Future physicians' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey among medical interns in Maharashtra, India

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Title: Future physicians' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey among medical interns in Maharashtra, India

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Article focus

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge and perceptions on contraceptive use and counselling among future physicians in Maharashtra, India.

Key message points

Despite positive attitudes towards modern contraceptives, sex education, and family planning counselling future physicians in Maharashtra have fair knowledge and misconceptions about modern contraceptive.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to decrease unplanned pregnancies and unsafe abortions in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise pre- and in service training in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of interns from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

ABSTRACT

Background: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives. This study aimed to investigate knowledge and perceptions on contraceptive use and counselling among future physicians in Maharashtra, India.

Study design: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical interns in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services and individual counselling. They had a fair knowledge of contraception, but showed some misconceptions about modern methods and the impact of sex education. Attitudes towards contraception were positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Pre- and in-service training of providers in evidence-based contraceptive counselling would decrease unplanned pregnancies and reduce unsafe abortions in the region studied. Expanding the provider base to health care professionals other than physicians would increase the availability of services.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. The growing number of people of reproductive age in developing countries poses a challenge for family planning programmes and health care services. In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide. Every year, nearly 60,000 women in India die from complications related to pregnancy [6]. Approximately 6.7 million induced abortions take place in India annually. Despite the fact that induced abortion has been legal in India since 1971 [7], most abortions are performed in an unsafe manner and put women's health and lives at risk [8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for family planning among married women is 14%. The overall unmet need for modern contraceptives is 22% in the cities and higher in rural areas. Among married women in India, 56% use some form of contraception and 49% use a modern method. Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is infrequent: male condoms are used by 5%, the pill 3%, IUD 2%, injection 1%, and male sterilisation 1% [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women

[13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women to avoid unintended pregnancy [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain unplanned and unintended. Considering the future role of medical students and interns as contraceptive counsellors, little is known about their views on contraceptive methods, use or counselling. This study aimed to investigate knowledge and perceptions on contraceptive use and counselling among future physicians in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire in the Indian state of Maharashtra among 1996 medical students in their fifth year (internship) of training [15]. Out of a total of 43 medical colleges in Maharashtra, a convenience sample of 27 colleges (8 government, 19 private) was included. All medical interns at the selected institutions were asked to participate before they were to take a pre-service CAC orientation program. In the State of Maharashtra out of 43 medical colleges (5195 students) 19 are Public (2200 students). In total 27 colleges (8 public, 19 private) were included in the study and 1423 and 573 students participated from private and public colleges respectively.

Study setting

Maharashtra is located in west-central India. It is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. Mumbai, India's largest city, is the capital of the state. Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of

internship, which includes a two-month rotation in obstetrics/gynaecology and three months of community medicine [17].

Instrument

The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to the medical curriculum and questions concerning perceptions of contraceptive methods and services.

Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for interns of different genders, types of colleges, and places of birth. The alternatives ‘agree’ and ‘agree completely’ were aggregated, as well as the alternatives ‘disagree’ and ‘disagree completely’. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical interns eligible for participation in the study were given oral information about the study and were informed that participation was anonymous and voluntary and that choosing not to participate would not affect their studies or future careers

negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet (Dnr: 2013/415-31/4).

RESULTS

Out of 2,006 questionnaires, 1,996 were at least partially filled-in, making the overall response rate 99.5%. The demographic characteristics of the interns are outlined in Table 1. Since the interns were homogenous in terms of age, religion, and marital status, the variables remaining for inter-group comparisons were gender (57% male, 43% female), place of birth (72% urban, 25% rural), and type of college (71% private, 29% public).

Table 2 shows the respondents' coursework on sexual and reproductive health. Most of the interns thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between interns from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74% believed it should be given individually and not in a group. A majority of the respondents (67%) thought doctors should be the ones to provide contraception to patients, while 27% considered health workers to be the most appropriate counsellors. A few interns chose other alternatives (nurse 3%, other 1%, missing 1%). A majority (95%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 89% of the interns stated they should be taken every day. Some interns (6%) thought they were to be taken after intercourse or once a month (3%). A cross-sectional analysis of answers given by interns with rural versus urban places of birth revealed no significant differences with regard to contraceptive counselling. However, those from private colleges preferred

individual contraceptive counselling over group counselling (private college interns 78%, CI 95%, 75.9–80.3; public college interns 71%, CI 95%, 66.6–74.4). Female interns were also more supportive of individual counselling than males (females 80%, CI 95%, 77.4–82.9; males 73%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98%, CI 95%, 96.8–98.8; males 95% CI, 93.8–96.4). Moreover, female interns were better informed on the daily intake of oral contraceptive pills than males (females 93%, CI 95%, 91.5–94.9; males 89%, CI 95%, 86.8–90.6).

The knowledge, attitudes, and perceptions of medical interns on contraceptive methods, services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing interns from public and private colleges indicated a difference of opinion regarding the statement "Doctors working in abortion service have friendly attitudes towards unmarried women". Fewer interns from private colleges agreed or agreed completely as compared to interns from public colleges (private college interns 44%, CI 95%, 41.8–46.4; public college interns 51%, CI 95%, 47.0–51.4). A comparison of the answers based on the interns' place of birth (urban or rural) revealed significant differences in responses to three statements: "Contraceptive pills might cause cancer"; "Doctors working in abortion service have friendly attitudes towards unmarried women"; and "Sex education encourages unmarried people to have sex" (Table 4).

Table 5 compares male and female medical interns' knowledge, attitudes, and perceptions on contraception. More female interns agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female interns largely agreed or agreed completely that condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 50% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 39% among females.

DISCUSSION

Our findings suggest that although the medical interns surveyed had a fair knowledge and a positive attitude toward contraception and pre-marital counselling, they also had misconceptions about modern contraceptive methods and the impact of sex education. They recognized the influence of traditional values and negative provider attitudes regarding contraceptive services, and they expressed a clear interest in disseminating contraceptive information as future physicians.

Very few respondents had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility. More females than males were unaware that emergency contraceptive pills may be used several times a month. Recent studies indicate that family planning training during residency improve future physicians proficiency in both uterine evacuation and contraceptive counselling[19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college interns. The background factor that had the greatest influence on knowledge was gender. Female interns were better informed about the dosage of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most interns in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although interns born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health. At the same time, premarital sex is increasing among Indian youth [20]. Although comprehensive sex education has been shown to have a positive impact on young people's risky sexual behaviour [21], in parts of India sex education has been banned in schools [20]. Young people in India have

expressed a desire for formal sex education and doctors are their preferred source of advice [22]. India is known to have negative attitudes toward pre-marital sex and a reluctance to provide married couples with contraceptives before they have had at least one child [23]. Other research reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [24]. A review of studies from developing countries indicates a similar pattern [25]. One in four respondents in our study did not believe doctors working in abortion services held positive attitudes towards unmarried women. However, as noted above, most interns supported providing contraceptive information to unmarried couples. Females expressed a slightly greater interest in working with contraceptive services in their medical practice than males. Although nearly all interns in our survey said they would like to assume the responsibility for contraceptive counselling in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing and task shifting within family planning services is recommended by World Health Organization (WHO) [26]. The involvement of clinical officers, midwives and nurses increases equitable access to modern contraception among women in low resource setting [27]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future doctors would be willing to relegate such tasks to others. This might overcome the present inequalities in access to reproductive health services in India [28]. A recent study suggests that the inclusion of nurses, midwives, and ayurvedic physicians in medical abortion care is feasible in India [29]. Broadening of the provider base for family planning services would be a pragmatic response to the current shortage especially in rural area of India. Several studies conclude that even though abortion providers discuss contraception with their patients and advise them about a range of methods, it is common for patients to refuse any form of contraception following an abortion [30, 31]. Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of

women [32]. Two recent studies from rural India may indicate a change in attitude. In the first, nearly one-third of young married women without children were found to be using contraceptives; 10% were using condoms to postpone having their first child [23]. The second study found growing autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers-in-law [33].

The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [34]. Comprehensive sexual and reproductive health services should conform with international human rights standards and include respect for privacy and confidentiality, provide full and accurate information, and ensure free and informed consent [11].India has one of the most privatized medical systems in the world. The public system, which provides health care for the poor, employs only two physicians and eight nurses per 10,000 population [35]. The strategic use of nurses and midwives has been described to contribute to mitigating human resource problems in emergency obstetric and gynecological care [36]. There is evidence from developing countries that trained nurses and midwives can replace doctors in many settings [37], yet medical doctors are still the dominant providers of contraceptive services in India. Strategies' identified to cover critical gaps in access to reproductive health are; integrated family planning with postpartum and abortion care, pre and in service training on evidence based contraception and task shift and sharing between physicians and midwives and nurses [38].

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students in both private (50 %) and public (26%) colleges is included are thought to strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all medical interns in the country. On the other hand, the presence of interns from public and

private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous questionnaires is suitable for sensitive topics like sexual and reproductive health. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive attitudes towards modern contraceptive methods, sex education, and family planning counselling among future physicians in India. There has also been a willingness to offer sexual and reproductive health services to people regardless of their marital status. Pre- and in-service training in evidence-based contraceptive counselling would decrease unplanned pregnancies and unsafe abortions in India. Expansion of the provider base to include categories of health care staff other than physicians as purveyors of contraceptive information could increase access to services.

Contributor statement

BE had the original idea of the study and developed the study protocol together with HO, KGD and MKA, whom developed the original questionnaire. HO entered the data and made first analysis together with SH who wrote the first draft. All authors contributed to the final version of the manuscript.

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Competing interests

The authors declare no competing interests

Data sharing statement

There is no additional data available

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ABSTRACT

Background: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives. This study aimed to investigate knowledge and perceptions on contraceptive use and counselling among future physicians in Maharashtra, India.

Study design: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical interns in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services and individual counselling. They had a fair knowledge of contraception, but showed some misconceptions about modern methods and the impact of sex education. Attitudes towards contraception were positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Pre- and in-service training of providers in evidence-based contraceptive counselling would decrease unplanned pregnancies and reduce unsafe abortions in the region studied. Expanding the provider base to health care professionals other than physicians would increase the availability of services.

Keywords: contraceptives, medical students, India, reproductive health

Key message points

- Despite positive attitudes towards modern contraceptives, sex education, and family planning counselling, future physicians in Maharashtra have fair knowledge and misconceptions about modern contraceptives.
- Future physicians expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.
- Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to decrease unplanned pregnancies and unsafe abortions in India.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. The growing number of people of reproductive age in developing countries poses a challenge for family planning programmes and health care services. In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide. Every year, nearly 60,000 women in India die from complications related to pregnancy [6]. Approximately 6.7 million induced abortions take place in India annually. Despite the fact that induced abortion has been legal in India since 1971 [7], most abortions are performed in an unsafe manner and put women's health and lives at risk [8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for family planning among married women is 14%. The overall unmet need for modern contraceptives is 22% in the cities and higher in rural areas. Among married women in India, 56% use some form of contraception and 49% use a modern method. Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is

infrequent: male condoms are used by 5%, the pill 3%, IUD 2%, injection 1%, and male sterilisation 1% [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women [13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women to avoid unintended pregnancy [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain unplanned and unintended. Considering the future role of medical students and interns as contraceptive counsellors, little is known about their views on contraceptive methods, use or counselling. This study aimed to investigate knowledge and perceptions on contraceptive use and counselling among future physicians in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire in the Indian state of Maharashtra among 1996 medical students in their fifth year (internship) of training [15]. Their colleges had opted to take part in a one-day training session on comprehensive abortion care at the invitation of a non-governmental organization. In the case of public colleges, the state government made this decision. All medical interns at the selected institutions were asked to participate before they were to take a

pre-service CAC orientation programme. Questionnaires were distributed before the first lecture of the program. In the State of Maharashtra out of 43 medical colleges (5195 students) 19 are Public (2200 students). In total 27 colleges (8 public, 19 private) were included in the study and 1423 and 573 students participated from private and public colleges respectively.

Study setting

Maharashtra is located in west-central India. It is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. Mumbai, India's largest city, is the capital of the state. Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of internship, which includes a two-month rotation in obstetrics/gynaecology and three months of community medicine [17].

Instrument

The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to the medical curriculum and questions concerning perceptions of contraceptive methods and services.

Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for interns of different genders, types of colleges, and places of birth. The alternatives ‘agree’ and ‘agree completely’ were aggregated, as well as the alternatives ‘disagree’ and ‘disagree completely’. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical interns eligible for participation in the study were given oral information about the study and were informed that participation was anonymous and voluntary and that choosing not to participate would not affect their studies or future careers negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet (Dnr: 2013/415-31/4).

RESULTS

Out of 2,006 questionnaires, 1,996 were at least partially filled-in, making the overall response rate 99.5%. The demographic characteristics of the interns are outlined in Table 1. Since the interns were homogenous in terms of age, religion, and marital status, the variables

remaining for inter-group comparisons were gender (57% male, 43% female), place of birth (72% urban, 25% rural), and type of coll

Table two is not showing the course work, but interns perceptions on coursework, their own assessment of their knowledge and their clinical practice.

Table 2 shows the respondents' coursework on sexual and reproductive health. Most of the interns thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between interns from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74% believed it should be given individually and not in a group. A majority of the respondents (67%) thought doctors should be the ones to provide contraception to patients, while 27% considered health workers to be the most appropriate counsellors. A few interns chose other alternatives (nurse 3%, other 1%, missing 1%). A majority (95%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 89% of the interns stated they should be taken every day. Some interns (6%) thought they were to be taken after intercourse or once a month (3%). A cross-sectional

What do you mean by health worker?

by interns with rural versus urban places of birth revealed no sig

what about concelling

regard to contraceptive counselling. However, those from private c

inconsistency of reporting. please use one decimal place for all your percentages throughout the manuscript

individual contraceptive counselling over group counselling (private college interns 78%, CI 95%, 75.9–80.3; public college interns 71%, CI 95%, 66.6–74.4). Female interns were also more supportive of individual counselling than males (females 80%, CI 95%, 77.4–82.9;

males 73%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98%, CI 95%, 96.8–98.8; males 95% CI, 93.8–96.4). Moreover, female interns were better informed on the daily intake of oral contraceptive pills than males (females 93%, CI 95%, 91.5–94.9; males 89%, CI 95%, 86.8–90.6).

Why do you use a table for this and not for the above

The knowledge, attitudes, and perceptions of medical interns on contracept… services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing interns from public and private colleges indicated a difference of opinion regarding the statement "Doctors working in abortion service have friendly attitudes towards unmarried women". Fewer interns from private colleges agreed or agreed completely as compared to interns from public colleges (private college interns 44%, CI 95%, 41.8–46.4; public college interns 51%, CI 95%, 47.0–51.4).

what is the significance ? who is having more negative attitudes?

A comparison of the answers bas… …an or rural) revealed significant differences in responses… …ptive pills might cause cancer"; "Doctors working in abortion service have friendly attitudes towards unmarried women"; and "Sex education encourages unmarried people to have sex" (Table 4).

Table 5 compares male and female medical interns' knowledge, attitudes, and perceptions on contraception. More female interns agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female interns largely agreed or agreed completely that

condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 50% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 20% [illegible]

I do not agree that they have fair knowledge when 11% of interns are unaware that OCP should be taken everyday!!!!

DISCUSSION

Our findings suggest that although the medical interns surveyed had a fair knowledge and a positive attitude toward contraception and pre-marital counselling, they also had misconceptions about modern contraceptive methods and the impact of sex education. They recognized the influence of traditional values and negative provider attitudes regarding contraceptive services, and they expressed a clear interest in disseminating contraceptive information as future physicians.

Very few respondents had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility. More females than males were unaware that emergency contraceptive pills may be used several times a month. Recent studies indicate that family planning training during residency improve future physicians proficiency in both uterine evacuation and contraceptive counselling[19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college interns. The background factor that had the greatest influence on

knowledge was gender. Female interns were better informed about the dosage of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most interns in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although interns born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health. At the same time, premarital sex is increasing among Indian youth [20]. Although comprehensive sex education has been shown to have a positive impact on young people's risky sexual behaviour [21], in parts of India sex education has been banned in schools [20]. Young people in India have expressed a desire for formal sex education and doctors are their preferred source of advice [22]. India is known to have negative attitudes toward pre-marital sex and a reluctance to provide married couples with contraceptives before they have had at least one child [23]. Other research reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [24]. A review of studies from developing countries indicates a similar pattern [25]. One in four respondents in our study did not believe doctors working in abortion services held positive attitudes towards unmarried women. However, as noted above, most interns supported providing contraceptive information to unmarried couples. Females expressed a slightly greater interest in working with contraceptive services in their medical practice than males. Although nearly all interns in our survey said they would like to assume the responsibility for contraceptive counselling

in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing and task shifting within family planning services is recommended by World Health Organization (WHO) [26]. The involvement of clinical officers, midwives and nurses increases equitable access to modern contraception among women in low resource setting [27]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future doctors would be willing to relegate such tasks to others. This might overcome the present inequalities in access to reproductive health services in India [28]. A recent study suggests that the inclusion of nurses, midwives, and ayurvedic physicians in medical abortion care is feasible in India [29]. Broadening of the provider base for family planning services would be a pragmatic response to the current shortage especially in rural area of India.

Several studies conclude that even though abortion providers discuss contraception with their patients and advise them about a range of methods, it is common for patients to refuse any form of contraception following an abortion [30, 31]. Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of women [32]. Two recent studies from rural India may indicate a change in attitude. In the first, nearly one-third of young married women without children were found to be using contraceptives; 10% were using condoms to postpone having their first child [23]. The second study found growing

autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers-in-law [33].

The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [34]. Comprehensive sexual and reproductive health services should conform with international human rights standards and include respect for privacy and confidentiality, provide full and accurate information, and ensure free and informed consent [11].India has one of the most privatized medical systems in the world. The public system, which provides health care for the poor, employs only two physicians and eight nurses per 10,000 population [35]. The strategic use of nurses and midwives has been described to contribute to mitigating human resource problems in emergency obstetric and gynecological care [36]. There is evidence from developing countries that trained nurses and midwives can replace doctors in many settings [37], yet medical doctors are still the dominant providers of contraceptive services in India. Strategies' identified to cover critical gaps in access to reproductive health are; integrated family planning with postpartum and abortion care, pre and in service training on evidence based contraception and task shift and sharing between physicians and midwives and nurses [38].

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students in both private (50 %) and public (26%) colleges is included are

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thought to strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all medical interns in the country. On the other hand, the presence of interns from public and private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous questionnaires is suitable for sensitive topics like sexual and reproductive health. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive attitudes to … tive methods, sex education, and family planning co… o been a willingness … their marital s… would decrease… er base to in… contraceptive …

I think this conclusion underestimates medical training. We do not want medical practitioners with myths and poor attitudes. Considerable number of interns in this sample have poor attitudes and myths related to contraceptives, which is unacceptable for medical practitioners. I agree with this statement if this was done among lay people or healthcare workers. i wonder whether this level of myths are acceptable among medical practitioners in Sweden? Lay people might be different in developed and developing countries, but all medical

Acknowledgements

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Competing interests

The authors declare no competing interests

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Table 1. Demographics for medical interns in Maharashtra, India, 2011 (n = 1996). Data from 27 medical colleges (8 public, 19 private).

Variable	n	%
Age		
20–24	1886	94.4
25 and above	98	5.0
Data missing	12	0.6
Gender		
Female	860	43.1
Male	1134	56.8
Data missing	2	0.1
Place of birth/upbringing		
Rural	508	25.5
Urban	1444	72.3
Data missing	44	2.2
Religion		
Hindu	1747	87.7
Muslim	97	4.9
Christian	17	0.9
Other	133	6.7
Data missing	2	0.1
Marital status		
Single	1970	98.7
Married	22	1.1
Data missing	4	0.2
Type of college		
Private	1423	71.3
Public	573	28.7

Is this table title correct?

Table 2. Educational background of all medical interns (n = 1996) from private colleges (n = 1402) and public colleges (n = 556). Data from 27 medical colleges (8 public, 19 private) in Maharashtra, India, 2011.

Variable	All n (%)	Private n (%)	Public n (%)
Was sexual and reproductive health included in your curriculum?			
Not at all	27 (1.4)	17 (1.2)	10 (1.8)
Somewhat	468 (23.4)	352 (25.0)	116 (20.6)
Sufficiently	1475 (73.9)	1039 (73.8)	436 (77.6)
Data missing	26 (1.3)		
Have contraceptive methods been taught in your program?			
Not at all	16 (0.8)	4 (0.3)	12 (2.1)
Somewhat	199 (10.0)	143 (10.1)	56 (10.0)
Sufficiently	1759 (88.1)	1265 (89.6)	494 (87.9)
Data missing	22 (1.1)		
How do you assess your theoretical knowledge of sexual and reproductive health?			
Poor	30 (1.5)	24 (1.7)	6 (1.1)
Fair	552 (27.7)	381 (27.0)	171 (30.9)
Good	1122 (56.2)	815 (57.8)	307 (55.4)
Very good	260 (13.0)	190 (13.5)	70 (12.6)
Data missing	32 (1.6)		
Have you had clinical practice in abortion care services during your training?			
Yes	268 (13.4)	196 (14.1)	72 (13.0)
No	1678 (84.1)	1196 (85.9)	482 (87.0)
Data missing	50 (2.5)		

all the stems in this attitude questionnaire are testing negative attitudes. I suggest change of the title accordingly

Table 3. Attitudes and perceptions towards contraception among medical interns in Maharashtra, India (n = 1996). Data from 27 medical colleges (8 public, 19 private) in 2011.

Statement		Disagree Completely	Disagree	Neither	Agree	Agree completely	Missing
Contraceptive pills might cause cancer	n	118	267	170	1126	304	11
	%	5.9	13.4	8.5	56.1	15.2	0.6
Contraceptive pills can cause infertility	n	526	857	227	349	25	12
	%	26.4	42.9	11.4	17.5	1.3	0.6
Contraceptive pills are inconvenient to use	n	608	855	236	249	38	10
	%	30.5	42.8	11.8	12.5	1.9	0.5
Emergency contraceptive pills can be used several times a month	n	972	630	115	227	37	15
	%	48.7	31.6	5.8	11.4	1.9	0.8
Condoms protect against STD/HIV	n	30	19	22	556	1361	8
	%	1.5	1.0	1.1	27.9	68.2	0.4
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	n	647	913	166	190	69	11
	%	32.4	45.7	8.3	9.5	3.5	0.6
Contraceptive information should only be for married couples	n	1305	566	57	41	20	7
	%	65.4	28.4	2.9	2.1	1.0	0.4
Doctors working in abortion services have friendly attitudes towards unmarried women	n	166	346	559	695	215	15
	%	8.3	17.3	28.0	34.8	10.8	0.8
Married couples are shy to talk about contraception with each other	n	150	629	423	720	64	10
	%	7.5	31.5	21.2	36.1	3.2	0.5
Women feel confident discussing contraception with doctors	n	86	654	445	696	105	10
	%	4.3	32.8	22.3	34.9	5.3	0.5
Traditional values are barriers for sex education in India	n	72	137	116	939	722	10
	%	3.6	6.9	5.8	47.0	36.2	0.5
Sex education encourages unmarried people to have sex	n	536	824	329	232	68	7
	%	26.9	41.3	16.5	11.6	3.4	0.4

this title is also not describing the table content properly. It is difficult to say that this table present knowledge attitude and perceptions, because it has only three questions. I'm not sure which question addresses which component. How did you chose these three questions from the list of questions? In the table 3, you mentioned only the attitude and perceptions, but in this table knowledge is also included with the same questions

Table 4. Place of birth in relat ions on contraception (n = 1996). Summary of sign rashtra, India, 2011.

Statement			% nfidence erval
Contraceptive pills migh cancer			62.2–70.5
			71.8–76.4
Doctors working in abo services have friendly udes towards unmarried women			51.5–60.2
	Urban	617 (42.4)	39.8–45.0
Sex education encourages unmarried people to have sex	Rural	105 (20.2)	16.9–24.0
	Urb n	193 (13.2)	11.5–15.1

[a]Number of students does not always total 1996 due to missing answers

Table 5. Comparison of male and female medical interns' knowledge, attitudes, and perceptions towards contraception (n = 1996), Data [illegible] same comments as above two tables, private) in Maharashtra, India, 2011.

Statement	Gender	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer[b]	F	what is F and M?	**74.1–79.9**
	M	**753 (68.0)**	**65.2–70.8**
Contraceptive pills can cause infertility	F	150 (17.7)	15.2–20.4
	M	216 (19.5)	17.2–22.0
Contraceptive pills are inconvenient to use	F	132 (15.6)	13.2–18.2
	M	149 (13.4)	11.5–15.6
Emergency contraceptive pills can be used several times a month	F	**76 (9.0)**	**7.2–11.1**
	M	**182 (16.5)**	**14.3–18.8**
Condoms protect against STD/HIV	F	**830 (97.9)**	**96.7–98.7**
	M	**1056 (95.3)**	**93.9–96.5**
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	F	90 (10.7)	8.7–12.9
	M	163 (14.7)	12.7–16.9
Contraceptive information should only be for married couples	F	22 (2.6)	1.6–3.9
	M	37 (3.3)	2.4–4.6
Doctors working in abortion services have friendly attitudes towards unmarried women	F	**326 (38.5)**	**35.2–41.9**
	M	**569 (51.4)**	**48.4–54.4**
Married couples are shy to talk about contraception with each other	F	311 (36.7)	33.5–40.1
	M	462 (41.7)	38.8–44.7
Women feel confident discussing contraception with doctors	F	350 (41.3)	37.9–44.7
	M	438 (39.5)	36.6–42.5
Traditional values are barriers for sex education in India	F	718 (84.8)	82.2–87.1
	M	920 (83.0)	80.6–85.1
Sex education encourages unmarried people to have sex	F	**88 (10.4)**	**8.4–12.6**
	M	**209 (18.8)**	**16.6–21.3**

[a]Number of students does not always total 1996 due to missing answers
[b]**Bold** indicates significant difference

Table 1. Demographics for medical interns in Maharashtra, India, 2011 (n = 1996). Data from 27 medical colleges (8 public, 19 private).

Variable	n	%
Age		
20–24	1886	94.4
25 and above	98	5.0
Data missing	12	0.6
Gender		
Female	860	43.1
Male	1134	56.8
Data missing	2	0.1
Place of birth/upbringing		
Rural	508	25.5
Urban	1444	72.3
Data missing	44	2.2
Religion		
Hindu	1747	87.7
Muslim	97	4.9
Christian	17	0.9
Other	133	6.7
Data missing	2	0.1
Marital status		
Single	1970	98.7
Married	22	1.1
Data missing	4	0.2
Type of college		
Private	1423	71.3
Public	573	28.7

Table 2. Educational background of all medical interns (n = 1996) from private colleges (n = 1402) and public colleges (n = 556). Data from 27 medical colleges (8 public, 19 private) in Maharashtra, India, 2011.

Variable	All n (%)	Private n (%)	Public n (%)
Was sexual and reproductive health included in your curriculum?			
Not at all	27 (1.4)	17 (1.2)	10 (1.8)
Somewhat	468 (23.4)	352 (25.0)	116 (20.6)
Sufficiently	1475 (73.9)	1039 (73.8)	436 (77.6)
Data missing	26 (1.3)		
Have contraceptive methods been taught in your program?			
Not at all	16 (0.8)	4 (0.3)	12 (2.1)
Somewhat	199 (10.0)	143 (10.1)	56 (10.0)
Sufficiently	1759 (88.1)	1265 (89.6)	494 (87.9)
Data missing	22 (1.1)		
How do you assess your theoretical knowledge of sexual and reproductive health?			
Poor	30 (1.5)	24 (1.7)	6 (1.1)
Fair	552 (27.7)	381 (27.0)	171 (30.9)
Good	1122 (56.2)	815 (57.8)	307 (55.4)
Very good	260 (13.0)	190 (13.5)	70 (12.6)
Data missing	32 (1.6)		
Have you had clinical practice in abortion care services during your training?			
Yes	268 (13.4)	196 (14.1)	72 (13.0)
No	1678 (84.1)	1196 (85.9)	482 (87.0)
Data missing	50 (2.5)		

Table 3. Attitudes and perceptions towards contraception among medical interns in Maharashtra, India (n = 1996). Data from 27 medical colleges (8 public, 19 private) in 2011.

Statement		Disagree Completely	Disagree	Neither	Agree	Agree completely	Missing
Contraceptive pills might cause cancer	n	118	267	170	1126	304	11
	%	5.9	13.4	8.5	56.1	15.2	0.6
Contraceptive pills can cause infertility	n	526	857	227	349	25	12
	%	26.4	42.9	11.4	17.5	1.3	0.6
Contraceptive pills are inconvenient to use	n	608	855	236	249	38	10
	%	30.5	42.8	11.8	12.5	1.9	0.5
Emergency contraceptive pills can be used several times a month	n	972	630	115	227	37	15
	%	48.7	31.6	5.8	11.4	1.9	0.8
Condoms protect against STD/HIV	n	30	19	22	556	1361	8
	%	1.5	1.0	1.1	27.9	68.2	0.4
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	n	647	913	166	190	69	11
	%	32.4	45.7	8.3	9.5	3.5	0.6
Contraceptive information should only be for married couples	n	1305	566	57	41	20	7
	%	65.4	28.4	2.9	2.1	1.0	0.4
Doctors working in abortion services have friendly attitudes towards unmarried women	n	166	346	559	695	215	15
	%	8.3	17.3	28.0	34.8	10.8	0.8
Married couples are shy to talk about contraception with each other	n	150	629	423	720	64	10
	%	7.5	31.5	21.2	36.1	3.2	0.5
Women feel confident discussing contraception with doctors	n	86	654	445	696	105	10
	%	4.3	32.8	22.3	34.9	5.3	0.5
Traditional values are barriers for sex education in India	n	72	137	116	939	722	10
	%	3.6	6.9	5.8	47.0	36.2	0.5
Sex education encourages unmarried people to have sex	n	536	824	329	232	68	7
	%	26.9	41.3	16.5	11.6	3.4	0.4

Table 4. Place of birth in relation to knowledge, attitudes, and perceptions on contraception (n = 1996). Summary of significant findings among medical interns in Maharashtra, India, 2011.

Statement	Place of birth	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer	Rural	344 (66.4)	62.2–70.5
	Urban	1081 (74.1)	71.8–76.4
Doctors working in abortion services have friendly attitudes towards unmarried women	Rural	289 (55.9)	51.5–60.2
	Urban	617 (42.4)	39.8–45.0
Sex education encourages unmarried people to have sex	Rural	105 (20.2)	16.9–24.0
	Urban	193 (13.2)	11.5–15.1

[a]Number of students does not always total 1996 due to missing answers

Table 5. Comparison of male and female medical interns' knowledge, attitudes, and perceptions towards contraception (n = 1996). Data from 27 medical colleges (8 public, 19 private) in Maharashtra, India, 2011.

Statement	Gender	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer[b]	F	**652 (77.1)**	**74.1–79.9**
	M	**753 (68.0)**	**65.2–70.8**
Contraceptive pills can cause infertility	F	150 (17.7)	15.2–20.4
	M	216 (19.5)	17.2–22.0
Contraceptive pills are inconvenient to use	F	132 (15.6)	13.2–18.2
	M	149 (13.4)	11.5–15.6
Emergency contraceptive pills can be used several times a month	F	**76 (9.0)**	**7.2–11.1**
	M	**182 (16.5)**	**14.3–18.8**
Condoms protect against STD/HIV	F	**830 (97.9)**	**96.7–98.7**
	M	**1056 (95.3)**	**93.9–96.5**
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	F	90 (10.7)	8.7–12.9
	M	163 (14.7)	12.7–16.9
Contraceptive information should only be for married couples	F	22 (2.6)	1.6–3.9
	M	37 (3.3)	2.4–4.6
Doctors working in abortion services have friendly attitudes towards unmarried women	F	**326 (38.5)**	**35.2–41.9**
	M	**569 (51.4)**	**48.4–54.4**
Married couples are shy to talk about contraception with each other	F	311 (36.7)	33.5–40.1
	M	462 (41.7)	38.8–44.7
Women feel confident discussing contraception with doctors	F	350 (41.3)	37.9–44.7
	M	438 (39.5)	36.6–42.5
Traditional values are barriers for sex education in India	F	718 (84.8)	82.2–87.1
	M	920 (83.0)	80.6–85.1
Sex education encourages unmarried people to have sex	F	**88 (10.4)**	**8.4–12.6**
	M	**209 (18.8)**	**16.6–21.3**

[a]Number of students does not always total 1996 due to missing answers
[b]**Bold** indicates significant difference

UPPSALA UNIVERSITET

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Dear Editor,

We were pleased to read your positive response regarding our manuscript entitled "Future physicians' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey among medical interns in Maharashtra, India" and we would like to thank you for the useful comments. We have made revision according to your suggestions. Please find attached a detailed description of our changes of the manuscript, according to the reviewers and editor´s comments. We hereby resubmit the manuscript for publication.

We confirm that this manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript and agree with its submission to BMJ Family Planning and Reproductive Health Care.

Yours Sincerely,

Marie Klingberg-Allvin, PhD

Associate Editor

1. The **aim of the study needs clarification** as does the study question that led to the research being carried out. The study design does not lend itself to analysis of the views of participants in the manner it has been presented.
Author's comments: We have revised the aim in order to clarify according to your comment.

2. It would be helpful to identify and present the various stages at which bias has entered the study and the ways in which it could be addressed in future studies. The reason why medical students were considered for the study are also not clear. If the point was to study views of medical students because of their age group and socio-cultural background then the comparison group should have been non-medical students of similar backgrounds. This would then highlight if the differences in opinion were due to the medical training rather than socio-cultural influences.
Author's comments: Medical students are the future provider of abortion care and contraceptive counseling in India and are therefore the targeted subjects/population in our study. It is not really relevant to compare with non-physicians as no other professionals are permitted by law to conduct comprehensive abortion care of which post abortion contraceptive counseling is central.

Reviewer #1

1. Information given on sampling technique is inadequate to decide the external validity of this study. The only information given was that 27 out of 43 colleges participated in this study (8 public and 19 private). So the sample has self-selection bias. Was this similar to the ratio of public private medical schools in the district?
Author's comments: We agree with you and have added more information about the sampling technique (page 8, paragraph 1) and also discuss this in the section methodological considerations (page 18, paragraph 2).

2. Analysis of place of birth: this seems to be a confounded by the place where they were brought up, which was not discussed in the paper. There is no rationale for taking place of birth for analysis unless someone assumes that it is a proxy measure of the place they lived the longest period where the perceptions and attitudes could be influenced from the residential area. This assumption should be adequately rationalized showing that there was limited internal migration in this area.
Author's comments: In our study the definition of place of birth/area of upbringing (page 9, paragraph 1) and is a well-known proxy (urban or rural area) for attitudes and perceptions in relation to sexual and reproductive health issues. This was also found in our study, that interns born in rural areas had more negative perceptions of sex education. Internal migration is not very common in this context.

3. What was the rationale for using confidence limits? The sample of medical schools participating in the study was selected using a non-probability sampling technique. From these schools, all intern medical graduates were participated in the study (not a sample). Inferences cannot be on other med schools based on this, even though one can discuss all possibilities.
Author's comments: Reporting of estimate and p-value only is widely criticized in statistical literature because it suppresses all other information but whether it is significantly

different from a hypothetical value or not. The confidence interval gives a range measure of uncertainty and is therefore more informative than a p-value. The validity in relation to sampling technique is now discussed in the section methodological considerations (page 18, paragraph 2).

4. Table 3 – column title is partially missing
Author's comments: Have been added accordingly.

5. In the Discussion, the above mentioned study limitations should be clearly mentioned in a separate paragraph.
Author's comments: We have added a separate section: Methodological considerations (page 18, paragraph 2).

Reviewer #2
1. As all five authors are from Sweden for this study in Maharashtra, the role of the New Delhi office of IPAS is not clear because it can be expected that at least one author would be from India.
Author's comments: Ipas office in Delhi distributed the questionnaires and was invited to take part in analyses and writing however they rejected. Those who have made a substantive intellectual contribution to the manuscript are acknowledged as author. Intellectual contribution to the manuscript requiring participation in the conception or design of the study, the analysis or interpretation of data, or drafting or revising the manuscript for content. It does not include acquisition of data using methods designed by others, collection of data, obtaining funding, supervising personnel, or medical editing assistance.

2. The manuscript is much too long and could easily be decreased by half, specially for the Introduction (Pages 4/5), Instrument and Statistical Analysis (Pages 7/8), Methodological Considerations (Pages 15/16) and the 46 references. Interesting findings from the study relate to the lack of clinical practice in abortion care services during training (Page 9, Lines 10/13), differences between private and public colleges on abortion (Page 10, Lines 9/17) and major misconceptions such as the role of sex education in encouraging sexual activities among those who are unmarried (Page 10, Line 46). The manuscript should focus on the above important programmatic items as well as the delegation of tasks (Page 14, Lines 16/31) as opposed to unresolved issues (Page 11, Lines 38/42).
Author's comments: Thanks, we agree with you and have reduced the text in the sections; introduction and instrument. We have further made major revision of the discussion in order to focus on the most important findings of our study according to your suggestion. The number of references has also been decreased.

Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India

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Title: Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India

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Keywords: contraceptives, medical students, India, reproductive health, cross sectional survey

Word count: 2480 (excluding abstract and references)

ABSTRACT

Objectives: This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Setting: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives.

Participants: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical students in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services. Few had experienced training in abortion care. There were misconceptions about modern contraceptive methods and the impact of sex education. Attitudes towards contraception were mainly positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, future physicians in Maharashtra show misconceptions about modern contraceptives prevail. Pre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

Article summary

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Key message points

Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students in Maharashtra show misconceptions about modern contraceptives, and lack training in family planning services.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to increase the access to comprehensive family planning services in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise pre- and in service training in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of medical students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide [6]. Despite the fact that induced abortion has been legal in India since 1971, most of the approximately 6.7 million annually induced abortions are performed in an unsafe manner [7, 8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for modern contraceptives is 22% in the cities and higher in rural areas. Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is infrequent [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women [13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain unintended. Considering the future role of medical students as contraceptive counsellors, little

is known about their views on contraceptive methods, use or counselling. This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire in the Indian state of Maharashtra among 1,996 medical students in their fifth year (internship) of training [15]. Out of a total of 43 medical colleges in Maharashtra (5,195 students), 19 are Public (2,200 students). A convenience sample of 27 colleges (8 public, 556 students; 19 private, 1,402 students) was included in the study. All medical students at the selected institutions were asked to participate before attending a lecture in comprehensive abortion care (CAC). The lecture was organized by a non-governmental organization within the medical education program.

Study setting

Located in west-central India, Maharashtra is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of internship. According to the national medical education curriculum the theoretical studies should cover comprehensive abortion care, as well as contraceptive methods, and counselling[17].

Instrument

The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for students of different genders, types of colleges, and places of birth. The alternatives 'agree' and 'agree completely' were aggregated, as well as the alternatives 'disagree' and 'disagree completely'. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical students eligible for participation in the study were given oral information about the study and were informed that participation was anonymous

and voluntary and that choosing not to participate would not affect their studies or future careers negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet(Dnr: 2013/415-31/4).

RESULTS

Out of 2,006 questionnaires, 1,996 were at least partially filled-in, making the overall response rate 99.5%. The demographic characteristics of the students are outlined in Table 1. Since the students were homogenous in terms of age, religion, and marital status, the variables remaining for inter-group comparisons were gender (56.8% male, 43.1% female), place of birth (72.3% urban, 25.5% rural), and type of college (71.3% private, 28.7% public).

Table 2 shows the students' perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. Most of the students thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between students from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74.0% believed it should be given individually and not in a group. A majority of the respondents (67.2%) thought doctors should be the ones to provide contraception to patients, while 27.1% considered health workers to be the most appropriate counsellors. A few students chose other alternatives (nurse 3,0%, other 1,6%,

missing 1,1%). A majority (95.1%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 88.5% of the students stated they should be taken every day. Some students (5.8%) thought they were to be taken after intercourse or once a month (3.4%). A cross-sectional analysis of answers given by students with rural versus urban places of birth revealed no significant differences with regard to these results. However, those from private colleges preferred individual contraceptive counselling over group counselling (private college students 78.2%, CI 95%, 75.9–80.3; public college students 70.6%, CI 95%, 66.6–74.4). Female students were also more supportive of individual counselling than males (females 80.2%, CI 95%, 77.4–82.9; males 72.8%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98.2%, CI 95%, 96.8–98.8; males 95.3% CI, 93.8–96.4). Moreover, female students were better informed on the daily intake of oral contraceptive pills than males (females 93.3%, CI 95%, 91.5–94.9; males 88.8%, CI 95%, 86.8–90.6).

The knowledge, attitudes, and perceptions of medical students on contraceptive methods, services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing students from public and private colleges indicated a difference of opinion regarding the statement “Doctors working in abortion service have friendly attitudes towards unmarried women”. Fewer students from private colleges agreed or agreed completely as compared to students from public colleges (private college students 43.8%, CI 95%, 41.8–46.4; public college students 51.2%, CI 95%, 47.0–51.4).

Table 4 summarizes the significant differences in perceptions found among students based on their place of birth (urban or rural): Students with urban place of birth to a higher extent

agreed to that "Contraceptive pills might cause cancer" (urban 74.1%, CI 95%, 71.8–76.4; rural 66.4%, CI 95%, 62.2–70.5); A larger proportion of students with rural background agreed to the statement that "Doctors working in abortion service have friendly attitudes towards unmarried women" (rural 55.9%, CI 95%, 51.6-60.2; urban 42.4, CI 95%, 39.8–45.0).; and it was more common for students with rural place of birth to agree to the statement "Sex education encourages unmarried people to have sex" (rural 20.2%, CI 95%, 16.9–24.0; urban 13.2, CI 95%, 11.5–15.1).

Table 5 compares male and female medical students' knowledge, attitudes, and perceptions on contraception. More female students agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female students largely agreed or agreed completely that condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 51.4% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 38.5% among females.

DISCUSSION

The major finding in this study is the inadequate level of training in comprehensive abortion care and contraceptive counselling of medical students who already passed the theoretical part of the medical education. Our findings further suggest that even though the medical students surveyed had experienced little training in abortion care services, they expressed a clear interest in disseminating contraceptive information as future physicians. Although they had

mostly positive attitudes toward contraception and pre-marital counselling, misconceptions about modern contraceptive methods and the impact of sex education were common.

Few respondents in our study had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility and one in ten did not know that contraceptive pills are to be taken on a daily basis. More females than males were unaware that emergency contraceptive pills may be used several times a month. A majority of both males and females perceived that contraceptive pills might cause cancer, although females were more likely to agree on this. Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college students. The background factor that had the greatest influence on knowledge was gender. Female students were better informed about the utilisation of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most students in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although students born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health [20]. Research reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [21, 22]. One in four respondents in our study did not

believe doctors working in abortion services held positive attitudes towards unmarried women.

Although nearly all students in our survey said they would like to assume the responsibility for contraceptive counselling in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing or shifting within family planning services is recommended by the WHO [23]. The involvement of clinical officers, midwives and nurses increases the access to modern contraception in low resource settings [24]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future physicians would be willing to relegate such tasks to others.

Several studies conclude that even though abortion providers discuss contraception with their patients, it is common for patients to refuse any form of contraception following an abortion [25, 26]. The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [27]. Medical students need training in comprehensive sexual and reproductive health services that conforms with international human rights standards and include respect for privacy and confidentiality, in order to provide full and accurate information to their future patients.

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students in both private (47.5%) and public (26.0%) colleges is included are thought to strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all

medical students in the country. On the other hand, the presence of students from public and private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous questionnaires is suitable for sensitive topics like sexual and reproductive health. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive and negative attitudes towards modern contraceptive methods, sex education, and family planning counselling among future physicians in India. There has been a willingness to offer sexual and reproductive health services to people regardless of their marital status. Still, future physicians in Maharashtra have misconceptions about modern contraceptives prevail. Training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

Contributor statement

BE had the original idea of the study and developed the study protocol together with HO, KGD and MKA, whom developed the original questionnaire. HO entered the data and made first analysis together with SH who drafted the manuscript. All authors have contributed to writing and revising the final version of the manuscript and approved the submitted version.

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Competing interests

The authors declare no competing interest

Data sharing statement

There is no additional data available

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Table 1. Demographics of medical students in Maharashtra, India, 2011 (n = 1996). Data from 27 medical colleges (8 public, 19 private).

Variable	n	%
Age		
20–24	1886	94.4
25 and above	98	5.0
Data missing	12	0.6
Gender		
Female	860	43.1
Male	1134	56.8
Data missing	2	0.1
Place of birth/upbringing		
Rural	508	25.5
Urban	1444	72.3
Data missing	44	2.2
Religion		
Hindu	1747	87.7
Muslim	97	4.9
Christian	17	0.9
Other	133	6.7
Data missing	2	0.1
Marital status		
Single	1970	98.7
Married	22	1.1
Data missing	4	0.2
Type of college		
Private	1402	71.3
Public	556	28.7

Table 2. Perceptions of education and training in sexual and reproductive health among medical students (n = 1996) from private colleges (n = 1402) and public colleges (n = 556) in Maharashtra, India, 2011.

Variable	All n (%)	Private n (%)	Public n (%)
Was sexual and reproductive health included in your curriculum?			
Not at all	27 (1.4)	17 (1.2)	10 (1.8)
Somewhat	468 (23.4)	352 (25.0)	116 (20.6)
Sufficiently	1475 (73.9)	1039 (73.8)	436 (77.6)
Data missing	26 (1.3)		
Have contraceptive methods been taught in your program?			
Not at all	16 (0.8)	4 (0.3)	12 (2.1)
Somewhat	199 (10.0)	143 (10.1)	56 (10.0)
Sufficiently	1759 (88.1)	1265 (89.6)	494 (87.9)
Data missing	22 (1.1)		
How do you assess your theoretical knowledge of sexual and reproductive health?			
Poor	30 (1.5)	24 (1.7)	6 (1.1)
Fair	552 (27.7)	381 (27.0)	171 (30.9)
Good	1122 (56.2)	815 (57.8)	307 (55.4)
Very good	260 (13.0)	190 (13.5)	70 (12.6)
Data missing	32 (1.6)		
Have you had clinical practice in abortion care services during your training?			
Yes	268 (13.4)	196 (14.1)	72 (13.0)
No	1678 (84.1)	1196 (85.9)	482 (87.0)
Data missing	50 (2.5)		

Table 3. Knowledge, attitudes, and perceptions on contraception among medical students (n = 1996) in Maharashtra, India, 2011.

Statement		Disagree Completely	Disagree	Neither	Agree	Agree completely	Missing
Contraceptive pills might cause cancer	n	118	267	170	1126	304	11
	%	5.9	13.4	8.5	56.1	15.2	0.6
Contraceptive pills can cause infertility	n	526	857	227	349	25	12
	%	26.4	42.9	11.4	17.5	1.3	0.6
Contraceptive pills are inconvenient to use	n	608	855	236	249	38	10
	%	30.5	42.8	11.8	12.5	1.9	0.5
Emergency contraceptive pills can be used several times a month	n	972	630	115	227	37	15
	%	48.7	31.6	5.8	11.4	1.9	0.8
Condoms protect against STD/HIV	n	30	19	22	556	1361	8
	%	1.5	1.0	1.1	27.9	68.2	0.4
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	n	647	913	166	190	69	11
	%	32.4	45.7	8.3	9.5	3.5	0.6
Contraceptive information should only be for married couples	n	1305	566	57	41	20	7
	%	65.4	28.4	2.9	2.1	1.0	0.4
Doctors working in abortion services have friendly attitudes towards unmarried women	n	166	346	559	695	215	15
	%	8.3	17.3	28.0	34.8	10.8	0.8
Married couples are shy to talk about contraception with each other	n	150	629	423	720	64	10
	%	7.5	31.5	21.2	36.1	3.2	0.5
Women feel confident discussing contraception with doctors	n	86	654	445	696	105	10
	%	4.3	32.8	22.3	34.9	5.3	0.5
Traditional values are barriers for sex education in India	n	72	137	116	939	722	10
	%	3.6	6.9	5.8	47.0	36.2	0.5
Sex education encourages unmarried people to have sex	n	536	824	329	232	68	7
	%	26.9	41.3	16.5	11.6	3.4	0.4

Table 4. Place of birth in relation to knowledge, attitudes and perceptions on contraception. Summary of significant differences among medical student's (n=1996) in Maharashtra, India, 2011.

Statement	Place of birth	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer	Rural	344 (66.4)	62.2–70.5
	Urban	1081 (74.1)	71.8–76.4
Doctors working in abortion services have friendly attitudes towards unmarried women	Rural	289 (55.9)	51.5–60.2
	Urban	617 (42.4)	39.8–45.0
Sex education encourages unmarried people to have sex	Rural	105 (20.2)	16.9–24.0
	Urban	193 (13.2)	11.5–15.1

[a]Number of students does not always total 1996 due to missing answers

Table 5. Comparison of male and female medical interns' knowledge, attitudes, and perceptions towards contraception (n = 1996) in Maharashtra, India, 2011.

Statement	Sex Female (F) Male (M)	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer[b]	F	**652 (77.1)**	**74.1–79.9**
	M	**753 (68.0)**	**65.2–70.8**
Contraceptive pills can cause infertility	F	150 (17.7)	15.2–20.4
	M	216 (19.5)	17.2–22.0
Contraceptive pills are inconvenient to use	F	132 (15.6)	13.2–18.2
	M	149 (13.4)	11.5–15.6
Emergency contraceptive pills can be used several times a month	F	**76 (9.0)**	**7.2–11.1**
	M	**182 (16.5)**	**14.3–18.8**
Condoms protect against STD/HIV	F	**830 (97.9)**	**96.7–98.7**
	M	**1056 (95.3)**	**93.9–96.5**
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	F	90 (10.7)	8.7–12.9
	M	163 (14.7)	12.7–16.9
Contraceptive information should only be for married couples	F	22 (2.6)	1.6–3.9
	M	37 (3.3)	2.4–4.6
Doctors working in abortion services have friendly attitudes towards unmarried women	F	**326 (38.5)**	**35.2–41.9**
	M	**569 (51.4)**	**48.4–54.4**
Married couples are shy to talk about contraception with each other	F	311 (36.7)	33.5–40.1
	M	462 (41.7)	38.8–44.7
Women feel confident discussing contraception with doctors	F	350 (41.3)	37.9–44.7
	M	438 (39.5)	36.6–42.5
Traditional values are barriers for sex education in India	F	718 (84.8)	82.2–87.1
	M	920 (83.0)	80.6–85.1
Sex education encourages unmarried people to have sex	F	**88 (10.4)**	**8.4–12.6**
	M	**209 (18.8)**	**16.6–21.3**

[a]Number of students does not always total 1996 due to missing answers
[b]**Bold** indicates significant differences

Title: Medical students' ~~Future physicians'~~ knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey ~~among medical interns~~ students in Maharashtra, India

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Keywords: contraceptives, medical students, India, reproductive health, cross sectional survey

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Article focus

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students future physicians in Maharashtra, India.

Key message points

Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students future physicians in Maharashtra have fair knowledge andshow misconceptions about modern contraceptives, and lack training in family planning services.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to increase the access to comprehensive family planning services decrease unplanned pregnancies and unsafe abortions in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise pre- and in-service training in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of medical interns students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

ABSTRACT

Objectives: This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Setting: ~~*Background*~~: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives. ~~This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students future physicians in Maharashtra, India.~~

Participants~~*Study design*~~: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical ~~interns~~ students in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services ~~and individual counselling~~. Few had experienced training in abortion care. ~~They had a fair knowledge of contraception, but showed some~~There were misconceptions about modern contraceptive methods and the impact of sex education. Attitudes towards contraception were mainly positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, future physicians in Maharashtra ~~have fair knowledge and~~show misconceptions about modern contraceptives ~~and myths~~ prevail. Pre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. ~~Pre- and in-service training of providers in evidence-based contraceptive counselling would decrease unplanned pregnancies and reduce unsafe abortions in the region studied.~~ Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

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The large sample size and the high proportion of the total number and the presence of medical students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. ~~The growing number of people of reproductive age in developing countries poses a challenge for family planning programmes and health care services.~~ In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide ~~. Every year, nearly 60,000 women in India die from complications related to pregnancy~~ [6]. ~~Approximately 6.7 million induced abortions take place in India annually.~~ Despite the fact that induced abortion has been legal in India since 1971 ~~[7]~~, most of the approximately 6.7 million annually induced abortions are performed in an unsafe manner ~~and put women's health and lives at risk~~ [7, 8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for ~~family planning among married women is 14%. The overall unmet need for~~ modern contraceptives is 22% in the cities and higher in rural areas. ~~Among married women in India, 56% use some form of contraception and 49% use a modern method.~~ Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is infrequent~~: male condoms are used by 5%, the pill 3%, IUD 2%, injection 1%, and male sterilisation 1%~~ [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women

[13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women ~~to avoid unintended pregnancy~~ [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain ~~unplanned and~~ unintended. Considering the future role of medical ~~students and interns~~students as contraceptive counsellors, little is known about their views on contraceptive methods, use or counselling. This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students ~~future physicians~~ in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire in the Indian state of Maharashtra among 1,996 medical students in their fifth year (internship) of training [15]. Out of a total of 43 medical colleges in Maharashtra (5,195 students), 19 are Public (2,200 students). A convenience sample of 27 colleges (8 ~~government~~public, 55~~6~~73 students; 19 private, 1,40~~2~~23 students) was included in the study. All medical ~~interns~~ students at the selected institutions were asked to participate before attending ~~they were to take~~ a lecture ~~pre-service CAC orientation program~~ in comprehensive abortion care (CAC). The lecture was ~~The CAC program was~~ organized by a non-governmental organization ~~organized but part of~~within the ~~within the~~ medical ~~in-~~ educationnal ~~and training~~ program ~~and organized by an NGO~~. ~~In the State of Maharashtra out of 43 medical colleges (5195 students) 19 are Public (2200 students). In total 27 colleges (8 public, 19 private) were included in the study and 1423 and 573 students participated from private and public colleges respectively.~~

Study setting

L~~Maharashtra is l~~ocated in west-central India. ~~It~~ Maharashtra is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. ~~Mumbai, India's largest city, is the capital of the state.~~ Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of internship. According to the national medical education curriculum~~a for medical education~~ the theoretical studies should cover ~~both~~ comprehensive abortion care, as well as ~~CAC and~~ contraceptive methods, and counselling~~, which includes a two month rotation in obstetrics/gynaecology and three months of community medicine~~ [17].

Instrument

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The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to perception of education and training in sexual and reproductive health~~previous coursework and training~~, and respondents' assessment of their knowledge regarding ~~the medical curriculum and questions concerning perceptions of~~ contraceptive methods and services.

Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for ~~interns~~ students of different genders, types of colleges, and places of birth. The alternatives 'agree' and 'agree completely' were aggregated, as well as the alternatives 'disagree' and 'disagree completely'. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical ~~interns~~ students eligible for participation in the study were given oral information about the study and were informed that participation was anonymous and voluntary and that choosing not to participate would not affect their studies or future careers negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was

obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet. (Dnr: 2013/415-31/4).

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RESULTS

Out of 2,006 questionnaires, 1,996 were at least partially filled-in, making the overall response rate 99.5%. The demographic characteristics of the interns students are outlined in Table 1. Since the interns students were homogenous in terms of age, religion, and marital status, the variables remaining for inter-group comparisons were gender (56.87% male, 43.1% female), place of birth (72.3% urban, 25.5% rural), and type of college (71.3% private, 28.79% public).

Table 2 shows the students' perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. interns'students' perceptions on coursework and training on sexual and reproductive health, and their own assessment of knowledge. Most of the interns students thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between interns students from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74.0% believed it should be given individually and not in a group. A majority of the respondents (67.2%) thought doctors should be the ones to provide contraception to patients, while 27.1% considered health workers to be the most appropriate counsellors. A few interns students chose other alternatives (nurse 3.0%, other 1.6%, missing 1.1%). A majority (95.1%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 88.59% of the interns students stated they should be taken every day. Some interns students (5.86%) thought they were to be taken after intercourse or once a month

(3.4%). A cross-sectional analysis of answers given by ~~interns~~ students with rural versus urban places of birth revealed no significant differences with regard to ~~contraceptive counselling~~these results. However, those from private colleges preferred individual contraceptive counselling over group counselling (private college ~~interns~~ students 78.2%, CI 95%, 75.9–80.3; public college ~~interns~~ students 70.6~~1~~%, CI 95%, 66.6–74.4). Female ~~interns~~ students were also more supportive of individual counselling than males (females 80.2%, CI 95%, 77.4–82.9; males 72.8~~3~~%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98.2%, CI 95%, 96.8–98.8; males 95.3% CI, 93.8–96.4). Moreover, female ~~interns~~ students were better informed on the daily intake of oral contraceptive pills than males (females 93.3%, CI 95%, 91.5–94.9; males 8~~8.89~~%, CI 95%, 86.8–90.6).

The knowledge, attitudes, and perceptions of medical ~~interns~~ students on contraceptive methods, services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing ~~interns~~ students from public and private colleges indicated a difference of opinion regarding the statement "Doctors working in abortion service have friendly attitudes towards unmarried women". Fewer ~~interns~~ students from private colleges agreed or agreed completely as compared to ~~interns~~ students from public colleges (private college ~~interns~~ students 43.8~~4~~%, CI 95%, 41.8–46.4; public college ~~interns~~ students 51.2%, CI 95%, 47.0–51.4).

Table 4 summarizes the significant differences in perceptions found among ~~interns~~students based on their place ~~A comparison of the answers based on the interns' place~~ of birth (urban or rural) ~~revealed significant differences in responses to three statements~~: ~~Interns~~Students with urban place of birth to a higher extent agreed to that "Contraceptive pills might cause cancer" (urban 74.1%, CI 95%, 71.8–76.4; rural 66.4%, CI 95%, 62.2–70.5); A larger proportion of ~~interns~~students with rural background agreed to the statement that "Doctors working in abortion service have friendly attitudes towards unmarried women" (rural 55.9%, CI 95%, 51.6-60.2; urban 42.4, CI 95%, 39.8– 45.0).; and it was more common for ~~interns~~students with rural place of birth to agree to the statement "Sex education encourages

unmarried people to have sex" (rural 20.2%, CI 95%, 16.9–24.0; urban 13.2, CI 95%, 11.5–15.1) ~~(Table 4)~~.

Table 5 compares male and female medical ~~interns'~~ students' knowledge, attitudes, and perceptions on contraception. More female ~~interns~~ students agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female ~~interns~~ students largely agreed or agreed completely that condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 51.4~~0~~% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 38.5~~9~~% among females.

DISCUSSION

The major finding in this study is the inadequate level of ~~education and~~ training in ~~CAC~~comprehensive abortion care and contraceptive ~~methods~~counselling ~~although the~~of medical students~~'s~~ who already ~~have undertaken~~passed the ~~full~~ theoretical parts ~~of the their program~~medical education. Our findings further suggest that even though ~~although~~ the medical ~~interns~~ students surveyed had experienced little training in abortion care services, they expressed a clear interest in disseminating contraceptive information as future physicians. Although they had mostly ~~a fair knowledge and a~~ positive attitudes toward contraception and pre-marital counselling, ~~they also had~~ misconceptions about modern contraceptive methods and the impact of sex education were common.

~~Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19]. Few had experienced clinical training in abortion care services. They recognized the influence of traditional values and~~

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negative provider attitudes regarding contraceptive services, and they expressed a clear interest in disseminating contraceptive information as future physicians.

FVery few respondents in our study had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility and one in ten did not know that contraceptive pills are to be taken on a daily basis. More females than males were unaware that emergency contraceptive pills may be used several times a month. A majority of both males and females perceived that contraceptive pills might cause cancer, although females were more likely to agree on this. Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19]. Recent studies indicate that family planning training during residency improves future physicians' proficiency in both uterine evacuation and contraceptive counselling [19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college internsstudents. The background factor that had the greatest influence on knowledge was gender. Female interns students were better informed about the dosage utilisation of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most interns students in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although interns students born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health. At the same time, premarital sex is increasing among Indian youth [20]. Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of women [32]. Two recent studies from rural India may

~~indicate a change in attitude. In the first, nearly one third of young married women without children were found to be using contraceptives [23]. The second study found growing autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers in law [33]. Although comprehensive sex education has been shown to have a positive impact on young people's risky sexual behaviour [21], in parts of India sex education has been banned in schools [20]. Young people in India have expressed a desire for formal sex education and doctors are their preferred source of advice [22]. India is known to have negative attitudes toward pre-marital sex and a reluctance to provide married couples with contraceptives before they have had at least one child [23].~~ R~~Other r~~esearch reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [214, 225~~]~~ ~~A review of studies from developing countries indicates a similar pattern [25]~~. One in four respondents in our study did not believe doctors working in abortion services held positive attitudes towards unmarried women. ~~However, as noted above, most interns supported providing contraceptive information to unmarried couples.~~

~~Females expressed a slightly greater interest in working with contraceptive services in their medical practice than males.~~ Although nearly all ~~interns~~ students in our survey said they would like to assume the responsibility for contraceptive counselling in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing or ~~sharing and task~~ shifting within family planning services is recommended by the ~~World Health Organization~~WHO [236]. The involvement of clinical officers, midwives and nurses increases the ~~equitable~~ access to modern contraception ~~among women~~ in low resource settings [247]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future physicians ~~doctors~~ would be willing to relegate such tasks to others.~~. This might overcome the present inequalities in access to reproductive health services in India [28].~~

~~A recent study suggests that the inclusion of nurses, midwives, and ayurvedic physicians in medical abortion care is feasible in India [29]. Broadening of the provider base for family planning services would be a pragmatic response to the current shortage especially in rural area of India.~~ Several studies conclude that even though abortion providers discuss contraception with their patients ~~and advise them about a range of methods~~, it is common for patients to refuse any form of contraception following an abortion [25~~30~~, 26~~31~~]. ~~Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of women [32]. Two recent studies from rural India may indicate a change in attitude. In the first, nearly one third of young married women without children were found to be using contraceptives; 10% were using condoms to postpone having their first child [23]. The second study found growing autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers in law [33].~~

The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [27~~34~~]. Medical students need training in c~~C~~omprehensive sexual and reproductive health services ~~should~~ that conforms with international human rights standards and include respect for privacy and confidentiality, in order to provide full and accurate information to their future patients~~, and ensure free and informed consent [11]~~.

~~India has one of the most privatized medical systems in the world. The public system, which provides health care for the poor, employs only two physicians and eight nurses per 10,000 population [35]. The strategic use of nurses and midwives has been described to contribute to mitigating human resource problems in emergency obstetric and gynecological care [36]. There is evidence from developing countries that trained nurses and midwives can replace doctors in many settings [37], yet medical doctors are still the dominant providers of contraceptive services in India. Strategies' identified to cover critical gaps in access to reproductive health are; integrated family planning with postpartum and abortion care, pre-~~

and in service training on evidence based contraception and task shift and sharing between physicians and midwives and nurses [38].

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students in both private (47.550%) and public (26.0%) colleges is included are thought to strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all medical interns students in the country. On the other hand, the presence of interns students from public and private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous questionnaires is suitable for sensitive topics like sexual and reproductive health. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive and negative attitudes towards modern contraceptive methods, sex education, and family planning counselling among future physicians in India. There has been a willingness to offer sexual and reproductive health services to people regardless of their marital status. Despite positive attitudes towards modern contraceptives, sex education, and family planning counsellingStill, future physicians in Maharashtra have fair knowledge and misconceptions about modern contraceptives and myths prevail. TPre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

Pre- and in-service training in evidence-based contraceptive counselling would decrease unplanned pregnancies and unsafe abortions in India. Expansion of the provider base to

~~include categories of health care staff other than physicians as purveyors of contraceptive information could increase access to services.~~

Contributor statement

BE had the original idea of the study and developed the study protocol together with HO, KGD and MKA, whom developed the original questionnaire. HO entered the data and made first analysis together with SH who wrote the first draft. All authors contributed to the final version of the manuscript.

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Competing interests

The authors declare no competing interests

Data sharing statement

There is no additional data available

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Research checklist for paper: Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract. *YES*
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found.*YES*
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported. YES
Objectives	3	State specific objectives, including any prespecified hypotheses. *AIM included which correspond with Title.*
Methods		
Study design	4	Present key elements of study design early in the paper. *YES in abstract, focus of paper and in method section*
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection. *YES short but focused on important aspects*.
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. *YES*
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable. *YES.*
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. *YES.*
Bias	9	Describe any efforts to address potential sources of bias. *YES in methodological considerations.*
Study size	10	Explain how the study size was arrived at. *YES in sampling.*
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why. *YES*
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding. *YES.*
		(*b*) Describe any methods used to examine subgroups and interactions. *YES.*
		(*c*) Explain how missing data were addressed. *Hardly any missing data (external or internal. Missing is reported in tables.*
		(*d*) If applicable, describe analytical methods taking account of sampling strategy. *Not applicable.*
		(*e*) Describe any sensitivity analyses. *Not applicable.*
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. *YES.*
		(b) Give reasons for non-participation at each stage. *YES.*
		(c) Consider use of a flow diagram. *Not adequate*.

Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. *YES in table 1 and then included in analyses.*
		(b) Indicate number of participants with missing data for each variable of interest. *YES reported in tables.*
Outcome data	15*	Report numbers of outcome events or summary measures. *YES.*
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included. *YES.*
		(*b*) Report category boundaries when continuous variables were categorized. *Not relevant.*
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period. *Not relevant.*
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses. *No.*
Discussion		
Key results	18	Summarise key results with reference to study objectives. *YES in beginning of discussion.*
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. *YES included in methodological considerations.*
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence. *YES.*
Generalisability	21	Discuss the generalisability (external validity) of the study results. *YES included in methodological considerations.*
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based. *YES.*

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Questionnaire

Knowledge, Attitude & Perception
On
Contraceptive Services & Abortion Care

In order to increase our knowledge about what you think is needed in your education and for your future work we have designed this questionnaire as part of the co-operation between the pre service Comprehensive Abortion Care orientation program for interns in INDIA and Uppsala University, Sweden.

Name of the institution: _____

Section 1: Your background	
1.1 What is your sex?	Female 1 Male 2
1.2 How old are you?	Years old …….
1.3 What is your religion?	Hindu 1 Muslim 2 Christian 3 Other…… 4 (Specify)
1.4 What is your marital status?	Single 1 Married 3 Other…… 4
1.5 Where were you born?	Rural area 1 Urban area 2

Section 2 Training	
2.6 What do you think are the special problems within sexual & reproductive health today in India	**Please write in your own words**
2.7 Has the topic sexual & reproductive health been included in your study programme?	Not at all 1 ( ) Somewhat 2 ( ) Sufficiently 3 ( )
2.8 How do you assess your theoretical knowledge in sexual & reproductive health to be?	Poor 1 ( ) Fair 2 ( ) Good 3 ( ) Very good 4 ( )
2.9 Have you had clinical practice in abortion care services during your training?	Yes 1 ( ) No 2 ( )
2.11 Do you think counselling should be given in group or individually?	In group 1 ( ) Individually 2 ( )
2.12 Who is most suitable to give information about contraceptive methods?	Doctor 1 ( ) Nurses 2 ( ) Pharmacist 3 ( ) Health worker 4 ( ) Others ----------

2.13 As a future doctor, would you like to have responsibility for contraceptive information?	Yes 1 ( ) No 2 ( )

Section 3 Perception on contraceptive methods	
3.1 Has the topic contraceptive methods been included in your study programme (in school or at hospital)?	Not at all 1 Somewhat 2 Sufficiently 3
3.2 When should oral contraceptive pill be taken?	After intercourse 1 Once a month 2 Every day 3
3.4 Which contraceptive method do you think is most suitable for women? CIRCLE ONE ANSWER	Pill 1 Condom 2 Emergency Pill 3 IUD 4 Withdrawal 5 Safe periods 6 Female sterilization 7 Male sterilization 8

Statements Please place a tick in the circle which you feel most appropriate answer.	**Disagree completely**	**Disagree**	**Neutral**	**Agree**	**Agree completely**
3.5 Contraceptive pill might cause cancer	( )	( )	( )	( )	( )
3.6 Contraceptive pill can cause infertility	( )	( )	( )	( )	( )
3.7 Contraceptive pill is inconvenient to use	( )	( )	( )	( )	( )
3.8 Emergency contraceptive pill can be used several times a month	( )	( )	( )	( )	( )
3.9 Condoms protects against STD/HIV	( )	( )	( )	( )	( )
3.10 Contraceptive information should be only for married couples	( )	( )	( )	( )	( )
3.12 Traditional values are barriers for sexual education in India	( )	( )	( )	( )	( )
3.13 Sexual education encourage unmarried to have sex	( )	( )	( )	( )	( )
3.14 Doctors working in abortion service have friendly attitude towards unmarried clients	( )	( )	( )	( )	( )
3.15 Married couples are shy to talk about contraceptive with each other	( )	( )	( )	( )	( )
3.16 Women feel confident discussing contraception with doctors	( )	( )	( )	( )	( )
3.18 Traditional contraceptive methods (safe periods, withdrawal) are the best methods	( )	( )	( )	( )	( )
Section 4 Abortion **Statements** Please place a tick in the circle below the right answer	**Disagree completely**	**Disagree**	**Neutral**	**Agree**	**Agree completely**
4.1 Unsafe abortion is a serious health problem in India	( )	( )	( )	( )	( )
4.2 Abortion among unmarried are rising in India	( )	( )	( )	( )	( )
4.3 Abortion is more dangerous/harmful for unmarried women than for married	( )	( )	( )	( )	( )

4.4 Unmarried women have more complications from abortion than married	( )	( )	( )	( )	( )
4.5 Unmarried women prefer to have abortion outside of public health clinics	( )	( )	( )	( )	( )
4.6 Abortion at clinics outside of the public health care are more harmful than abortion at public clinics	( )	( )	( )	( )	( )
4.7 Abortion among unmarried is acceptable in case of an unplanned pregnancy	( )	( )	( )	( )	( )
4.8 Abortion is morally wrong	( )	( )	( )	( )	( )
4.9 A woman should always have the right to have an abortion in case of an unwanted pregnancy	( )	( )	( )	( )	( )
4.10 A woman need to have her partner/spouse approval to have an abortion	( )	( )	( )	( )	( )
4. 11 Abortion is not harmful if it is clinically safe	( )	( )	( )	( )	( )
4.12 Abortion clients are treated in privacy in India	( )	( )	( )	( )	( )
4.13 Women prefer to have surgical abortion rather than medical abortion	( )	( )	( )	( )	( )
4. 15 Surgical abortion is more harmful than medical abortion	( )	( )	( )	( )	( )
4.16 Specially trained General Nurse midwives have a potential to provide abortions in India	( )	( )	( )	( )	( )

Thank you for your participation!

Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India

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Keywords:	EDUCATION & TRAINING (see Medical Education & Training), Reproductive medicine < GYNAECOLOGY, Public health < INFECTIOUS DISEASES

Title: Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India

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Keywords: contraceptives, medical students, India, reproductive health, cross sectional survey

Word count: 2480 (excluding abstract and references)

ABSTRACT

Objectives: This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Setting: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives.

Participants: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical students in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services. Few had experienced training in abortion care. There were misconceptions about modern contraceptive methods and the impact of sex education. Attitudes towards contraception were mainly positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students in Maharashtra have misconceptions about modern methods of contraception. Pre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services.

Article summary

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Key message points

Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students in Maharashtra show misconceptions about modern contraceptives, and lack training in family planning services.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to increase the access to comprehensive family planning services in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise basic medical education in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of medical students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide [6]. Despite the fact that induced abortion has been legal in India since 1971, most of the approximately 6.7 million annually induced abortions are performed in an unsafe manner [7, 8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for modern contraceptives is 22% in the cities and higher in rural areas. Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is infrequent [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women [13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain unintended. Considering the future role of medical students as contraceptive counsellors, little

is known about their views on contraceptive methods, use, or counselling. This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire among medical students in their fifth year (internship) of training in the Indian state of Maharashtra [15]. Out of a total of 43 medical colleges in Maharashtra (5,195 students), 19 are Public (2,200 students). A convenience sample of 27 colleges (8 public and 19 private) was included in the study. The total number of students eligible at the study sites were 2,006 and in total 1,996 responded to the questionnaire (1,423 private colleges and 573 public colleges). All medical students at the selected institutions were asked to participate before attending a lecture in comprehensive abortion care (CAC). The lecture was organized by a non-governmental organization within the medical education program.

Study setting

Located in west-central India, Maharashtra is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of internship. According to the national medical education curriculum the theoretical studies should cover comprehensive abortion care, as well as contraceptive methods, and counselling [17].

Instrument

The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for students of different genders, types of colleges, and places of birth. The alternatives 'agree' and 'agree completely' were aggregated, as well as the alternatives 'disagree' and 'disagree completely'. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical students eligible for participation in the study were given oral information about the study and were informed that participation was anonymous

and voluntary and that choosing not to participate would not affect their studies or future careers negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet (Dnr: 2013/415-31/4).

RESULTS

A total of 1,996 medical students participated in the study (response rate 99%; 1,996/2,006). The demographic characteristics of the students are outlined in Table 1. Since the students were homogenous in terms of age, religion, and marital status, the variables remaining for inter-group comparisons were gender (56.8% male, 43.1% female), place of birth (72.3% urban, 25.5% rural), and type of college (71.3% private, 28.7% public).

Table 2 shows the students' perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. Most of the students thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between students from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74.0% believed it should be given individually and not in a group. A majority of the respondents (67.2%) thought doctors should be the ones to provide contraception to patients, while 27.1% considered health workers to be the most appropriate counsellors. A few students chose other alternatives (nurse 3,0%, other 1,6%,

missing 1,1%). A majority (95.1%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 88.5% of the students stated they should be taken every day. Some students (5.8%) thought they were to be taken after intercourse or once a month (3.4%). A cross-sectional analysis of answers given by students with rural versus urban places of birth revealed no significant differences with regard to these results. However, those from private colleges preferred individual contraceptive counselling over group counselling (private college students 78.2%, CI 95%, 75.9–80.3; public college students 70.6%, CI 95%, 66.6–74.4). Female students were also more supportive of individual counselling than males (females 80.2%, CI 95%, 77.4–82.9; males 72.8%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98.2%, CI 95%, 96.8–98.8; males 95.3% CI, 93.8–96.4). Moreover, female students were better informed on the daily intake of oral contraceptive pills than males (females 93.3%, CI 95%, 91.5–94.9; males 88.8%, CI 95%, 86.8–90.6).

The knowledge, attitudes, and perceptions of medical students on contraceptive methods, services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing students from public and private colleges indicated a difference of opinion regarding the statement “Doctors working in abortion service have friendly attitudes towards unmarried women”. Fewer students from private colleges agreed or agreed completely as compared to students from public colleges (private college students 43.8%, CI 95%, 41.8–46.4; public college students 51.2%, CI 95%, 47.0–51.4).

Table 4 summarizes the significant differences in perceptions found among students based on their place of birth (urban or rural): Students with urban place of birth to a higher extent

agreed to that “Contraceptive pills might cause cancer” (urban 74.1%, CI 95%, 71.8–76.4; rural 66.4%, CI 95%, 62.2–70.5); A larger proportion of students with rural background agreed to the statement that “Doctors working in abortion service have friendly attitudes towards unmarried women” (rural 55.9%, CI 95%, 51.6-60.2; urban 42.4, CI 95%, 39.8–45.0).; and it was more common for students with rural place of birth to agree to the statement “Sex education encourages unmarried people to have sex” (rural 20.2%, CI 95%, 16.9–24.0; urban 13.2, CI 95%, 11.5–15.1).

Table 5 compares male and female medical students’ knowledge, attitudes, and perceptions on contraception. More female students agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female students largely agreed or agreed completely that condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 51.4% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 38.5% among females.

DISCUSSION

The major finding in this study is the inadequate level of training in comprehensive abortion care and contraceptive counselling of medical students who already passed the theoretical part of the medical education. Our findings further suggest that even though the medical students surveyed had experienced little training in abortion care services, they expressed a clear interest in disseminating contraceptive information as future physicians. Although they had mostly positive attitudes toward contraception and pre-marital counselling, misconceptions about modern contraceptive methods and the impact of sex education were common.

Few respondents in our study had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility and one in ten did not know that contraceptive pills are to be taken on a daily basis. More females than males were unaware that emergency contraceptive pills may be used several times a month. A majority of both males and females perceived that contraceptive pills might cause cancer, although females were more likely to agree on this. Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college students. The background factor that had the greatest influence on knowledge was gender. Female students were better informed about the utilisation of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most students in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although students born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health [20]. Research reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [21, 22]. One in four respondents in our study did not believe doctors working in abortion services held positive attitudes towards unmarried women.

Although nearly all students in our survey said they would like to assume the responsibility for contraceptive counselling in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing or shifting within family planning services is recommended by the WHO [23]. The involvement of clinical officers, midwives, and nurses increases the access to modern contraception in low resource settings [24]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future physicians would be willing to relegate such tasks to others.

Several studies conclude that even though abortion providers discuss contraception with their patients, it is common for patients to refuse any form of contraception following an abortion [25, 26]. The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [27]. Medical students need training in comprehensive sexual and reproductive health services that conforms with international human rights standards and include respect for privacy and confidentiality, in order to provide full and accurate information to their future patients.

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students from both private (47.5%) and public (26.0%) colleges from the state of Maharashtra are included strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all medical students in the country. On the other hand, the presence of students from public and private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous

questionnaires is suitable for sensitive topics like sexual and reproductive health. The fact that the questionnaire was distributed before a lecture covering the subject under investigation might influence the result. However, the students' knowledge, perceptions, and attitudes reflect the content of their basic education program. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive and negative attitudes towards modern contraceptive methods, sex education, and family planning counselling among medical students in India. There has been a willingness to offer sexual and reproductive health services to people regardless of their marital status. Still, medical students in Maharashtra have misconceptions about modern methods of contraception. Training in contraceptive counselling should be implemented in basic medical education in India in order to increase women's access to evidence-based maternal health care services.

Contributor statement

BE had the original idea of the study and developed the study protocol together with HO, KGD and MKA, whom developed the original questionnaire. HO entered the data and made first analysis together with SH who drafted the manuscript. All authors have contributed to writing and revising the final version of the manuscript and approved the submitted version.

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Competing interests

The authors declare no competing interest

Data sharing statement

There is no additional data available

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Table 1. Demographics of medical students in Maharashtra, India, 2011 (n = 1996). Data from 27 medical colleges (8 public, 19 private).

Variable	n	%
Age		
20–24	1886	94.4
25 and above	98	5.0
Data missing	12	0.6
Gender		
Female	860	43.1
Male	1134	56.8
Data missing	2	0.1
Place of birth/upbringing		
Rural	508	25.5
Urban	1444	72.3
Data missing	44	2.2
Religion		
Hindu	1747	87.7
Muslim	97	4.9
Christian	17	0.9
Other	133	6.7
Data missing	2	0.1
Marital status		
Single	1970	98.7
Married	22	1.1
Data missing	4	0.2
Type of college		
Private	1423	71.3
Public	573	28.7
Data missing	0	0

Table 2. Perceptions of education and training in sexual and reproductive health among medical students (n = 1996) from private colleges (n = 1423) and public colleges (n = 573) in Maharashtra, India, 2011.

Variable	All n (%)	Private n (%)	Public n (%)
Was sexual and reproductive health included in your curriculum?			
Not at all	27 (1.4)	17 (1.2)	10 (1.8)
Somewhat	468 (23.4)	352 (25.0)	116 (20.6)
Sufficiently	1475 (73.9)	1039 (73.8)	436 (77.6)
Data missing	26 (1.3)		
Have contraceptive methods been taught in your program?			
Not at all	16 (0.8)	4 (0.3)	12 (2.1)
Somewhat	199 (10.0)	143 (10.1)	56 (10.0)
Sufficiently	1759 (88.1)	1265 (89.6)	494 (87.9)
Data missing	22 (1.1)		
How do you assess your theoretical knowledge of sexual and reproductive health?			
Poor	30 (1.5)	24 (1.7)	6 (1.1)
Fair	552 (27.7)	381 (27.0)	171 (30.9)
Good	1122 (56.2)	815 (57.8)	307 (55.4)
Very good	260 (13.0)	190 (13.5)	70 (12.6)
Data missing	32 (1.6)		
Have you had clinical practice in abortion care services during your training?			
Yes	268 (13.4)	196 (14.1)	72 (13.0)
No	1678 (84.1)	1196 (85.9)	482 (87.0)
Data missing	50 (2.5)		

Table 3. Knowledge, attitudes, and perceptions on contraception among medical students (n = 1996) in Maharashtra, India, 2011.

Statement		Disagree Completely	Disagree	Neither	Agree	Agree completely	Missing
Contraceptive pills might cause cancer	n	118	267	170	1126	304	11
	%	5.9	13.4	8.5	56.1	15.2	0.6
Contraceptive pills can cause infertility	n	526	857	227	349	25	12
	%	26.4	42.9	11.4	17.5	1.3	0.6
Contraceptive pills are inconvenient to use	n	608	855	236	249	38	10
	%	30.5	42.8	11.8	12.5	1.9	0.5
Emergency contraceptive pills can be used several times a month	n	972	630	115	227	37	15
	%	48.7	31.6	5.8	11.4	1.9	0.8
Condoms protect against STD/HIV	n	30	19	22	556	1361	8
	%	1.5	1.0	1.1	27.9	68.2	0.4
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	n	647	913	166	190	69	11
	%	32.4	45.7	8.3	9.5	3.5	0.6
Contraceptive information should only be for married couples	n	1305	566	57	41	20	7
	%	65.4	28.4	2.9	2.1	1.0	0.4
Doctors working in abortion services have friendly attitudes towards unmarried women	n	166	346	559	695	215	15
	%	8.3	17.3	28.0	34.8	10.8	0.8
Married couples are shy to talk about contraception with each other	n	150	629	423	720	64	10
	%	7.5	31.5	21.2	36.1	3.2	0.5
Women feel confident discussing contraception with doctors	n	86	654	445	696	105	10
	%	4.3	32.8	22.3	34.9	5.3	0.5
Traditional values are barriers for sex education in India	n	72	137	116	939	722	10
	%	3.6	6.9	5.8	47.0	36.2	0.5
Sex education encourages unmarried people to have sex	n	536	824	329	232	68	7
	%	26.9	41.3	16.5	11.6	3.4	0.4

Table 4. Place of birth in relation to knowledge, attitudes, and perceptions on contraception. Summary of significant differences among medical students (n=1996) in Maharashtra, India, 2011.

Statement	Place of birth	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer	Rural	344 (66.4)	62.2–70.5
	Urban	1081 (74.1)	71.8–76.4
Doctors working in abortion services have friendly attitudes towards unmarried women	Rural	289 (55.9)	51.5–60.2
	Urban	617 (42.4)	39.8–45.0
Sex education encourages unmarried people to have sex	Rural	105 (20.2)	16.9–24.0
	Urban	193 (13.2)	11.5–15.1

[a]Number of students does not always total 1996 due to missing answers

Table 5. Comparison of male and female medical students' knowledge, attitudes, and perceptions towards contraception (n = 1996) in Maharashtra, India, 2011.

Statement	Sex Female (F) Male (M)	Agree or agree completely n[a] (%)	95% Confidence Interval
Contraceptive pills might cause cancer[b]	F	**652 (77.1)**	**74.1–79.9**
	M	**753 (68.0)**	**65.2–70.8**
Contraceptive pills can cause infertility	F	150 (17.7)	15.2–20.4
	M	216 (19.5)	17.2–22.0
Contraceptive pills are inconvenient to use	F	132 (15.6)	13.2–18.2
	M	149 (13.4)	11.5–15.6
Emergency contraceptive pills can be used several times a month	F	**76 (9.0)**	**7.2–11.1**
	M	**182 (16.5)**	**14.3–18.8**
Condoms protect against STD/HIV	F	**830 (97.9)**	**96.7–98.7**
	M	**1056 (95.3)**	**93.9–96.5**
Traditional contraceptive methods (safe periods, withdrawal) are the best methods	F	90 (10.7)	8.7–12.9
	M	163 (14.7)	12.7–16.9
Contraceptive information should only be for married couples	F	22 (2.6)	1.6–3.9
	M	37 (3.3)	2.4–4.6
Doctors working in abortion services have friendly attitudes towards unmarried women	F	**326 (38.5)**	**35.2–41.9**
	M	**569 (51.4)**	**48.4–54.4**
Married couples are shy to talk about contraception with each other	F	311 (36.7)	33.5–40.1
	M	462 (41.7)	38.8–44.7
Women feel confident discussing contraception with doctors	F	350 (41.3)	37.9–44.7
	M	438 (39.5)	36.6–42.5
Traditional values are barriers for sex education in India	F	718 (84.8)	82.2–87.1
	M	920 (83.0)	80.6–85.1
Sex education encourages unmarried people to have sex	F	**88 (10.4)**	**8.4–12.6**
	M	**209 (18.8)**	**16.6–21.3**

[a]Number of students does not always total 1996 due to missing answers
[b]**Bold** indicates significant differences

Title: Medical students' ~~Future physicians'~~ knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey ~~among medical interns~~ students in Maharashtra, India

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Article focus

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students future physicians in Maharashtra, India.

Key message points

Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students future physicians in Maharashtra have fair knowledge andshow misconceptions about modern contraceptives, and lack training in family planning services.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to increase the access to comprehensive family planning services decrease unplanned pregnancies and unsafe abortions in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise pre- and in-service training in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of medical interns students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

ABSTRACT

Objectives: This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Setting: ~~*Background*~~: Considerable global maternal mortality and morbidity could be avoided through the use of effective contraception. In India, contraception services are frequently unavailable or there are obstacles to obtaining modern, reversible contraceptives. ~~This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students future physicians in Maharashtra, India.~~

Participants~~*Study design*~~: A cross-sectional descriptive study using a self-administered questionnaire was conducted among 1996 medical ~~interns~~ students in their fifth year of study at 27 medical colleges in the state of Maharashtra, India. Descriptive and analytical statistics interpreted the survey instrument and significant results were presented with a 95% confidence interval.

Results: Respondents expressed the desire to provide contraceptive services ~~and individual counselling~~. Few had experienced training in abortion care. ~~They had a fair knowledge of contraception, but showed some~~There were misconceptions about modern contraceptive methods and the impact of sex education. Attitudes towards contraception were mainly positive, pre-marital counselling was supported, and the influence of traditional values and negative provider attitudes on services was recognized. Gender, area of upbringing, and type of medical college did not change the results.

Conclusions: Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, future physicians in Maharashtra ~~have fair knowledge and~~show misconceptions about modern contraceptives ~~and myths~~ prevail. Pre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. ~~Pre- and in-service training of providers in evidence-based contraceptive counselling would decrease unplanned pregnancies and reduce unsafe abortions in the region studied.~~ Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

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Article focus

Contraceptive use is an effective primary prevention strategy to avoid unintended pregnancies and unsafe abortions and thus reduces maternal mortality and morbidity.

This study aimed to investigate knowledge, attitudes and perceptions on contraceptive use and counselling among medical students in Maharashtra, India.

Key message points

Despite mostly positive attitudes towards modern contraceptives, sex education, and family planning counselling, medical students in Maharashtra show misconceptions about modern contraceptives, and lack training in family planning services.

Respondents expressed a desire to provide sexual and reproductive health services to people regardless of their marital status.

Pre- and in-service training in evidence-based contraceptive counselling should be implemented in order to increase the access to comprehensive family planning services in India.

Strengths and Limitations

This study contributes with important evidence that may be used to revise pre- and in service training in contraceptive counselling and thus reduce maternal mortality related to unintended pregnancies in India.

Important limitation with this study is the non-probability sampling technique applied and this might reduce the external validity.

The large sample size and the high proportion of the total number and the presence of medical students from public and private medical schools in both urban and semi-urban settings strengthen the generalizability.

INTRODUCTION

Contraceptive use is an effective primary prevention strategy for reducing maternal mortality [1]. It has been estimated that the use of effective contraception could avert 90% of abortion-related and more than 20% of obstetric-related mortality globally [2]. Abortion incidence is inversely associated with the level of contraceptive use, especially where fertility rates are stable [3]. In addition, comprehensive sex education has the potential to prevent unintended pregnancies that lead to unsafe abortions [4]. ~~The growing number of people of reproductive age in developing countries poses a challenge for family planning programmes and health care services.~~ In order to meet the increasing demand for contraceptives and ensure the sexual and reproductive health and rights of women, including the right to planned parenthood, intensified efforts are urgently needed [5].

India accounts for 20% of maternal deaths worldwide ~~. Every year, nearly 60,000 women in India die from complications related to pregnancy~~ [6]. ~~Approximately 6.7 million induced abortions take place in India annually.~~ Despite the fact that induced abortion has been legal in India since 1971 ~~[7]~~, most of the approximately 6.7 million annually induced abortions are performed in an unsafe manner ~~and put women's health and lives at risk~~ [7, 8]. Moreover, a recent study concluded that 70% of all Indian women who have an abortion do not use post-abortion contraception [9]. The unmet need for ~~family planning among married women is 14%. The overall unmet need for~~ modern contraceptives is 22% in the cities and higher in rural areas. ~~Among married women in India, 56% use some form of contraception and 49% use a modern method.~~ Female sterilization is the most common contraceptive practice and accounts for 75% of all methods used [10]. The use of reversible, modern methods in order to postpone birth of a first child or for spacing births is infrequent~~: male condoms are used by 5%, the pill 3%, IUD 2%, injection 1%, and male sterilisation 1%~~ [11].

Some of the barriers that impede women's access to contraception are health care providers who are inadequately trained, insufficient in number, and poorly supervised [12]. Studies have shown that improving quality of care increases and sustains contraceptive use by women

[13]. Providers need adequate knowledge of contraceptive methods and training in counselling skills in order to provide reliable information to women ~~to avoid unintended pregnancy~~ [14]. Despite the availability of effective methods of contraception in India, many pregnancies remain ~~unplanned and~~ unintended. Considering the future role of medical ~~students and interns~~students as contraceptive counsellors, little is known about their views on contraceptive methods, use or counselling. This study aimed to investigate knowledge, attitudes, and perceptions on contraceptive use and counselling among medical students ~~future physicians~~ in Maharashtra, India.

MATERIALS AND METHODS

In February 2011, a cross-sectional survey was conducted using a pre-tested, self-administered questionnaire in the Indian state of Maharashtra among 1,996 medical students in their fifth year (internship) of training [15]. Out of a total of 43 medical colleges in Maharashtra (5,195 students), 19 are Public (2,200 students). A convenience sample of 27 colleges (8 ~~government~~public, 55~~6~~73 students; 19 private, 1,40~~2~~23 students) was included in the study. All medical ~~interns~~ students at the selected institutions were asked to participate before attending ~~they were to take~~ a lecture ~~pre-service CAC orientation program~~ in comprehensive abortion care (CAC). The lecture was ~~The CAC program was~~ organized by a non-governmental organization ~~organized but part of~~within the ~~within the~~ medical ~~in-~~ educationnal ~~and training~~ program ~~and organized by an NGO~~. ~~In the State of Maharashtra out of 43 medical colleges (5195 students) 19 are Public (2200 students). In total 27 colleges (8 public, 19 private) were included in the study and 1423 and 573 students participated from private and public colleges respectively.~~

Study setting

L~~Maharashtra is l~~ocated in west-central India. ~~It~~ Maharashtra is the country's second most populous state and the third largest by area. Of its 112 million inhabitants, a slight majority live in rural areas. ~~Mumbai, India's largest city, is the capital of the state.~~ Maharashtra's socio-economic status, literacy rate, and health infrastructure are better than the national average [16]. Medical education in India is regulated by the Medical Council of India and is either public or private. Medical education consists of 4.5 years of theoretical studies followed by one year of internship. According to the national medical education curriculum~~a for medical education~~ the theoretical studies should cover ~~both~~ comprehensive abortion care, as well as ~~CAC and~~ contraceptive methods, and counselling~~, which includes a two month rotation in obstetrics/gynaecology and three months of community medicine~~ [17].

Instrument

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The questionnaire contained three sections. Section 1 included socio-demographic characteristics as gender, age, religion, marital status, place of birth/area of upbringing, and type of college. Section 2 included questions related to perception of education and training in sexual and reproductive health~~previous coursework and training~~, and respondents' assessment of their knowledge regarding ~~the medical curriculum and questions concerning perceptions of~~ contraceptive methods and services.

Section 3 consisted of twelve statements on different aspects of contraceptive methods, services, and values surrounding sexual and reproductive health. Participants were asked to circle the most appropriate alternative on a five-point Likert scale (Disagree completely/Disagree/Neither agree nor disagree/Agree/Agree completely) [18].

Statistical analysis

Questionnaires that contained one or more answers were included in the analysis. Statistical Package for Social Studies (SPSS) 20.0 software was used. Descriptive statistics were applied to all sections of the questionnaire; actual numbers and proportions were calculated; and cross-tabulations with intergroup comparisons of answers were made for ~~interns~~ students of different genders, types of colleges, and places of birth. The alternatives 'agree' and 'agree completely' were aggregated, as well as the alternatives 'disagree' and 'disagree completely'. Any difference with a 95% confidence interval (CI) was regarded as significant.

Ethical considerations

The study was carried out in compliance with the principles of the World Medical Association Declaration of Helsinki. The medical ~~interns~~ students eligible for participation in the study were given oral information about the study and were informed that participation was anonymous and voluntary and that choosing not to participate would not affect their studies or future careers negatively. By filling in the questionnaire written consent to participation was given. Permission to conduct the survey in connection with the training programme was

obtained from the principal at each college. The study has been approved by the research ethical committee at Karolinska Institutet. (Dnr: 2013/415-31/4).

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RESULTS

Out of 2,006 questionnaires, 1,996 were at least partially filled-in, making the overall response rate 99.5%. The demographic characteristics of the interns students are outlined in Table 1. Since the interns students were homogenous in terms of age, religion, and marital status, the variables remaining for inter-group comparisons were gender (56.87% male, 43.1% female), place of birth (72.3% urban, 25.5% rural), and type of college (71.3% private, 28.79% public).

Table 2 shows the students' perception of education and training in sexual and reproductive health, and respondents' assessment of their knowledge regarding contraceptive methods and services. interns'students' perceptions on coursework and training on sexual and reproductive health, and their own assessment of knowledge. Most of the interns students thought that the topic of reproductive health had been adequately covered in their curriculum, including contraceptive methods. A majority considered their theoretical knowledge in sexual and reproductive health fair or good. A large proportion reported having had no clinical practice in abortion care services during their training. A comparison between interns students from private and public colleges revealed no significant differences.

With regard to contraceptive counselling, 74.0% believed it should be given individually and not in a group. A majority of the respondents (67.2%) thought doctors should be the ones to provide contraception to patients, while 27.1% considered health workers to be the most appropriate counsellors. A few interns students chose other alternatives (nurse 3.0%, other 1.6%, missing 1.1%). A majority (95.1%) indicated they would like to have responsibility for providing information on contraception as future doctors. Regarding the use of oral contraceptives, 88.59% of the interns students stated they should be taken every day. Some interns students (5.86%) thought they were to be taken after intercourse or once a month

(3.4%). A cross-sectional analysis of answers given by ~~interns~~ students with rural versus urban places of birth revealed no significant differences with regard to ~~contraceptive counselling~~these results. However, those from private colleges preferred individual contraceptive counselling over group counselling (private college ~~interns~~ students 78.2%, CI 95%, 75.9–80.3; public college ~~interns~~ students 70.6~~1~~%, CI 95%, 66.6–74.4). Female ~~interns~~ students were also more supportive of individual counselling than males (females 80.2%, CI 95%, 77.4–82.9; males 72.8~~3~~%, CI 95%, 70.1–75.4). Females also expressed a greater interest in having responsibility for providing contraceptive information as future doctors than males (females 98.2%, CI 95%, 96.8–98.8; males 95.3% CI, 93.8–96.4). Moreover, female ~~interns~~ students were better informed on the daily intake of oral contraceptive pills than males (females 93.3%, CI 95%, 91.5–94.9; males 8~~8.89~~%, CI 95%, 86.8–90.6).

The knowledge, attitudes, and perceptions of medical ~~interns~~ students on contraceptive methods, services, and values surrounding sexual and reproductive health are shown in Table 3. Cross-sectional analysis comparing ~~interns~~ students from public and private colleges indicated a difference of opinion regarding the statement "Doctors working in abortion service have friendly attitudes towards unmarried women". Fewer ~~interns~~ students from private colleges agreed or agreed completely as compared to ~~interns~~ students from public colleges (private college ~~interns~~ students 43.8~~4~~%, CI 95%, 41.8–46.4; public college ~~interns~~ students 51.2%, CI 95%, 47.0–51.4).

Table 4 summarizes the significant differences in perceptions found among ~~interns~~students based on their place ~~A comparison of the answers based on the interns' place~~ of birth (urban or rural) ~~revealed significant differences in responses to three statements~~: ~~Interns~~Students with urban place of birth to a higher extent agreed to that "Contraceptive pills might cause cancer" (urban 74.1%, CI 95%, 71.8–76.4; rural 66.4%, CI 95%, 62.2–70.5); A larger proportion of ~~interns~~students with rural background agreed to the statement that "Doctors working in abortion service have friendly attitudes towards unmarried women" (rural 55.9%, CI 95%, 51.6-60.2; urban 42.4, CI 95%, 39.8– 45.0).; and it was more common for ~~interns~~students with rural place of birth to agree to the statement "Sex education encourages

unmarried people to have sex" (rural 20.2%, CI 95%, 16.9–24.0; urban 13.2, CI 95%, 11.5–15.1) ~~(Table 4)~~.

Table 5 compares male and female medical ~~interns'~~ students' knowledge, attitudes, and perceptions on contraception. More female ~~interns~~ students agreed or agreed completely that contraceptive pills might cause cancer. Males tended to believe that emergency contraceptive pills may be used several times a month. Both male and female ~~interns~~ students largely agreed or agreed completely that condoms protect against sexually transmitted diseases (STD) and HIV, although females were significantly more supportive of their use. One in five males versus one in ten females agreed or agreed completely that sex education encourages unmarried people to have sex. Among males, 51.4~~0~~% agreed or agreed completely that doctors working in abortion services have friendly attitudes towards unmarried women, compared to 38.5~~9~~% among females.

DISCUSSION

The major finding in this study is the inadequate level of ~~education and~~ training in ~~CAC~~comprehensive abortion care and contraceptive ~~methods~~counselling ~~although the~~of medical students~~'s~~ who already ~~have undertaken~~passed the ~~full~~ theoretical parts ~~of the their program~~medical education. Our findings further suggest that even though ~~although~~ the medical ~~interns~~ students surveyed had experienced little training in abortion care services, they expressed a clear interest in disseminating contraceptive information as future physicians. Although they had mostly ~~a fair knowledge and a~~ positive attitudes toward contraception and pre-marital counselling, ~~they also had~~ misconceptions about modern contraceptive methods and the impact of sex education were common.

~~Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19]. Few had experienced clinical training in abortion care services. They recognized the influence of traditional values and~~

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negative provider attitudes regarding contraceptive services, and they expressed a clear interest in disseminating contraceptive information as future physicians.

FVery few respondents in our study had had any clinical experience in abortion care services, yet a majority thought the topics of sexual and reproductive health and contraceptive methods had been adequately covered in their coursework. Still, nearly one in five interns falsely believed that contraceptive pills can cause infertility and one in ten did not know that contraceptive pills are to be taken on a daily basis. More females than males were unaware that emergency contraceptive pills may be used several times a month. A majority of both males and females perceived that contraceptive pills might cause cancer, although females were more likely to agree on this. Recent studies indicate that family planning training during residency improves future physicians' proficiency in contraceptive counselling [19]. Recent studies indicate that family planning training during residency improves future physicians' proficiency in both uterine evacuation and contraceptive counselling [19].

Our findings did not reveal any differences in self-rated or theoretical knowledge between public and private college internsstudents. The background factor that had the greatest influence on knowledge was gender. Female interns students were better informed about the dosage utilisation of oral contraceptives and the protection that condoms offer against STD/HIV. They also report that sex education does not encourage unmarried people to have sex. Regardless of demographic background, most interns students in our study recognized that traditional values are barriers to sex education. Few thought contraceptive information should only be provided to married couples, although interns students born in rural areas had more negative perceptions of sex education. The socio-cultural norms of Indian society contribute to making sex-related issues taboo and hinder young people from seeking counselling regarding sexual health. At the same time, premarital sex is increasing among Indian youth [20]. Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of women [32]. Two recent studies from rural India may

~~indicate a change in attitude. In the first, nearly one third of young married women without children were found to be using contraceptives [23]. The second study found growing autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers in law [33]. Although comprehensive sex education has been shown to have a positive impact on young people's risky sexual behaviour [21], in parts of India sex education has been banned in schools [20]. Young people in India have expressed a desire for formal sex education and doctors are their preferred source of advice [22]. India is known to have negative attitudes toward pre-marital sex and a reluctance to provide married couples with contraceptives before they have had at least one child [23].~~ R~~Other r~~esearch reveals that health care providers often impose unnecessary barriers in dispensing contraceptives, including denial of a contraceptive method on the basis of age, parity, marital status, or lack of parental or spousal authorization [214, 225~~]~~ ~~A review of studies from developing countries indicates a similar pattern [25]~~. One in four respondents in our study did not believe doctors working in abortion services held positive attitudes towards unmarried women. ~~However, as noted above, most interns supported providing contraceptive information to unmarried couples.~~

~~Females expressed a slightly greater interest in working with contraceptive services in their medical practice than males.~~ Although nearly all ~~interns~~ students in our survey said they would like to assume the responsibility for contraceptive counselling in their future careers, the current shortage of providers (especially in rural areas) may require the shifting of tasks. Task sharing or ~~sharing and task~~ shifting within family planning services is recommended by the ~~World Health Organization~~WHO [236]. The involvement of clinical officers, midwives and nurses increases the ~~equitable~~ access to modern contraception ~~among women~~ in low resource settings [247]. The fact that one-fourth of our respondents believed that health workers, rather than physicians, were best suited to dispense contraceptive information suggests that future physicians ~~doctors~~ would be willing to relegate such tasks to others.~~. This might overcome the present inequalities in access to reproductive health services in India [28].~~

~~A recent study suggests that the inclusion of nurses, midwives, and ayurvedic physicians in medical abortion care is feasible in India [29]. Broadening of the provider base for family planning services would be a pragmatic response to the current shortage especially in rural area of India.~~ Several studies conclude that even though abortion providers discuss contraception with their patients ~~and advise them about a range of methods~~, it is common for patients to refuse any form of contraception following an abortion [25~~30~~, 26~~31~~]. ~~Indian women have limited power to decide about birth control. The preference for a male child, which still strongly prevails in India, also has an influence on reproductive behaviour. Reducing such a preference would require a change in social norms and an improvement in the status of women [32]. Two recent studies from rural India may indicate a change in attitude. In the first, nearly one third of young married women without children were found to be using contraceptives; 10% were using condoms to postpone having their first child [23]. The second study found growing autonomy among young couples in using contraception to space births, even when this conflicted with the views of their mothers in law [33].~~

The quality of provider counselling and patient education is important for the successful integration of new hormonal methods of contraception into clinical practice [27~~34~~]. Medical students need training in c~~C~~omprehensive sexual and reproductive health services ~~should~~ that conforms with international human rights standards and include respect for privacy and confidentiality, in order to provide full and accurate information to their future patients~~, and ensure free and informed consent [11]~~.

~~India has one of the most privatized medical systems in the world. The public system, which provides health care for the poor, employs only two physicians and eight nurses per 10,000 population [35]. The strategic use of nurses and midwives has been described to contribute to mitigating human resource problems in emergency obstetric and gynecological care [36]. There is evidence from developing countries that trained nurses and midwives can replace doctors in many settings [37], yet medical doctors are still the dominant providers of contraceptive services in India. Strategies' identified to cover critical gaps in access to reproductive health are; integrated family planning with postpartum and abortion care, pre-~~

and in service training on evidence based contraception and task shift and sharing between physicians and midwives and nurses [38].

METHODOLOGICAL CONSIDERATIONS

One weakness is the non-probability sampling technique applied in our study and this might reduce the external validity. The large sample size and the fact that a fairly high proportion of the total number of students in both private (47.550%) and public (26.0%) colleges is included are thought to strengthen the validity. However, since India is a country with large regional differences in socioeconomic and health status, our results may not be representative of all medical interns students in the country. On the other hand, the presence of interns students from public and private medical schools in both urban and semi-urban settings may strengthen the generalizability for Maharashtra. The method of using anonymous questionnaires is suitable for sensitive topics like sexual and reproductive health. The reliability and validity of the survey is strengthened through previous testing of the instrument.

CONCLUSIONS

We have found positive and negative attitudes towards modern contraceptive methods, sex education, and family planning counselling among future physicians in India. There has been a willingness to offer sexual and reproductive health services to people regardless of their marital status. Despite positive attitudes towards modern contraceptives, sex education, and family planning counsellingStill, future physicians in Maharashtra have fair knowledge and misconceptions about modern contraceptives and myths prevail. TPre- and in-service training in contraceptive counselling should be implemented in order to increase women's access to evidence-based maternal health care services. Expanding the provider base to health care professionals other than physicians would further increase the availability of services.

Pre- and in-service training in evidence-based contraceptive counselling would decrease unplanned pregnancies and unsafe abortions in India. Expansion of the provider base to

~~include categories of health care staff other than physicians as purveyors of contraceptive information could increase access to services.~~

Contributor statement

BE had the original idea of the study and developed the study protocol together with HO, KGD and MKA, whom developed the original questionnaire. HO entered the data and made first analysis together with SH who wrote the first draft. All authors contributed to the final version of the manuscript.

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Competing interests

The authors declare no competing interests

Data sharing statement

There is no additional data available

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Research checklist for paper: Medical students' knowledge, attitudes, and perceptions on contraceptive use and counselling: a cross-sectional survey in Maharashtra, India.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract. *YES*
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found.*YES*
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported. YES
Objectives	3	State specific objectives, including any prespecified hypotheses. *AIM included which correspond with Title.*
Methods		
Study design	4	Present key elements of study design early in the paper. *YES in abstract, focus of paper and in method section*
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection. *YES short but focused on important aspects*.
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. *YES*
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable. *YES.*
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. *YES.*
Bias	9	Describe any efforts to address potential sources of bias. *YES in methodological considerations.*
Study size	10	Explain how the study size was arrived at. *YES in sampling.*
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why. *YES*
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding. *YES.*
		(*b*) Describe any methods used to examine subgroups and interactions. *YES.*
		(*c*) Explain how missing data were addressed. *Hardly any missing data (external or internal. Missing is reported in tables.*
		(*d*) If applicable, describe analytical methods taking account of sampling strategy. *Not applicable.*
		(*e*) Describe any sensitivity analyses. *Not applicable.*
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. *YES.*
		(b) Give reasons for non-participation at each stage. *YES.*
		(c) Consider use of a flow diagram. *Not adequate*.

Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. *YES in table 1 and then included in analyses.*
		(b) Indicate number of participants with missing data for each variable of interest. *YES reported in tables.*
Outcome data	15*	Report numbers of outcome events or summary measures. *YES.*
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included. *YES.*
		(*b*) Report category boundaries when continuous variables were categorized. *Not relevant.*
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period. *Not relevant.*
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses. *No.*
Discussion		
Key results	18	Summarise key results with reference to study objectives. *YES in beginning of discussion.*
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. *YES included in methodological considerations.*
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence. *YES.*
Generalisability	21	Discuss the generalisability (external validity) of the study results. *YES included in methodological considerations.*
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based. *YES.*

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Questionnaire

Knowledge, Attitude & Perception
On
Contraceptive Services & Abortion Care

In order to increase our knowledge about what you think is needed in your education and for your future work we have designed this questionnaire as part of the co-operation between the pre service Comprehensive Abortion Care orientation program for interns in INDIA and Uppsala University, Sweden.

Name of the institution: _____

Section 1: Your background	
1.1 What is your sex?	Female 1 Male 2
1.2 How old are you?	Years old …….
1.3 What is your religion?	Hindu 1 Muslim 2 Christian 3 Other…… 4 (Specify)
1.4 What is your marital status?	Single 1 Married 3 Other…… 4
1.5 Where were you born?	Rural area 1 Urban area 2

Section 2 Training	
2.6 What do you think are the special problems within sexual & reproductive health today in India	**Please write in your own words**
2.7 Has the topic sexual & reproductive health been included in your study programme?	Not at all 1 ( ) Somewhat 2 ( ) Sufficiently 3 ( )
2.8 How do you assess your theoretical knowledge in sexual & reproductive health to be?	Poor 1 ( ) Fair 2 ( ) Good 3 ( ) Very good 4 ( )
2.9 Have you had clinical practice in abortion care services during your training?	Yes 1 ( ) No 2 ( )
2.11 Do you think counselling should be given in group or individually?	In group 1 ( ) Individually 2 ( )
2.12 Who is most suitable to give information about contraceptive methods?	Doctor 1 ( ) Nurses 2 ( ) Pharmacist 3 ( ) Health worker 4 ( ) Others ----------

2.13 As a future doctor, would you like to have responsibility for contraceptive information?	Yes 1 ( ) No 2 ( )

Section 3 Perception on contraceptive methods	
3.1 Has the topic contraceptive methods been included in your study programme (in school or at hospital)?	Not at all 1 Somewhat 2 Sufficiently 3
3.2 When should oral contraceptive pill be taken?	After intercourse 1 Once a month 2 Every day 3
3.4 Which contraceptive method do you think is most suitable for women? CIRCLE ONE ANSWER	Pill 1 Condom 2 Emergency Pill 3 IUD 4 Withdrawal 5 Safe periods 6 Female sterilization 7 Male sterilization 8

Statements Please place a tick in the circle which you feel most appropriate answer.	**Disagree completely**	**Disagree**	**Neutral**	**Agree**	**Agree completely**
3.5 Contraceptive pill might cause cancer	( )	( )	( )	( )	( )
3.6 Contraceptive pill can cause infertility	( )	( )	( )	( )	( )
3.7 Contraceptive pill is inconvenient to use	( )	( )	( )	( )	( )
3.8 Emergency contraceptive pill can be used several times a month	( )	( )	( )	( )	( )
3.9 Condoms protects against STD/HIV	( )	( )	( )	( )	( )
3.10 Contraceptive information should be only for married couples	( )	( )	( )	( )	( )
3.12 Traditional values are barriers for sexual education in India	( )	( )	( )	( )	( )
3.13 Sexual education encourage unmarried to have sex	( )	( )	( )	( )	( )
3.14 Doctors working in abortion service have friendly attitude towards unmarried clients	( )	( )	( )	( )	( )
3.15 Married couples are shy to talk about contraceptive with each other	( )	( )	( )	( )	( )
3.16 Women feel confident discussing contraception with doctors	( )	( )	( )	( )	( )
3.18 Traditional contraceptive methods (safe periods, withdrawal) are the best methods	( )	( )	( )	( )	( )
Section 4 Abortion **Statements** Please place a tick in the circle below the right answer	**Disagree completely**	**Disagree**	**Neutral**	**Agree**	**Agree completely**
4.1 Unsafe abortion is a serious health problem in India	( )	( )	( )	( )	( )
4.2 Abortion among unmarried are rising in India	( )	( )	( )	( )	( )
4.3 Abortion is more dangerous/harmful for unmarried women than for married	( )	( )	( )	( )	( )

4.4 Unmarried women have more complications from abortion than married	( )	( )	( )	( )	( )
4.5 Unmarried women prefer to have abortion outside of public health clinics	( )	( )	( )	( )	( )
4.6 Abortion at clinics outside of the public health care are more harmful than abortion at public clinics	( )	( )	( )	( )	( )
4.7 Abortion among unmarried is acceptable in case of an unplanned pregnancy	( )	( )	( )	( )	( )
4.8 Abortion is morally wrong	( )	( )	( )	( )	( )
4.9 A woman should always have the right to have an abortion in case of an unwanted pregnancy	( )	( )	( )	( )	( )
4.10 A woman need to have her partner/spouse approval to have an abortion	( )	( )	( )	( )	( )
4. 11 Abortion is not harmful if it is clinically safe	( )	( )	( )	( )	( )
4.12 Abortion clients are treated in privacy in India	( )	( )	( )	( )	( )
4.13 Women prefer to have surgical abortion rather than medical abortion	( )	( )	( )	( )	( )
4. 15 Surgical abortion is more harmful than medical abortion	( )	( )	( )	( )	( )
4.16 Specially trained General Nurse midwives have a potential to provide abortions in India	( )	( )	( )	( )	( )

Thank you for your participation!