# Effects of semen parameters and age on male sperm motility in Sichuan

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**Abstract.** Objective: Sperm motility describes the ability of sperm to move correctly in the female reproductive tract and reach the egg to fertilize it. It is mainly reflected by the proportion of forward motile sperm, which is one of the most important factors to judge male fertility. The sperm quality of men in Sichuan area was analyzed, and the influence of semen parameters and age on sperm motility and the effect of age on semen parameters were discussed. Method: According to the semen examination results of 18,200 male volunteers recruited from January 2018 to December 2021, the effects of age, semen volume, sperm concentration and sperm morphology on sperm motility were analyzed. effect on sperm quality. Divided into 5 age groups to analyze the effect of age on sperm quality. Result: The results manifested that semen volume, sperm concentration and normal morphology ratio showed a positive correlation with sperm motility, while there was a negative correlation between age and sperm motility, and sperm concentration had the greatest impact on sperm motility. With the increase of age, especially after the age of 40, the parameters of the semen decreased significantly. Conclusion: Semen parameters have an effect on sperm motility. The increase of age makes the sperm quality of elderly men decline, and the male reproductive time should not be too late.

Keywords: semen analysis, sperm motility, age, assisted reproduction

## 1. Introduction

Delayed childbearing has become a more common trend due to increasing life expectancy and changing roles of women in society[1]. With the promulgation and implementation of the promulgation and implementation of the policy of promoting fertility in China to liberalize the second and third children and the increasing maturity and popularization of assisted reproductive technology, the age of childbearing has also been extended. The influence of age on female fertility has been recognized by the public, but whether age affects male fertility is still controversial. In the context of the increasing proportion of infertility patients in the world, the quality of male semen has received more attention [2]-[4].

Semen analysis is the main diagnostic method for the evaluation of male infertility. The items examined include semen volume, liquefaction time, pH value, semen concentration, motility and movement patterns. Sperm motility affects male fertility, but the relationship of other semen parameters to sperm motility and how they interact with each other has not been demonstrated. Therefore, this study retrospectively analyzed the semen quality of 18,200 cases in Sichuan, aiming to explore the effect of semen parameters on sperm motility and the effect of age on semen quality.

## 2. Materials and Methods

#### 2.1 Materials

With the consent of the patients, the semen test results of volunteers who visited a human assisted reproduction center of a tertiary hospital in Sichuan from January 2018 to December 2021 were selected for analysis. The volunteers were 18-54 years old, with a total of 18,200 cases. In order to minimize the influence of the volunteer's own disease and environment on the results, the

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test results of volunteers with kidney disease, smoking history and current occupational exposure to toxic environments were not included in this statistical analysis data.

### 2.2 Methods

1) Sample collection

Abstain from sex for 2 to 7 days, ejaculate the semen at one time in the semen collection room by masturbation and collect it in a sterile wide-mouth container, and then send the sample to the laboratory.

2) Routine semen examination

According to the "World Health Organization Human Semen Examination and Processing Laboratory Manual" (5th Edition) operating standards[5], semen volume, liquefaction time, pH value, sperm concentration, sperm motility and sperm Parameters such as shape are checked.

3) Quality control

Before the daily inspection, two inspectors will check the quality control products to monitor the systematic errors of the inspectors and the instruments, to ensure the accuracy and reliability of the results, and to ensure the inspection of different laboratories. comparability of results.

4) Statistical analysis

SPSS 24.0 was used for statistical analysis of experimental data, and regression analysis was performed on semen parameters and semen motility. Use MATLAB to draw scatter plots and boxplots to visualize the results. One-way analysis of variance was used for pairwise comparison of data, and P<0.05 was considered statistically significant.

## 3. Result

## 3.1 Semen parameter inspection quality control

Quality control is to find errors in the detection and analysis process and the causes of errors, and to ensure the accuracy of the detection results. The semen quality control material is detected and the mean value is calculated, and the daily mean value is monitored by setting up control limits and quality control rules through the quality control chart. Figure 1 shows the Xbar chart of the sperm concentration of the quality control product in December 2019. The figure shows that the inspection results are all within the normal range and do not deviate from the target value extremely, indicating that the systematic and random errors in the inspection are controllable.



Figure 1. Xbar chart of the sperm concentration

#### 3.2 Analysis of the influence of semen parameters on sperm motility

Semen volume, sperm concentration, proportion of normal sperm morphology and age were used as independent variables, and the proportion of forward motile sperm was used as the dependent variable to analyze the relationship. The scatter plot and linear regression analysis are shown in Advances in Engineering Technology Research ISSN:2790-1688

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Figure 2. The analysis showed that semen volume, sperm concentration and normal sperm morphology had significant effects on sperm motility (P < 0.005), that is, these three parameters would significantly promote the enhancement of sperm motility, and semen concentration had the greatest impact on semen motility. The patient's age also significantly affected motility (P < 0.002), and increasing age would lead to lower sperm motility, which may be related to male genital ageing and sexual dysfunction. Studies have shown that testosterone is required to produce sperm with normal motility and maintain normal activity of testes and gonads, and testosterone levels decline with age[6]. The decline of semen motility with age has great differences in male individuals, which may be related to factors such as obesity, drugs, alcohol, genetics and chronic diseases[7].

At the same time, the influence of different semen parameters on promoting sperm motility was also evaluated. The importance of each parameter is shown in Figure 3. The results showed that among the parameters studied, increasing semen concentration had the most significant improvement in sperm motility, followed by sperm morphology. High semen volume improves sperm motility. It may be that seminal plasma has a good protective effect on sperm, and seminal plasma wraps sperm to avoid premature aging and improve motility. A higher volume of seminal plasma and good composition can better preserve sperm and their motility. Semen volume was positively correlated with short-term abstinence time, as well as diet, such as zinc intake. The examination also found that sperm motility decreased with increasing semen liquefaction time.



Figure 3. The importance of each parameter

#### 3.3 Changes of semen parameters with age

The age range of patients was 18-54, and the patients were divided into age groups < 25, 26-30, 31-35, 36-40, 41-45 and > 45. The box plot drawn by the semen parameters of each age group is shown in Figure 4. The red line is the median of the data, which is basically in the middle of the upper quartile and the lower quartile. The data is relatively stable and stable. and no outliers. Comparing the upper and lower quartiles and medians of the test results of volunteers of different ages, it can be seen that semen volume, sperm concentration, normal morphology and sperm motility are affected by age, especially after the age of 40, the semen parameters showed a more obvious downward trend with the increases of age.



Figure 2. The importance of each parameter



Figure 4. The semen parameters of each age group

#### 4. Discuss

Studies have shown that sperm fertilization ability is closely related to sperm motility[8]-[10]. In this study, we sought to determine whether there is any relationship between other semen parameters and semen motility. The results showed a significant correlation between several semen parameters and sperm motility in men. There was a positive correlation between sperm motility and sperm concentration, normal morphology and semen volume, with the effect of sperm concentration having the greatest importance, while there was a negative correlation between sperm motility and age.

An increase in sperm with normal morphology increases sperm motility, and although sperm tail shape is the most important factor affecting sperm motility, head shape is also extremely important. Studies by Khadijeh et al have shown that cervical mucus will select sperm according to sperm morphology, and sperm with abnormal head will be blocked by mucus[11][12]. The higher volume and better composition of seminal plasma has a protective effect on the sperm and avoids premature aging of the sperm during storage.

This study show that increasing age leads to a decrease in sperm parameters, which is consistent with the results of some other studies[13]-[15], but this study does not provide an age threshold for significant changes in sperm parameters. The effect of age on sperm quality may be related to the aging of the male genitalia. Testosterone levels in men decline as men age. Testosterone is necessary for normal sperm production and maintains testicular and gonad activity. It should be pointed out that other potential factors affecting sperm quality, such as lifestyle, occupation and physical condition, such as smoking and drinking, the presence of varicocele and vitamin intake, may affect the results of semen examination[16].

#### 5. Conclusion

Although sperm motility has little effect on fertilization and embryo formation in assisted reproduction, it directly affects natural pregnancy. The present study showed that sperm motility was influenced by other semen parameters, with positive correlations between sperm motility and sperm concentration, normal morphology and semen volume, while there was a negative correlation between sperm motility and age. Semen quality is affected by aging. The increase of age makes the sperm quality of elderly men decline, and it is not too late for men to give birth.

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