For cited: *Al-Janabi, A. O. F., Jaffal, W. N. & Abbas, D. A. (2022). The effect of Reactive oxygen in male infertility in al-Anbar province / west of Iraq. Journal of Current Researches on Health Sector, 12 (2), 187-192.*

Year: 2022
Volume: 12
Issue: 2

Journal of Current Researches on Health Sector
(JoCReHeS)
www.jocrehes.com
ISSN: 2547-9636

Research Article

Crossref doi: 10.26579/jocrehes.12.2.6

The effect of Reactive oxygen in male infertility in al- Anbar province / west of Iraq

Abbas Obaid Farhan AL-JANABI[1], Waleed Nassar JAFFAL[2] & Dhuha Ahmed ABBAS[3]

Keywords
Vertigo, Anti-inflammatory drugs, ZIC-HILIC, Betahistine, Tablet dosage forms.

Article History
Received
25 Mar, 2022
Accepted
30 Dec, 2022

Abstract
Reactive oxygen species (ROS) are produced in the male genital tract by spermatozoa and leukocytes, such as neutrophils and macrophages. The regulation of sperm activities, including acrosome responses and capacitation, is mediated by ROS. As a first line of defense, neutrophils and macrophages undergo a "oxidative burst" as a result of high ROS generation brought on by infections. Infection causes an imbalance of pro- and antioxidants favoring the former, which causes oxidative stress and inhibits motility and fertilization of sperm as well as the previously described functions. Because of the increased contact time and absence of antioxidant defense, ROS produced during testis and epididymis infections is extremely damaging to sperm. Only extremely high levels of ROS-producing leukocytes are detrimental to sperm functions in the final ejaculate.

Introduction

Infertility affects up to 15% of the world's population(1). Male infertility accounts for around 20% of cases, while 40% of infertile couples will contribute (2). The reactive oxygen species (ROS) is an oxygen molecule that has one or more unpaired electrons in atomic orbits. For example, adding one electron to dioxygen (O2) produces radical superoxide anion (O2), the fundamental type of ROS. Superoxide can be transformed directly or indirectly (metallic, enzymatic) into secondary ROS, such as radical hydroxyl ((OH)) (3). Superoxide is the primary ROS produced by biological machinery (4). Leukocytes (macrophages and polymorphonuclear neutrophils) play an important role in male infertility by producing reactive oxygen species (ROS). ROS has a physiological role at a low level (5). However, at high levels, they generate oxidative stress, which overwhelms the physiology of sperm and causes damage. This damage was discovered to be caused by lipid peroxidation of the plasma membrane (6). When ROS enter the sperm,

[1] Assist. Prof. Dr. University of Anbar , College of Medicine, Department of Microbiology,Ramadi-Iraq.
[2] Prof. Dr. University of Anbar , College of Medicine, Department of Surgery, Ramadi-Iraq
[3] Al-Faluga Hospital, Anbar -Iraq

they attack the genetic components, destroying and blocking intracellular mitochondrial DNA synthesis with ATP (7). Functionality and sperm motility are both compromised when ATP is not produced properly (8). This can lead to infertility in men. Oxidative stress can also lower the success rates of assisted reproductive techniques including in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) (9). Previously, the WHO threshold for leukocytospermia was criticized as being excessively high due to the negative effects of seminal leukocytes on sperm at low levels (10, 11). The presence of less than 106 WBC/mL of leukocytes (Low-Leukocytospermia) has been demonstrated to

reduce motility and DNA integrity (11). The majority of infertile urogenital tract infection / inflammation patients are asymptomatic, indicating a high risk of chronic illness (12, 13). Acute and chronic infection after male reproductive inflammation can impair sperm function as well as the Spermatogenetic processes that induce qualitative and quantitative alterations in sperm (14). Bacteriospermia affects the normal process of fertility through any of these mechanisms:the spermatogenesis deterioration, reduced motility of sperm, morphological alterations, altered acrosome reaction, anti-sperm antibody formation, reactive oxygen species formation, resulting in a higher DNA fragmentation index (15).

Materials and Methods

Eighty seminal fluid samples of infertile males are collected, and twenty samples are collected from fertile males as control group. The semen samples was collected in sterile clean dry and leak-proof container after 2-3 days abstinence. Before getting a culture, patients do not take any antibiotics.To avoid contamination, patients are advised to wash their hands and external genitals before ejaculation and to urinate before collecting semen samples.

Bacteriological study

All samples are cultured on blood agar, Mac Conkey agar, and chocolate agar plates using a semi-quantitative culture method and an appropriate incubation duration.

Immunological study

The seminal samples are centrifuged for 7 minutes at 3000 rpm, and the seminal plasma is collected in a sterile tube and refrigerated at -20 °C until the ROS levels are measured using an ELISA assay.

Data Analysis

IBM SPSS Statistics Version 22 (Statistical Package for the Social Sciences)." Analyzed the data and displayed it in tables.

Results

The table shows the association between ROS and seminal parameters with positive and negative culture in the infertile group.

Variables	Culture +ve	Culture -ve	P value
	Mean ± SD	Mean ± SD	
ROS	5.17 ±1.136	3.11 ±0.429	0.003 (HS)
Total sperm	80.12±21.41	72.38±13.17	0.159 (NS)
Motility	52.11±4.73	53.55±9.24	0.45 (NS)
Abnormal morphology	17.56±5.27	16.24±4.11	0.87 (NS)
Liquefication time	20.21±2.63	25.64±5.77	0.007 (HS)
Volume of sample	2.43±0.50	2.52±0.69	0.58 (NS)

The results of the above table are in agreement with the results of (16) who found that there was significant differences in ROS level between culture positive and culture negative group.

References

1. Agarwal A, Mulgund A, Hamada A, Chyatte MR. A unique view on male infertility around the globe. Reprod Biol Endocrinol. 2015;13(1):37.

2. Sharlip ID, Jarow JP, Belker AM, Lipshultz LI, Sigman M, Thomas AJ, et al. Best practice policies for male infertility. Fertil Steril. 2002;77(5):873–82.

3. Tremellen K. Oxidative stress and male infertility—a clinical perspective. Hum Reprod Update. 2008;14(3):243–58.

4. MacLeod J. The role of oxygen in the metabolism and motility of human spermatozoa. Am J Physiol Content. 1943;138(3):512–8.

5. Griveau JF, Lannou D Le. Reactive oxygen species and human spermatozoa: physiology and pathology. Int J Androl. 1997;20(2):61–9.

6. Jones R, Mann TRR. Lipid peroxides in spermatozoa; formation, r ôle of plasmalogen, and physiological significance. Proc R Soc London Ser B Biol Sci. 1976;193(1113):317–33.

7. Villegas J, Schulz M, Soto L, Iglesias T, Miska W, Sánchez R. Influence of reactive oxygen species produced by activated leukocytes at the level of apoptosis in mature human spermatozoa. Fertil Steril. 2005;83(3):808–10.

8. Pentyala S, Lee J, Annam S, Alvarez J, Veerraju A, Yadlapalli N, et al. Current perspectives on pyospermia: a review. Asian J Androl. 2007;9(5):593–600.

9. Barraud-Lange V, Pont J-C, Ziyyat A, Pocate K, Sifer C, Cedrin-Durnerin I, et al. Seminal leukocytes are Good Samaritans for spermatozoa. Fertil Steril. 2011;96(6):1315–9.

10. Punab M, Lõivukene K, Kermes K, Mändar R. The limit of leucocytospermia from the microbiological viewpoint. Andrologia. 2003;35(5):271–8.
11. Mahfouz R, Sharma R, Thiyagarajan A, Kale V, Gupta S, Sabanegh E, et al. Semen characteristics and sperm DNA fragmentation in infertile men with low and high levels of seminal reactive oxygen species. Fertil Steril. 2010;94(6):2141–6.

12. Schuppe H, Meinhardt A, Allam JP, Bergmann M, Weidner W, Haidl G. Chronic orchitis: a neglected cause of male infertility? Andrologia. 2008;40(2):84–91.

13. Haidl G, Allam JP, Schuppe H. Chronic epididymitis: impact on semen parameters and therapeutic options. Andrologia. 2008;40(2):92–6.

14. Papava V, Didbaridze T. RELATIONSHIP OF NON-SPECIFIC BACTERIA AND SEMEN PARAMETERS. BLACK SEA. 2017;

15. Vilvanathan S, Kandasamy B, Jayachandran AL, Sathiyanarayanan S, Tanjore Singaravelu V, Krishnamurthy V, et al. Bacteriospermia and its impact on basic semen parameters among infertile men. Interdiscip Perspect Infect Dis. 2016;2016.

16. Mazzilli F, Rossi T, Marchesini M, Ronconi C, Dondero F. Superoxide anion in human semen related to seminal parameters and clinical aspects. Fertil Steril. 1994;62(4):862–8.