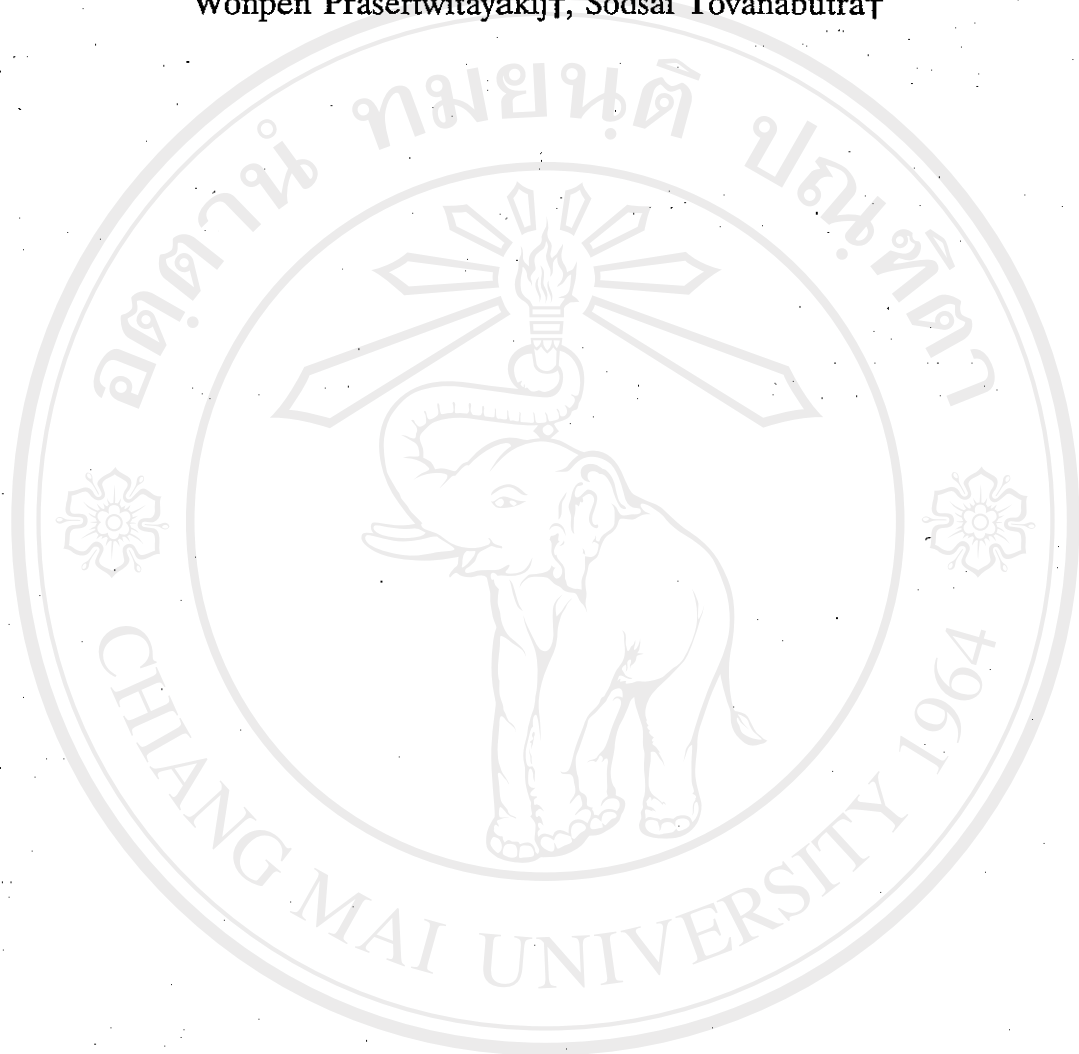


**CONDOM BREAKAGE DURING COMMERCIAL SEX IN CHIANG MAI,
THAILAND**

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Abstract

Used condoms in 30 female brothels in Chiang Mai, Thailand during the period from August 1992 to October 1992 were examined for breakage. Data were also collected by interviewing 326 prostitutes who accounted for 65 percent of the total prostitutes provided condoms. The prostitutes had a mean age of 20.6 ± 3.2 years. Sixty-one (61%) percent had no formal education. The median duration of prostitution was 13 months. The average number of clients in the past 24 hours and in the past 3 months were 4.4 ± 2.5 and 5.5 ± 2.2 , respectively. Eighty-eight percent (88%) charged between \$2 and \$8 for their sexual service. All refused to practice oral or anal sex during the past 24 hours. Of 5559 condoms, 298 were used two together and 15 were used three together. The breakage rate per act of intercourse was 5.9 percent (95 % CI = 5.3, 6.5). The breakage per total condoms examined was 5.7 percent (95 % CI = 5.1, 6.3). Breakage relating to manufacturing defect, i.e. pinholes, and that relating to use was 0.8 percent (95 % CI = 0.6,1.0) and 5.0 percent (25 % CI = 4.4, 5.6), respectively. The probability of breakage when using two condoms together was 3.4 percent (95 % CI = 0.5, 6.3). Most of the breakages occurred at the distal part of the condom. There was no difference between the breakage rates of condoms in brothels provided them and those brought by the client; nor was there any difference between manufacturing defect or use. The breakage rate per client as estimated by prostitutes in the past 24 hours corroborated with that was estimated by examination.

Keywords : condom breakage, commercial sex, female prostitutes.

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Introduction

Brothel based female prostitution has been the most important source of the spread of HIV in Thailand, particularly in Chiang Mai.^(1,2) Apart from abstinence, monogamy, and curtailment of sexual activities, the use of condoms appears to be the only way to prevent sexual transmission of HIV infection.⁽³⁾ In 1991, the Government of Thailand adopted the "100% Condom Campaign" in 5 provinces in the Northern part of Thailand, including Chiang Mai Province. Unfortunately condom use is not 100 percent effective.^(4,5) The most common problem reported by Bangladesh condom users was breakage.⁽⁶⁾ Knowledge of the condom breakage rate in different cultural settings is essential to help estimate more accurately the likelihood of contracting HIV infection during commercial sex. The risk of contracting HIV infection from female prostitutes should be estimated and reported to the public even if there is a high rate of condom use. If people are led to believe that condoms eliminate HIV transmission, they may not reduce other high risk sexual practices such as high frequency of sexual intercourse with prostitutes.^(7,8) Few studies on condom breakage have been undertaken and most of them did not concentrate on commercial sex.^(6,9,10) Moreover, information on condom breakage was obtained from interviews, which is subject to the respondents' perception and recall bias. This study aimed at estimation of the rate of condom breakage among brothel-based female prostitutes in Chiang Mai by examination of actually used condoms collected from brothels. By using this strategy, broken condoms were not missed, thus avoiding recall bias. The total condoms examined serve as the numerator, instead of reported condom used, and render a more accurate estimate of the breakage rate. An attempt to demonstrate the characteristics and sexual behavior of prostitutes who were provided condoms to be studied was also made by interviewing.

Subjects and methods

The names and addresses of brothels in Muang District, Chiang Mai city, were obtained from the "Directory of Sources of the Spread of Sexually Transmitted

Diseases". This directory was compiled by the Royal Thai Government's Ministry of Public Health, Division of Venereal Diseases, through a survey carried out throughout the country in January 1990. There are altogether 46 brothels in Muang District, Chiang Mai. Only brothels that had more than 5 prostitutes were selected for study. The brothel owners were contacted and asked to participate in the study. Of 30 brothels owners contacted, none refused participation in this study. The prostitutes were asked to collect all used condoms during 24 hours. Chlorox (0.5 %) was used as an HIV disinfectant in order to prevent condom examiners from contracting HIV through contaminated semen. An experiment was conducted to determine whether 0.5 % Chlorox cause condoms to deteriorate when they were soaked in this solution for 24 hours. The findings showed that used condoms remained essentially unchanged and there was no condom breakage attributable to 24 hr soaking in 0.5 % Chlorox solution. Each condom was examined for evidence of use and breakage. Condom breakage was identified by direct visual inspection as well as air inflation and filling the condom with tap water. The width and length of broken sites were measured. The condom was divided into 3 equal parts. Part one was the distal part consisting of the reservoir end and the part above reservoir. Part two was the middle part. The proximal or the opened end of a condom was the third part.

Socio-demographic data, numbers of clients, sexual behavior as well as condom use and breakage, was also obtained by interviewing voluntary prostitutes working in the brothels studied, using standard questionnaires.

Data analysis involved calculation of condom breakage rate by various variables. A comparison of condom breakage rate between variables were be done by calculation of 95 % confidence intervals.

Results

Data was collected during the period from August 1992 to October 1992.

I. Results obtained by interview

The number of prostitutes in each of 30 brothels studied ranged from 6

to 39. Out of 501 prostitutes, only 328 (65 percent) were interviewed. The percentage of prostitutes interviewed at each brothel ranged from 40 to 100 percent. Of the 328 prostitutes interviewed, 2 were unable to understand the questions asked. Thirty-two had no clients in the past 24 hours, so they could not respond to questions about their previous 24 hours experience.

The mean age of 326 prostitutes interviewed was 20.6 ± 3.2 years. Only 35.9 percent were Thai. Most of them (60.7 percent) had no formal education. Duration of prostitution ranged from 10 days to approximately 5 years (median = 13 months). Average clients per day reported in the past 24 hours and in the past 3 months were consistent, i.e., 4.4 ± 2.5 and 5.5 ± 2.2 respectively. Most or all clients used condoms as reported in the past 24 hours and the past 3 months. Eight-six (86.8) percent paid between \$2 and \$8 for sexual service. All prostitutes reported refusing either anal or oral intercourse (Table 1).

All numbers of clients in the past 24 hours reported by 294 prostitutes were 1296. Nearly all of the clients (94.5 percent) received condoms at the brothels. This figure was consistent with that reported in the past 3 months. Prostitutes reported they put condoms on 96.3 percent of clients, and 97.2 percent of them normally put condoms on clients in the past 3 months (Table 2).

Table 3 shows the condom breakage rates as reported by prostitutes. Ever breakage rate in the past 24 hours was 12.6 percent (95 % CI = 8.8, 16.4), whereas in the past 3 months was reported to be much higher, i.e. 63.5 (95 % CI = 58.3, 68.7). The breakage rate per client in the past 24 hours was 3.9 percent (95 % CI = 2.8, 5.0).

Other rates of event related to failure of condom use surveyed included condom leakage, slipping off, taking off and continuing sexual intercourse, not using the condom at every act of intercourse and putting the condom on too late; were higher when estimated in the past 3 months as compared to the past 24 hours (Table 4).

Thirty seven prostitutes who recognized condom breakage in the past 24 hours

responded to question "How do you know that a condom breaks?". The distribution of responses is shown in Table 5. Of 51 responses (some had more than one response), 47.1 percent recognized breakage by a loud noise, 27.5 percent felt that it was more tight than non-breakage. 5.9 percent felt warm inside vagina because of ejaculation and 19.6 percent were unable to tell although they recognized that condoms broke.

II. Results obtained by condom examination

Of the 5,559 condoms examined, 5246 had been used only once, 298 were used two together and 15 were used three together. Assuming that one sample of condom represents one act of sexual intercourse, there were 5,400 acts of sexual intercourse using condoms. The rate of using one condom was 97.1 percent (5246/5559), whereas the rates of using two together (one on top of the other) or three condoms together were 2.8 percent (149/5559) and 0.1 percent (5/5559) respectively. When defined breakage as all condoms that broke, if two or more condoms were used together, the probability of breakage of condom use was 5.9 percent (95 % CI = 5.3, 6.5). The rate of breakage per total condom examined was 5.7 (95 % CI = 5.1, 6.3). There were 46 condoms which had a pinhole, the breakage most likely due to manufacturing defects. The breakage rate related to condom use was 5.0 percent (95 % CI = 4.4, 5.6). The breakage rate when using only one condom was 5.9 (95 % CI = 5.3, 6.5) and using two condoms was 3.4 percent (95 % CI = 0.5, 6.3). There was no breakage in the 5 acts of sexual intercourse using three condoms.

The 5559 condoms examined were distinguished by their colors as originating from 2 sources i.e. those that were provided by brothels (96.9 percent) and those that were brought along by clients (3.1 percent). Condoms brought by clients themselves were of nine brands with frequency distribution ranging from 0.6 to 40.2 percent. The rates of breakage were not different between brothel-provided condoms and client brought ones, whether comparing for all types of breakage, pinholes or breakage related to use (Table 7), although the 95% confidence intervals among client brought

condoms were wider due to small sample size.

Condom breakage could be classified into 7 types. Burst reservoir meant the loss of most or all of the reservoir end, whereas ring tears meant the loss of the condom above the reservoir end. Of 46 condoms with pinholes, 6.3 percent had more than one pinhole. Twenty-three percent (23%) had a burst reservoir and 5.3 percent lost their distal or middle parts. Longitudinal or spiral breakages occurred 14.8 percent, whereas shark mouth breakage occurred in 6.9 percent. The most common type of breakage was oval or round (35.5 percent) (Table 8). The mean width of broken sites varied from 0.9 ± 0.7 to 2.4 ± 1.1 centimeters. The mean length of broken sites ranged from 1.3 ± 1.3 to 4.4 ± 0.9 centimeters (Table 8). Most of the breakages occurred at the distal part of condoms (86.8 percent). Breakages at the middle and the proximal part were 9.6 and 3.7 percent, respectively.

Discussion

The study population represents female prostitutes in brothels situated in Muang District or the municipal area of Chiang Mai only. However, the reported condom breakage rate of women residing in urban and semirural areas in Bangladesh was not significantly different (i.e. 13.6 and 12.7 percent respectively).⁽⁶⁾ Neither study results should be applicable for non-commercial sexual intercourse. There has been controversy concerning the relative magnitude of condom breakage between commercial and non-commercial sex. Some have postulated that breakage rate is lower in commercial sex, since commercial sex lasts for a shorter period of time than non-commercial sex and this puts less stress on the condom.⁽¹¹⁾ Others found that breakage was more likely to be related to non-lubricated or dry vagina and secondarily to minimal foreplay.⁽¹²⁾ Since foreplay is least likely to occur in commercial sex, it is postulated that the rate of condom breakage is higher. Lastly, the study reflects vaginal sexual intercourse only, oral or anal sexual relation may have different condom breakage rates.⁽¹¹⁾

Method of data collection in this study involved examination and testing for breakage of used condoms. This can avoid error resulted from recall memory when

data collection is performed by interviewing. Reported condom breakage can be underestimated because it is not recognized. Under-collection of used condoms to be examined was considered unlikely. Since the launching of the "100 percent condom campaign" all brothel owners as well as prostitutes have been willing to collect all condoms in order to show that they fully complied with the campaign.

The condom breakage rate per client in the past 24 hours was consistent between that was estimated by prostitutes (3.9 percent, 95 % CI = 2.8, 5.0) and that was estimated by condom examination (5.0 percent, 95 % CI = 4.4, 5.6). Reported ever breakage in the past 3 months (63.5 percent, 95 % CI = 58.3, 68.7) was much higher than that was estimated in the past 24 hours (12.6 percent, 95 % CI = 8.8, 16.4). The past 24 hour rate of this study corroborates with 13 percent breakage reported by Bangladesh semirural women, when estimated for averaged 2.3 years of continuous use.⁽⁶⁾ The over reported of breakage in the past 3 months implies that estimation of past sexual experiences of this population may not reliable.

The breakage rate of single condom use in this study (5.9 percent, 95 % CI = 5.3, 6.5) was higher than similar study in prostitutes in Sydney, Australia (0.8 percent in vaginal intercourse).⁽¹³⁾ The discrepancy may reflect in part actual population difference. This study represents condoms actually used in commercial sex which may had lower quality standard or not as fresh as those used in the study in Sydney.

The similar breakage rates between condoms provided by brothels and those brought along by clients, for either all types of breakage, pinholes and breakage related to use, imply the equivalent quality of brothel provided condoms to other brands of condom sold in the market. Although the sample size of client brought condoms was rather small which was responsible for wide 95 % confidence intervals.

Both reported and examined condoms showed that most of them (more than 90 percent) obtained condoms from the brothels. This may reflect in part less awareness and less cautious of clients to prevent HIV/STDs infection. In the contrary, few clients showed that they were very cautious by wearing two to three condoms together.

The unlinked information between data obtained by interviewing and condom examination have made identification of cause of condom breakage impossible. However, breakage should not be mainly due to manufacturing defect, since the rates of pinhole leakage between brothel provided and other brands of condoms were comparable. One possible cause of breakage was intentional tearing by clients. Since during the study period, 100 % condom use campaign had been launching, some clients might used condoms by coercion. There is an anecdotal report that clients may tear condoms in order to have their semen out of condoms. However, either intentional or accidental breakage has implication for risk of contracting HIV/STDs infection.

The FDA of Thailand required that condoms in the market should pass the water leakage test, which has the minimum requirement that not more than 4 in 1000 condoms fail the test. This study showed that at the level of actual use, pinhole leakage was higher than the set standard, i.e. approximately 8 in 1000 condoms.

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References

1. Ungchusak K, Sriprapandh S, Pinichpongse S, Kunasol P, and Thanprasertsuk S. First National Sentinel Seroprevalence survey of HIV-1 infection in Thailand, June, 1989. *Thai AIDS* 1989;1(2):57-74.
2. Siraprapasiri T, Thanprasertsuk S, Rodklay A, Srivanichakorn S, Sawanpanyalert P, and Temtanarak J. Risk factors for HIV among prostitutes in Chiang Mai, Thailand. *AIDS* 1991;5:579-582.
3. Venereal Disease Control and AIDS Region 10. Report on the result of venereal and AIDS prevention and control programs, presented to the meeting

"Venereal Diseases within 5 years (1985-1989)", during 7-9 January 1990, at Mae Hong Son Province.

4. Mann J, Quinn TC, and Piot P. Condom use and HIV infection among prostitutes in Zaire (Letter). *N Engl J Med* 1987;316:345.
5. Fischl MA, Dickinson GM, Scott GB, Klismas N, Fletcher MA and Parks W. Evaluation of heterosexual partners, children, and household contacts of adults with AIDS. *JAMA* 1987;257:640-644.
6. Ahmed G, Liner EC, Williamson NE, and Schellstede WP. Characteristics of condom use and associated problems: experience in Bangladesh. *Contraception* 1990;42:523-533.
7. Emanuel EJ, Emanuel LL. Is our AIDS policy ethical? *American J of Medicine* 1987;83:519-520.
8. McKusick L, Horstman W, and Coates TJ. AIDS and sexual behavior reported by gay men in San Francisco. *Am J Public Health* 1985;75:493-496.
9. Free MJ, Hutching J, Lubis F, and Natakusumah R. An assessment of burst strength distribution data for monitoring quality of condom stocks in developing countries. *Contraception* 1986;33(3):285-299.
10. Albert AE, Hatcher RA, Graves W. Condom use and breakage among women in a municipal hospital family planning clinic. *Contraception* 1991;43(2):167-176.
11. Curran JW, Morgan WM, Hardy AM, Jaffe MW, Darrow WW, and Dowdle WR. The epidemiology of AIDS: current status and future prospects. *Science* 1985;229:1352-1357.
12. Peterman TA and Curran JW. Sexual transmission of HIV. *JAMA* 1986;256:2222-2226.
13. Richters J, Donovan B, Gerofi J, Watson L. Low condom breakage rate in commercial sex (Letter). *Lancet* 1988;2(8626-8627):1487-1488.

Table 1

Socio-Demographic Characteristics Among 326 Prostitutes

Characteristic	Number	Mean \pm SD Range	Percentage
Age			
Mean \pm SD (years)		20.6 \pm 3.2	
Range		16 - 37	
Ethnicity			
Thai	117		35.9%
Others	209		64.1%
Years of Education			
0	198		60.7%
≤ 6	114		35.0%
> 6	12		3.7%
Unknown	2		0.6%
Duration of Prostitution (months)			
Median		13	
Range		10 days to 168 months	
Number of Clients in Past 24 Hours			
Mean \pm SD		4.4 \pm 2.5	
Range		1 - 18	
Number of Clients Using Condoms in Past 24 Hours			
Mean \pm SD		4.4 \pm 2.5	
Range		1 - 18	
Sexual Service Charge (Dollars)			
1.20 - 2	17		5.2%
2 - 8	283		86.8%
8 - 12	26		8.0%
Number of Clients Per Day in Past 3 Months			
Mean \pm SD		5.5 \pm 2.2	
Range		1 - 15	
Number of Clients Using Condoms Per Day in Past 3 Months			
Mean \pm SD		5.4 \pm 2.2	
Range		1 - 15	
Types of Sexual Relations in Past 24 Hours			
Vaginal	294		100%

Table 2

Reported Source of Condom Supply and Persons
Putting On Condoms

Time	Prostitutes N (%)	Clients N (%)	Brothels N (%)	Unknown N (%)
In Past 24 Hrs (n = 1296 clients)				
Source	-	65 (5.0)	1225 (94.5)	6 (0.5)
Persons Putting on Condoms	1248 (96.3)	39 (3.0)	-	9 (0.7)
In Past 3 Months (N = 326 prostitutes)				
Source	-	-	324 (99.4)	2 (0.6)
Persons Putting On Condoms	317 (97.2)	9 (2.8)	-	-

Table 3

Reported Condom Breakage Rate

	Number	%	95% CI
In Past 24 Hours Ever Broken (N = 294)	37	12.6	8.8, 16.4
Breakage Rate Per Client (N = 1296)	51	3.9	2.8, 5.0
In Past 3 Months Ever Broken (N = 326)	207	63.5	58.3, 68.7

Table 4

Reported Other Events Related to Failure
of Condom Use

Activity	Past 24 Hours (N = 1296 Clients)			Past 3 Months (N = 326 Prostitutes)		
	N	%	95% CI	N	%	95% CI
Leakage	0	-	-	9	2.8	1.9,3.7
Slipping Off	5	0.4	0.2,0.6	66	20.2	17.8,22.4
Taking Off Condoms and Continuing Sexual Intercourse	3	0.2	0.1,0.3	18	5.5	4.2,6.8
Not Using Condoms at Every Coitus	0	-	-	11	3.4	2.4,4.4
Putting Condoms on Too Late	2	0.2	0.1,0.3	6	1.8	1.1,2.5

Table 5

Response to Question "How do you know that a condom breaks?"
(N = 51 Answers)^a

Response	N ^a	%
Heard a loud noise	24	47.1
Felt tighter	14	27.5
Know, but unable to tell	10	19.6
A feeling inside vagina	3	5.9

^aMore than one response was eligible for inclusion.

Table 6

Condom Breakage Rate estimated by Examination of Used Condoms

Activity	N ^a	%	95% CI
Breakage ^b per act of intercourse while using a condom (N = 5400)	316	5.9	5.3, 6.5
Breakage ^c per total condoms examined (N = 5559)	318	5.7	5.1, 6.3
Breakage ^b related to use (excluding condoms with pinholes) (N = 5354)	270	5.0	4.4, 5.6
Breakage ^b when using one condom (N = 5246)	311	5.9	5.3, 6.5
Breakage ^b when using two condoms together (N = 149)	5	3.4	0.5, 6.3
Breakage ^b when using three condoms together (N = 5)	0	-	-

Table 7

Condom Breakage Rate by Source of Condom and Type of Breakage

Type of Breakage	Source of Condoms					
	Brothels (N = 5385)			Clients (N = 174)		
	N ^a	%	95% CI	N ^a	%	95% CI
All Types	317	5.9	5.3,6.5	10	5.7	2.3,9.1
Pinhole (manufacturing defect)	44	0.8	0.6,1.0	2	1.1	-0.4,2.6
Breakage related to use	273	5.1	4.8,5.4	8	4.6	1.5,7.7

^bTo be counted as breakage, all condoms used at one act of intercourse must break.

^cAny condom breakage was counted even if two or more condoms were used together.

Table 8

Types and Sizes of Condom Breakage

Inner Condoms	N	%	Width		Length	
			M ± SD	Range	M ± SD	Range
Pinhole	26	8.2	-	-	-	-
> one pinhole	20	6.3	-	-	-	-
Reservoir Burst	73	23.0	2.4 ± 1.1	0.5 - 5.0	2.5 ± 1.0	0.5 - 5.5
Ring Torn	17	5.3	4.3 ± 0.9	2.5 - 5.2	4.4 ± 0.9	2.5 - 5.4
Longitudinal Spiral	47	14.8	-	-	2.7 ± 1.3	0.6 - 7.0
Shark mouth	22	6.9	-	-	3.2 ± 1.8	0.5 - 8.3
Oval, round	113	35.5	1.1 ± 1.0	0.2 - 4.9	1.3 ± 1.3	0.2 - 6.5
Outer Condoms	N	%	Width		Length	
			M ± SD	Range	M ± SD	Range
Longitudinal, spiral	2	-	-	-	-	0.7 - 5.8
Shark mouth	1	-	-	-	-	2.2
Oval, round	5	-	0.9 ± 0.7	0.1 - 1.8	1.0 ± 0.9	0.1 - 2.3

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Table 9

Sites by Types of Breakage

Types of Breakage	Distal		Middle		Proximal		Total		
	Reservoir End		Above Reservoir						
	N	%	N	%	N	%			
One Pinhole	2	4.3	33	71.7	7	15.2	4	15.4	46
Multiple pinholes	73	98.6	1	1.4	-	-	-	-	74
Reservoir burst	-	-	12	70.6	5	29.4	-	-	17
Ring torn	12	25.0	28	58.3	7	14.6	2	4.2	48
Longitudinal, spiral	8	33.3	10	41.7	3	12.5	3	12.5	24
Shark mouth	50	42.7	55	47.0	9	7.7	3	2.6	117
Oval, round	1	-	-	-	-	-	-	-	1
Total	145	44.3	139	42.5	31	9.5	12	3.7	327

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