

How to Optimize Conception: Timing is everything!

Archana Ayyar¹, Laurie J. McKenzie^{2,3}

¹Resident Physician, Obstetrics and Gynecology Baylor College of Medicine Houston, Texas

²Associate Professor, Division of Gynecology Oncology and Reproductive Medicine University of Texas MD Anderson Cancer Houston, Texas

³Associate Professor Baylor College of Medicine, Division of Reproductive Endocrinology and Infertility Houston, Texas

***Corresponding Author:** Laurie J. McKe, Associate Professor, Division of Gynecology Oncology and Reproductive Medicine University of Texas MD Anderson Cancer Houston, Texas

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Abstract

Infertility is defined as the inability to conceive within 12 months of regular unprotected intercourse for women under 35 years of age and affects approximately 15% of reproductive aged couples [1]. A diagnosis of infertility is often emotionally, physically, and financially devastating and many patients will seek fertility assistance with their obstetrician and gynecologist. While there may be underlying factors contributing to infertility that require specific treatments (i.e. fibroids requiring myomectomies), there are also many patients that are unaware of how best to optimize conception timing. Counseling patients regarding the science of reproduction and adjusting at home practices may increase their chances for success.

Keywords: spinnbarkeit; egg white; mittelschmerz

Timing is key for successful conception. The reproductive window is much narrower than many patients assume and coincides directly with ovulation. While motile sperm may survive in the reproductive tract up to five days after coitus, the oocyte is only capable of fertilization for approximately 12-24 hours [2]. A sentinel study that assessed 625 attempted conception cycles found conception occurred when intercourse took place during the 5 window prior to ovulation. Fecundability (the possibility of conception in one month) was 10% five days prior to ovulation, and increased to 33% when intercourse occurred the day of ovulation [3]. If coitus occurred after ovulation however, conception rates plummeted. Therefore, precise ascertainment of ovulation timing can maximize home fertility efforts.

Detecting Ovulation

Ovulation timing can fluctuate, even for women with regular cycles [4]. Fortunately, there are multiple methods that can assist in detecting ovulation. This includes monitoring cervical mucus, basal body temperature, utilizing mobile applications that track menstrual cycles, and ovulation predictor kits.

At the onset of menstruation, cervical fluid is created and is typically thick in consistency. Around the time of ovulation, the mucus becomes thinner, clearer, and stretchy resembling that of an "egg white" consistency called "spinnbarkeit" (German word origin "able to be spun out in threads"). After ovulation, the mucus once again becomes viscous. This change in cervical mucus secretion is a convenient and useful method to detect ovulation [5]. A prospective cohort study monitored 161 conception and

2,594 non-conception cycles with daily documentation of mucus characteristics and intercourse timing. Fecundability was low (less than 5%) when intercourse occurred on days without subjective evidence of cervical mucus, however rose markedly (to nearly 30%) when intercourse occurred on days with appropriate cervical mucus [6]. Another study utilized what they referred to as a "Two-Day" algorithm which predicted fertility the day prior to and the day of cervical mucus production, regardless of the quality of the secretions (i.e. thin versus thick, clear versus white). This study found that simply the presence of secretions closely correlated with basal body temperature and more accurately predicted ovulation compared to a menstrual cycle tracking alone [7].

Another method to identify ovulation is monitoring the basal body temperature (BBT). The BBT rises approximately 0.3 degrees during the luteal phase in response to progesterone production [8]. The increase in body temperature is attributed to the thermogenic effect of progesterone, with a rise in core body temperature evident approximately 24 hours after a detectable increase in plasma progesterone levels [9], plateau within 48 hours [10], and remaining high until the approach to menstruation. It is important to note that this rise in temperature does not prospectively alert the patient to their fertile window, but rather is used to indicate that ovulation already occurred [5]. Thus, this may not be as useful as the other methods for those attempting to conceive unless a woman has consistent cycle length.

For women with regular cycles of predictable length, menstrual calendar tracking may be useful to identify their fertile window. The follicular

phase of a menstrual cycle is less predictable, yet the luteal phase is typically a consistent 14 days. While some may utilize a physical calendar, many women have turned to mobile applications (apps) that assist with cycle tracking. Menstrual tracking apps are growing in popularity with a reported 200 million downloads to date in 2016, of which some are detailed in Table 1 [11, 12]. Furthermore, some of these apps alert patients regarding impending ovulation. While one study demonstrated the accuracy of ovulation prediction by calendar/app method was only 21%, this is a tool that patients can use in conjunction with other tracking methods [13]. Importantly, some of these applications

allow users to anonymously interact with other women also struggling with infertility and can provide psychosocial support.

Many women will also track ovulatory pain or “mittelschmerz” (*German word origin middle + pain*) to assess for presumptive evidence of ovulation. However, this ovulatory pain does not appear to coincide with actual follicular rupture, but rather the follicle expansion that occurs prior to ovulation [14] which can be misleading for ovulation timing. Furthermore, direct observation of human ovulation demonstrates that the release of the oocyte from the follicle is a slow extrusion over time as opposed to a rapid release [15, 16].

Name	Price	Additional Benefits
Clue	Free with in app purchases	Encourages daily logging of symptoms (energy levels, mood swing) in addition to tracking cycles. The app will also analyze last cycles and predict fertility windows for three upcoming cycles.
Ovia	Free	Provides users with a summary of monthly cycles and allows users to export data to share with their partner or physician
Glow	Free with in app purchases	Branched into multiple apps: - <i>Eve by Glow</i> (period tracker) - <i>Glow</i> (fertility focused) - <i>Glow Nature</i> (information for expectant mothers) - <i>Glow Baby</i> (support for user's children)
Period Tracker by GP Apps	Free with option of premium membership	A simplified platform that is user friendly without excess information
Natural Cycles	Annual (\$89.99) or monthly subscription (\$9.99)	Encourages the user to pay attention to their body's signs of ovulation including documenting daily temperature and cervical mucus. Allows patients to utilize this information for both fertility and for natural family planning.
Flo	Free	Flo does not utilize a fixed algorithm and instead uses artificial intelligence. This app claims it better predicts fertility than other apps for women with irregular cycles.

Table 1: Commonly downloaded fertility applications [14].

Lastly, urine ovulation predictor kits (OPK) can be utilized. These over the counter tests typically assess for (LH) levels, however some also monitor for estradiol or pregnanediol glucuronide levels. Ovulation usually occurs ~36 hours after onset of the LH surge, and ~12 hours after its peak. While multiple studies correlate urine LH detection and ovulation, these ovulation predictor kits may underestimate the fertile window [17] and approximately 7% have false positives [18]. Many kits instruct patients to utilize OPKs any time of the day, but often encourage

testing at approximately the same time each day. Other instructions may include limiting water intake and avoidance of urination for four prior to testing to concentrate the urine and avoid missing the LH surge. Therefore, many patients opt to test their OPKs with first morning urine.

Timing of Intercourse

Patients often inquire regarding optimal coital frequency. In men with normal semen quality, sperm parameters remain normal even with daily

ejaculation, thus dispelling the myth of needing to abstain for a period time to allow for sperm recovery [19]. In a prospective study of 221 women attempting conception, coital timing and frequency was recorded over 625 menstrual cycles. Patient's fecundability was 37 percent with daily intercourse, 33 percent with every other day coitus, and decreased to 15 percent with untimed intercourse once per week [3]. All 192 conceptions occurred with coitus in the 5 days prior to and including day of ovulation. No pregnancies occurred with intercourse the day after ovulation, again underscoring the importance intercourse relative to ovulation. Mandating coital frequency however can result in significant stress for couples and this should ultimately be determined by patient and partner preference.

Initiating an Infertility Work Up

As maternal age is such a significant factor impacting fertility, an infertility work-up is recommended for women younger than 35 who have been trying to conceive (TTC) for 12 months or greater, women older than 35 TTC for 6 months or more, and immediately for women TTC over 40 years of age [20]. Instances for immediate evaluation include oligo or amenorrhea, known reproductive tract disease, Stage III or IV endometriosis, or known/ suspected male infertility. In addition to a detailed medical, obstetric, and gynecologic history, it is important to investigate for underlying thyroid, breast, or endocrine disorders. Furthermore, imaging should be considered to evaluate the patient's ovarian reserve and anatomy. It is important to acknowledge that a male factor infertility contributes to 40-50% of infertile heterosexual couples. Thus, a basic medical history of the partner as well as semen analysis should be obtained. Referrals to male infertility providers may be performed in lieu or in addition to the history taking [20].

Preconception Counseling and Recommendations

Every patient encounter with a reproductive capable woman is an opportunity to counsel regarding a potential pregnancy. The goal is to optimize the health of the woman, fetus, and neonate. It is important to counsel women to inform their provider prior to attempting for pregnancy or as early in their pregnancy as possible. If a patient indicates they are TTC, addressing their current chronic conditions such as diabetes or HIV, vaccination status, and reviewing current medications is indicated. Sexual and social habits should be addressed, offering preconception genetic screening, and testing for STD's may be warranted. Lastly, patients should be encouraged to initiate prenatal vitamins that contain folic acid for three months prior to conception [21].

Conclusion

Timing intercourse relative to ovulation is important to optimize success. The goal is to be aware of when ovulation is about to occur and to have intercourse prior to ovulation. There are a multitude of ways to detect ovulation, and the patient should select the option that is most convenient for her. Patients should be encouraged to discuss with their physician when they are ready to conceive. It is helpful to know both when to initiate an infertility work up and the importance of optimizing their patient's health prior to conceiving to improve pregnancy outcomes.

Common Myths Debunked

Frequent ejaculation can decrease male fertility

Frequent ejaculation does not decrease male fertility in men with normal sperm parameters. Conversely, abstinence for periods of 5 days or greater may negatively impact sperm counts [22].

Position during and after coitus can affect fecundability

Remaining supine after intercourse does not increase fecundability. Sperm is recovered in the cervical canal within seconds of ejaculation, regardless of position during coitus [4].

Position during intercourse can impact the gender of the baby

There is no evidence that position during intercourse impacts the gender of the baby [4].

Timing of intercourse can determine the gender of the baby

Timing of intercourse relative to ovulation does not impact the gender of the baby [4].

Diet affects fecundability

Yes and no. While no specific type of diet has reliably shown to affect fecundability, patients with a normal body mass index (BMI) are shown to have increased fecundability and a decrease in pregnancy complications [2, 23].

Lubrication should be avoided if the couple is trying to conceive

Some lubricants decrease sperm motility in vitro, however, these effects have not been shown to alter cycle fecundability [24]. Lubricants that are hydroxyethylcellulose-based (such as Pre-Seed and ConceiveEase) have not demonstrated adverse impact on semen parameters unlike water-based lubricants (such as K-Y jelly, K-Y touch, or Astroglide) [4]. While these fertility friendly lubricants will not improve a patient's chances of getting pregnant, it will not hinder sperm motility. Other cost-friendly alternatives that are seemingly safe for those TTC include canola oil or mineral oil [25-27].

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