Current Medical Research

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In this issue

The Influence of Ever Use of Natural Family Planning and Contraceptive Methods on Divorce Rates as Found in the 2006-2010 and 2011-2013 National Survey of Family Growth

Natural Family Planning

Professional Nurses Enhance Medical Practice in Provision of NFP Services

Basic management of subfertility includes helping couples understand the fertile phase of the menstrual cycle (i.e., to learn fertility awareness and Natural Family Planning or NFP) so that they can optimize their chances of pregnancy. Basic management of subfertility falls in the scope of practice of primary medical providers (e.g., primary care family medicine physicians) and secondarily with the collaboration of professional nurses. Studies have shown that most sub-fertile couples seeking pregnancy are unaware of the fertile phase of the menstrual cycle. Helping them with fertility awareness as a first step could prevent some couples from being referred to infertility specialists and expensive infertility treatments. Although many women and couples are interested in receiving fertility awareness information, this type of service is not standard in a primary care practice, whether medical or nursing. Due to this situation, researchers sought to understand the barriers and enablers to fertility awareness education in primary care medical practices from the perspectives of primary care physicians and professional nurses (Hampton, Newton, Parker and Mazza 2016).

The study was qualitative. It involved in depth interviews with primary care physicians and professional nurses involved in primary care medical practices. The researchers used purposeful sampling by seeking participants in three divisions of general practice in the city of Victoria, Australia, i.e., the primary care divisions included rural and urban (underserved) areas of the city. Advertisement seeking volunteers for the study was placed in newsletters and by directly faxing practitioners in primary medical practices. Interviews were obtained from eleven primary care physicians and twenty professional nurses. Interviews with the physicians were carried out over the telephone and with nurses in group sessions. The interview was guided by a conceptual model of primary care and included 20 open-ended questions that involved assessing barriers and enablers of providing fertility awareness services. The interviews were conducted by one of the researchers for consistency and transposed into a qualitative software for analysis. Themes from the interviews were coded and reviewed by the researchers and placed into the domains of the theoretical framework. They were able to discern six major themes from the interviews.

The first theme was "Lack of everyday resources" necessary to provide fertility awareness services including lack of time in a short office visit, too busy with other required services, and the lack of patient educational materials that could aid providing fertility services. The second theme was "Belief in preventive health care," i.e., there was an awareness of the value of providing fertility awareness as a way of enhancing women's health and optimizing conception but both the physicians and nurses did not feel prepared to provide fertility awareness services. This was reflected in the third theme, i.e., "Lack of skills" in providing fertility awareness education. Only one of the primary care physicians felt prepared to provide fertility care services and none of the professional nurses. Theme four "Practice options for fertility-awareness education" involved providing options for fertility awareness education services in a primary care practice. There was consensus that having professional nurses educated in the provision of fertility awareness services as part of the medical practice would be ideal and secondarily to have visiting nurses specialized in fertility education or referral to such services when needed. Theme five was labeled "Medical dominance," which indicated that there was an

environmental pressure that supported primary care physicians to refer couples into higher level infertility specialists and artificial reproductive technology (ART) services. There was also a question of scope of practice for the primary care provider to be involved with sub-fertility and the remuneration for such services. The final theme was the personal nature of the topic, which meant that the use of fertility awareness education was highly personal for both the patient and the physician and some express being uncomfortable in providing those services, especially when there are gender, language, cultural and religious barriers. In summary, the biggest barriers to the provision of fertility awareness services were the constraints (i.e., time, knowledge, and materials) of a primary care practice. The biggest enabler was to have professional nurses provide fertility awareness services in collaboration with the primary care physician.

Comments

The model of using a professional nurse in collaboration with a primary care physician (i.e., family medicine, obstetrician/gynecologist, internist or pediatrician) in the provision of NFP services is a viable professional model. This type of NFP delivery model is especially important when the system of NFP is rather complex and requires long 45 minutes to 90 minutes introductory sessions and multiple 30-60 minutes follow-up sessions. In addition, when the couples have more complex menstrual cycles, such as during postpartum breastfeeding when fertility is returning, and when there are serious medical problems that preclude pregnancy, this collaborative model makes sense. There are however, simpler systems of NFP that can be provided in a short office visit by physicians and advanced practice nurses. Also, there are numerous fertility monitoring applications for smart phones and online NFP teaching sites that can be integrated with the provision of professional NFP services.

Hampton, K. D., J. M. Newton, R. Parker and D. Mazza. (2016). **A qualitative study of the barriers and enablers to fertility-awareness education in general practice.** *Journal of Advanced Nursing* December 28, 2015. Epub ahead of print.

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Salivary Ferning as a Natural Fertility Indicator for Use in Natural Family Planning

Over the past twenty years there have been numerous miniature microscope type devices that were developed and marketed to observe changes in salivary ferning patterns that are purported to reflect the fertile window of the menstrual cycle. The changes in the patterns of salivary ferning are thought to reflect the changes in estrogen levels from a developing follicle much like what happens with the changes in the characteristics of cervical mucus. Women who use these microscope type devices, lick a small microscope lens, let the saliva dry and then view the ferning pattern with the miniature microscope. There are three general patterns: no ferning, which indicates an infertile time; a mixed pattern with some ferning, which indicates a moderate or transitional fertility; and peak fertility when there is a clear ferning pattern that takes up the whole field of view. A new salivary ferning monitor or microscope device was developed called the *Geratherm ovu* control device. Researchers conducted a study to determine the accuracy of this device in estimating fertility by comparing the results of the *Geratherm* salivary ferning monitor (SFM) with a test strip that measures a threshold of urinary luteinizing hormone (LH) (Günther, Bauer, and Hedderich, et al., 2015). The researchers assumed that ovulation takes place about 24-36 hours post the LH surge.

The researchers were able to obtain 74 healthy women volunteers with a mean age of 24 years (range 20-35 years of age) with regular menstrual cycle lengths (25-35 days). The volunteers were from the medical clinic in the Department of Obstetrics and Gynecology at the university hospital in Keil, Germany. The women were not on any hormonal contraception nor were they pregnant or breastfeeding. The women were asked to use the SFM from day 5 until day 22 of their next menstrual cycle and to rate and record daily the viewed ferning patterns as not fertile, transitional, or fertile. They were also asked to use the EXACTO brand of a urinary LH test strip on the same days when using the SFM with concentrated urine. The researchers plotted out the correlation between the positive LH surge and the ferning levels with a line graph.

The researchers found that the curve of fertility with the LH test and the peak of ferning with the SFM was almost parallel with the maximum day of fertility with use of the SFM on day 16 of the menstrual cycle and the LH test on day 17 of the menstrual cycle. The conformity between the two tests of fertility was 100% on day 5 through day 13, and 84% on day 14. At the 18th day there was 80% conformity and from day 19 through day 22 at 96% conformity. The researchers speculated the one day difference in peak fertility between the LH surge and peak in ferning is that the LH surge would follow the rise and peak in estrogen levels from the developing follicle. The researchers concluded that since the SFM conformed well with the LH tests, that it could be used by women for help in achieving pregnancy and also felt confident that the device could be an aid for preventing pregnancy.

Comments

Researchers in the 1990s studied the use of salivary ferning and found some positive correlations to fertility (Barbato, Pandolfi, and Guida 1993; Guida, Barbato, and Bruno, et al. 1993; Fehring and Gaska 1998); however, later studies with use of serial ultrasound of the developing follicle as the gold standard of estimating the day of ovulation found that salivary ferning did not conform to the peak in fertility and the estimated day of ovulation (Braat, Smeen, and Manger, et al. 1998; Guida, Tommaselli, and Palumba, et al. 1999). They also found peak ferning at other times in the menstrual cycle and that the field of view from these devices did not match a more sophisticated standard microscope in which they could view peak ferning at one part of the field and no ferning at other parts. Braat, et al. (1999) also found excellent ferning from a matched group of male and peri-menopausal women participants. I would not recommend these devices as an aid with use in NFP methods because they are very imprecise in estimating the fertile phase of the menstrual cycle.

Barbato, M., A. Pandolfi, and M. Guida. (1993). **A new diagnostic aid for natural family planning.** *Advances In Contraception* 9 (1993): 335-340.

Braat, D. D., J. Smeen, and A. P. Manger, et al. (1998). **Saliva test as ovulation predictor.** *Lancet* 352 (October 17, 1998): 1283-1284.

Günther, V., I. Bauer, and J. Hedderich, et al. (2015). **Changes of salivary estrogen levels for detecting the fertile period.** *European Journal of Obstetrics & Gynecology and Reproductive Biology* 194 (2015): 38-42.

Guida, M., M. Barbato, and P. Bruno, et al. (1993). Salivary ferning and the menstrual cycle in women. *Clinical Experiments in Obstetrics and Gynecology* 20 (1993): 48-54.

Guida, M., G. Tommaselli, and S. Palumba, et al. (1999). **Efficacy of methods for determining ovulation in a natural family planning program.** *Fertility and Sterility* 72 (November, 1999): 900-904.

Fehring, R., and N. Gaska. (1998). **Evaluation of the Lady Free Biotester in determining the fertile period**. *Contraception* 57 (1998): 325-328.

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Family Planning and Contraception

Women Prefer Family Planning Methods That Are Easy to Use, Effective, and Have No Side Effects

Unintended pregnancy, nonuse of contraception, and lack of use of more effective family planning methods are behaviors more common among the poor and racial and ethnic minorities in the United States compared with middle class white women. To explain this disparity, researchers sought to determine preferences of family planning method characteristics (Jackson, Karasek, Dehlendorg and Foster 2016).

The researchers were able to obtain 1,240 volunteer women from multiple family planning clinics throughout the United States who completed an 18 item survey that ranked family planning characteristics as to being "extremely," "somewhat," or "not at all" important. The survey was completed on a laptop computer and were computer guided. The 18 characteristics were two questions on ease of "getting the method,' three on ease of "using the method," seven characteristics on "side effects or health concerns," three on "control and privacy," and two on "stopping the method." The sample of 1783 women participants included, 39% white, 30% black, 24% Latina, and 7% Asian/Pacific Islanders. They were between the ages of 15-45. Twenty-six percent were Catholic, 27% Protestant, 28% "No Religion," and 19% "Other." In comparing the racial and ethnic women with white users they dichotomized the responses as to "extremely important" or "not important."

The researchers found that the racial and ethnic women were more likely to rate as "extremely important" being able to stop using the method at any time, using a method only with intercourse, and using a method that does not interfere with the menstrual cycle compared with white respondents ($p < 0.05$). Minority and racial participants were also more likely to rate as "extremely important," methods that protect against sexual transmitted disease, having control over when and whether to use the method, and being able to become pregnant after stopping use of the method. The authors felt that some of the preferences were due to myths about contraceptive methods and distrust by these women with reproductive services that in the past have used governmental regulations to coerce use of more effective methods–like receiving more governmental financial support if they are using more effective methods of family planning. The authors recommended that family planning methods be developed that meet preferences of minority women.

Comments

Of interest is that "no method at all" was rated as the method that best met the 18 preferences for family planning methods with "using no method" having met 66% of the preferences. Natural Family Planning only was rated as meeting 33% of the characteristics. The contraceptive ring (65%) and the sponge (62%) were the highest rated actual methods. Overall, only 1.5% of the participants were intending to use NFP. This is of concern since NFP methods have no side effects or health concerns, are effective when used correctly, provide self-control in that one is free to use the method or not, they do not interfere with the menstrual cycle, and can help to achieve a pregnancy. These characteristics of NFP need to be promoted more to the racial and ethnic minority populations in the United States since they seem to meet many of the characteristics that minorities prefer.

Jackson, A.V., D. Karasek, C. Dehlendorg, and G. Foster. (2016). **Racial and ethnic differences in women's preferences for features of contraceptive methods.** *Contraception* (2016) Epub ahead of print.

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Only 3% of Reproductive Age Women in Japan Use Oral Contraceptive Pills

The hormonal oral contraceptive pill (OCP) was made legal in Japan in 1999. It was the last developed industrial country to do so. Prior to 1999, the OCP was only used in Japan for off label use. Right before legalization, experts predicted about 12% of the Japanese women would eventually use the OCP. Japanese researchers, therefore, were interested in determining the pattern of contraceptive use in Japan prior to and after the legalization of the OCP (Yoshida, Sakamoto, Leslie, Akahaski, Tsuboi, and Kitamura 2016).

The researchers were able to access and combine two ongoing nationally represented contraceptive use surveys of Japanese women between 15–49 years of age from 1950 to 2014. The two studies yielded a population sample of 10,009 participants. Besides recording the method of contraception they were currently using, the participants were asked why they were not using OCPs and where they obtained their information on contraceptive methods.

The researchers discovered that only 3% were currently using OCPs, but 83.4% were using condoms, 19.5% withdrawal, and 8.3% the Rhythm Method. The reasons for not using OCPs were worry about side effects (49.8%), they were satisfied with their current method (9.3%), and they did not like taking a medicine everyday (7.1%). Most learned about methods of contraception from teachers at school (40.0%), friends (20.3%), and online sources (10.4%). Only 1-2% received information from health care providers. They also discovered that use of OCPs did not differ from the percentage of use prior to the government approval of the method, (a mean of 1.21% prior and 1.97% after; p = .38). The authors concluded that healthcare providers (nurses and family medicine physicians) need to provide women with adequate and appropriate family planning information. They felt that there was a lack of reproductive health information that was contributing to the low use of OCPs.

Comments

One of the reasons that Japanese women have a high level of Rhythm Method use (compared to the United States and other developed countries) is that one of the original developers of the Rhythm Method was Dr. Ogino from Japan. It is remarkable that the use of condoms, withdrawal and Rhythm (i.e., methods of family planning with low effectiveness) seem to be working well among Japanese women since they have one of the lowest birth rates among developed countries. Perhaps the Japanese nurses and family medicine physicians should be promoting the use of Calendar Rhythm to achieve pregnancy. It also seems unlikely that a highly educated society like Japan would not know enough about the negative side effects of OCPs to make good family planning decisions. It would be interesting to know how much Japanese women know about more modern methods of NFP.

Yoshida, H., H. Sakamoto, A. Leslie, O. Akahaski, S. Tsuboi, and K. Kitamura. **Contraception in Japan: current trends.** *Contraception* (2016) E Published Ahead of Print.

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Effectiveness of a Fertility Monitoring Application for Avoiding Pregnancy

Over the past several years a number of fertility monitoring applications (apps) for smart phones and other electronic devices have been developed to serve as a convenient device for women who wish to track their menstrual cycles and their fertility. One such app called Natural Cycles was developed by Swedish researchers that includes the ability to record basal body temperature (BBT) and results from luteinizing hormone (LH) urine test kits. The app has a built in algorithm that calculates an estimated fertile window based on the first day of menses and the BBT recordings and provides a red color for potential fertile days and green color for estimated infertile days. A paper on this app was published and reviewed in the 2015 Winter/Spring edition of *Current Medical Research* (Scherwitzl, Hirschberg, and Scherwitzl 2015). The developers and researchers of the fertility app subsequently conducted and published a study to determine the effectiveness of the Natural Cycles app in helping women avoid pregnancy (Scherwitzl, Daielsson, Sellberg, and Sherwitzl 2016).

The study was a retrospective analysis of data produced by 4,050 women between the age of 18 and 45 who purchased a 50 euro subscription to the app to avoid pregnancy between August 2014 and March 2015. To be a participant they had to use the app for three months at a minimum, enter data for at least 20 days, and be at least 18 years old. The 4,050 women who purchased the app and agreed to the study produced 2,085 women years of data. The data entered by the app users was connected to an online system that was able to anonymously analyze menstrual cycle data. The participants also received an e-mail questionnaire on their satisfaction with the app and whether they had an unintended pregnancy or not. The researchers analyzed the data using the Pearl index and with survival analysis.

The participants had a total of 143 unintended pregnancies. These pregnancies and the 2,053 women years of use yielded a perfect use Pearl Index pregnancy rate of 0.5 per 100 women over 12 cycles of use and a pregnancy rate of 7.0 per 100 women for typical use. Survival analysis produced a typical use pregnancy rate of 7.5 per 100 women over 12 cycles of use. The authors concluded that their app improved the effectiveness of using a fertility

awareness-based method of family planning. They indicated that the app is effective in preventing unintended pregnancy when couples consistently used methods of protection on the estimated (red) fertile days.

Comments

A strength of this study is that it is the first published cohort study in the use of a fertility monitoring app in helping couples avoid pregnancy. A weakness of the study is the lack of a control group–those using NFP without the app. Unfortunately, the intent of the developers is that the method be used with some type of barrier method during the estimated fertile time. This discounts the method as a method of NFP which requires periodic abstinence during the estimated fertile time–and as such is really not a natural method of family planning but rather a barrier based or barrier assisted method. Use of barriers confounds the use of these methods and also the results.

Scherwitzl, E. B., A. L. Hirschberg, and R. Scherwitzl. (2015). **Identification and prediction of the fertile window using NaturalCycles.** *The European Journal of Contraception and Reproductive Health Care* Early Online: 1-6.

Scherwitzl, E. B., K. G. Daielsson, J. A. Sellberg, and R. Sherwitzl. (2016). **Fertility awareness-based mobile application for contraception.** *The European Journal of Contraception & Reproductive Health Care,* Published Online 21 March 2016.

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Menstrual Cycle

Low Plasma Levels of Vitamin D Associated with Irregular Menstrual Cycles

Two studies on the association of low vitamin D levels with irregular length menstrual cycles were recently published by researchers from the National Institute of Environmental Health Sciences (NIEHS). Both studies are based on the increased understanding of the role that Vitamin D has in reproduction. It is known that there are receptors for vitamin D on the ovaries, uterus, and placenta and that vitamin D has a role in facilitating anti Müllerian hormone (AMH), follicle stimulating hormone, and follicular genesis. The first study involved the 1,430 participants (between the age of 30 and 49 years) in a large NIEHS sponsored study from 1996-1999 on uterine fibroids and who had a sample of their blood drawn and frozen (Jukic, Steiner, and Baird 2015). The participants completed a telephone based survey on reproductive and gynecological health and a question on their menstrual cycle length including whether it was too irregular to estimate the length. For this study participants who were menopausal, on hormonal contraception, breastfeeding or pregnant, older than 45 years, had no menses in the past year, no reported cycle lengths, and missing blood samples were eliminated, leaving 636 for the current study. The researchers had the frozen blood samples measured for a metabolite of vitamin D (25-hydroxyvitamin D) and discovered that the median level of vitamin D for this sample of women was 12.0 ng/mL. The recommended Institute of Medicine (IOM) minimal level of vitamin D is 20 ng/mL. They found that 76% of their sample had below IOM norms of Vitamin D. They also dichotomized the menstrual cycle as being as irregular or not, with short cycles having lengths less than 25 days, and long cycles having lengths 32 days or longer. After controlling for age,

BMI, education, current smoking, alcohol use, and physical activity, the researchers found that a decrease of 10 ng/mL from the IOM norm resulted in 1.9 times the odds of having irregular menstrual cycles (odds ratio (OR) (95% Confidence Interval (CI): 1.9 (1.0, 3.4). p = 0.04). They did not find an association of vitamin D levels with long or short menstrual cycles.

In the second study, the NIEHS researchers utilized data from a prospective study to determine environmental factors that are associated with uterine fibroids. One of the environmental factors studied was Vitamin D levels (Jukic, Upson, Harmon, and Baird 2016). The participants in this study were African-American women between the ages of 23-34 years and obtained through advertisement in various health systems in the Detroit area. The original study enrolled 1,695 women but for this study women who were breastfeeding, on hormonal contraception, or did not have a serum vitamin D level were eliminated yielding a sample of 1,102. All participants were provided a computer assisted survey on reproductive health and questions as to the regularity and lengths of their menstrual cycles. For this study, 632 participants had normal length menstrual cycles defined as being between 27 to 34 days, 380 participants had short menstrual cycles defined as less than or equal to 26 days in length, 55 participants had long menstrual cycles defined as greater than or equal to 35 days, and 53 participants had menstrual cycles that were too irregular to estimate. The researchers dichotomized the participants based on whether their vitamin levels were less than or more than the IOM level of 20 ng/mL. The median vitamin D level for this sample of participants was 14.8 ng/mL and only 14% had sufficient levels of vitamin D. In this study, the researchers found that a doubling of vitamin D levels was associated with approximately half the odds of having long menstrual cycles (adjusted odds ratio (aOR) 0.54, 95% confidence interval (CI: 0.32-0.89). Women who were sufficient in vitamin D levels (i.e., 20 ng/mL or more) had approximately half the odds of long cycles compared with women who were deficient (aOR 0.42, 95% CI 0.17 – 1.0). Vitamin D levels were not associated with irregular or short length menstrual cycles. The researchers concluded that vitamin D levels may influence menstrual cycle length and may play *a role in follicular ovarian function.*

Comments

The NIEHS researchers identified limitations in both studies. The first was that the participants' menstrual cycle lengths were by retrospective self-report and not an actual measure of cycle length. Both studies were cross-sectional and thus the association of vitamin D levels with menstrual cycle lengths is susceptible to reverse causation, i.e., the authors indicated that it is possible that the occurrence of long cycles affect diet, supplement use, or other behaviors that leads to changes in vitamin D status. They also mentioned that some of the participants in the studies could have polycystic ovarian syndrome (PCOS) and that is the reason for irregular and long cycle lengths. They also pointed out that there is some evidence that vitamin D plays a role in PCOS and vitamin D has been used as a treatment (Tehrani, Mostajeran, and Shahsavari 2014). They concluded that prospective trials of vitamin D and menstrual cycle lengths are feasible. Women who chart their menstrual cycles with the practice of NFP could be ideal candidates for such a study.

Jukic, A. M. Z., A. Z. Steiner, and D. D. Baird. (2015). **Lower plasma 25-hydroxyvitamin D is associated with irregular menstrual cycles in a cross-sectional study.** *Reproductive Biology and Endocrinology* 13:20 1-6.

Jukic, A. M. Z., K. Upson, Q. E. Harmon, and D. D. Baird. (2016). **Increasing serum 25-hydroxyvitamin D is associated with reduced odds of long menstrual cycles in a cross-sectional study of African American women.** *Fertility and Sterility* Epub ahead of print.

Tehrani, H. G., F. Mostajeran, and S. Shahsavari. (2014). **The effect of calcium and vitamin D supplementation on menstrual cycle, body mass index and hyperandrogenism state of women with poly cystic ovarian syndrome.** *Journal of Research in Medical Sciences* 19 (9): 875-880.

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Under the Microscope

The Influence of Ever Use of Natural Family Planning and Contraceptive Methods on Divorce Rates as Found in the 2006-2010 and 2011-2013 National Survey of Family Growth

In the 2013 Summer/Fall issue of *Current Medical Research* (CMR), there was a short report on the influence of NFP and other methods of family planning on divorce rates among United States (US) Catholic women of reproductive age as found in data from the 2011-2013 National Survey of Family Growth (NSFG) (Fehring 2013; Martinez, Chandra, Febo-Vazquez, and Mosher 2013). The relevance of the data from the NSFG is that it is population based and, as such, gives a good picture of the family planning practices of Catholics at a national level. Since the 2013 CMR Summer/Fall publication another edition of the NSFG (i.e., Cycle 8 2011-2013) was released (Daniels, Daugherty, Jones and Mosher. 2014). This new data set therefore, provides the opportunity to update an investigation of the influence family planning methods have on divorce among U.S. Catholic women of reproductive age.

National Survey of Family Growth (NSFG)

As mentioned in the 2013 CMR Summer/Fall edition, scientists at the National Center for Health Statistics (NCHS) and the Center for Disease Control and Prevention (CDC) conduct the National Survey of Family Growth (NSFG) approximately every 5-7 years. The NSFG includes factors that help explain trends in contraception use, infertility, sexual activity, abortion, pregnancy outcomes and marital status. The NSFG involves use of a nationally representative, randomly selected sample of women 15-44 years of age in the United States (US). In the 2006-2010 (Cycle 7) NSFG there were 5,102 Catholic women in the data set out a total of 12,676 women, i.e., 40% of the population based sample. The Cycle 8 (2011-2013) NSFG involved a data set of 5,601 US women of which 1,285 or 23% indicated that they were of the Catholic faith.

Review of Previous NSFG Studies

There are several studies that have used NSFG data sets to compare divorce rates among users of NFP with couples using other methods of family planning. Wilson compared the divorce rate of 505 Catholic women (aged 21-44) selected from NFP programs with the 10,471 women in the Cycle 5 (1995) NSFG and found 3% of NFP users from the NFP programs were divorced compared with 15% of the Catholic women using contraception in the 1995 (Cycle 5) NSFG. A

significant limitation of this study was that the Catholic women in the NFP groups were self-selected from small NFP provider programs, whereas the NSFG women were population based and randomly selected. The two groups of women are not comparable and the differences in divorce rates could be due to many reasons other than use of NFP.

The 2013 CMR Summer/Fall issue also had an analysis of the 109 (out of 1,502) ever-married Catholic women who ever used NFP compared with ever married Catholic women who used other methods of family planning from the Cycle 7 (2006-2010) of the NSFG (Fehring 2013). Among the Catholic women who ever used NFP only 9.5% were currently divorced, compared with 18.3% who never used NFP. The two family planning methods which had statistically significant odds ratios (OR) were sterilization, with a 2.4 times more likely to be divorced compared to those Catholic women who were never sterilized, and NFP users who were 53% less likely to be divorced compared to those women who never used NFP. Those women who had frequent church attendance had a 34% less likelihood of being divorced compared with women who had less frequent church attendance.

In 2015, Fehring published a study that involved 5,530 reproductive age women in the (2006-2010) NSFG who indicated that they were ever married. The purpose of this study was to determine the influence of contraception, abortion, and Natural Family Planning (NFP) on divorce rates of all U.S. women of reproductive age–not just the Catholic women. The variables of "importance of religion" and "frequency of church attendance" were also included in the analysis. Among the women who ever used NFP only 9.6% were currently divorced compared with 14.4% of women who never used NFP ($x^2 = 5.34$, p < 0.21). Odds ratio analysis indicated that ever having an abortion, sterilization, and or use of other methods of contraception increased the likelihood of divorce—up to 2 times. Frequency of church attendance decreased the risk of divorce. The importance of religion was not a significant factor in that study.

The reason that the variables "importance of religion" and "frequency of church attendance" was added in this study was because couples who use NFP frequently do so because of religious reasons and/or find religion to be very important in their lives. Furthermore, frequent church attendance is a very good measure of how serious individuals take their religious beliefs, and this in turn could have an influence on divorce rates. The purpose of this current report is to examine new data from the 2011-2013 (Cycle 8) NSFG to determine the influence of ever use of select family planning methods (i.e., the hormonal pill, sterilization, abortion, rhythm, and NFP) and the importance of religion and frequency of church attendance on the divorce rates of ever-married reproductive age Catholic women and to compare the results with those from the 2006-20010 (Cycle 7) NSFG.

Methods

The 2006-2010 NSFG is a population based selection of 12,676 women and the 2011-2013 NSFG is a selection of 5,601 reproductive age women. Both data sets contains variables on ever use of abortion, methods of contraception, and variables of marital status, importance of religion, church attendance, and attitudes on human sexuality. This report only includes the 1,502 women in the (Cycle 7) NSFG and the 561 women in the (Cycle 8) NSFG who indicated that they were of the Catholic faith and were ever married.

The family planning methods chosen for this report were ever use of the hormonal birth control pill, female and male sterilization, condoms, abortion, Rhythm Method, and NFP. The hormonal birth control pill, male and female sterilization, and condoms were used because they are by far the most frequently used methods of family planning by reproductive age women in the United States. For both cycles of the NSFG respondents could choose 1 of 5 items to indicate frequency of church attendance: 1) more than once a week; 2) once a week; 3) 1-3 times per month; 4) less than once a month; and 5) never. For analysis purposes the responses were dichotomized into two categories: 1) Frequent Church Attendance = more than once a week and once a week; and 2) Not Frequent Church Attendance, i.e., 1-3 times per month, less than once a month, and never. The variable of importance of religion was dichotomized into 2 categories: 1) Very Important; and 2) Not Important. Ever use of NFP (mucus or temperature), Rhythm, ever-abortion, ever use of the hormonal pill, and male and female sterilization were also used in this analysis. The dependent variable for this study was currently divorced or separated or not. Odds ratios (OR) were calculated to determine influence of ever use of NFP, Rhythm, male condoms, hormonal pill, or sterilization compared to never use on current marital status.

Results

Percentage of Divorce

There were 1,502 Catholic women in the 2006-2010 NSG or approximately 12% of the total population. Among the 105 Catholic women who ever used NFP (i.e., the cervical mucus method with or without temperature charting) only 11.4% were currently divorced or separated compared with the 22.8% who never used NFP. There were 561Catholic women in the 2011-2013 NFP or 11% of the total population. Of the 39 Catholic women who ever used NFP, 7 or 17.9% reported being divorced or separated as compared to 131 of the 522 Catholic women (25.1%) who never used NFP and were divorced or separated.

Odds of Divorce or Separation

The Odds of divorce or separation by family planning method and religiosity can be seen in Table 1. The family planning methods with statistically significant odds ratios (OR) for the Cycle 7 data set were female sterilization, ever abortion, ever use of NFP and Rhythm. Those women who were sterilized were 2.4 times more likely to be divorced compared to those Catholic women who were never sterilized. Those women who ever had an abortion were 2.4 times more likely to be divorced and separated compared to those women who never had an abortion. In contrast ever users of NFP were 53% less likely to be divorced and Rhythm users 30% less likely compared to those women who never used NFP or Rhythm. Those women who had frequent church attendance had a 31% less likelihood of being divorced compared with women who had less frequent church attendance. Importance of religion was not significant.

For the Catholic women in the Cycle 8 NSFG, only ever abortion and importance of religion produced significant odds ratios. Those women who ever had an abortion were 2.25 more likely to be divorced or separated than those Catholic women who never had an abortion. However, those Catholic women who reported their religion to be very important in their lives were 32% less likely to be divorced or separated compared to those who did not feel religion to be very important in their lives.

Table 1: Odds of divorce among 1,397 Catholic women who never used NFP compared with 105 Catholic women who ever used NFP

Method	Odds Ratio Cycle7	Odds Ratio Cycle8	95% CI Cycle7	95% CI Cycle8	Sig. Cycle7	Sig. Cycle8
Pill (OC)	1.09	0.91	0.81 – 1.46	0.57 – 1.44	p<.581	p<.680
TubesTied	2.28	1.44	1.73 - 3.00	0.90 – 2.28	p<.001	p<.125
Vasectomy	1.39	1.23	0.97 – 1.99	0.71 – 2.12	p<.074	p<.462
Condom	1.31	1.09	0.91 – 1.86	0.57 – 2.09	p<.141	p<.800
Abortion	2.44	2.25	1.74 – 3.42	1.28 – 3.97	p<.001	p<.004
Rhythm	0.70	1.01	0.51 – 0.95	0.63 – 1.63	p<.022	p<.960
NFP	0.44	0.65	0.24 – 0.81	0.28 – 1.52	p<.007	p<.317
ChurchAtt	0.69	0.99	0.53 – 0.91	0.66 – 1.49	p<.007	p<.962
Imp Rel	0.98	0.68	0.76 – 1.25	0.46 – 1.00	p<.841	p<.048

Discussion

The 2006-2010 (Cycle 7) NSFG showed that the percentage of Catholic women of reproductive age who indicated ever using NFP were almost 50% less likely to report their marital status as "divorced" or "separated" compared with Catholic women of reproductive age who never used NFP methods. Although the 2011-2013 (Cycle 8) also showed a difference between ever users of NFP and those with never use, the percentage differences (i.e., 18% versus 21%) was not significant. In comparison, the percentage of Catholic women who had ever used NFP methods and who indicated that they were divorced was greater than the 3% of Catholic women in the Wilson (2002) study. These differences might be reflected in the fact that the NSFG results are population based and the Wilson study survey result was not. The differences in the Fehring (2013) study of divorce among NFP ever and never users showed a statistically significant difference between the 10% divorce rate among the ever NFP users versus the 14% divorce rate among the never users of NFP. The current study only found 39 ever users of NFP among the 561 Catholics in the data set. This small sample of Catholic NFP users is probably too small to have enough statistical power to yield significant results.

The only consistent variable that showed a significant influence of ever use was ever having an abortion in both the 7th and 8th Cycle of the NSFG. This makes sense in that the use of an extreme method of family planning, which results in the death of an unborn child, might be

associated with troubled marriages (Burke and Reardon 2002). In the 2015 Fehring study, having an abortion in the past 12 months was the variable associated with the highest likelihood of divorce, with more than a three times the odds of divorce compared with couples that did not have an abortion in the past 12 months.

With regard to religious variables, it is of interest that "importance of religion" was a significant variable in Cycle 8 but not 7, i.e., the Catholic women in Cycle 8 who rated religion as very important had a 32% less likelihood of being divorced or separated. In the Cycle 7 analysis, frequency of church attendance was the religious variable that influenced divorce rates, with a 31% less likelihood of divorce among Catholic women who attended church at least once a week compared to those that did not. Why there was a switch in the religious variable on the influence of divorce is unknown. In the Fehring 2013 study, frequency of church attendance and rating religion as not being very important was the significant variable. It will be interesting to determine among the larger population of U.S. women in the Cycle 8 data set as to whether these religious variables exert the same influence, with importance of religion rather than church attendance as the variable that makes a difference. Other studies with regard to sexual activity outside of marriage also showed that the variable frequency of church attendance and not the variable of rating importance of religion made a difference, i.e., the variable of frequent church attendance was associated with less sexual activity outside of marriage and not the variable of rating religion as very important or not (Edwards, Fehring, Jarrett, and Haglund 2008; Haglund and Fehring 2010). This made sense, since religious attendance indicated a strong behavior and not just a feeling. In a previous study with the 2002 (Cyle6) NSFG data set, this author also showed that sterilization had a very significant influence on the rates of abortion (Rodriguez and Fehring 2012).

There are many factors that potentially influence the propensity to divorce among reproductive age couples. Much of the rise in divorce in the 1960s was thought to be due to no-contest divorce. Choice of family planning method and especially the use of NFP might be associated with less divorce, but this might be due to the religiosity of the woman and couple as well. A logistic regression was conducted with the predictor variables of use of the pill, female and male sterilization, condom use, use of Rhythm and NFP and importance of religion, and church attendance. Of the above variables in the Cycle 7 NSFG only ever use of NFP, frequent church attendance, and ever sterilized (female) contributed to predicting whether the woman respondents were divorced or not with an R = 45% (R square = 2%). With the Cycle 8 NSFG data set only importance of religion was a significant predictor associated with a reduced likelihood of divorce.

A limitation of this report and analysis is that the frequency of divorce among the Catholic women in the NSFG data set might be under reported as the results were based on the current marital status. Some of the participants in both data sets most likely were divorced in the past and now are re-married. Future studies need to look at other factors that might contribute to divorce, such as cohabitation, sexual intercourse before marriage, early sexual debut, economic status, and number of sexual partners outside of marriage. In addition, the results from both data sets are based on ever use of a contraceptive method or NFP. Some of the women in the ever use of NFP population could have used contraceptive methods in the past or are currently using sterilization or hormonal methods for family planning purposes. Future studies are needed that follow use of NFP, other family planning methods, and divorce over time. These types of

studies, however, would be extremely difficult and usually would involve a selected (non-population based) sample.

The fact that there are not many Catholic women who have ever used NFP (only about 4% of sexually active Catholic women) in the United States as compared to other family planning methods makes studying the influence of NFP difficult. The low use makes it difficult to have statistical power to determine significance. In the Fehring 2015 study with use of all U.S. women who were ever married, all of the family planning method variables studied (including NFP and Rhythm) and the religiosity variables had significant odds ratios. Future studies that are doable and helpful, would be to analyze the trend in the influence of methods of family planning, NFP, and religiosity from the 1995 (Cycle 5), 2002 (Cycle 6), the 2006-2010 (cycle 7) and the 2011-2013 (Cycle 8) NSFG data sets. Including all women of reproductive age would increase the number of participants and the statistical power to determine significance.

The conclusion from this study is that use of abortion seems to have a consistent association with increased divorce among Catholic women of reproductive age. Religious variables, whether importance of religion or frequent church attendance, continues to be associated with less divorce. The lack of Catholic couples using NFP hinders the study of the association of NFP with marital stability. Studies of these associations among all U.S. women of reproductive age, however, holds promise.

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