

## Use of lemon or lime juice douches in women in Jos, Nigeria

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**Abstract.** *Objective:* To describe the use of lemon/lime juice for douching by female sex workers (FSWs) and family planning clients (FPCs) in Jos, Nigeria. *Method:* A total of 300 sexually active women comprising 200 FSWs and 100 FPCs were interviewed in June 2004 to determine the mode and rationale for the use of lemon/lime juice for sex. *Result:* Majority of the women 167/300 (55.7%, 95% CI = 50–61%) i.e. 163/200 (81.5%, 95% CI = 75–87%) FSWs, 4/100 (4%, 95% CI = 1–10%) FPCs used vaginal lemon/lime douches. Lime juice was used by 105/167 (62.8%, 95% CI = 55–70%), lemon juice by 30/167 (18%, 95% CI = 12–25%) or a mixture by 18/167 (10.8%, 95% CI = 7–25%). The juice was used either neat 44/167 (26%, 95% CI = 20–34%) or diluted in water 75/167 (45%, 95% CI = 37–53%) either before or after sex. Nineteen per cent (32/167) found the juice painful. Over half of the women believed that it protected them from pregnancy and/or sexually transmitted infections; they did not know their HIV status. Eighty-six per cent would recommend it to others, and 71% would be willing to take part in a study to evaluate its safety and efficacy. *Conclusion:* Lemon and lime juice are widely used for douches among women at high risk of HIV transmission. There is an urgent need to determine whether or not this practice promotes or prevents HIV infection.

*Additional keywords:* contraceptive, microbicide, female sex workers.

### Introduction

Women account for nearly 50% of the 42 million people living with HIV worldwide and in sub-Saharan Africa, the proportion of HIV-positive women is increasing due to their poor socio-economic circumstances and gender inequity.<sup>1</sup>

In our centre in Jos, Nigeria, HIV prevalence among pregnant women has risen from 0.25% in 1989<sup>2</sup> to 8.2% currently.<sup>3</sup> HIV infection among female commercial sex workers in Nigeria has been reported to be up to 60.6%.<sup>4</sup> Readily accessible and affordable ways of protecting women from HIV infection are urgently needed.

Women have a long history of using vaginal douching with lemon or lime juice, vinegar or some soft drinks in a belief that it may prevent pregnancy and sexually transmitted infections.<sup>5–8</sup> We wished to discover how extensively lemon or lime juice douching was being used by female sex workers (FSWs) and family planning clients (FPCs) in the city of Jos, Nigeria.

### Materials and methods

A questionnaire was administered in English or Hausa by trained counsellors to consecutive and consenting 200 FSWs in their brothels in Jos and 100 FPCs at the Family Planning Clinic at the Jos University Teaching Hospital (JUTH) in June 2004. This study was approved by the Ethical Committee of JUTH. The data were collated with File Maker Pro 6 ([www.filemaker.com/](http://www.filemaker.com/), verified October 2005) and analysed with SPSS statistical software ([www.spss.com/](http://www.spss.com/), verified October 2005).

### Results

The participating 200 FSWs had a mean age of  $26.7 \pm 5.5$  years, whereas the 100 FPCs were aged  $33.1 \pm 7.1$  years and both groups were predominantly literate. There were many more lemon/lime users among the FSWs (81.5%, 95% CI = 75–87%) than the FPCs (4%, 95% CI = 1–10%).

Table 1 shows lemon/lime juice was used either neat or diluted in water. About one-quarter of the FSWs used

**Table 1. The mode, preference and rationale for use of lemon/lime juice by sexually active women (female sex workers and family planning clients) in Jos, Nigeria**

Predictor ( <i>n</i> = 167)	<i>n</i> (%)	95% Confidence interval (%)
A. Do you use lemon or lime		
Lime	105(62.8)	55–70
Lemon	30(18.0)	12–25
Mixture	18(10.8)	7–16
Blank	14(8.4)	5–14
B. In what concentration do you use lemon/lime juice for sex?		
Neat (undiluted)	44(26.3)	20–34
Diluted in water	75(44.9)	37–53
Diluted in other fluids	6(3.6)	1–8
Others	22(13.2)	8–19
Blank	20(12.7)	7–18
C. How do you know it (lemon/lime) works?		
1. It prevents pregnancy	44(26.3)	20–34
2. It prevents infection	44(26.3)	20–34
3. It increases sexual pleasure	8(4.8)	2–9
Both 1 and 2	13(7.8)	4–13
Both 2 and 3	1(0.6)	0–3
Other reasons	54(34.1)	25–40
D. How do you use lemon/lime?		
Before sex?	44(26.3)	20–34
After sex?	50(29.9)	23–37
Both?	2(1.2)	0–4
Anytime?	1(0.6)	0–3
Blank	70(42.0)	34–50
E. How long have you been using lemon/lime for sex?		
<1 year	64(38.3)	31–46
1–5 years	42(25.1)	19–32
6–10 years	4(2.0)	1–6
>10 years	19(11.0)	7–17
Others (not sure)	38(22.8)	17–30
F. Do you find lemon/lime juice painful for sex?		
No	122(73.7)	66–80
Yes	29(17.3)	12–24
Sometimes	3(1.8)	0–5
Blank	13(7.8)	4–13
G. Would you recommend lemon/lime to others?		
Yes	143(85.6)	79–91
No	15(9.0)	5–14
Others	4(2.4)	1–6
Blank	5(3.0)	1–7
H. Would you be interested in a trial study of lemon/lime?		
Yes	116(70.6)	62–76
No	39(23.4)	17–31
I will think about it	4(2.4)	1–6
Blank	6(3.6)	1–8

Lemon/lime users: *n* = 167 (163 female sex workers, 4 family planning clients).

lemon/lime to douche before sexual intercourse, whereas three out of ten did so after sex. Over 50% of the women believed that lemon/lime would protect them from pregnancy and sexually transmitted infections, although

none of them knew their HIV status. Two-thirds of the women had used it for 1–5 years, whereas just over 10% had used the agent for longer than 10 years. Nineteen per cent of the women found that the juice was painful to use. Nevertheless,

86% of the subjects would recommend lemon/lime to others, and 71% were prepared to take part in a clinical trial of its safety and efficacy.

### Discussion

This study has shown that a high proportion of FSWs in Jos, Nigeria use lemon/lime juice for vaginal douching and they hailed from all parts of Nigeria. Our enquiry from the lemon/lime users also revealed that the juice was either squeezed directly into the vagina or first soaked in a cotton plug or applied with a syringe.

Himes (1963) described how Turkish women in the 18th century used a piece of sponge soaked in diluted lemon juice placed in the vagina to prevent pregnancy.<sup>9</sup> Lemon and lime juice have a pH between 2 and 3. Substances with a low pH, such as lemon/lime juice, vinegar and soft drinks, have been found to rapidly immobilise spermatozoa and destroy HIV and other STDs and their use to wash out the vagina following sexual intercourse to prevent pregnancy and sexually transmitted infections, including HIV, have been suggested.<sup>5, 6, 8, 10</sup>

In this study, 19% of FSWs complained of pain from the juice, and the cause remains unknown. It is possible that the pain experienced may be due to lesions from prior sexually transmitted infections, or to vaginal lesions produced by repeated lemon/lime juice douching, as occurs after repeated vaginal use of the microbicide Nonoxynol-9.<sup>11</sup> A clinical study of the safety of lime juice on the vagina in non-sexually active women is already underway at the School of Public Health, University of California, Berkeley, USA.

Although this questionnaire survey provides information on lemon/lime juice usage for douching among sexually active women in Jos, it does not address issues concerning the safety and efficacy of the agent. Since a large proportion of women at risk of acquiring HIV currently use lemon/lime juice for douching and would volunteer to take part in a study of its safety and efficacy, there is an urgent need to determine whether this practice promotes or prevents HIV infection.

### Conflicts of interest

The authors wish to express that there are no conflicts of interest of any kind in this work.

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