Cervical mucus monitoring prevalence and associated fecundability in women trying to conceive

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Objective: To assess the use of cervical mucus monitoring (CMM) in women trying to conceive and determine whether monitoring is associated with increased cycle-specific probability of conception (fecundability).
Design: Time-to-pregnancy cohort study.
Setting: Population-based cohort.
Patient(s): Three hundred thirty-one women trying to conceive, ages 30 to 44 years, without known infertility.
Intervention(s): None.
Main Outcome Measure(s): CMM prevalence and fecundability.
Result(s): During the first cycle of the study, CMM was performed consistently (checked on >66% of pertinent cycle days) by 20 women (6%), inconsistently (34% to 66% of days) by 60 women (18%), infrequently (≤33% of days) by 73 women (22%), and not performed by 178 women (54%). Cycles in which CMM was consistently performed were statistically significantly more likely to result in conception after adjusting for age, race, previous pregnancy, body mass index, intercourse frequency, and urinary luteinizing hormone (LH) monitoring. Fecundability also increased with increasing consistency of CMM.
Conclusion(s): Among women trying to conceive, CMM is uncommon, but our study suggests that CMM—a free, self-directed method to determine the fertile window—is associated with increased fecundability independent of intercourse frequency or use of urinary LH monitoring. (Fertil Steril® 2013;100:1033–8. ©2013 by American Society for Reproductive Medicine.)
Key Words: Cervical mucus monitoring, fertile window, conception, fecundability

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Timed intercourse during the 6-day window before and including the day of ovulation (the fertile window) is significantly more likely to result in conception (1, 2). In the United States, it has been estimated that over 7 million women have sought professional fertility treatment, and almost 450,000 of those women sought medical care for advice on topics such as detecting the fertile window and optimizing intercourse timing (3, 4). Because the duration of the luteal phase is relatively stable, the days of the fertile window can be estimated based on historical cycle length (5). In addition, a variety of self-administered methods based on symptoms or biomarkers have been developed to assist in the prospective detection of ovulation and the fertile window (4).

Urinary luteinizing hormone (LH) monitoring is one such method that is commonly used to detect ovulation; however, this method can be expensive. Urinary LH monitoring alone results in

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false-positive results in approximately 7% of cycles in an infertile population (6), and it does not allow for prospective determination of the entire fertile window (7). Basal body temperature (BBT) monitoring is another frequently used method; however, the temperature change may be difficult to define, and the fertile window can only be defined retrospectively (8–10).

Cervical mucus monitoring (CMM), a prospective method to detect the fertile window, is performed via vulvar observations (excluding days of menstrual flow). Internal checking of the vagina or cervix is not required. The cervical mucus (CM) is easily classified based upon appearance and sensation. Types 1 and 2 CM are typically present at the beginning of the menstrual cycle and are associated with dry (type 1) or damp (type 2) sensations at the vulva. Type 3 is typically characterized by thick, creamy, and whitish or yellowish CM and a damp sensation at the vulva. Type 4 is characterized by transparent and stretchy or elastic CM (reminiscent of raw egg whites) and a wet or slippery sensation at the vulva (11). Several studies have demonstrated that CMM is an excellent method for predicting conception probabilities. Intercourse on a day with type 4 CM results in the highest probability of conception and type 1 the lowest (11–15). An act of sexual intercourse occurring on a day with type 4 CM is at least two to three times more likely to result in conception than intercourse on a day with types 1 or 2 (14).

Previous trials of CMM have included at least one face-to-face training session regarding monitoring. These studies have examined the predictive value of a given type of CM, but none have determined whether using CMM improves the timing of intercourse or shortens the time to pregnancy. Furthermore, CMM prevalence has not been assessed in an untrained, noninfertile population. Therefore, our study assessed the current prevalence and consistency of CMM in a population of women trying to conceive and determined whether CMM, without formal training, is associated with increased cycle-specific probability of conception (fecundability).

MATERIALS AND METHODS

Time to Conceive (TTC) is an ongoing time-to-pregnancy study approved by the institutional review board of the University of North Carolina (16). The cohort from which our subjects were obtained included English-speaking women between 30 and 44 years of age who had been trying to conceive for 3 months or less. The exclusion criteria included history of infertility, polycystic ovary syndrome, pelvic inflammatory disease, endometriosis, prior pelvic radiation, or a history of infertility in the partner. After consent was obtained, eligible women completed a self-reported, online baseline survey of demographics, height, weight, and medical history—for both herself and her male partner—as well as behaviors including tobacco, alcohol, and caffeine use. Women were also instructed on the use of an online daily diary to record information on vaginal bleeding, intercourse, methods and results of testing for the fertile window (if performed), as well as pregnancy test results.

Women who reported that they checked their CM on any given day were asked to choose the type observed that day (according to the types 1 to 4, with the descriptions provided in the previous section). Women were given no other instruction on CMM, were not required to perform CMM, and were given no information about its potential utility for identifying the fertile window or optimizing intercourse timing. Participants were asked to complete the diary daily until their first positive pregnancy test or four months of completed charting if no pregnancy occurred. After the fourth month the women were asked to complete a similar diary only once per month for up to 12 months of enrollment or until pregnancy occurred. The women were given free home pregnancy tests (sensitivity: 20 mIU human chorionic gonadotropin/mL) and were instructed to use them at the time of a missed menses and inform the study staff of a positive result.

Analysis

The TTC study did not require the collection of systematic biomarker or symptom data across all women or all cycles in the study, so the fertile widow was estimated using calendar calculations based on cycle length (5, 17). Ovulation was estimated to have occurred 14 days before the first day of menses or the first positive home pregnancy test, with the fertile window designated as extending from 5 days before to 3 days after the estimated day of ovulation as defined previously. The use and frequency of CMM was determined for each cycle by the women's responses in the daily diary. The percentage of days of CMM from the first day after the cessation of menses through the end of the fertile window was calculated for each woman in each cycle. Given that CMM varied across cycles, each cycle for each woman was independently categorized as non-monitored (did not record a CM score on any of the days from the first day after menses through the fertile window), infrequently monitored (mucus checked on 1% to 33% of days), inconsistently monitored (34% to 66% of days), or consistently monitored (>66% of days). Pregnancy was defined by the first report of a positive home pregnancy test.

Pearson correlations, Kruskal-Wallis tests, and chi-square tests were used to compare demographics and potential covariates (age, race, marital status, education level, smoking, previous pregnancy, body mass index [BMI], intercourse frequency in the fertile window, urinary LH monitoring, past hormonal contraception, partner age, partner race, partner BMI, and partner education) between the categories of CMM during the first completed cycle in the study.

The potential covariates were subsequently examined via bivariate analysis and likelihood ratio testing. For the models, we included the covariates that were strongly associated with fecundability in our study or that had been identified in multiple prior studies as related to fecundability, even if these variables were not statistically significant in our study. Potential covariates that were highly correlated with other predictors thought to have a greater relevance (i.e., partner age is highly correlated with subject age) were excluded. Unadjusted discrete-time survival models were subsequently created to assess the relationship between the covariates and fecundability.

These models treated an attempt cycle as the time unit of interest, using the "discrete" method to handle ties and