EJMI

DOI: 10.14744/ejmi.2018.27247
EJMI 2018;2(3):152–155

Research Article

Spermogram Values of Fertile Men in Malatya Province, Turkey

Aliseydi Bozkurt[1], Ugur Yilmaz[2]

[1]Department of Urology, Erzincan Binali Yıldırım University, Erzincan, Turkey
[2]Department of Urology, Inonu University, Malatya, Turkey

Abstract

Objectives: The aim of this study was to perform a comprehensive evaluation of the current status of semen parameters in fertile men who had 1 or more children and whose wife had a pregnancy within the last 12 months in Malatya province, Turkey.

Methods: Sperm samples were obtained from 131 fertile volunteers and analyzed in terms of sperm volume (mL), number of sperm (sperm/mL), sperm motility, liquefaction, and sperm viscosity using a Makler device (Sefi Medical Industries, Haifa, Israel). The classification was made according to the World Health Organization criteria.

Results: The mean ejaculate volume ranged from 1.5 mL to 5.5 mL, sperm count from 27 to 180 million/mL and motility from 35% to 90%. The average sperm motility was found to be 69.9% for grade-A, 7.6% for grade-B, 8.7% for grade-C, and 13.3% for grade-D.

Conclusion: The mean spermogram values of fertile men in Malatya province were similar to those determined by WHO for fertile men. This study is significant in terms of providing a regional classification of spermogram values.

Keywords: Fertile men, infertility, sperm motility, spermogram

Infertility is defined as the inability of a couple to conceive after a year of regular sexual activity without the use of contraception.[1] Infertility is a condition that affects both men and women, and 50% of infertility in couples who cannot have children are caused by the man. A standard semen analysis including sperm number, motility and morphology is an important test in assessing male fertility. Semen quality is a widely used measure in clinical andrology, particularly in the assessment of male reproductivity, male fertility, reproductive toxicology, epidemiology, and pregnancy risk.[2] However, this assessment is not a definitive indicator for male fertility since semen analysis among fertile individuals provides average values. Although spermogram is not a criterion for determining fertility, it can be used to identify the limits of fertility.[3]

A standard semen analysis requires several tests to be carefully undertaken under very specific conditions. For this analysis, two wet mounts are prepared, the average percentage is calculated for each mount, and the difference between the two percentages is determined for the most frequent motility grade. The results are evaluated if the difference between the percentages is acceptable.[2] In general, when fertile men are examined, it is seen that they have better sperm quality than infertile men. Spermogram refers to the determination of sperm concentration, sperm motility, sperm morphology, viscosity, liquefaction, and pH. In addition, optional tests, such as hypo-osmotic swelling, penetration, acrosomal and sperm nucleus maturation tests are also used for the evaluation of fertility.[3, 4] Male fertility is also affected by several other factors, including stress and chemical agents, age, nutritional status, lifestyle, and reproductive system infections. It is considered that at least half of male etiologic infertility is caused by environmental and occupational harmful agents.[5, 6]

Address for correspondence: Aliseydi Bozkurt, MD. Erzincan Binali Yildirim Universitesi, Uroloji Anabilim Dali, Erzincan, Turkey
Phone: +90 533 630 72 31 **E-mail:** draliseydi@gmail.com
Submitted Date: September 08, 2018 **Accepted Date:** October 03, 2018 **Available Online Date:** November 15, 2018

This study was designed according to the manual laboratory guidelines of the World Health Organization (WHO)[2] for investigating and processing human sperm. It aimed to perform a comprehensive assessment on the current status of semen parameters in fertile males in Malatya, Turkey.

Methods

Sperm samples were obtained from 131 fertile male volunteers aged 20 to 40 years who had one or more children and whose wife had been pregnant within the last 12 months. The exclusion criteria were alcohol or drug use, genetic diseases, acute or chronic infections, trauma to the testes, history of inguinal operation, physical examination revealing varicocele, and the presence of cryptorchidism. The participants' demographic data, education, lifestyle, occupational exposure, reproductive history, tobacco and alcohol consumption, and previous or current illnesses were recorded in detail, and their written informed consent was obtained. The local ethics committee approved the study.

In the physical examination, secondary sex characteristics, varicocele, hydrocele, and the location of testes in the scrotum were determined. The individuals that presented with any pathologies were not included in the study.

Obtaining and Evaluation Ejaculates;

After the volunteers had abstained from sexual intercourse for three to four days semen samples were collected by masturbation in the clinic, and each sample was placed in a sterile container. The samples were labeled with an anonymous serial number, then incubated at 37 °C until analysis. All the samples were analyzed within 60 minutes of collection. After the samples liquefied, the semen volume was measured. Following the homogenization of the ejaculate, 10 microliters of semen samples were placed on a Makler device (Sefi-Medical Instruments, Haifa, Israel), analyzed under a light microscope at 20X magnification and classified according to the WHO criteria.[2, 5, 6] In this evaluation, the percentages were calculated twice, and when the difference between the two percentages was acceptable, the sperm count was regarded as normal.[2]

In each analysis, sperm volume (ml), number of sperm (sperm/ml), sperm motility, liquefaction, and sperm viscosity were examined. According to the WHO criteria, the percentage of motile sperm was classified as grade A (rapid progressive motility PR), grade B (slow PR), grade C (non-progressive motility NP), and grade D (immotility) (Table 1).[2]

Statistical Analysis

Semen parameters were calculated as mean values and standard deviation.

Results

The mean age of the 131 participants was 29.6 years (min: 20, max: 40). Demographic characteristics of the participants are shown Table 2. The mean ejaculate volume ranged from 1.5 ml to 5.5 ml, sperm count from 27 million/ ml to 180 million/ ml, and motility from 35% to 90%. Table 3 presents the mean values for all parameters including standard deviations.

Table 2. Demographic characteristics of the participants

	Mean±SD
Age (year), n=131	29.6±4.7
Height (cm), n=131	169.0±4.2
Weight (kg), n=131	68.2±6.9
BMI (kg m^2), n=131	23.4±2.7
Smoking status, n=131, %	
Smoker	68.3
Non-smoker	30.6
Alcohol consumption, n=131	None
Previous surgery	None
Varicocele	None

SD: Standard deviation; BMI: Body mass index.

Table 1. Classification of semen viscosity, agglutination and motility

Semen parameters	0	1	2	3	4
Semen viscosity	Water-like	Drops falling from the pipette tip	Thread-like drops from the pipette tip	Longer than 2 cm threadlike drops falling from the pipette tip	Gel-like
Agglutination	None	1 or less than 1 agglutinated spermatozoon in 3% or more of a 20X area	Agglutination present in 1% to 2% of a 20X area	1 or more than 1 agglutinated spermatozoon per % in a 20X area	-
Motility Progression	Grade D (immotility)	Grade C (non-progressive motility NP)	Grade B (slow PR)	Grade A motile sperm percentage (rapid progressive motility PR)	

Table 3. The mean sperm volume, count and motility of the participants by semen grade

Volume (ml) (±SD)	Number (million) (±SD)	Motility (%) (±SD)			
		Grade D (immotility)	Grade C (non-progressive motility NP)	Grade B (slow PR)	Motile sperm percentage – Grade A (rapid progressive motility PR)
3.3±0.9	91.4±30.1	13.3±8.7%	8.7±3.7%	7.6±3.7%	69.9±12.2%

SD: Standard deviation.

Discussion

Semen analysis is the evaluation of macroscopic and microscopic properties of ejaculate in order to predict the reproductive capacity of a man.[7] A standard semen analysis involving the determination of the sperm number, motility and morphology is used as a basic descriptor of male fertility. Many men known to be infertile have a low sperm concentration, low sperm motility, and abnormal sperm morphology.[3]

Both exogenous and endogenous factors negatively affect sperm quality. Among the former factors are alcohol consumption, smoking, drug addiction, drug therapy, and exposure to radiation or pesticides, whereas the latter group include acute or chronic infections in the seminal tract, trauma to the testes, varicocele, and undescended testis.[5, 6] Kulikauskas et al.[8] compared the sperm parameters of smokers and non-smokers, and found that smokers had a statistically significant decrease in sperm motility and number. This decrease in the number and motility of sperm may be due to increased acetyl transferase inhibitors in smokers. The reduced human reproductive abilities indicate the effect of mutagens. Pesticides and radiation are among the mutagens known to cause DNA damage. The effect of mutagens leads to anomalies in sperm quality in men.[9, 10]

Sperm can also be damaged by reactive oxygen species produced by living spermatozoa under aerobic conditions.[11] The level of impaired seminal antioxidants may also result in deterioration of sperm function. Intracellular and extracellular antioxidants play an important role in fertilization by clearing the superoxide radicals that are continuously produced by sperm cells and oocytes.[11] It is well known that prolonged alcohol use and dependence leads to erectile dysfunction, decreased libido, and gynecomastia. This effect is shown in the decrease in serum testosterone levels due to reduced testicular production and increased metabolic clearance in the liver.

It has been reported that the progressive deterioration of semen quality is associated with increased alcohol consumption and smoking, the latter also having a significant negative effect on sperm production, motility and morphology.[12] A high or low BMI has also been associated with low semen quality.[13]

Considering the varying environmental factors, different seminal parameters may be obtained from different regions in the world; therefore, it is appropriate to obtain a more accurate nomogram in studies undertaken with fertile individuals under the specific conditions of a region where an infertility clinic is located.[14] Nomograms obtained from fertile individuals exposed to similar environmental factors allow more objective results to be obtained to evaluate infertile individuals. In the current study, we aimed to determine the nomogram values for our own laboratory using the samples taken from fertile men in Malatya, Turkey.

The duration of sexual abstinence can also change the quality of sperm. A positive correlation was found between the duration of sexual abstinence and semen measurements. As the duration of sexual abstinence increased, the number of semen volume and total sperm was significantly increased; however, sperm motility was reduced.[15, 16]

In the current study, the mean ejaculate volume was found to be 3.3±0.9 ml, sperm concentration was 91.4±30.1 million/ml, and grade A motility was 69.9±12.2. The mean semen volume in this study was lower than reported in recent studies conducted in the USA and Europe (France, Denmark, Finland, Estonia and Norway) but higher than fertile Chinese men.[17, 18] The mean sperm concentration (91.4×106 ml−1) in our study was higher compared to that of young American, Scandinavian-Baltic and Chinese men, but lower than French men (95×106 ml−1).[19] In the current study, age not having an important effect on semen parameters may be due to the participants were mostly at the peak of their reproductive ability (20 to 40 years). Recent studies suggest that increased age is related not only to reduced semen volume but also decreased sperm morphology and motility.[20]

In the literature concerning sperm concentration, only the results of Saarenen et al.[21] (153.4 million/ml) differ from our results. This may be due to a prolonged abstinence period, seasonal differences or counting errors. However, our study is in line with spermogram findings reported by

other researchers and WHO. In the light of these results, it can be stated that semen parameters may differ between and within individuals.[14] Furthermore, many of the above-mentioned factors can affect semen parameters.

Conclusion

In the current study, we aimed to achieve high-quality spermogram by selecting healthy and fertile individuals. The effect of seasonal changes on sperm was not taken into account in this study. When we evaluated the results in this regard, we found that males with good sperm parameters also had good fertility characteristics. Although spermogram is not a definite criterion for the determination of fertility, this systematic study revealed that fertile men in Malatya also meet the sperm criteria specified by WHO. The results of spermogram undertaken in this study have value in terms of providing a classification for the Malatya region. Despite not providing an average value for the whole country, the results offer an insight into the situation in Turkey. Our spermogram parameters conforming to the world criteria confirms the positive accuracy of our work.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – A.B.; Design – A.B.; Supervision – A.B., U.Y.; Materials – A.B.; Data collection &/or processing – A.B.; Analysis and/or interpretation – A.B., U.Y.; Literature search – A.B.; Writing – A.B.; Critical review – A.B., U.Y.

References

1. World Health Organization. WHO manual for the standardized investigation and diagnosis of the infertile couple. Cambridge: Cambridge University Press; 2000. Available at: http://www.who.int/reproductivehealth/publications/infertility/9780521431361/en/. Accessed Oct 5, 2018.
2. Cooper TG, Noonan E, von Eckardstein S, Auger J, Baker HW, Behre HM, et al. World Health Organization reference values for human semen characteristics. Hum Reprod Update 2010;16:231–45. [CrossRef]
3. Liu DY, Baker HW. Tests of human sperm function and fertilization in vitro. Fertil Steril 1992;58:465–83. [CrossRef]
4. Zaini A, Jennings MG, Baker HW. Are conventional sperm morphology and motility assessments of predictive value in subfertile men? Int J Androl 1985;8:427–35. [CrossRef]
5. Yılmaz O, Dinç H. Ağır metallerin üreme sistemi üzerine etkileri. Yüzüncü Yıl Üniversitesi Veteriner Fakültesi Dergisi 2013;24:91–4.
6. Akinloye O, Arowojolu AO, Shittu OB, Anetor JI. Cadmium toxicity: a possible cause of male infertility in Nigeria. Reprod Biol 2006:17–30.
7. Comar VA, Petersen CG, Mauri AL, Mattila M, Vagnini LD, Renzi A, et al. Influence of the abstinence period on human sperm quality: analysis of 2,458 semen samples. JBRA Assist Reprod 2017;21:306–12. [CrossRef]
8. Kulikauskas V, Blaustein D, Ablin RJ. Cigarette smoking and its possible effects on sperm. Fertil Steril 1985;44:526–8. [CrossRef]
9. Jamal F, Haque QS, Singh S, Rastogi SK. The influence of organophosphate and carbamate on sperm chromatin and reproductive hormones among pesticide sprayers. Toxicol Ind Health 2016;32:1527–36. [CrossRef]
10. Zhou DD, Hao JL, Guo KM, Lu CW, Liu XD. Sperm quality and DNA damage in men from Jilin Province, China, who are occupationally exposed to ionizing radiation. Genet Mol Res 2016;15.
11. Miesel R, Jedrzejczak P, Sanocka D, Kurpisz MK. Severe antioxidase deficiency in human semen samples with pathological spermiogram parameters. Andrologia 1997;29:77–83. [CrossRef]
12. Emanuele MA, Emanuele NV. Alcohol's effects on male reproduction. Alcohol Health Res World 1998;22:195–201.
13. Jensen TK, Andersson AM, Jørgensen N, Andersen AG, Carlsen E, Petersen JH, et al. Body mass index in relation to semen quality and reproductive hormones among 1,558 Danish men. Fertil Steril 2004;82:863–70. [CrossRef]
14. Swan SH, Brazil C, Drobnis EZ, Liu F, Kruse RL, Hatch M, et al. Geographic differences in semen quality of fertile U.S. males. Environ Health Perspect 2003;111:414–20. [CrossRef]
15. Mallidis C, Howard EJ, Baker HW. Variation of semen quality in normal men. Int J Androl 1991;14:99–107. [CrossRef]
16. Gökçe A, Gül D, Direk HC, Çimen Hİ, Halis F. Relationship between the duration of sexual abstinence and semen parameters. Androl Bul 2018;20:11–5.
17. Auger J, Jouannet P. Evidence for regional differences of semen quality among fertile French men. Fédération Francaise des Centres d'Etude et de Conservation des Oeufs et du Sperme humains. Hum Reprod 1997;12:740–5. [CrossRef]
18. Jørgensen N, Carlsen E, Nermoen I, Punab M, Suominen J, Andersen AG, et al. East-West gradient in semen quality in the Nordic-Baltic area: a study of men from the general population in Denmark, Norway, Estonia and Finland. Hum Reprod 2002;17:2199–208. [CrossRef]
19. Tang YG, Tang LX, Wang QL, Song G, Jiang YJ, Deng SM, et al. The reference values for semen parameters of 1213 fertile men in Guangdong Province in China. Asian J Androl 2015;17:298–303.
20. Levitas E, Lunenfeld E, Weisz N, Friger M, Potashnik G. Relationship between age and semen parameters in men with normal sperm concentration: analysis of 6022 semen samples. Andrologia 2007;39:45–50. [CrossRef]
21. Saaranen M, Suonio S, Kauhanen O, Saarikoski S. Cigarette smoking and semen quality in men of reproductive age. Andrologia 1987;19:670–6. [CrossRef]