further analysis of sexually transmitted outcomes (i.e. HIV, HSV-2).

MC status and demographic factors

As expected, circumcision status was strongly related to self-identified ethnic group: 11% of Luo males reported being circumcised compared to 79% of non-Luos (OR = 32.2, 95% CI 20.0–52.0). Men reporting being circumcised were younger than those not circumcised (mean age = 23 versus 28 years, p<.001) and more likely to be Muslim (81% [n = 31] of Muslim men reported being circumcised compared to 22% [n = 673] of Christians; p<.0001). The median age at circumcision was 12 years (IQR 8–15 years). Men identifying as Luo reported significantly older age at circumcision (mean age 14) compared to non-Luo men (11 years; p = .005). Table 1 presents demographic factors by preference for circumcision in uncircumcised men.

MC preference and belief regarding reduced risk of HIV infection

In this study population, circumcision status was not associated with HIV or HSV-2 seroprevalence or current genital ulceration. By preference for circumcision, no significant difference between age at sexual debut, lifetime number of sex partners, marital status, and ethnicity (HIV: OR = 1.0; 95% CI 0.5–2.0; HSV-2: OR = 1.0; 95% CI 0.3–1.7; Genital ulceration: OR = 0.9, 95% CI 0.3–1.8). In uncircumcised men and in women, circumcision preference was not associated with HIV or HSV-2 serostatus. Men favoring future circumcision were, however, two and a half times more likely to report current genital ulceration (OR 2.5, 95% CI 1.3–3.1) than men not favoring circumcision.

By circumcision status, no significant difference between age at sexual debut, lifetime number of sexual partners, or reported condom use was observed. Women preferring uncircumcised partners did, however, report more lifetime number of partners, (median number 3 vs. 2; Komogorov-Smirnov, p = 0.06). Uncircumcised men with preference to become circumcised were more likely to never or inconsistently use condoms compared to other uncircumcised men (OR = 2.7; 95% CI, 1.6–4.7), and less likely to have an age of sexual debut less than 16 years of age (OR = 0.55; 95% CI 0.4–0.8). Additionally, uncircumcised men who preferred to be circumcised were more likely to report a sexual history including one or more casual partnerships (OR 1.9, 95% CI 1.03–3.8). Table 2 provides further detail for uncircumcised men regarding circumcision preference, associated high risk behavior, and STI infection.

Discussion

We have briefly described the circumcision prevalence, preference, knowledge, and beliefs in a traditionally non-circumcising community just prior to widespread promotion of VMMC for HIV prevention.

In Kisumu, MC prevalence in Luo men was stable at 10% between 1997 and the period of the current study nearly a decade later[9]. We observed no difference in reported sexual risk-taking behavior between circumcised and uncircumcised men suggesting
Table 1. Demographic factors and beliefs about HIV by preference for circumcision in uncircumcised men – Kisumu, Kenya.

|                              | Preference to be Circumcised n = 284 (55%) | Preference to be Uncircumcised n = 229 (45%) | p-value |
|------------------------------|--------------------------------------------|-----------------------------------------------|---------|
| Age                          |                                            |                                               |         |
| Median [range] (SD = )       | 23 [15–47] (SD = 7.3)                      | 22 [15–49] (SD = 9.2)                         | 0.06    |
| Ethnicity                    |                                            |                                               |         |
| Luo ethnic group             | 259 (54%)                                  | 224 (46%)                                     | 0.001   |
| All other ethnic groups      | 25 (83%)                                   | 5 (17%)                                        |         |
| Religion                     |                                            |                                               |         |
| Catholic                     | 104 (62%)                                  | 63 (38%)                                      | 0.02    |
| Muslim                       | 5 (83%)                                    | 1 (17%)                                       |         |
| Other Christian              | 170 (51%)                                  | 164 (49%)                                     |         |
| Region (urban vs. rural)     |                                            |                                               |         |
| Urban community              | 120 (59%)                                  | 83 (41%)                                      | 0.17    |
| Rural community              | 164 (53%)                                  | 146 (47%)                                     |         |
| Education                    |                                            |                                               |         |
| No formal education          | 7 (41%)                                    | 10 (59%)                                      | 0.006   |
| Primary school education     | 125 (49%)                                  | 132 (51%)                                     |         |
| Secondary school education   | 131 (64%)                                  | 74 (36%)                                      |         |
| Post-secondary school        | 17 (57%)                                   | 13 (43%)                                      |         |
| Alcohol (use in last 4 weeks)|                                            |                                               |         |
| Yes                          | 141 (63%)                                  | 82 (37%)                                      | 0.002   |
| No                           | 143 (49%)                                  | 147 (51%)                                     |         |

doi:10.1371/journal.pone.0015552.t001

Table 2. Association of MC preference in uncircumcised men with STI infection and high risk behaviors.

| Factor                        | Preference to be Circumcised n = 284 (55%) | Preference to be Uncircumcised n = 229 (45%) | OR (95% CI) |
|-------------------------------|--------------------------------------------|-----------------------------------------------|-------------|
| **HIV Status**                |                                            |                                               |             |
| Positive                      | 48 (20%)                                   | 28 (16%)                                      | 1.42 (0.8–2.5) |
| Negative                      | 197 (80%)                                  | 152 (84%)                                     |             |
| **HSV status**                |                                            |                                               |             |
| Positive                      | 108 (44%)                                  | 73 (41%)                                      | 1.23 (0.8–1.9) |
| Negative                      | 137 (56%)                                  | 107 (59%)                                     |             |
| **Genital Ulcers**            |                                            |                                               |             |
| Current report/visible genital ulcers | 36 (14%)                                  | 12 (6%)                                       | 2.55 (1.3–5.0) |
| No current genital ulcerations| 220 (86%)                                  | 185 (94%)                                     |             |
| **Condom use**                |                                            |                                               |             |
| Inconsistent use              | 67 (67%)                                   | 41 (42%)                                      | 2.82 (1.6–5.0) |
| Consistent use                | 33 (33%)                                   | 57 (58%)                                      |             |
| **History of ‘casual’ sex partners** |                                         |                                               |             |
| History of casual partners    | 63 (58%)                                   | 35 (39%)                                      | 1.92 (1.03–3.6) |
| No history of casual partners | 45 (42%)                                   | 55 (61%)                                      |             |
| **Lifetime number of sex partners** |                                         |                                               |             |
| Median (IQR)                  | 6 (3–11)                                   | 5 (3–9)                                       | P = 0.22    |

*Statistically significant association (p ≤ 0.05),

1Controlling for age, number of sex partners, ethnic group (Luo/non-Luo), and marriage status.

*Controlling for age.

1Difference by Kolmogorov-Smirnov test for comparing two groups.

doi:10.1371/journal.pone.0015552.t002
that no risk compensation was occurring among circumcised men. The majority of men, 75% of those circumcised and 61% of those uncircumcised, understood that circumcised men are less likely to get infected by HIV, and this belief was strongly associated with circumcision preference in men and women.

In uncircumcised men and Luo women there were high levels of circumcision acceptability and preference. Almost 60% of uncircumcised men stated an inclination to be circumcised and over 60% of women reported preferring circumcised partners despite the relatively low potential exposure to circumcised partners in the population. Again, circumcision predilection was associated with the belief that circumcised men are less likely to be infected by HIV, indicating that reduced HIV risk is a potentially motivating factor. This agrees with a 2005 study by Mattson et al. finding that circumcision preference in Nyanza would likely be higher if the procedure was proven effective[10].

Uncircumcised men who preferred circumcision were more likely to report inconsistent or no condom use, describe sexual partners as ‘casual’, and report current/recent genital ulcers. This finding reflects conclusions from a 2007 study completed in a similar population by Agot and colleagues that men engaging in riskier sex and reporting more frequent penile injury were more likely to be early adopters of VMMC [11]. Such findings may indicate the self-selection of higher risk individuals for early VMMC adoption potentially leading to greater impact in the community than the biological protective effect of being circumcised [12,13].

This study did not detect the expected association between male circumcision and HIV seropositivity, possible due to limitations in sample size and prevalence. With 38% of men and nearly 65% of women HSV-2 positive, however, our ability to detect any association between genital herpes and circumcision status or preference for circumcised partners was improved - no association was found. This supports the lack of risk on HSV-2 seroconversion with MC noted in the Kisumu trial [14], but is in contrast to the protective effect noted in the Rakai and Orange Farm trials [15].

Our study had a number of limitations. As with any survey, self report bias can be a significant limitation. Additionally, there is a possibility of misclassification of circumcision status; however, in this population self report had strong agreement with confirmatory clinical exam. Ultimately, our ability to contact just over 65% of eligible participants for enrollment is a limitation and could impact the validity of our findings. Strengths of this study include a randomly selected general population sample, the availability of HIV and HSV-2 test results linked to responses to a structured interview, and a relatively large sample size.

By sampling the population from which the randomized controlled trial of MC in Kenya was conducted, this study offers insight into the early impact of that study on the surrounding community. Considering the encouraging results of that trial, the two similar trials in South Africa and Uganda, the international health community’s subsequent endorsement of MC as an HIV prevention measure, and the Kenyan government’s national plan for community based VMMC promotion and provision, this work serves as a valuable baseline for subsequent assessments of changes in characteristics, perceptions, uptake, and impact of MC in Kisumu Kenya over the coming years.

Acknowledgments

We wish to acknowledge the support of Director, Kenya Medical Research Institute (Nairobi); Director, Center for Microbiology Research (Nairobi); staff of the ARTIS Project and the Family AIDS Care and Educational Services (Kisumu); and the University of California (San Francisco) - particularly Kimberly Bale.

Author Contributions

Conceived and designed the experiments: RCB EAB MM CRC. Performed the experiments: ZK. Analyzed the data: MW. Wrote the paper: MW RCB EAB MM ZK CRC.

References

1. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, et al. (2005) Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 trial. PLoS Medicine 2: 1–11.
2. Bailey RC, Moses S, Parker CB, Agot K, Maclean I, et al. (2007) Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomized controlled trial. Lancet 369: 643–656.
3. Gray RH, Kigozi G, Serwadda D, Makumbi F, Watya S, et al. (2007) Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. Lancet 369: 657–666.
4. WHO/UNAIDS Technical Consultation (2007) Male Circumcision and HIV Prevention: Research Implications for Policy and Programming - Montreux, 6 - 8 March 2007. Geneva: WHO Press.
5. Cohen CR, Montandon M, Carrico AW, Shiboski S, Bontjem A, et al. (2009) Association of Attitudes and Beliefs towards Antiretroviral Therapy with HIV- Serore prevalence in the General Population of Kisumu, Kenya. PLoS ONE 4: e4573. Epub 2009 Mar 4574.
6. Central Bureau of Statistics [Kenya]. Ministry of Finance and Planning (2002) Kenya 1999 Population and Housing Census. Volume VII: Analytical Report on Population Projections.
7. Bailey RC, Muga R, Poulsussen R, Abicht H (2002) The acceptability of male circumcision to reduce HIV infections in Nyanza Province, Kenya. AIDS Care 14: 27–40.
8. Bueir A, Carael M, Hayes RJ, Auvert B, Ferry B, et al. (2001) Multicentre study on factors determining differences in rate of spread of HIV in sub-Saharan Africa: methods and prevalence of HIV infection. AIDS 15 Suppl 4: S5–14.
9. Auvert B, Bueir A, Lagarde E, Kahindo M, Chege J, et al. (2001) Male circumcision and HIV infection in four cities in sub-Saharan Africa. AIDS 15 Suppl 4: S31–40.
10. Mattson CL, Bailey RC, Muga R, Poulsussen R, Onyango T (2005) Acceptability of male circumcision and predictors of circumcision preference among men and women in Nyanza Province, Kenya. AIDS Care 17: 102–104.
11. Agot KE, Kiarie JN, Nguyen HQ, Odhiambo JO, Onyango TM, et al. (2007) Male Circumcision in Siaya and Bondo Districts, Kenya: Prospective Cohort Study to Assess Behavioral Disinhibition Following Circumcision. Journal of Acquired Immune Deficiency Syndromes: JID 45: 66–70.
12. Weiss HA, Halperin D, Bailey RC, Hayes RJ, Schmid G, et al. (2008) Male circumcision for HIV prevention: from evidence to action? Aids 22: 567–574.
13. Weiss HA, Quigley MA, Hayes R (2000) Male circumcision and risk of HIV infection in sub-Saharan Africa: a systematic review and meta-analysis. AIDS 14: 2361–2370.
14. Bailey RC (2009) Personal Communication. In: Westercamp MD, ed. Kisumu, Kenya.
15. Tobian AA, Serwadda D, Quinn TC, Kigozi G, Gevitt PE, et al. (2009) Male circumcision for the prevention of HSV-2 and HPV infections and syphilis. N Engl J Med 360: 1298–1309.