

Sperm DNA Integrity and Some Immune Biomarkers are Related in Pyospermia as Compare with Control Group

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Abstract: Inflammation of the semen and the resulting secretions is a problem in the male body. One of the most prominent problems caused by prostatitis is a bacterial infection. Infections cause a lot of pain during urination, as well as pain during intercourse and ejaculation. It has a very harmful effect on men and may sometimes lead to infertility. The aim is find out how the effects of some diseases are linked to certain biomarkers through this work. **Materials and Methods:** Semen specimen were collected from infertile patients with sperm infections, as well as a control group, who visited the fertility center at Al-Sadr Hospital in Najaf Governorate. The average age of infertile patients was (36.15 ± 2.16) years. The number of examined specimen was 90 specimen. **The results** showed that normal sperm morphology was a lot less in Pyospermia when compared to the control group. The result also show and significantly increased in Round cell concentration in Pyospermia when compared with control group. There is also significant increase in Interleukin 8 level, Malonaldehyde concentration and Antisperm antibody level in Pyospermia patients compared with control group. **Conclusion:** - Pyospermia, elevated inflammatory markers like IL-8, and the presence of antisperm antibodies significantly impact male fertility by inducing inflammation, oxidative stress, and immune-mediated sperm dysfunction. Early diagnosis and targeted interventions—ranging from antimicrobial and antioxidant therapy to assisted reproductive technologies—are crucial in managing these conditions and improving reproductive outcomes.

Key points: Pyospermia, Interleukin 8, Malonaldehyde, and antisperm antibody.

Introduction

Male infertility factors alone account for 50% of infertile couples, while female infertility factors account for 50% [1]. The causes of male infertility include genetic mutations, chromosomal abnormalities, infectious diseases, obstruction of the ejaculatory duct, varicocele, radiation, chemotherapy, and erectile dysfunction [2,3]. A patient is considered to have poor sperm motility when less than 32% of the sperm has the ability to move. Low sperm motility is the main reason men can't have children, because healthy sperm have good progressive motility are those that will be able to penetrate the cervical mucus and reach the female reproductive tract until they reach the fallopian tube [4,5]. The molecular mechanism side by side poor sperm motility is not fully understood in most cases, and one of the main reasons is the producing reactive oxygen species which have a direct effect on the movement of sperm by increasing the production of malondialdehyde in the sperm. [6,7]. Some sperm proteins have been found to be responsible for energy production and metabolism and are evaluated and broken down at high levels in patients with low sperm count, while sperm specimen showed high levels of expression of proteins involved in motility, regulation, protein turnover, folding, and stress response [8,9]. Inflammation in the semen indicates the presence of pus or secretions resulting from a problem in the man's body. These are the most prominent problems that cause pus: Prostatitis: Inflammation often occurs as a result of a bacterial infection. The bacteria causes some pain during urination, as well as pain during intercourse and ejaculation [10,11]. The causes of inflammation are many, but its effect is very

harmful to men and may sometimes lead to infertility [12,13]. Apart from other problems that accompany inflammation, such as erection, sexual factors, the absence of infertility in women, immune causes, and sperm dysfunction may contribute to such cases [14,15]. Reactive oxygen species (ROS) molecules are always being made by live cells. They are a part of metabolic and chemical reactions in cells as well as physiological and tissue processes. These reactive oxygen species, which include oxygen free radicals made by the body itself, play a unique and important role in health. [16,17]. A lot of attention has been paid to changes in the nucleus, especially the harm to hexahydroxyguanosine (8-OH-dG), which is made in living things and can be measured in cells after DNA is broken down into its bases. [18,19]. The hydroxyl group in water reacts with building blocks of DNA, such as guanine, to make C8-hydroxyguanine (8-OHGua) or deoxyguanosine which is a nucleoside. Usually, hydroxyl water makes radical addition products. [20,21]. Researchers have found that having a lot of octahydroxyguanosine (8-OHdG) in sperm DNA is linked to smoking and men not being able to have children [22,23]. The aim to find out how few biomarkers are linked to the effects of some diseases.

Methods and materials

Semen specimen were collected from infertile patients with sperm infections, as well as a control group, who visited the fertility center at Al-Sadr Hospital in Najaf Governorate. The average age of infertile patients was (37.14 ± 1.14) years. The number of specimen examined was 80 specimen. The sample obtained from the control group was 45 specimen, and 5 specimen from men with sperm infections.

Materials

Patients with poor sperm quality and also suffering from sperm infection were diagnosed by specialists at the Infertility Center in Sadr Medical City from 12/1/2025 to 1/6//2025 using a light microscope and other devices, through which the number of sperm was counted and their movement and normal shape were diagnosed. All other diseases that may interfere with the research topic were excluded.

Biostatistical

GraphPad Prism 5 was used for statistical studies to find the mean and standard error (\pm SE). The t-test was used to check for statistical differences between groups at the ($P < 0.05$) level to show how important the results were.

Results and Discussion

Semen parameters

It was clear from Table 1 that the amount of seminal fluid, pH, sperm count, and body mass index were all about the same. There were, however, big changes in the standard shape of the sperm and the number of round cells. Another interesting finding was that sperm motility wasn't nearly as high in people with Pyospermia as it was in the control group This could be because more reactive oxygen species were being produced, which made sperm movement weak. [24].

The relationship between age and infection highlights the dynamic changes in immune competence across the lifespan. Immunization, healthy lifestyles, and early treatment can mitigate risk and improve outcomes. Understanding these age-related patterns can guide preventive measures and tailored health care strategies. This is not the case because the age profile is consistent across patients.

Table (1) Shows biomarkers of semen and sperm of patients compared to control group

Semen and Sperms Parameters	Control group (Fertile) N=45	Pyospermia infertility N=45	P value
Volume (ml)	2.33 \pm 0.11 A	2.24 \pm 0.12 A	p < 0.05

pH	6.92±0.21 A	6.89±0.14 A	p < 0.05
Concentration (Sperm/ml.)×10⁶	63.15±2.5 A	65.13±1.4 A	p < 0.05
Sperms Progressive motile (%)	71.16±1.85 A	77.8±1.21 A	p < 0.05
Sperm normal morphology (%)	46.18±2.33 A	17.3±0.91 B	p < 0.05
Round cell concentration ×10⁶ cells	1.19±0.07 A	15.04±0.16 A	p < 0.05
Body Mass Index	28.08±0.87 A	27.05±0.17 A	p < 0.05

Results in the table represent mean ± standard error S.E.

Number of fertile(Control group) individuals = 45

Number of individuals with Pyospermia = 45

Different letters indicate significance (P<0.05)

Effect of infection in Interleukin 8 level in seminal plasma.

The end result The amount of Interleukin 8 people with Pyospermia had a lot more than people in the control group, as shown in Figure 1. IL-8 is made in reaction to a lot of different of signals that frequently begin with infection or injury. Cytokines play a pivotal role as mediators of many physiological and pathological processes, especially in initiating the inflammatory immune cascade as a result of the effects of environmental pollution that Iraq suffers from [25].

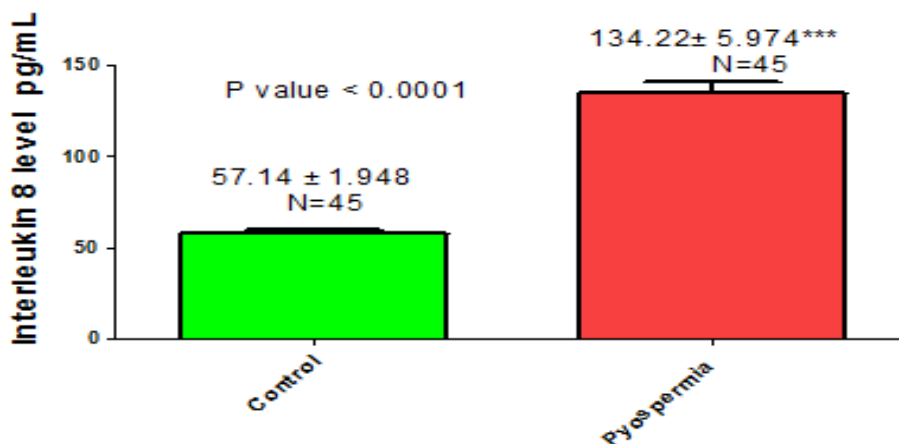


Figure 1. Interleukin 8 level in Pyospermia patients compared to the control group.

Results in the table represent mean ± standard error S.E.

Number of fertile(Control group) individuals = 45

Number of individuals with Pyospermia = 45

Effect of infection in Malonaldehyde concentration in seminal plasma.

The results As shown in Figure 2 that Malonaldehyde concentration was significantly higher among Pyospermia patients compared to the control group, and this may be due to the large amounts of active oxygen species that are made by developing sperm and white blood cells in Pyospermia patients, as inflammation causes a lot more sperm to go through death, in addition to the death of many sperm, Increased levels of malonaldehyde in patients with pyospermia highlight oxidative stress plays a key role in male impotence. High MDA levels show how bad lipid breakdown is and are a good way to tell if sperm is damaged, Effective management requires treating the underlying inflammation, reducing oxidative stress, and employing ART when necessary to optimize fertility outcomes [26,27].

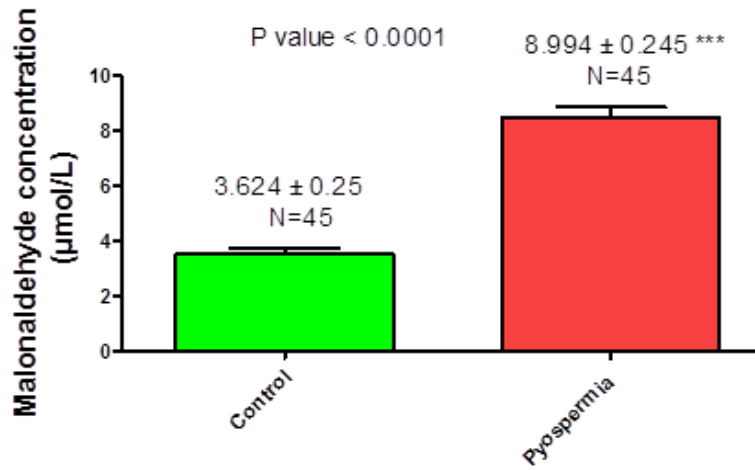


Figure 2. Malonaldehyde concentration in Pyospermia patients compared to the control group.

Results in the table represent mean ± standard error S.E.

Number of fertile(Control group) individuals = 45

Number of individuals with Pyospermia = 45

Effect of infection on Antisperm antibody level in seminal plasma.

The results as shown in Figure 3 show that the concentration of antisperm antibody became much higher in patients with pus compared to the control group, which may be due to a defect in the blood-testis barrier, which is an abnormal result for sperm and due to the high inflammation affecting the sperm tissues and the high active oxygen species produced by dead sperm and inflammation together and white blood cells in patients with pus, and inflammation leads to a significant increase in sperm death especially in the epididymis , Patients with pyospermia often exhibit significantly higher levels of antisperm antibodies due to inflammation, immune activation, and increased oxidative stress. This relationship underscores the importance of addressing both infection and immune responses to improve fertility outcomes. Comprehensive management, including anti-inflammatory treatments, antioxidants, and assisted reproductive techniques, can help mitigate the impact of ASA and enhance reproductive success[28,29,30].

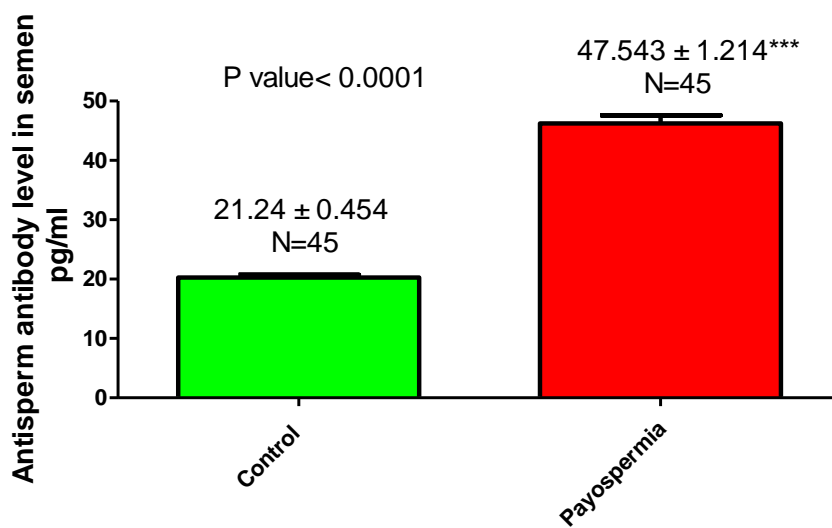


Figure 3. Antisperm antibody concentration in the semen in Pyospermia patients compared to the control group.

Results in the table represent mean \pm standard error S.E.

Number of fertile(Control group) individuals = 45

Number of individuals with Pyospermia = 45

Conclusion

Pyospermia, elevated inflammatory markers like IL-8, and the presence of antisperm antibodies significantly impact male fertility by inducing inflammation, oxidative stress, and immune-mediated sperm dysfunction. Early diagnosis and targeted interventions—ranging from antimicrobial and antioxidant therapy to assisted reproductive technologies—are crucial in managing these conditions and improving reproductive outcomes.

Inflammation in the male reproductive system can profoundly impact fertility. Conditions such as pyospermia, elevated inflammatory markers (e.g., Interleukin-8), and the presence of antisperm antibodies (ASA) contribute to poor semen quality and reduced fertility.

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