

A Fixed Formula to Define the Fertile Window of the Menstrual Cycle as the Basis of a Simple Method of Natural Family Planning

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A significant number of women worldwide use periodic abstinence as their method of family planning. Many of them use some type of calendar-based approach to determine when they should abstain from unprotected intercourse to avoid pregnancy; yet they often lack correct knowledge of when during their menstrual cycle they are most likely to become pregnant. A simple method of natural family planning (NFP) based on a fixed formula to define the fertile window could be useful to these women. This article reports the results of an analysis of the application of a fixed formula to define the fertile window. A large existing data set from a World Health Organization study of the Ovulation Method was used to estimate the theoretical probability of pregnancy using this formula. Information about the variable probability of pregnancy on different cycle days relative to ovulation also was considered in the analysis. Results suggest that a fixed formula in which days 8–19 of the menstrual cycle are considered to be the fertile window would provide the appropriate basis of a simple, effective, family planning method. CONTRACEPTION 2000;60:357–360 © 2000 Elsevier Science Inc. All rights reserved.

KEY WORDS: natural family planning, periodic abstinence, fertile phase, blanket rule

Introduction

This article presents an analysis of the theoretical probability of pregnancy that would result from the application of a fixed formula to identify the fertile window of the menstrual cycle. This formula, which defines cycle days 8–19 as the fertile window, is the

basis of the proposed Standard Days method, a simple method of natural family planning (NFP). Survey data from a number of countries around the world show that a substantial number of women worldwide use periodic abstinence as their method of family planning.¹ Many of these women use calendar-based approaches to determine when they should abstain from unprotected intercourse to avoid pregnancy. However, research also indicates that a significant percentage of women who claim to use periodic abstinence lack correct knowledge of when during their menstrual cycle they are most likely to become pregnant.^a Most of these women simply abstain from sexual intercourse during some part of their cycle, but without accurate information about how to determine when they are fertile. This lack of accurate knowledge can be an important factor accounting for unplanned pregnancies.

Many women—particularly those who are not using any family planning method, who use barrier methods inconsistently, or who lack reliable access to services and commodities—could clearly benefit from simple, accurate instructions to help them know when they need to abstain from unprotected intercourse if they wish to avoid pregnancy. This would increase correct use and reduce unintended pregnancies. Making instructions easy to provide to clients would also make it feasible for many programs to incorporate these methods into their services, thus meeting the needs of a broader spectrum of women, particularly those in underserved populations, as well as those who prefer to use a method with no risk of side effects and no use of drugs, devices, or surgical procedures.

One such simple method is the Standard Days method, based on a fixed formula for defining the

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Submitted for publication November 8, 1999

Revised November 22, 1999

Accepted for publication November 22, 1999

^aThis is apparent in several reports of the Demographic and Health Surveys. See, for example, Republic of the Philippines. National Demographic Survey 1993. Manila, Philippines: National Statistics Office. Calverton, Maryland: Macro International Inc., 1994.

fertile window. This method would counsel women/couples to abstain from unprotected sexual intercourse on days 8–19 (inclusive) of their menstrual cycle to avoid pregnancy.^b This would eliminate the need for observations of fertility signs or for arithmetical calculations, making a natural method more accessible and practical to some populations with low educational levels or limited access to family planning services.

Because of its simplicity, the Standard Days method holds the promise of being easier for clients to learn and use and for providers to learn and teach. It would be less time-consuming and complex, less expensive, and involve less provider follow-up of clients than other natural methods; and it would potentially be more feasible for programs to provide. Furthermore, as the same formula (defining the fertile window as cycle days 8–19) would be applied to all users, the same information could be given to every client, facilitating service delivery.

A 1996 article in *Contraception*² evaluated the theoretical effectiveness of several calendar-based formulas for determining the fertile phase of a woman's cycle. The authors validated the usefulness of a fixed "window", in which all users regard the same cycle days as fertile, and suggested that abstinence from unprotected intercourse during days 9–19 of the menstrual cycle would be an appropriate rule to test. However, they acknowledged that their analysis did not include the probability of pregnancy resulting from the application of this formula.

The Institute for Reproductive Health at Georgetown University has recently conducted a more comprehensive analysis, which considers the theoretical probability of pregnancy for women using a fixed formula to identify the fertile window. Results suggest that the previously recommended formula could be the basis of an effective method of family planning for women with cycles ranging from 26 to 32 days. However, our reanalysis suggests that including another day at the beginning of the fertile window (day 8 of the cycle) would provide an additional margin of safety. Given the relatively high proportion of comparatively short cycles (26–27 days), to include day 8 in the fertile window would result in a lower probability of pregnancy and would provide a basis of a method that could be applicable to more women. This article presents the results of this analysis of the theoretical probability of pregnancy resulting from the use of the fixed 8–19 day formula, ie, the potential effectiveness of the Standard Days method, in which

women would abstain from unprotected intercourse on days 8–19 of their menstrual cycle.

Materials and Methods

We tested the potential effectiveness of the Standard Days method by examining the estimated probability of pregnancy if women had followed the method's rule—abstaining from unprotected intercourse on days 8–19 (inclusive) of the menstrual cycle. We used data from a World Health Organization (WHO) study of the Ovulation Method,⁶ which collected information on various aspects of the menstrual cycle, in five geographically and culturally diverse settings. The data offer information on several characteristics of approximately 7,600 menstrual cycles, including cycle length and signs of ovulation. We applied the fixed formula of the Standard Days method to these cycles.

We used three types of information to calculate the probability of pregnancy if women had followed the rules of the Standard Day method, as described below.

First, we determined, based on the fertile days identified by the Ovulation Method, the percentage of cycles in which the woman would not have become pregnant if she had had unprotected intercourse only on days considered to fall outside the fixed fertile window (1–7, and day 20 through the end of her menstrual cycle).

Second, we incorporated existing data that identify the probability that unprotected intercourse on various days relative to ovulation would result in a pregnancy, detected clinically at 6 weeks from the first day of the last menstrual period.³ This probability increases progressively from about 4% 5 days before ovulation to 29% 2 days before and 27% 1 day before ovulation, declining to 8% from intercourse occurring on the day of ovulation.^{c,d,4,5} Unprotected intercourse earlier and later in the cycle is very unlikely to result in pregnancy. We use these probabilities in our calculations.^e

Third, we estimated when ovulation occurred during the analyzed cycles. Women using the Ovulation Method, which the WHO study examined, identified the *peak day* of their menstrual cycles, which is generally accepted as a good proxy for ovulation.^f Hilgers et al⁷ established that some 97% of ovulations occur within 2 days before or after peak day, with the majority (38%) occurring on peak day itself.

^bThe method as originally developed specified abstinence from unprotected intercourse starting on day 9 of the menstrual cycle. See discussion below on the addition of day 8 to the fertile period.

^cAn older study, and preliminary results from a multi-center European study show a similar pattern.

^dThis is consistent with the known life spans of gametes, which is 3–5 days for sperm and <1 day for the egg.

^eThese probabilities were calculated with a 95% confidence interval.

^fPeak day is defined as the last day on which fertile-type mucus is recognized, or the last day on which the wet or lubricative sensation is felt.

Table 1. Estimated probability of clinically detected pregnancy from unprotected intercourse on different days relative to peak day, for women observing the rules of the Standard Days method

	Cycles of women with cycles ranging 26–32 days 25.7% of women (n = 1,377 cycles)	Cycles of women with cycles ranging 24–34 days 59.3% of women (n = 4,079 cycles)	All cycles 100.0% of women (n = 7,592 cycles)
P – 8	0.0004	0.0004	0.0004
P – 7	0.0039	0.0045	0.0042
P – 6	0.0068	0.0092	0.0088
P – 5	0.0049	0.0087	0.0092
P – 4	0.0043	0.0092	0.0108
P – 3	0.0032	0.0058	0.0078
P – 2	0.0034	0.0040	0.0071
P – 1	0.0031	0.0036	0.0066
Peak	0.0029	0.0030	0.0051
P + 1	0.0020	0.0021	0.0031
P + 2	0.0010	0.0010	0.0014
P + 3	0.0003	0.0003	0.0003

P denotes peak day.

More ovulations occur before peak day than after. We applied these probabilities to the cycles in our data.

Recognizing that the fertile window begins 5 days before ovulation and extends through the day of ovulation, and that peak day can potentially occur from ≤ 3 days before through ≤ 3 days after ovulation, we determined that the period starting on P–8 (8 days before peak day) and ending on P + 3 (3 days after peak day) constitutes the entire potentially-fertile window for each cycle. We therefore calculated the estimated probabilities of pregnancy on each of these days. These would be the theoretical pregnancy rates if all women in the WHO study had used the Standard Days method, by applying the fixed formula of days 8–19 to define their fertile window and abstaining from unprotected intercourse on these days.

Results

We first examined the percentage of cycles in which days P–8 (8 days before peak day) through P + 3 (3 days after peak day) are covered by the method (ie, days P–8 through P+3 occur during days 8–19 of the cycle, and are thus identified as potentially “fertile days” in which method users would abstain from unprotected intercourse). In almost all (96%–98%) cycles, days P–3 through peak day itself occur during days 8–19 of the cycle. This percentage gradually decreases for days further from peak day, so that some 80% of cycles are covered on day P+3 and 34% of cycles are covered on day P–8.

Next, we weighted the percentage of cycles that are *not* covered by the method (the reverse of these figures) by the probability that unprotected intercourse on that day relative to ovulation would result

in pregnancy,³ and the probability that ovulation would occur on that day relative to peak day,^{6,7} to arrive at our final estimated probabilities of pregnancy if women had followed the method rules.

We recognize that most women with cycles ranging from 26 to 32 days occasionally experience a cycle outside of this range.⁸ We therefore calculated the probabilities of pregnancy for three overlapping subsets of cycles. First, including only cycles of women who experienced only cycles ranging 26–32 days; second, cycles of women who experienced only cycles of 24–34 days (allowing for occasional shorter or longer cycles by ≤ 2 days); and third, for all cycles (ranging 12–64 days). Results are presented in Table 1. Only cycles with a clearly defined peak day are included in our analysis. Because peak day generally suggests ovulation, most anovulatory cycles were thus excluded from the analysis.

Discussion

Our results indicate that the Standard Days method, based on a fixed formula defining days 8–19 of the cycle as the fertile window, can be a highly effective family planning method for most women. It seems to be most effective for women with cycles ranging 26–32 days—the highest probability of pregnancy for these women on any given day is only about 0.007. Although only 25.7% of women experienced this range of cycle lengths throughout the study, about 78% of cycles reported in the WHO study were in the 26–32 day range.

We expect that the method would not be effective for women who consistently have cycles < 26 days or > 32 days. However, it would still be very effective

for women whose cycle length occasionally falls outside the range of 26–32 days by 1 or 2 days (women with cycles ranging 24–34 days). The highest probability of pregnancy for these women on any given day is only about 0.009, and most cycles in the study (94.8%) are within this range. However, even when we include in the analysis cycles of all lengths (ranging 12–64 days), the method still seems to be effective.

We conclude, therefore, that the Standard Days method can be a highly effective family planning method for most couples who choose it. It would be easier than other natural methods for clients to learn and use, for providers to teach, and for programs to offer. Therefore, it could be a good family planning option in populations with low literacy and numeracy levels.

The Institute for Reproductive Health at Georgetown University is currently undertaking a study to test the effectiveness and acceptability of the Standard Days method in several countries. We expect the results to confirm the potential effectiveness findings presented in this article.

Acknowledgments

The authors appreciate the willingness of the World Health Organization to share the data from its study of the Ovulation Method, and Dr. Lawrence Grummer-Strawn for his facilitation in obtaining the data. We also thank Ms. Erin Anastasi for her help in producing the manuscript. Support for conceptualizing the Standard Days method, conducting analysis of potential effectiveness, and preparing this paper was

provided by the Institute for Reproductive Health, Department of Obstetrics and Gynecology at Georgetown University Medical Center, Washington, DC, which is funded under a cooperative agreement HRN-A-00-97-00011-00 with the United States Agency for International Development. The views expressed by the authors do not necessarily reflect the views or policies of USAID or Georgetown University.

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