

Self-identification of the clinical fertile window and the ovulation period

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Objective: To assess the sensitivity and specificity of the self-identified fertile window.

Design: Observational study.

Setting: Not applicable.

Patient(s): A total of 107 women.

Intervention(s): Women recorded cervical mucus observation and basal body temperature daily while undergoing daily ovarian ultrasound.

Main Outcome Measure(s): The biological fertile window, defined as the 6 days up to and including the day of ovulation; and the 2-day ovulation window, defined as the day before and the day of ovulation.

Result(s): The self-identification of the biological fertile window by the observation of any type of cervical mucus provides 100% sensitivity but poor specificity, yielding a clinical fertile window of 11 days. However, the identification of the biological fertile window by peak mucus (defined as clear, slippery, or stretchy mucus related to estrogen) yielded 96% sensitivity and improved specificity. The appearance of the peak mucus preceded the biological fertile window in less than 10% of the cycles. Likewise, this type of mucus identified the ovulation window with 88% sensitivity.

Conclusion(s): These results suggest that, when perceived accurately, more accurate clinical self-detection of the fertile window can be obtained by identification of peak mucus. This may improve efforts to focus intercourse in the fertile phase for couples with fertility concerns. (Fertil Steril® 2015;103:1319–25. ©2015 by American Society for Reproductive Medicine.)

Key Words: Fertile window, ovulation, menstrual cycle, fertility awareness methods, cervical mucus

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Recently, there has been renewed interest in the concept of the fertile window of the menstrual cycle (1, 2). This window of fertility is the period of the cycle during which sexual intercourse may result in conception. Traditionally the mens-

trual cycle has been divided into two phases: the preovulatory (or follicular) phase, from the first day of menses up to the end of the ovulation day; and the postovulatory (or luteal) phase, from the day following ovulation to the onset of the next menses.

Recognizing the importance of the fertile window, it may be more appropriate to divide the follicular phase of the menstrual cycle into two sub-phases: the latency phase (3) and the fertile window. The postovulatory (luteal) phase would then become the third phase of the cycle. In addition, Wilcox et al. (4) estimated the probability of conception beginning 5 days before ovulation and ending on the day of ovulation itself. In this article, this 6-day window is called the biological fertile window (BFW). However, a more precise terminology might be "the 6-day fertile window" indexed to

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ultrasound. This is in line with other studies describing the fertile window using the lifespan of spermatozoa and of the ovum as the limiting factors (5, 6) (i.e., the number of days of the BFW would be limited by the number of days of spermatozoa survival).

In the context of fertility awareness-based methods, another fertile window has long been defined: the clinical fertile window (CFW) (7, 8). This window is clinically identifiable by self-assessment of the cervical mucus. It is well known that the cervix acts as a valve, facilitating transport of sperm when the cervical mucus is fluid and inhibiting transport of sperm when the cervical mucus is sticky (9–11). The presence of the cervical mucus felt or seen by the woman at the vulva is the main observable symptom to define the CFW. The CFW begins on the first day of this discharge. The peak day is defined as the last day on which the mucus is observed to be clear, slippery, or stretchy (see Materials and Methods for a detailed definition). The end of this CFW takes place the fourth day after the peak symptom of the mucus (7). Alternatively, the CFW ends on the third day of high temperature established using the basal body temperature (BBT) rules (12). The CFW, unlike the BFW, is not defined by the lifespan of spermatozoa but by the opening of the cervix as identified by cervical mucus changes. This article does not attempt to assess the impact of these signs on pregnancy rates but to initially assess their validity in relation to ovulation.

The identification of the CFW has been used for a variety of applications, including assisting couples wanting to conceive (13, 14). Mistiming of the fertile window has a significant impact on conception rates (15). Identifying the fertile window may help couples to optimize their chance of conception (15, 16) but also to choose optimal days for medical investigations (17). To apply this recommendation in clinical practice it is necessary to have an estimation of the exact sensitivity and specificity of these clinical signs. In the present study we tested three scenarios to define the CFW: [1] beginning the first day of any cervical mucus and ending the fourth day after peak mucus (see Materials and Methods for a detailed definition); [2] beginning the first day of any cervical mucus and ending the third day of high BBT; or [3] beginning the first day of peak mucus and ending on the last day of this type of mucus. These three scenarios are correlated with daily ultrasound scans and hormonal profiles, the latter correlation done as secondary analysis to provide useful clinical information on different markers of ovulation. In the mid-1990s a large observational study was carried out on normally fertile women, which included ultrasound-confirmed ovulation, daily urine hormone measurements, and self-assessment of cervical mucus and BBT. Because of legal-commercial disclosure agreements, the results regarding the window of fertility were not able to be published until now.

MATERIALS AND METHODS

Patients

Patients were recruited from 1996 to 1997 from eight natural family planning clinics located in France, Italy, Germany, Belgium, and Spain. The inclusion criteria consisted of

women aged 19–45 years inclusive, with previous menstrual cycle lengths of 24–34 days inclusive.

Exclusion criteria included women with a consistent history of anovulatory cycles, infertility, or active hormonal treatment of infertility in the past 3 months, use of hormonal contraception or hormonal replacement in the past 3 months, abnormal cycles (polycystic ovarian syndrome or luteal phase defect), hysterectomy, tubal ligation(s), and pelvic inflammatory disease. In addition, runners and breastfeeding or postpartum mothers (<3 months) were excluded.

A total of 107 women were finally recruited, contributing an average of three cycles. The study examined 326 cycles.

The study was approved by the local ethics committee (Comité Consultatif de Protection des Personnes dans la Recherche Biomédicale de Lyon). All the participants gave their written informed consent, and the study procedures were carried out in accordance with the Ethical Standards for Human Experimentation established by the Declaration of Helsinki.

Assessments

Cervical mucus. Cervical mucus at the vulva was assessed by participants two to three times daily, to record the sensation (dry, moist, wet, and slippery), appearance (white/yellow, clear), and the consistency (tacky, creamy, stretchy). On the basis of the Colombo and Masarotto definitions (18), a four-point score was defined: [1] dry sensation, rough and itchy or nothing felt/nothing seen; [2] no longer dry sensation/nothing seen; [3] damp sensation, with or without appearance of thick, creamy, whitish, yellowish, or sticky mucus; [4] wet, slippery sensation with or without the appearance of clear, stretchy mucus (similar to a raw egg white). If a discharge exhibited mixed characteristics, or if a woman observed multiple types of mucus through the course of the day, the highest matching category was chosen to assign the score. Mucus corresponding to a Colombo score of 4 is what we have identified as peak mucus in this article. The last day of continuous peak mucus is known as the “peak sign” (8). The fourth day after the peak sign was considered the beginning of the postovulatory (luteal) phase.

Basal body temperature. Basal body temperature was to be taken daily upon waking, before any activity, and recorded on an individual chart together with the date, the cycle day, and any condition affecting temperature (e.g., stress, illness, insomnia). We adopted the British Life Assurance Trust (BLAT)-World Health Organization (WHO) rule to read the BBT (19): a cover line was drawn 0.05°C above the temperature points separating lower temperatures in the first part of the cycle from higher temperatures in the second part of the cycle. To draw the cover line, all temperatures (a minimum of six) from the sixth day of the cycle were considered if they were not affected by a disturbance (e.g., disturbed sleep, illness). The third consecutive day of high temperature, above the cover line, was considered the day for entry into the postovulatory phase.

Ultrasound investigations. Serial transvaginal ovarian ultrasound scans with follicle measurement were performed by a single physician per center. Ovarian scanning started on the first day women observed cervical mucus or when an LH surge was detected by LH home tests (Quidel), whichever

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