# The Effects of Collection Lubricant on Sperm Motility In Vitro


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## Abstract


**Objective:** It is common for patients seeking infertility treatments to use lubricant provided by the clinic to aid in sperm collection. Although lubricant effects on sperm motility have been studied, there is not a lubricant that is agreed upon by experts that is safe for sperm. Lubricant contamination at semen collection could alter the sperm analysis of men seeking infertility studies. The goal of the current study is to compare the effect of four different personal lubricants at varying contamination levels on semen quality.

**Materials and Methods:** Semen samples were obtained from 12 donors presenting to the Department of Obstetrics and Gynecology Endocrinology Laboratory for sperm analysis. Samples were obtained by masturbation and analyzed for semen parameters; samples that contained at least 30 million motile sperm were included.

Acceptable samples were washed with 2 mL of Multi-Purpose Handling Medium-Complete (MHM-C) and standard sperm wash procedures. The sperm pellet was diluted with 7 mL of MHM-Cand vortexed for 10 – 15 seconds for resuspension. A 24-well Cell Culture Plate was prepared with an estimated 10, 50, and 100 µL of Pre-Seed™ Fertility-Friendly Lubricant (fertility), Henry Schein Lubricating Gel (standard), Überlube (silicon), or Fava Lubricant (water) then 0.5mL of the semen sample was added to the each well as well as an untreated control. The culture plate was incubated at room temperature in the dark.

At hours 0, 1, 3, 12, and 24, each analyzed using a Hamilton Thorne IVOS sperm analyzer for standard semen parameters.

**Results:** A total of 12 sperm samples were collected and analyzed. In comparison to the control, in lower contamination levels sperm motility was significantly decreased with the use of standard lubricant in the 1-, 3-, 12-, and 24-hour time intervals. The fertility lubricant decreased sperm motility overall but only significantly in the 3- and 24-hour intervals. Interestingly, the silicon-based lubricant greatly increased motility at 3 hours. The water-based lubricant was similar to the control at low contaminations.

The differences recorded with medium contamination included: the silicon lubricant increased sperm motility to a greater difference compared to the control than seen in the low contaminations, the fertility lubricant significant decreased motility at the 1-, 3-, 12-, and 24- hours, and with the standard lubricant, motility had dropped to nearly 0% by the 1-hour interval.

Similar results were recorded in the high contamination group.

**Conclusion:** The lubricant offered to men undergoing infertility studies can impact their sperm motility and their study results. These effects are demonstrated in the catastrophic decrease in motility in the sample treated with Henry Schein Lubricant. Further, even natural or fertility lubricants showed decreased motility of sperm treated with Pre-Seed™ and Fava Lubricant. However, unexpectedly there was increased motility seen with Überlube. While further studies need to be done, this data suggest lubricants need to undergo sperm toxicology studies before being provided in fertility clinics.

**Impact Statement:** National guidelines should be developed to ensure lubricants used in sperm collection do not deleteriously effect sperm analyses. Further guidelines should be created to counsel patients who are actively trying to conceive on sperm safe lubricants.


## Introduction

Lubricants are widely used among couples during sexual intercourse. Over half of women in American have used lubricant during sexual intercourse.[1] While one in four couples will use lubricant when trying to conceive.[2] It is well known that many of the commercially available lubricants can be detrimental to sperm health and in turn, can negatively effect infertility studies.

One in three couples seeking infertility counseling, can be attributed to male factor infertility. The emotional stress of being unable to conceive a child and the environmental stress of being in a physician's office can make it difficult for men to produce a semen sample. Therefore, men undergoing infertility studies are commonly offered lubricants to aid in masturbation. Many lubricants have not undergone testing to determine if they are sperm friendly, and numerous lubricants that are labeled “sperm friendly” can have destructive effects to sperm.

Currently, there is not a standard lubricant recommended by fertility experts that is safe for semen collection or sexual intercourse when trying to conceive. The current “gold standard” on the market for semen collection has not been tested for sperm safety.

The current study aimed to evaluate Henry Schein Lubricant, Pre-Seed™, Überlube, and Fava Lubricant at different concentrations for their effects on sperm motility.


[1]Herbenick, D., Reece, M., Schick, V., Sanders, S. A., & Fortenberry, J. D. (2014). Women's use and perceptions of commercial lubricants: prevalence and characteristics in a nationally representative sample of American adults. *The journal of sexual medicine*, *11*(3), 642–652. https://doi.org/10.1111/jsm.12427

[2]Ellington J, Daugherty Short. Prevalence of vaginal dryness in trying-to-conceive couples. *Fertil Steril.* 2003;79(Supplement 2):21–22.


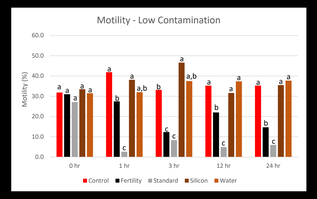


Figure 1. A comparison of motility of sperm cells when exposed to a small lubricant contamination (~ 50uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a time-period (0,1, 3, 12, or 24 hrs) with different superscripts are different at the P < 0.05 level, suggesting a difference in lubricants at that time point.

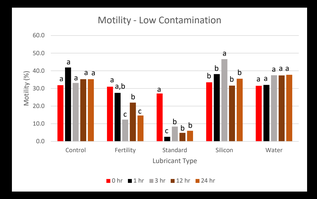


Figure 2. A comparison of motility of sperm cells when exposed to a small lubricant contamination (~ 50uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a lubricant treatment with different superscripts are different at the P < 0.05 level, suggesting a time-dependent effect of the lubricant on sperm motility.

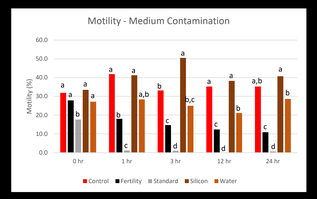


Figure 3. A comparison of motility of sperm cells when exposed to a moderate lubricant contamination (~ 100 uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a time-period (0,1,3, 12, or 24 hrs) with different superscripts are different at the P < 0.05 level, suggesting a difference in lubricants at that time point.

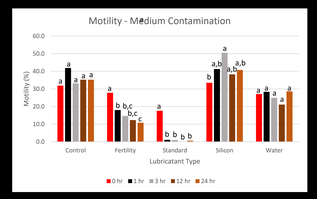


Figure 4. A comparison of motility of sperm cells when exposed to a moderate lubricant contamination (~ 100 uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a lubricant treatment with different superscripts are different at the P < 0.05 level, suggesting a time-dependent effect of the lubricant on sperm motility.

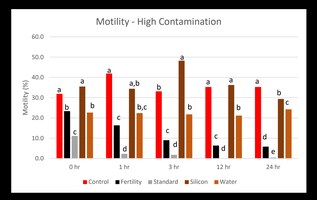


Figure 5. A comparison of motility of sperm cells when exposed to a high lubricant contamination (~ 250 uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a time-period (0,1,3, 12, or 24 hrs) with different superscripts are different at the P < 0.05 level, suggesting a difference in lubricants at that time point.

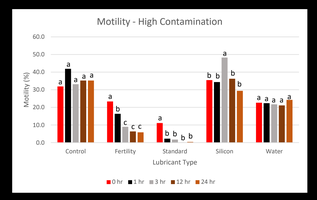


Figure 6. A comparison of motility of sperm cells when exposed to a high lubricant contamination (~ 250 uL) comparing four lubricants and a non-contaminated control at various times over 24 hr period. Data suggests differences in the lubricant effect. Bars within a lubricant treatment with different superscripts are different at the P < 0.05 level, suggesting a time-dependent effect of the lubricant on sperm motility.

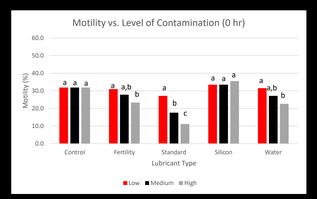


Figure 7. Initial effects of varying doses of four lubricants on sperm cell motility (50, 100 or 250 uL). Data suggests a concentration-dependent effect in some lubricants tested effect. Bars within a lubricant treatment with different superscripts are different at the P < 0.05 level, suggesting a dose-dependent effect of the lubricant on sperm motility.

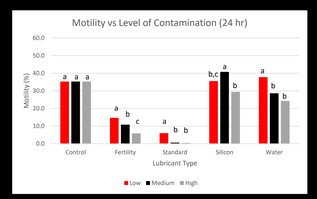


Figure 8. Effects of varying doses of four lubricants on sperm cell motility (50, 100 or 250 uL) after 24 hrs of continuous exposure. Data suggests a concentration-dependent effect in some lubricants tested effect. Bars within a lubricant treatment with different superscripts are different at the P < 0.05 level, suggesting a dose-dependent effect of the lubricant on sperm motility.

## Materials and Methods

**Semen Samples**

Samples were obtained in a plastic cup by masturbation after sexual abstinence of 48 to 72 hours. Samples were included in the study if they met the parameter of 30 million motile sperm (N=12).

**Treatment Conditions:**

1. Semen samples were liquified at 37˚C for a minimum of 10 minutes and a maximum 30 minutes and transferred to a glass tube.
2. Samples were vortexed for 10-15 seconds and then washed with 2 mL of Multi-Purpose Handing Medium-Complete (MHM-C) (FUJIFILM Irvine Scientific Inc., Santa Ana, CA). Samples were vorxted an additional 10-15 seconds.
3. Washed semen samples were centrifuged at 600 revolutions per minute for 6 minutes. The supernatant was discarded.
4. The pellet was diluted with 7 ml of MHM-C and vortexed for 10-15 seconds for resuspension.
5. A Falcon® 24-well Cell Culture Plate (Corning Inc., Corning, NY) was prepared with approximately 10, 50, and 100 µL of Fertility (Pre-Seed™ Fertility-Friendly Lubricant, Church & Dwight Co., Inc, Ewing, NJ), Henry Schien Lubricating Gel (Henry Schien Inc., Melville, NY) Überlube (Überlube, Chicago, IL), Fava Lubricant (need manufacture and city).
6. .5 mL of the semen sample was added to wells containing 10, 50, and 100 µL of Pre-Seed™ Fertility-Friendly Lubricant (fertility), Henry Schein Lubricating Gel (standard), Überlube (silicon), or Fava Lubricant (water) and one control well.
7. The culture plate was incubated at room temperature and stored in a dark area.
8. At hours 0, 1, 3, 12, and 24, 4µl from each sperm and lubricant solution were drawn up and placed on a slide.
9. Each microscope slide was placed into the Hamilton Thorne Integrated Visual Optical System (IVOS) sperm analyzer.
10. The following variables were recorded for each of the samples at 0-, 1-, 3-, 12-, and 24-hour intervals: total concentration (M/ml), motility (%), rapid cells (%), path velocity (VAP, µm/s), track speed (VCL, µm/s), lateral displacement (ALH, µm), straightness (STR, %), progressive velocity (VSL, µm/s), elongation (%), beat cross frequency (BCF, Hz), and linearity (LIN, %).

## Results

**Lower Contamination**

1. Standard lubricant significantly decreased sperm motility at 1-, 3-, 12-, and 24-hour intervals when compared to control.
2. Fertility lubricant significantly decreased sperm motility at 3- and 24-hour intervals.
3. Silicon lubricant significant was comparable to control at the 0-, 1-, 12-, 24-hour intervals, but significantly increased sperm motility at the 3-hour interval.
4. Water lubricant was comparable to control

**Medium Contamination**

1. Standard lubricant decreased sperm motility to nearly 0% by the 1-hour interval.
2. Fertility lubricant decreased sperm motility at the 1-, 3-, 12-, and 24-hour intervals
3. Silicon lubricant significant was comparable to control at the 0, 1, 12, 24-hour intervals, but significantly increased sperm motility at the 3-hour interval.
4. Water lubricant was comparable to control

**High Contamination**

**1.** Standard lubricant significantly decreased sperm motility at 1-, 3-, 12-, and 24-hour intervals when compared to control.

**2.** Fertility lubricant decreased sperm motility at the 1-, 3-, 12-, and 24-hour intervals

3. Silicon lubricant significant was comparable to control at the 0-, 1-, 12-, 24-hour intervals, but significantly increased sperm motility at the 3-hour interval.

4. Water lubricant slightly decreased sperm motility compared to control.

## Conclusion

1. The current standard lubricant in the fertility clinic shows extreme toxicity to sperm and could impact the infertility studies of man seeking treatment.
2. The results suggest that silicon lubricant increased sperm motility, a specific measure of fertility, but further studies need to be done to confirm this result.
3. Lubricants marketed as “fertility safe” may have deleterious effects on sperm motility.
4. Standard lubricant recommendations need to be created and distributed to OBGYN and fertility clinics to ensure patients are not using lubricants that harm sperm.