

INTERNATIONAL REVIEW OF

NATURAL FAMILY PLANNING



*To Jim,
with kindest regards,
J. Hill, O.S.B.*

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The Fertile Period

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THE FERTILE period of a woman's menstrual cycle consists of those days during which sexual intercourse can result in pregnancy. Its duration is determined by (a) the period of time before ovulation during which spermatozoa will survive and retain their fertilizing capability within her reproductive tract, and (b) the period of time following ovulation during which the released ovum remains able to be fertilized.

Detailed studies have yet to be carried out to determine precisely the functional life spans of the human sperm and ovum. However, a period of no longer than twenty hours and possibly as brief as six to ten hours is believed to apply to the ovum, while current expert opinion considers three days as an average survival period of spermatozoa within the female reproductive tract in the immediate preovulatory phase (Austin 1975). Under favorable conditions sperm may remain viable and capable of fertilization for five days and on rare occasions for longer. Active motile spermatozoa have indeed been observed in cervical mucus sampled as long as eight days after coitus, but whether these sperm had retained their ability to fertilize is uncertain (Frenkel 1961).

A number of factors influence sperm survival; these include the number and quality of the spermatozoa, the nature of the cervical mucus, and endocrine and immunological factors. It is now well recognized that the cervical crypts and the mucus produced there play a vital role in the storage and survival of sperm (Moghissi 1972). The ovarian hormone estradiol (and perhaps other estrogens) induces increased secretion of cervical mucus and changes in the composition and structure of the mucus to favor sperm transport and survival. Progesterone, acting as an anti-estrogen, causes a decrease in mucus secretion, and under its influence a mucus is produced that is unfavorable to sperm transport and survival. Thus, the fertile period of the cycle is defined through the response of the cervix to the rising levels of estrogen which accompany

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follicular growth and maturation before ovulation and to the higher progesterone and lower estrogen levels which follow ovulation.

Certain of the hormonally induced changes in cervical mucus are easily recognized. Under the influence of estrogens the mucus increases in volume and water content; it becomes less viscous and brilliantly clear. Following ovulation, under the influence of progesterone, there is a rapid decrease in volume and increase in viscosity of the mucus. One of the major advances in natural family planning in recent years has been the development, principally by the Billings group in Melbourne, of methods to teach women self-recognition of these changes and thus a means of identifying the fertile period of their cycles.

The reliability of defining the fertile phase by self-observation of cervical mucus, however, has yet to be clearly elucidated. Published findings by Billings and co-workers (Billings et al, 1972) of a study of 22 menstrual cycles (22 subjects) showed that mucus symptoms appeared at a mean of 6.2 days before ovulation defined as occurring on the day following the "midcycle" peak in plasma luteinizing hormone (LH). The "peak mucus" symptom was observed at a mean of 0.9 days before the day of ovulation. More recently, Flynn and Lynch (1976) reported their investigation of the relationship between mucus symptoms and hormonal parameters of ovulation in 29 cycles (9 subjects). They defined the day of ovulation as coinciding with the day of the LH peak and found that the mucus symptoms first became evident at a mean of 5.2 days earlier, a finding identical to that of the Billings study. The maximum mucus grade (MMG) occurred at a mean of 0.45 days before the day of the LH peak. The MMG was defined as the maximum amount of clear mucus. This does not always coincide with the "peak mucus" symptom, defined by Billings (Billings, Billings, and Catarinich 1973, p. 6) as the last day of fertile mucus symptoms.

In our own research program we have also studied the correlation of cervical mucus symptoms with the basal body temperature (BBT) shift in a group of 12 fertile women with histories of regular menstrual cycles. A total of 106 cycles were studied. The relevant findings are summarized in table I. If it is assumed that ovulation occurs on the day preceding the BBT shift, the study shows a mean duration of mucus symptoms before ovulation of 5.5 days, a value in close agreement with the two other studies.

On the basis of the average values revealed in these three investigations, it appears that cervical mucus symptoms would be highly reliable in defining the fertile period. However, there was considerable individual cycle variation in the duration of fertile symptoms. Furthermore, each of the studies contained a small but significant number of cycles (8 percent in our own study) in which mucus symptoms were first recognized at an interval of 3 days or less prior to ovulation, as variously defined. These particular cycles raise a question about the relatively infertile nature of late dry days preovulation when

TABLE 1
 Relationship between Cervical Mucus Symptoms
 and the Basal Body Temperature (BBT) Shift in a Group of
 Cyclic Menstruating Women

Number of subjects	:	12
Total number of cycles studied	:	106
Number of cycles with mucus symptoms	:	102
Number of cycles with definable day of postovulation BBT shift	:	99
Mean duration (\pm SD) of mucus symptoms before BBT shift (from 95 cycles)	:	6.5 \pm 2.9 days
Range	:	21 to 1 day
Mean interval (\pm SD) "peak mucus" symptom to BBT shift (from 94 cycles)	:	0.55 \pm 0.90 days
Range	:	3 to - 3 days

Note: Mucus . . . symptoms were defined as by
 Billings, Billings, and Catarinich (1973).

mucus symptoms are only of a brief duration.

Trials of the Billings Ovulation Method in Tonga (Weissmann et al. 1972) and Australia (Ball 1976) found a theoretical effectiveness for the method of 0.5 and 2.9 pregnancies per 100 woman years, respectively, as calculated by the Pearl Formula. These values suggest that, at least for the purposes of family planning, cervical mucus symptoms in the context of the Ovulation Method are highly reliable in identifying the fertile period. On the other hand, Marshall (1976) recently reported the findings of a field trial of a combined use of cervical mucus symptoms and basal body temperature for regulating fertility in which a rate of 13 pregnancies per 100 woman years was experienced from sexual intercourse on preovulatory dry days. He concluded that cervical mucus symptoms were unreliable as a means of recognizing the preovulatory fertile days of the cycle. An interesting and significant finding of the Ball study of the Ovulation Method in Australia (Ball 1976) was the high incidence of pregnancies in women who had had sexual intercourse on preovulation days of sticky, cloudy mucus which marked the transition from dry days to the fertile, lubricative, wet mucus. In regard to the Marshall study also, it is possible that sexual intercourse in this transition phase may have contributed to

the high failure rate.

In recent years there has been a deepening in understanding of the factors that determine the duration of the fertile period. However, more detailed knowledge of the survival of spermatozoa within the female reproductive tract and of the lifespan of the ovum following ovulation is required if women are to determine accurately the fertile and infertile phases of their menstrual cycles for family planning purposes.

We can look forward to acquiring further data on physiological events related to the fertile period from current research being carried out in a number of centers into the relationships between hormonal changes, cervical mucus characteristics, BBT shift, and ovulation. The World Health Organization's multicenter trial of the Ovulation Method, together with the Los Angeles and Colombia collaborative study of this method and the Sympto-Thermal Method, will provide important information on the application of cervical mucus symptoms in recognizing the fertile period. The unplanned pregnancies that occur in these trials may offer further information on duration of sperm survival following coitus.

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