Human Reproduction Vol.20, No.2 pp. 549–556, 2005 doi:10.1093/humrep/deh574
Advance Access publication December 17, 2004.

Attitudes toward male fertility control: results of a multinational survey on four continents

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BACKGROUND: Following extensive research activity to develop an effective agent to control male fertility, such a product may be available for use within ~5 years. However, little is known concerning contraceptive knowledge, desires and attitudes of men in different countries, and their acceptance of male fertility control (MFC). METHODS: A survey of >9000 males aged 18–50 years was performed in nine countries on four continents in 2002. The objective was to compare, on a cross-cultural basis, the knowledge, attitudes and acceptability of MFC among men and assess their willingness to use such a method. RESULTS: Between 50 and 83% of the male respondents currently use contraceptive methods, and 55–81.5% reported that both partners participate in selecting the method of contraception employed. Overall acceptance of hormonal MFC was high (>55%), with 28.5–71.4% of survey participants of various nationalities expressing the willingness to use such a method. CONCLUSION: While MFC appears to be well accepted overall, the willingness to use this type of contraception varies widely between differing population groups. The specific characteristics and profile of any MFC product will have to be carefully evaluated to accurately assess its acceptance, both by men and their female partners.

Key words: administration route/contraception/male fertility control/multinational/survey

Introduction

Throughout history, the condom has generally been acknowledged as the only dependable and reversible method of contraception for use by men. While generally effective, however, its efficacy in actual practice varies widely. Condoms have frequently not been well accepted by many couples as a long-term fertility control method, often being considered inconvenient and unnatural. Nevertheless, the principal male-dependent method of contraception for as many as one-third of all couples worldwide is the condom (which has the added benefit of barrier protection against sexually transmitted diseases and human immunodeficiency virus infection). The importance of the male contribution to pregnancy prevention has been widely recognized (Ringheim, 1996; Drenman, 1998).

Extensive survey results have been reported concerning attitudes toward contraceptive practices in general. However, only a few have evaluated the opinions of males (Keith *et al.*, 1975; Davidson *et al.*, 1985; Ringheim, 1993; Ezeh *et al.*, 1996; Hulton and Falkingham, 1996; Drenman, 1998).

Although male fertility control (MFC) employing hormonal agents—administered orally, by injection or implant—has been considered for many years (World Health Organization, 1996), only now have potential MFC products reached a stage of development sufficient to enter Phase II clinical trials. The absence of any such product currently in the market leaves unanswered many questions concerning male attitudes toward MFC. These include overall acceptability, specific product attributes most likely to influence the level of acceptance, and differences between men who are willing, or unwilling, to consider the use of such an agent.

Earlier studies on this subject (Bebb *et al.*, 1996; Handelsman *et al.*, 1996; Meriggiola and Bremner, 1997; Sjögren and Gottlieb, 2001) have been taken into consideration, including several that specifically addressed MFC (Grady *et al.*, 1996; Glasier *et al.*, 2000; Martin *et al.*, 2000) and issues related to geographical variability (Glasier *et al.*, 2000; Martin *et al.*, 2000).

In 2002, a cross-cultural survey over four continents was designed to assess male attitudes regarding fertility control methods in general, development of a new MFC product, the route of administration that would be most acceptable, and those factors that would be likely to influence a man's decision on whether to consider the use of a new MFC.

Materials and methods

Objectives

It was the objective of our cross-cultural survey: (i) to prepare a comparative survey to provide details about knowledge, attitudes and acceptability of MFC in various product administrations (with ranking) on a multinational level; (ii) to determine the best-accepted route of administration of the MFC (oral, injection, implantation).

Survey method

A total of nine countries on four continents were identified for the purposes of this survey, in each of which ~1000 male subjects were included (except for 1500 in the USA). The study populations were from the following countries: Europe: France, Germany, Spain, Sweden; North America: USA; Central/South America: Argentina, Brazil, Mexico; and Asia: Indonesia. Due to budgetary limitations, and the availability of results from a recent four-country study by Martin *et al.*, (2000), no additional Asian countries and none from Africa were included. Indonesia was selected because the vast majority of the population is of the Muslim faith, an important consideration in assessing views on contraception.

The Centre for Epidemiology & Health Research Berlin (ZEG) served as the coordinating centre, while NFO (National Family Opinion) Health Europe Munich in collaboration with NFO Worldgroup, a worldwide operating market research organization, was responsible for the field work together with local representatives at each respective study centre. Local execution of the study was controlled and documented by a responsible market research institute in each country.

The study followed local regulations established for performing population surveys in each country. Subject surveys were undertaken between April and June 2002, and a preliminary database was completed in the early autumn of 2002.

Study participants

In Europe (except for Sweden) and North America, study participants were selected by a random sampling of males aged 18–50 years from existing community samples (ACCESS panels). These community panels have been in wide use for years in the respective countries, are representative of the overall populations with respect to age, sex, regional structure and social status (e.g. educational, income levels), and in some cases include medical history parameters. The methodology has been described elsewhere (Potthoff *et al.*, 2004). In Sweden the study participants were not selected from an ACCESS panel but from another existing, representative panel.

In Latin America and Indonesia, the study questionnaires were distributed by interviewers on the basis of a quota-sample. Interviewers were sent house to house in selected regions, recruiting men of the required age group who were willing to participate in this study. When a total of 1000 men had been interviewed, the study was considered complete in the respective country.

Information gathering

The survey was designed as a structured, standardized interview, with identical questions, possible answers and sequences in all countries. All questions were multiple-choice, except for two open-ended questions.

The master questionnaire was in English. In non-English-speaking countries, the questionnaire was translated into the respective local languages and revised if applicable, to ensure that all question-and-answer stipulations were identically understood. In some countries, not all of the questions could be asked in precisely the same manner, primarily those affecting socio-demographic and personal characteristics (e.g. school education, tertiary qualifications, religious affiliation, and ethnicity). In these situations, country-specific deviations from the master questionnaire were permitted.

A number of specific questionnaire adaptations should be noted: different health insurance systems (all countries); other educational categories (Sweden, USA); other occupational categories (France); questions regarding religion and ethnicity were not permitted or other scales with different categories used (France, Sweden, Mexico); other scale for household income (USA).

Data management and analysis

Data were computerized in each individual country. Answers to the open-ended questions were coded according to an international Master-Code plan. The database was controlled and/or corrected centrally by means of a standardized testing program. The checked dataset was then transformed into an SPSS format as well as a STATA database.

Analyses were performed with the statistical packages STATA (6th revision) and SPSS for Windows (10th revision). Frequency analyses, logistic regression, factor and cluster analyses were performed to obtain relevant information.

Results

Sample sizes

The target sample size was achieved in eight of the countries, as follows: Argentina (1000), Brazil (1000), Germany (1021), Indonesia (1000), Mexico (1024), Spain (1049), Sweden (1023) and the USA (1500). The questionnaire total in France (725) was lower because of a greater frequency of objections by prospective respondents to questions that were considered too intimate or inappropriate. Overall response rates were 36, 61, 63, 35 and 68% in France, Germany, Spain, Sweden and the USA respectively. (No formal response rates were calculated in Indonesia, Brazil, Mexico or Argentina due to the quota-sampling technique employed.)

Demographics

All respondents were between 18 and 50 years of age; median ages ranged from 29 years in Mexico to 34–37 years in Europe and 40 years in the USA. The demographics of the nine national study groups are shown in Table I.

It is clear that contraceptive decisions are often impacted by individuals' religious beliefs. Except for Indonesia, in which the vast majority of respondents were Muslim, most belonged to Christian denominations. In Latin America, Spain and Sweden, Roman Catholics were predominant, while Protestants formed the largest group in the USA. In Germany, Catholics and Protestants were equally represented. One-third of German respondents were not religious, a higher percentage than in any other country.

Most respondents were married or lived in stable relationships, and more than half discussed the questionnaire responses with their partner. In Europe, most participants had no, one or two children, while the highest percentage of men with more than two children was found in Indonesia.

With regard to socio-economic status, respondents were predominantly within the middle one-third of household

Table I. Demographic details of participating centres

	GER ($n = 1021$)	FRA ($n = 725$)	SPA ($n = 1049$)	SWE ($n = 1023$)	USA ($n = 1500$)	ARG ($n = 1000$)	BRA ($n = 1000$)	MEX ($n = 1024$)	INDON ($n = 1000$)
Inquiry with partner discussed	48	52	63	43	56	65	66	77	49
Age (years), median (range)	37 (18–50)	36 (18–50)	36 (18–50)	34 (18–50)	40 (18–50)	33 (18–50)	31 (18–50)	29 (18–50)	32 (18–50)
Marital status (married/cohabiting)	82.1	79.8	69.4	65.1	81.2	62.7	71.4	63.0	72.6
No. of long-term partners									
None	4.1	4.9	12.4	6.1	5.6	5.1	5.5	4.7	24.5
1	39.6	41.4	61.0	28.1	40.3	41.8	49.8	49.6	74.9
2–3	42.2	38.8	23.0	47.1	38.1	40.0	27.2	31.4	0.5
4–5	9.2	8.5	1.9	10.4	8.9	7.7	8.0	9.0	–
> 5	5.0	6.4	1.7	8.3	7.1	5.4	9.5	5.3	0.1
No. of children									
0	38.3	34.2	38.2	42.7	33.1	43.0	38.6	41.9	34.5
1–2	51.2	47.7	54.5	43.2	44.7	36.7	43.0	37.3	40.8
3–4	9.7	17.4	7.0	13.4	18.0	15.0	15.0	17.7	21.3
> 4	0.9	0.7	0.4	0.7	4.2	5.3	3.4	3.1	3.4
Religious domination									
Roman Catholic	33.4	ND	85.9	69.4	30.8	81.1	72.4	84.9	1.1
Protestant	31.4	ND	0.3	3.3	45.3	2.1	14.1	3.2	6.0
Orthodox Christian	0.4	ND	–	1.3	3.2	0.5	–	2.7	–
Anglican	–	ND	0.1	1.2	1.7	0.1	–	0.1	0.1
Buddhist	0.1	ND	–	0.2	0.2	0.4	0.7	–	1.1
Hindu	–	ND	–	0.1	–	–	–	–	0.2
Islamic	0.2	ND	0.1	4.2	0.2	0.2	–	–	91.5
Judaism	–	ND	–	0.2	1.7	0.4	–	0.1	–
None	34.5	ND	13.6	20.3	16.9	15.0	12.8	8.9	–
Educational level									
Low/medium	82.9	82.1	79.1	65.2	52.7	76.4	91.6	79.7	87.5
High	17.1	17.9	20.9	34.8	47.3	23.6	8.4	20.3	12.5
Income level									
Lower third	24.2	15.2	21.4	22.4	25.9	55.2	34.2	20.8	48.6
Medium	65.0	78.6	76.0	59.7	50.6	42.4	50.2	77.1	49.3
Upper third	10.7	6.3	2.6	17.9	23.4	2.3	15.6	2.1	2.1

Values are median (range) for age, and percentage of respondents in each centre.
GER = Germany; FRA = France; SPA = Spain; SWE = Sweden; ARG = Argentina; BRA = Brazil; MEX = Mexico; INDON = Indonesia.

income in their respective countries. The percentages of those in the lowest one-third income groups ranged from 15 to 25% in Europe and the USA, and generally higher in Latin America and Indonesia. As educational systems vary widely between the nine study countries, the respondent's level of education was classified as either low/medium or high (attended university).

Knowledge about contraceptive methods

Respondents generally had good knowledge regarding contraceptive methods used by men and their partners, and their utilization. The condom was the best known method across all countries, closely followed by the oral contraceptive pill. Survey results in all nine countries indicated the general belief that oral contraceptives are 'widely used', this response being reported by about 40% in Mexico, 54% in Brazil and > 70% in the remaining countries.

In general, European respondents were much less aware of the availability of injectable contraceptives than those in other countries, and contraceptive implants were similarly less well known. However, Latin American respondents were more familiar with these methods, particularly injectable agents. The intrauterine device (IUD) was well-recognized as a contraceptive method in most countries, but this approach was much less widely employed in the USA and Brazil.

In most countries men reported rare or no use, or awareness of, the tampon/sponge as a contraceptive method. Contraceptive suppositories, jelly/cream/foam, diaphragm/cap, and tampon/sponge were better known in Europe and the USA than in South America, but generally unknown in Indonesia. Relatively little knowledge concerning the emergency ('day-after') pill was evident in either North or South America, and Indonesia. Indonesian participants were also least familiar with tubal ligation and abortion, and only 46% knew about male sterilization.

Personal experience with contraceptive methods

Participants were asked about their own individual experience with male contraception methods, or experience through their partner with female contraceptive approaches. It was assumed that such personal experience would likely correlate with actual use of such methods.

As shown in Table II, the condom was the male contraceptive method with which most participants had experience, with an average ever-use response of (79.4%) across all countries. Withdrawal also continues to play a major role, but less often in Latin America and Indonesia.

Male respondents' overall personal experience with the 14 female-based methods of contraception was reported as follows: oral contraception (66.4%), rhythm method (28.3%),

Table II. Personal experience with contraceptive methods (respondent and partner)

	GER	FRA	SPA	SWE	USA	ARG	BRA	MEX	INDON
Pill	93.9	87.7	63.6	90.0	82.6	50.5	49.1	30.1	50.1
Injection	3.6	0	2.4	6.1	10.2	9.3	14.2	14.6	51.5
Implant	2.2	0.3	0.2	9.1	3.0	0.9	0.8	1.1	8.8
Intrauterine device, coil	29.8	35.2	16.2	43.6	8.2	20.7	5.0	26.8	21.3
Tampon, sponge	5.7	3.8	2.4	8.7	13.8	2.2	0.5	2.9	1.4
Suppositories	17.9	2.0	3.8	2.8	10.8	6.3	1.6	8.0	0.5
Jelly/cream/foam	8.4	7.5	3.5	10.6	24.7	2.8	4.8	10.0	1.4
Diaphragm/cap	4.2	1.7	7.2	15.7	18.7	6.0	8.0	10.6	0.5
Emergency pill	10.8	10.7	10.4	19.2	2.4	5.2	12.8	17.2	6.8
Rhythm/safe period	27.4	31.2	15.0	39.6	33.8	17.3	31.8	30.2	27.8
Douche	1.4	3.9	2.7	4.2	8.9	3.8	4.8	16.0	1.7
Tubal ligation	16.9	6.5	8.8	9.0	24.3	2.6	11.5	14.5	3.8
Abortion	5.8	7.5	3.6	20.7	7.7	2.2	5.5	3.1	5.3
Breastfeeding	18.8	10.0	11.0	14.6	21.6	4.4	16.3	13.9	40.0
Withdrawal	46.9	51.8	57.8	70.5	55.4	32.8	23.7	24.1	35.7
Condom	90.0	81.3	90.7	92.4	83.4	84.2	75.0	69.8	46.5
Vasectomy/male sterilization	11.9	0.3	14.4	6.9	19.4	1.4	2.3	4.3	1.8

Values are percentages of 'yes' answers.
GER = Germany; FRA = France; SPA = Spain; SWE = Sweden; ARG = Argentina; BRA = Brazil; MEX = Mexico; INDON = Indonesia.

IUD (21.8%), breastfeeding (17.2%), sterilization (11.7%), emergency pill (10.2%), jelly/cream (9.0%), diaphragm/cap (8.7%), abortion (6.8%), injection (12.9%, 12), suppositories (6.4%), douche (5.5%), tampon/sponge (5.0%), and implant (3.0%). Oral contraception was more widely used in Europe and North America, while injections were more frequent in North and South America and Indonesia, and implants were common only in Indonesia.

Finally, vasectomy was relatively common in the USA, Spain and Germany, but much less accepted in Sweden, and was nearly unknown in France, Latin America and Indonesia.

Attitudes toward contraception

A majority of couples currently use contraception (see Table III), with most deciding together about contraceptive issues, followed by the woman alone and, least often, the male alone. Very small percentages of respondents in the various countries disapproved of any contraceptive method at all, with >10% reported only in Indonesia and the USA. Methods that were not approved by the respondent's own religion were rejected in the same order of magnitude, except for being considerably higher in predominantly Muslim Indonesia (58.3%). Strong objections to vasectomy as a fertility control method were reported by approximately two-thirds or more of all respondents in France, Sweden, Argentina and Indonesia, but much greater acceptance was expressed elsewhere.

Attitudes toward MFC

A principal objective of this study was to query survey participants about their willingness to consider the use of a new method of MFC, capable of preventing sperm production and thus pregnancy. Table III shows that overall acceptability of a new method of MFC was good, with 55.1% expressing

Table III. Attitudes concerning contraceptive methods across countries

	GER	FRA	SPA	SWE	USA	ARG	BRA	MEX	INDON
Currently using contraception									
Yes	83.2	70.2	77.4	76.4	55.9	56.4	50.6	46.5	69.5
Currently no partner	8.2	9.7	6.7	12.9	8.2	20.4	22.4	7.2	0.5
Who decides on contraceptive method?									
You	3.7	6.3	6.3	1.9	8.0	10.5	8.4	11.9	6.5
Partner	19.3	39.6	12.2	23.3	17.5	11.0	29.8	13.3	30.5
Both	77.0	54.1	81.5	74.8	74.4	78.3	61.8	74.8	63.0
Moral objections against methods of contraception?									
Against any method	1.3	4.7	8.4	4.0	10.2	7.8	4.3	5.1	13.1
Methods not approved by my religion	3.0	5.1	6.4	3.6	13.3	8.6	6.8	5.8	58.3
Willingness to undergo vasectomy?									
Not at all	38.3	82.9	33.6	75.7	48.5	78.3	47.4	31.3	67.8
Possible under certain circumstances	45.0	16.4	51.6	16.7	35.3	16.1	24.9	30.2	18.3
I am considering it	14.4	0.4	7.7	7.1	11.7	3.4	22.4	17.8	13.3
Will get sterilized later	2.3	0.3	6.9	0.4	4.6	2.3	5.2	20.7	0.6
Already sterilized?	10.1	0.3	11.1	3.2	17.5	2.5	2.2	4.0	1.2
If available would you be willing to use the new male fertility control?									
Willing	69.0	47.0	71.4	58.1	49.3	44.5	62.7	65.4	28.5
Uncertain	24.4	34.9	26.2	17.4	38.4	13.2	12.8	8.9	37.3
Disapproving	6.6	17.5	2.4	24.4	12.4	42.3	24.5	25.7	34.2

Values are percentages of respondents in each centre.

Table IV. Multivariate analysis of the association between acceptance of a new method of male fertility control and socio-psychological factors

		Adjusted OR[a] (95% CI) (all countries together)
Age (years)	(<39/>39)	0.95 (0.9–1.03)
Married/partner	(no/yes)	1.01 (0.9–1.1)
No. of partners	(none/more than one)	0.7 (0.6–0.8)
Current contraception	(no/yes)	1.3 (1.2–1.5)
No. of children	(0, 1 and 2/ more than 2)	0.9 (0.8–0.99)
Desire more children	(no/yes)	0.9 (0.8–0.99)
Residency	(not city/city)	1.3 (1.1–1.4)
Education	(lower/higher)	1.2 (1.1–1.3)
Income	(lower/higher)	1.2 (1.1–1.3)
Religiously committed	(not really/really)	1.01 (0.9–1.1)
Objections, general	(no/yes)	0.6 (0.5–0.7)
Objections, religious	(no/yes)	0.5 (0.4–0.6)
Objections	(no/yes)	0.9 (0.8–0.97)
Willing vasectomy	(no/yes)	2.7 (2.4–3.1)

[a]Adjusted by age, country, religious objections against contraception, and acceptance of vasectomy.

their willingness to use such a method of contraception and only 20.7% (21.1) being unwilling to do so.

Among those willing to use a new MFC, 68% reported that they were currently using some type of contraception. Significantly ($P < 0.00001$) larger percentages of those who reported no moral objections to contraception and/or were willing to consider sterilization (vasectomy) were favourably inclined to consider a new method of MFC.

With regard to religion, 55–60% of Christian or Jewish participants expressed a willingness to try a new method of MFC, while most adherents to Buddhism, and especially Muslim men, were unwilling to do so—only 29% of Muslims and 40% of Buddhists expressed such interest.

Varying respondent characteristics in relation to acceptance of MFC

Logistic regression analysis was applied to assess the correlation between specific characteristics of male respondents and their professed willingness to consider using a new method of MFC. Table IV shows the odds ratios (OR) and 95% confidence intervals for the total study population. An OR >1.0 signifies a positive association (supportive) between a specific variable and the willingness to use a new method of MFC, while an OR <1.0 indicates a negative association ('inhibit use' or non-supportive).

Overall, age was not significantly related to a respondent's interest in MFC, except for Germany where higher age was correlated with greater acceptance of MFC. Partner status (married or cohabiting) also appeared to be largely unrelated to subjects' potential use of MFC.

While current use of any contraceptive method was moderately associated with greater acceptance of MFC, a more consistent finding was the relationship between higher education and acceptance of MFC. However, statistically significant OR (≥ 1.5) for higher education were found only in France, USA, Mexico and Indonesia, likely due to the substantial differences observed in defining educational levels in the various countries.

No association was found between religious commitment and acceptance of MFC. Although this study was not designed to analyse the impact of varying religions on the acceptance of MFC, the largely negative responses from Indonesia (the only Muslim majority country in the study) were noteworthy.

Objections to contraception in general and because of religious reasons were reflected in a lesser willingness to use MFC in most countries. However, while religious objections were a serious obstacle to the use of MFC, overall objections to contraception were rare (Table III). As anticipated, there was a convincing associaton between the acceptance of male sterilization (vasectomy) and acceptance of a new method of MFC in all countries surveyed.

Preference for different forms of MFC administration

An important study objective was to evaluate respondents' preferences with regard to varying dosage forms of a new method of MFC: daily oral administration, daily application of jelly/salve, a monthly injection, or annual implant. Figure 1 shows the percentages of respondents (only those willing to use the new method of MFC) who reported preferring each of these respective routes of administration.

In all country populations surveyed, daily oral dosing was the preferred route of administration. In Europe and the USA, daily oral administration was followed by an annual implant and monthly injection as second and third choices respectively, whereas the annual implant was least often preferred by South American and Indonesian respondents. In Indonesia, a monthly injection and the oral dosing were considered almost equally desirable.

The participants were also asked to compare condom use with three different dosing forms of MFC hormones: by daily oral administration, as a monthly injection, and as an annual implant. Figure 2, which compares the percentages of these methods selected as 'most desirable' by those respondents who stated a willingness to use the new MFC, illustrates the significant differences found between the survey populations in each of the four continents represented in this questionnaire survey. As would be expected, those unwilling to consider a new method of MFC overwhelmingly reported preferring the condom (67.8%), compared with 42.6% of those who expressed a willingness to consider MFC. Overall, the percentage of those willing to consider a new method of MFC who would prefer daily oral administration (22.3%), a monthly injection (12.4%), or an annual implant (23.3%) were significantly higher than those who rejected the concept of MFC (12.7, 7.2 and 13.1% respectively; $P < 0.00001$).

Preference for a daily agent (oral pill, jelly) was not associated with increasing age, but daily dosing was preferred by males without a permanent partner. On the other hand, implant preference was related to higher age and living in a stable union (married or cohabiting). Again, acceptance of vasectomy was a strong predictor of favourable inclination for all forms of MFC, in particular those with similarly long-acting effects such as injections and implants. Among those

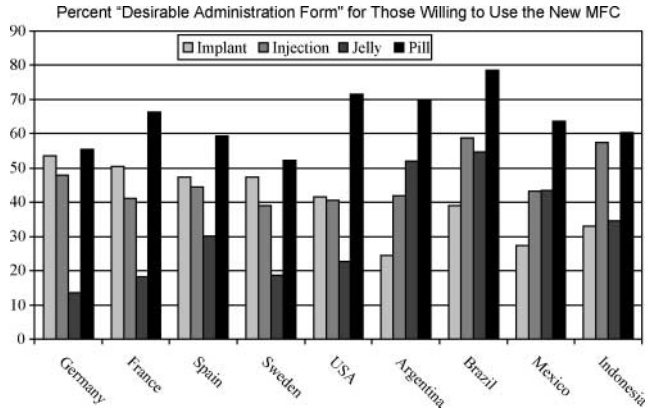

Figure 1. High acceptability of four possible forms of male fertility control (MFC) administration. The columns present the percentage of respondents who stated their willingness to use the new MFC that found the respective application form 'desirable'. Each route of administration was assessed separately. The percentage of 'uncertain' or 'disapproving' is not shown (= difference to 100% in each administration route).

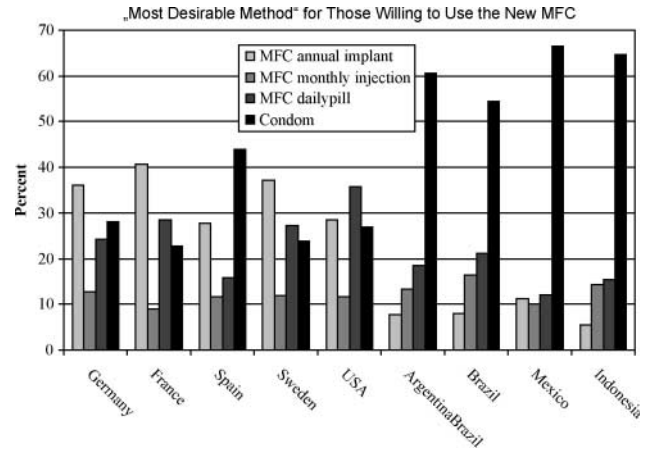

Figure 2. Most desirable methods of contraception. Comparison of condom with three forms of male fertility control (MFC). The percentage of rank 1 ('most desirable method') out of four possible rank places only for the respondents who stated their willingness to use a new MFC was shown in this graph.

who preferred an injectable or implantable form of MFC, one-third stated an overall preference for a medium- to long-term (6–12 month) frequency of application, while more than half reported preferring a shorter interval (e.g. monthly administration).

The respondents were also asked which would be desired or best accepted frequency of application if the MFC were an implant or an injection. Obviously, medium-to-long-term intervals (6–12 months) were more appreciated than very short ones (monthly) and very long ones (5 years) in most countries. But the two groups of 'willing to use the new MFC' and 'unwilling to use the new MFC' showed a distinct difference. Both of them stated that once a year would be the most preferred procedure (34% of the willing and 33% of the unwilling), but while the unwilling chose 'once every 5 years' as the second best choice, the willing rather inclined to shorter time-intervals. Only 13% of the willing liked the

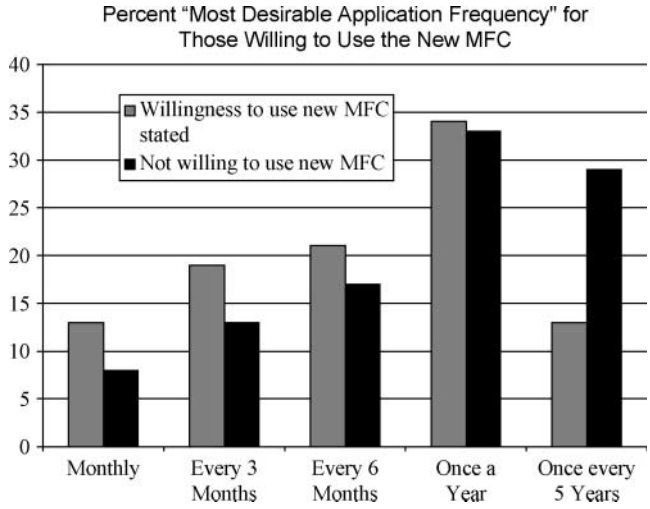

Figure 3. Most desirable application frequency. The columns present the percentage of respondents willing or unwilling to use the new male fertility control, who found the respective application frequency the most desirable one.

longest interval best compared to 29% of the unwilling. On the other hand, 53% of the willing participants liked shorter intervals (monthly, every 3 or 6 months) and only 38% of the unwilling (see Figure 3).

Discussion

An estimated 12% of all couples worldwide employ a male contraceptive method for fertility control, while in more developed countries this percentage is reported to be as high as 29% (United Nations, 1994). The cross-cultural survey described in this report was designed to obtain information on current attitudes toward male contraception and its use in nine different countries on four continents.

An obvious limitation to any population-based study of this nature is the substantial percentage of potential respondents (as high as 40–65% in some countries) who may decline to participate in the survey. The reasons for such non-participation may range from a subject's lack of time or interest, to an unwillingness to respond to questions of a highly personal nature. Nonetheless, many such surveys prove very instructive in identifying overall preference patterns between populations. The findings of the present study add to the current body of knowledge concerning the attitudes and thinking of different geographic groups regarding contraception in general and MFC in particular.

Between 40 and 80% of the respondents reported discussing the questionnaire with their partner. However, in this study it was not possible to identify who was principally responsible (the male, female or both partners) for decision-making in selecting a method of contraception. Glasier *et al.*, concluded that a majority of women agree that males have a responsibility to share contraceptive decisions with them, but the present survey of males did not specifically address the question of the views of women toward MFC. More extensive research on this important subject would therefore appear to be warranted in the future.

In all of the participating countries in this study, a majority of the respondents (all of whom were male) stated that they would decide together with their partner on the specific method of contraception to be used. However, in three countries (France, Brazil and Indonesia), $\geq 30\%$ of the respondents stated that the female alone decides this question, while in North and South America between 8 and 12% of men stated that they alone would make this crucial decision. The latter rates were nearly twice as high as in Europe, and perhaps suggest the impact of a more 'paternalistic' view which may be particularly prevalent in Latin American society. In any case, it is clear that there are significant differences between varying national populations regarding the roles of the respective genders in making decisions on contraception.

It is noteworthy that the results of this questionnaire study did not differ in any significant respects from those of the four-country (UK/South Africa/Hong Kong/Shanghai) survey reported in 2000 by Martin *et al.* and Glasier *et al.* In addition to reporting that similar percentages of respondents were familiar with the varying methods of contraception, both studies also generally correlated well with respect to actual contraceptive usage patterns, although substantial variations were clearly evident between differing geographical and cultural populations.

Overall, 55% of the current survey respondents reported being willing, or very willing, to use a new method of male fertility control as described in the study, with favourable response rates ranging from 28.5% in Indonesia to 71.4% in Spain. A very similar range of acceptance of MFC (32–83%) was reported in the four-country study (Martin *et al.*, 2000), and a recent survey in Australia found that $\sim 48\%$ of males were either 'definitely' or 'probably' willing to try MFC, with an additional 27% expressing 'possible' interest, for an overall total of $>75\%$.

Demographic characteristics that were found to be important predictors of a willingness to consider the use of MFC included educational and income levels, current use of contraception, and the acceptance of vasectomy. The influence of educational level on the acceptance of fertility control had also previously been reported in the four-country study (Martin *et al.*, 2000). With respect to religion, the majority of participants committed to Christianity or Judaism, and those who are not religious at all, expressed a willingness to try the new method of MFC, while most Muslims and Buddhists would not do so. There was no clear difference between the different Christian dominations regarding willingness to try.

Daily oral pill dosing was selected as the most desirable route of administration in all participating countries, except for Indonesia where the monthly injection ranked slightly higher. A yearly implant, which was accepted as second best in the European centres, ranked lowest in Latin America and Indonesia. Daily jelly application was very well accepted in Latin America, but was the least accepted in Europe and North America. In a recent Australian study (Weston *et al.*, 2002), a daily MFC oral pill ranked highest in preference: $>33\%$ of males preferred daily oral dosing, followed by a 3-monthly injection (27%), 2-monthly injection (21%), monthly injection (13%), patch (4%), and weekly injection (1%).

The preferred time-interval for application of an implant or injectable form of MFC across all centres was 'once a year'. Participants who stated their willingness to use a new MFC method generally preferred shorter intervals. It is possible that respondents who were unwilling to accept male contraception may have believed that such an MFC product would require frequent re-administration, while those willing to consider MFC may have been more concerned about efficacy than convenience. Higher age, current use of contraceptive methods, acceptability of male sterilization, fewer lifetime partners, fewer children, and fewer objections to contraception in general were associated with greater acceptance of longer-acting formulations (injections or implants), as compared with preparations that were administered daily (oral pill or jelly). While the concept of MFC was generally well received in this study, when respondents were explicitly asked to rank the condom versus three potential formulations of a new MFC method, the condom ranked first in acceptance in all of the countries surveyed.

One important conclusion previously reported in other studies (Glasier *et al.*, 2000; Martin *et al.*, 2000; Weston *et al.*, 2002) and confirmed in the present survey was that usually both partners are involved in the decision making process regarding the fertility control. However, if only one partner assumes this responsibility, it is more frequently the woman alone. This strong influence of females with regard to contraceptive choices requires that the attitudes of women toward contraception in general, and MFC in particular, be more explicitly assessed in future studies of this nature.

In conclusion, >9000 male respondents from nine different countries on four continents expressed generally wide acceptance of the concept of MFC, although the willingness to use a new male fertility product differed between the geographical populations surveyed. A number of variables were identified which correlate with a greater likelihood of an individual's acceptance of MFC. However, the study results should be considered preliminary pending further research, development and introduction of a specific MFC product formulation, as well as more in-depth assessment of the impact of the opinions of female partners on the selection and use of an MFC hormonal agent.

Acknowledgements

We thank our co-workers from ZEG Berlin, particularly Anita Assmann, for the planning, supervision, and initial evaluation of the survey; also Dr Peter Potthoff of TNS Infratest Health for planning, guiding and executing the worldwide field work together with national subsidiaries. This study would not have been possible without the support provided by an unconditional grant from Schering AG Germany.

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Submitted on March 18, 2004; resubmitted on June 21, 2004; accepted on September 29, 2004