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Male condom use and condom problems among women in Shanghai

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ABSTRACT

Objective: To explore the male condom use and the using problems as well as the influencing factors among Shanghai women. **Methods:** A prospective follow-up was conducted among 1 562 subjects who used either the condom or the combined regimen as their method for fertility regulation in nine districts in Shanghai. The study began in the October, 2003 with a baseline survey, and finished in the December, 2007. There were two groups, group I with condom use combined regimen (condom + ECP) and group II with condom use only. Totally 812 eligible subjects were assigned to group I, and 750 to group II. Data was collected with a daily diary card, on which menses, acts of intercourse, information on condom and ECP use, and condom using problems were recorded. Data were analyzed with binary logistic regression models adjusting the potential confounding factors. **Results:** During the whole study years, in group I the mean condom using frequency was (59.5±17.9) times and the whole course condom using frequency was (58.1±18.5). In group II, the mean condom using frequency and the whole course condom using frequency are (57.4±19.0) and (56.4±19.7), respectively. The condom using problem rate (CUPR) in group I and group II in the first month were 5.05 and 9.64 per 100 condoms. With the progress of the study, the CUPR in both groups were decreasing. The total year's CUPR in group I and group II were 0.82% and 1.45% (P=0.002). The study showed that the common condom using problems during the 1st year were too loose (41.9% in group I and 27.1% in group II), too long (15.6% in group I and 25.6% in group II), and too slippery (21.2% in group I and 20.2% in group II) among those reported condom using problems. Condom problems were more common in the inexperienced and in those who had not experienced problems previously. Subject's age, education and occupation might influence condom using problem rate. **Conclusions:** The condom using problems indicated that condom manufacturers should continue to refine the products so as to increase the condom acceptability. Experience was significant associated with condom using problem.

1. Introduction

Many laboratory researches showed that the intact latex condom form a barrier that is nearly impermeable to spermatozoa and pathogens. It follows that consistent and correct use of latex condoms substantially reduces the unintended pregnancy and STDs, although these risks are not zero, which has be confirmed by many studies[1,2]. Most epidemiologic studies on condom showed that consistent and correct use of condoms was far more important in preventing both pregnancy and STDs than failure of the device, such as breakage or slippage or other problems of condom[3]. A limited, but growing, research literature indicates that inconsistent or incorrect condom use compromises the potential benefits of condoms[4]. And perceived efficacy (incomplete protective effect) and perceived utilization-related problem (any reported problem using condoms) are the main barriers to condom use[5].

Shanghai is a large city in China. People in the city are more open to accept new things, thus leading to more people using condom as contraception method (about 30%). Unfortunately, condom use is not 100% effective. The most

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common problem reported by studies conducted in other countries was breakage. This study aimed at exploring condom using problem rate (per 100 sexual intercourse) among married women in Shanghai. By using the diary method, any condom related problems were not missed, and recall bias was avoided. The total number of condoms used served as the denominator, instead of the reported number.

2. Materials and methods

Nine districts in Shanghai were selected for the study. These study areas owned family planning clinics and motivated, easily traced groups of sexually active couples. These couples could receive family planning services from a health center or a family planning clinic or other facilities, through which they could be approached and their cooperation and willingness to participate in the study had be reasonably assured.

The study involved a prospective follow-up of couples opting to use either the condom or the combined regimen as their method for fertility regulation. Couples seeking contraception had been offered a range of contraceptive methods. Couples opting to use condom alone or in combination with emergency contraceptive pill (ECP) and willing to participate in the study were allocated to group I (combined regimen: condom + ECP) or group II (condom use only), and kept the daily diary card, on which menses, acts of intercourse, and information on condom and ECP use would be recorded.

Recruitment began in the October 2003. Sufficient supply of condoms and emergency contraceptive pills were provided to the study participants in group 1; while subjects in group 2 were provided with sufficient condoms. The condoms used in the study were standard, thin, silicone lubricated condoms approved by WHO. Instructions on correct use of condoms and emergency contraception regimen were prepared by the participating clinics during the course of the study. The subjects were told to take no more than 4 tablets of ECP in one month under any circumstances.

The subjects were interviewed in the 1st, 3rd, 6th, 9th and 12th month after enrollment using standard questionnaires to gain the condom-related information (Table 1). The major outcome measures, such as the occurrence of pregnancy, problems associated with condom use, side effects associated with emergency contraception and reasons for non-use of condom/emergency contraception were collected, then compute failure rates and continuation rates associated with use of the combined regimen. Reasons for irregular or incorrect use of the condoms/emergency contraception and for discontinuation of the contraceptive regimen were assessed (Table 2).

All data were analyzed using the SAS package. Data analyses involved calculation of condom breakage rate, slippage rate and total condom problems rate by various variables. Multiple logistic regressions were used to take the potential confounding factors into account.

3. Results

3.1. Baseline information

Of the 824 women enrolled, 812 were eligible for admission in group I. A total of 749 subjects were interviewed 5 times, and the rate was 92.24%. Of the 754 women enrolled, in group II, 750 were eligible. 699 subjects were interviewed 5 times, and the rate was 93.20%. There was no statistically significant difference between follow-up rates of the two groups.

Among all discontinuation, there were 38.1% (24/63) in group I and 31.4% (16/51) subjects in group II who withdrew from the study because of personal reason. Of all discontinuation, there were 27.0% and 17.7% in group I and group II whose withdraws were attributed to pregnancy. No subject withdrew from study because of condom slippage and bleeding. The survival Cox regression (Breslow method) showed that the cumulative discontinuation rates for all reasons during the whole year in group I and group II were respectively (7.64±0.93) and (6.54±0.90) per 100 women, and the log-rank test showed that there was no statistical significance of the discontinuation rates between two groups (χ^2=0.41, P=0.522 7). The cumulative gross pregnancy rates in group I and group II were (2.18±0.52) and (1.25±0.41) per 100 women in Shanghai. The log-rank test for the event censored by pregnancy in group I and II showed that there was no statistical significance of the follow up function between two groups (χ^2=1.93, P=0.164 5).

The mean age of 812 subjects in group I was (29.8±3.1), and (29.9±3.2) in group II (P=0.446). The mean marriage year

Table 1
The number of subjects at different follow-up periods.

Month	Group I		Group II	
	Number of subjects	Number of discontinuation	Number of subjects	Number of discontinuation
0	812	12	750	11
1-3	812	40	750	28
4-6	772	11	722	11
7-9	761	10	711	6
10-12	751	2	705	6
1-12	812	63	750	51

Table 2
The reasons of censor except loss-up.

Reasons		Group I		Group II	
		f	%	f	%
Side effect	Sum	2	100.00	0	–
	Lack of sexual satisfiction	1	50.00	0	–
	Allergic reaction to rubber	1	50.00	0	–
Personal reason	Sum	24	100.00	15	100.00
	Planning pregnancy	4	16.67	1	6.67
	Disease	4	16.67	1	6.67
	No sexual life	1	4.16	5	33.33
	Bother for using	9	37.50	2	13.33
	Others	6	25.00	6	40.00
Pregnnacy	Sum	17	100.00	9	100.00
	Condom breakage	2	11.76	3	33.33
	Forget using condom	2	11.76	1	11.11
	Incorrectly use condom	10	58.83	3	33.33
	Spouse dislikes	2	11.76	2	22.23
	Others	1	5.89	0	0.00
Change to others	Sum	14	100.00	18	100.00
	Uncomfortable/too bother	8	57.14	12	66.67
	Asking to change by husband	1	7.14	1	5.56
	Using other simple method	3	21.43	4	22.21
	Others	2	14.29	1	5.56
Other reasons	Sum	6	100.00	8	100.00
		6	100.00	8	100.00
Sum		63		50	

in group I was (5.4±2.9), and (5.5±2.9) in group II (P=0.25). The mean number of pregnancy in group I was (1.13±0.59) times, and 1.29±0.56 times in group II (P=0.454). Most of the subjects were with relatively high education level.

The recent contraceptive method used before the study is showed in Table 3. Before the study, 78.4% subjects in group I and 70.9% in group II used the IUD method. About 7.5% in group I and 15.0% in group II used pill as contraceptive method. There were 4.4% in group I and 2.4% in group II used withdrawal method. There was no significant difference in the distributions of the last contraceptive method between two groups (χ^2=11.64, P=0.168).

Table 3
The distribution of the recent contraceptive use before the study (%).

Method	Group I (n=227)	Group II (n=213)
Pill	7.5	15.0
Injection	1.3	2.4
IUD	78.4	70.9
Condom	0.0	1.9
Implant	0.0	1.4
Withdrawal	2.2	1.4
Rhythm	4.4	2.4
Spermicide	2.6	3.3
Others	3.6	1.3
Total	100.0	100.0

3.2. Sexual activity and condom use

As showed in Table 4, during the whole study year, in group I the mean condom using frequency was (59.5±17.9) times and the whole course condom using frequency was (58.1±18.5). In group II the mean condom using frequency, and whole course condom using frequency are respectively, (57.4±19.0) and (56.4±19.7). During 1-3 month, 7-9 month, 10-12 month and 1-12 month, the means of SI in group I were slightly higher than those in group II. During 1-3 month, 10-12 month and 1-12 month, the means of condom using frequency in group I were slightly higher than those in group II. And during 10-12 month, the mean of whole course condom using frequency in group I was slightly higher than those in group II. There was no significant difference in condom checking frequency between the two groups in this study (Table 4).

3.3. Prevalence of condom using problem

Condom using problem (CUP) was defined as any condom using problems, such as breakage, slippage, bleeding during or after SI, too short and too long condom and etc. Condom using problem rate (CUPR) was defined as the ratio of the No.

Table 4
SI frequency of every 3 months and 1 year in two groups (mean±SD).

Month	Variable	Group I	Group II	*t*	*P*
1–3	SI frequency	15.2±5.3	14.4±5.4	2.81	0.005
	Condom using frequency	14.6±5.3	13.9±5.5	2.38	0.017
	Whole course condom using frequency	14.0±5.5	13.4±5.9	1.92	0.055
	Condom checking frequency	13.9±5.6	13.4±5.6	1.70	0.089
4–6	SI frequency	15.2±5.3	15.0±5.3	0.82	0.410
	Condom using frequency	14.8±5.3	14.7±5.4	0.40	0.664
	Whole course condom using frequency	14.4±5.5	14.4±5.6	−0.14	0.886
	Condom checking frequency	14.3±5.7	14.2±5.6	0.45	0.651
7–9	SI frequency	15.3±5.0	14.8±5.2	1.88	0.060
	Condom using frequency	15.1±5.0	14.6±5.2	1.88	0.060
	Whole course condom using frequency	14.8±5.3	14.3±5.4	1.81	0.069
	Condom checking frequency	14.7±5.4	14.2±5.4	1.74	0.083
10–12	SI frequency	15.2±4.7	14.4±4.7	3.05	0.002
	Condom using frequency	15.1±4.9	14.2±4.8	3.25	0.001
	Whole course condom using frequency	14.9±5.1	14.2±5.5	2.49	0.013
	Condom checking frequency	14.7±5.1	14.0±5.6	2.31	0.021
1–12	SI frequency	60.7±17.9	58.5±18.7	2.27	0.023
	Condom using frequency	59.5±17.9	57.4±19.0	2.14	0.033
	Whole course condom using frequency	58.1±18.5	56.4±19.7	1.69	0.091
	Condom checking frequency	57.6±19.2	55.9±19.4	1.66	0.099

of condom using problem to the No. of condom used. The formula of the condom using problem rate was as following:

CUPR=Number of condom using problem/Number of condom used. (1)

3.3.1. CUPR of the two groups in the first month

The CUPRs of group I and group II in the first month of the study were 5.05% and 9.64% respectively (*P*=0.001), which indicated that the CUPR of group II was higher than that of group I (Table 5).

Table 5
CUPRs of the two groups in the first month.

Group	No condom used	Number of CUP	CUPR (%)	*P*
Group I	2 811	142	5.05	0.001
Group II	2 570	248	9.64	–

3.3.2. CUPR of the two groups in every 3 months and 1 year

Table 6 shows that there were statistically significant higher condom using problem rates in group II than that in group I during the study period (*P*=0.000 1). And the CUPRs of group I and group II during whole year were 0.82% and 1.45% respectively (*P*=0.002). The results indicated that the CUPRs in both groups were decreasing with the progress of the study. The CUPR of group I decreased from 1.59% to 0.53%, while it decreased from 2.94% to 0.53% in group II.

3.4. The distribution of condom using problems in two groups

Table 7 shows the distribution of the condom problems in two groups. There were 372 times of condom problems in group I and 598 times of condom problems in group II during the study. The common condom using problems during 1 year were too loose (41.9% in group I and 27.1% in group II), too long (15.6% in group I and 25.6% in group II), and too slippery (21.2% in group I and 20.2% in group II) among the reported condom using problems.

Table 6
CUPRs of the two groups in every 3 months and 1 year.

Month	Group	Number of condom	Number of CUP	CUPR (%)	χ^2	*P*
1–3	Group I	11 452	183	1.59	6.72	0.009
	Group II	10 181	300	2.94		
4–6	Group I	11 407	71	0.63	4.66	0.031
	Group II	10 571	130	1.23		
7–9	Group I	11 386	58	0.51	3.14	0.076
	Group II	10 306	89	0.86		
10–12	Group I	11 282	60	0.53	2.35	0.125
	Group II	9 946	79	0.79		
1–12	Group I	45 527	372	0.83	8.96	0.002
	Group II	41 004	598	1.45		

3.5. Logistic regression of CUPR

In order to understand risk factors better, the stepwise logistic regression was applied with confounding factors controled. Condom using problem was as the dependent variable. If subjects had condom breakage at any time during study period, the dependent variable was 1, else 0. About 17 variables or dummy variables, such as couple's age, education, occupation, marriage year, contraception using history, condom related problem experience, were used as independent variables. Multiple logistic regression results showed that during the study period CUPR might be influenced by the ever condom problem history, condom use experience and condom breakage experience. The logistic regression for 1 year showed that compared with <25 years subjects, women who were >30 years old could have lower condom using problem rate. Compared with medical subjects, subjects with other occupation could have higher condom using problem rate. The more contraceptive methods subjects used before, the lower condom using problem rate

Table 7
Distribution of CUP in two groups.

Month	Group	Difficult to open (%)	Too short (%)	Too long (%)	Too tight (%)	Too loose (%)	Too slippery (%)	Others (%)	Total
1–3	Group I	8.2	0.5	10.9	22.4	41.5	16.5	0.0	183
	Group II	14.0	2.0	20.0	14.3	25.7	22.0	2.0	300
4–6	Group I	8.5	0.0	26.8	14.1	40.8	9.9	0.0	71
	Group II	7.7	5.4	31.5	10.0	25.4	20.0	0.0	130
7–9	Group I	1.7	0.0	15.5	0.0	44.8	37.9	0.0	58
	Group II	10.1	3.4	29.2	6.7	33.7	16.9	0.0	89
10–12	Group I	1.7	0.0	16.7	0.0	41.7	33.3	1.7	60
	Group II	8.9	6.3	32.9	6.3	27.8	17.7	0.0	79
1–12	Group I	7.0	0.3	15.6	13.7	41.9	21.2	0.3	372
	Group II	11.4	3.5	25.6	11.2	27.1	20.2	1.0	598

The percentages are based on the total numeber in the same row.

Table 8
The logistic regression analysis of CUPR.

Month	Variable[a]	Ref group	Comp. group	β	SE	Wald χ^2	*P*	Stand. β	*OR*
1–3	Intercept			10.303 8	0.749	189.04	0.000 1	–	–
	Condom problem	No	Yes	–5.917 1	0.410	208.49	0.000 1	–0.823	0.003
4–6	Intercept			7.863 6	0.975	65.07	0.000 1	–	–
	Condom problem	No	Yes	–4.467 2	0.413	116.93	0.000 1	–0.702	0.110
	Condom experience	Yes	No	0.469 9	0.218	4.65	0.031 0	0.184	1.600
7–9	Intercept			10.198 4	0.830	151.07	0.000 1	–	–
	Condom problem	No	Yes	–3.011 0	0.513	34.44	0.000 1	–0.475	0.049
	Condom breakage	Yes	No	–1.951 4	0.468	17.35	0.000 1	–0.198	0.142
10–12	Intercept			11.858 6	0.938	159.85	0.000 1	–	–
	Condom problem	No	Yes	–1.492 7	0.583	6.55	0.010 5	–0.210	0.225
	Condom breakage	Yes	No	–5.288 6	0.563	88.38	0.000 1	–0.431	0.005
1–12	Intercept			3.482 3	0.408	72.97	0.000 1	–	–
	Wife age	<25	>30	–0.410 8	0.214	5.69	0.017 1	–0.141	0.663
	Occupation	Medical	others	0.523 8	0.297	4.35	0.037 1	0.145	0.074
	No. Contraception used	No	No	–0.306 8	0.155	3.92	0.047 8	–0.102	0.248
	Condom problem	No	Yes	–1.392 1	0.521	6.75	0.012 3	–0.209	–

[a]Condom problem: Condom problem history; Condom experience: Condom using experience.

they had. Subjects who had condom using problem history might have lower condom using problem rate (Table 8).

4. Discussion

Condom consistent and correct use is the most important factor for prevention from pregnancy and STD. However, condom effectiveness is lower than condom efficacy due to non use, inconsistent use and the incorrect application of condoms[6]. Condoms are most effective if used consistently and correctly. Many studies showed that even people who used condoms consistently may not using them correctly. This indicated that merely assessing consistency of condom use may underestimate the condom efficacy of preventing unintended pregnancy and STD/HIV risk[7,8]. In-depth interviews, pregnancies reported with condom use were due primarily to inconsistent, not due to defective condoms in this study. A substantial body of literature indicates that the establishment of effective condom use behaviour requires awareness of the benefits of condom use, skills regarding the use of condoms, confidence in these skills and awareness of the negative consequences of failure to use condoms[9-11]. Some subjects preferred unprotected sexual intercourse or using rhythm method rather than using a condom, which could lead to the pregnancy. The study had identified why people did not use condom when they had sexual intercourse. The most commonly reason subjects gave was that they used the rhythm method. Studies in other areas of the world indicated that couples do not use condom for many reasons, including fear of non-use of condoms, condoms inhibiting the enjoyment of sex, condoms causing sores on a penis, condoms coming off inside a women, condoms fueling promiscuity from a religious point of view[12-15]. The women said very often they did not need protection in addition to their primary contraceptive method because they were not at risk of STDs and pregnancies. In addition, condom was uncomfortable or decreased pleasure and their partners opposed to using condoms.

The study showed that, in the first month, the condom using problem rate in group II (9.64 per 100 condoms) was statistically higher than that in group I (5.05 per 100 condoms). But the rate in group I (0.82 per 100 condoms) was statistically higher than that in group II (1.45 per 100 condoms) in the whole 1 year. With the progress of the study, condom using problem rates in both groups were decreasing, which indicated that education to subject, the condom using experience and adaptation to it may influence the CUPR. A study in 1998 found 35 of 270 total condom uses (13.0%) resulted in potential exposure to sexually transmitted disease and/or HIV infection or pregnancy[16]. And the condom using problem rate is higher than that in our study. It presumes that the quality of condom and/or the skill of using condom are better and better.

Studies that define "condom failure" as breaking, leaking, or slipping off during penetrative sexual activity have found that lifetime prevalence of experiencing at least one occasion of condom breakage ranges from 1% to 33%[17]. The common condom using problems in our study were too loose, too slippery, too long and too tight. In the whole period, the rate of too loose, too slippery and too long were very high. During 1 year in group I the rate of too loose was 41.9%, too slippery was 21.2% and too long was 15.6%, while in group II the rate of too loose was 27.1%, too long was 25.6% and too slippery was 20.2%. The distribution of the most common using problems during 1 year in the two groups was same. But for the using problem of too tight, in the first 6 month, the rate was very high and had been the top 3 of the using problems. After 6 months, the rate decreased, even to 0%. Condom problems were more common in the inexperienced and in those who had not previously experienced problems. Subject's age, education and occupation might influence condom using problem rate. The results indicated that condom manufacturers should focus on how to solve the problems of too loose, too slippery, how to refine the size, improving the quality of condom and how to shorten the condom in a proper way. That may be the most emergency issue confronted in the process of expanding the use of condom. Other using problems may be declined when the clients get used with the product even the reported feeling of too tight. Meanwhile, we should help clients to use condom in the correct way when they begin to use, and make them comfortable to use it. If necessary, providers can show a sample to clients and use model to demonstrate condom. Studies on condom use and characteristics of users indicated that a history of condom failure and less experience on using condom were risk factors for future failure[18-20].

Most studies on condom failure showed that condom breakage and slippage occurred as a result of the no correct behaviors of the user, not due to a faulty device[21]. Associations were found between condom errors/problems and drug/alcohol use and errors/problems with condom use were significantly higher among teens diagnosed with an STD in a study among adjudicated girls[22]. It needs to perform a behavior study on condom user to understand users' behavior which might be related to condom breakage, such as opening condom packages with sharp objects, unrolling condoms before putting them on, using oil-based lubricants, using up condom, having lengthy or intense intercourse, and practicing anal intercourse or virginal drying. Hence, understanding which behavior and characteristics are associated with condom failure through public health message and counseling programs is critical to improving the effectiveness of condoms.

As a effective method to prevent unintended pregnancy and STDs, the condom use need further generalization. Among high school students in American in 2009, 34.2% were currently sexually active, 38.9% of currently sexually active students had not used a condom during their last sexual intercourse[23]. A study among STD patients showed that motivation and behavioral skills had a positive effect on condom use, and suggested that Interventions among STD patients should include activities addressing condom use motivation and directly enhancing condom skills[24]. Many experts in the social marketing field emphasized that condom campaign could reach to large number of

people, particularly to men. The campaign can also promote condoms for both disease and pregnancy prevention. With such a double message, a woman can bring up pregnancy prevention as a reason of using condoms. A completed randomized controlled trial of latex versus male plastic condoms reported the pregnancy rates of couples who used condoms at every sexual intercourse, called "consistent use". In the six-month of consistent use, pregnancy rates were 1.2 per 100 women using latex condoms and 2.6 per 100 women using plastic condoms, which would equate with 2 to 4 pregnancies per 100 women at 12 month[25]. The result was similar with our study. Pregnancy rates in group I and group II were 2.46% and 1.20% respectively in this study.

Conflict of interest statement

We declare that we have no conflict of interest.

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