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RESEARCH ARTICLE

**THE EFFECT OF INFECTION BY MUMPS AFTER PUBERTY ON THE SEMINAL FLUID
PARAMETERS AND THE PRODUCTION OF ANTIBODIES AGAINST SPERM IN INFERTILE MALES
IN ERBIL CITY, Iraq**

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Abstract

Background: Mumps is caused by a RNA virus belonging to the myxo virus group. One of its most notorious complications is mumps orchitis. Although it may cause infertility in some of the affected males, the exact mechanisms of fertility impairment are not entirely understood. Mumps viruses can attach to the sperm surface, and, serving as haptens, lead to the production of sperm antibodies.

Aims and objectives:

1. To know if there is a relation between the infection by mumps after puberty and the result of seminal fluid analysis.
2. To determine the presence of anti-sperm antibodies (ASAs) in male serum and semen.
3. To know the relation between mumps in puberty and the ASAs in semen and serum of infertile males.

Patients and methods: A cross sectional study carried in subfertility care and IVF centre in Erbil city in Iraqi Kurdistan from November 2013- September, 2014. 200 infertile males were included in the study.

A semen specimen was collected and analysed for semen parameters, the seminal fluid analysis of semen was classified the seminal fluid to normal and abnormal according to WHO guideline.

Serum and semen collected from males for detection of antisperm antibodies by using ELISA (enzyme linked immunosorbent assay) used for detection ASAs in the serum of males and also for detection ASAs in male seminal fluid qualitatively.

Result: The mean age of infertile male participated in the study was (33.905 year) with maximum and minimum age was (51 year, 22 year) respectively, among 200 male the frequency of males with history of mumps after puberty was 26 which represents about 13% of infertile male whom participated in the study.

Among 26(13%) of infertile males with history of mumps after puberty 16 infertile which represents about (61.54%) they have abnormal seminal fluid analysis.

Anti-sperm antibodies was positive in the serum of 12(46.15%) males out of 26 males with history of mumps after puberty and Anti sperm antibodies found in the semen of 18(54.55%) males with history of mumps infection after puberty.

Conclusions: Mumps can cause infertility in male if they infected after puberty due to the rupture of testis blood barrier and can affect the sperms either by decreasing the count or motility so it can lead to oligozoospermia or asthenozoospermia, mumps also can lead to production of antibodies against sperm and can be detected either in blood or seminal fluid and these

antibodies mostly it affect the motility of sperm in the seminal fluid or the movement of sperm in female reproductive canal and this result in infertility.

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Introduction:-

Mumps is caused by a RNA virus belonging to the myxovirus group. One of its most notorious complications is mumps orchitis. Although it may cause infertility in some of the affected males, the exact mechanisms of fertility impairment are not entirely understood. Varying degrees of permanent damage to the seminiferous tubules usually occurred when pubertal or adult testes were involved (1). Testicular biopsies have shown that, in acute cases, edema, perivascular lymphocytic exudate, and diffuse infiltration of interstitial tissue with focal hemorrhage can be observed (2). Some investigators have speculated that male infertility can occur after mumps infection without mumps orchitis (3).

It is generally accepted that one factor that can negatively affect fertility after mumps orchitis is the humeral immunity against spermatozoa—the sperm antibodies (4–6). This assumption is based on several alternative hypothetical mechanisms. (1)

Due to “breaks” in the blood–testis barrier and leakage of sperm, the inflammation of the testis causes autoimmunization with sperm antigens. (2) Mumps viruses can attach to the sperm surface, and, serving as haptens, lead to the production of sperm antibodies. (3) The antigenic mimicry between the mumps virus and human spermatozoa causes the production of cross-reacting antibodies in the course of the disease. However, the limited experimental and clinical data have revealed a contradictory picture with regard to any of the above hypotheses, and the results of the few studies available have remained uncertain (6, 7, 8, 9). None of these investigations have provided convincing data as to whether mumps orchitis can induce the production of systemic sperm antibodies. No data are available describing the sperm antibody activity at the beginning of the disease, when the patients were first diagnosed with orchitis, such data may be important; it is well established that, although the incidence and serum levels of sperm antibodies may be considerably lower, they can be found in fertile individuals (10, 11).

Mumps occurs worldwide. Humans are the only known natural hosts. This Paramyxovirus is highly infectious to non-immune individuals and is the only cause of epidemic parotitis. Although mumps cases occur at any time of year, an increase in case number is noted during late winter and early spring. (12)

Orchitis is considered the most common complication of mumps infection in the adult male. This inflammation usually follows parotitis but may precede or occur in the absence of parotid gland swelling. Orchitis usually appears during the first week of parotitis, but it can occur in the second or third week. Bilateral orchitis occurs less frequently (about 10% of cases). Gonadal atrophy may follow orchitis and poses a greater risk with bilateral involvement; however, sterility is rare. (13)

Aims and objectives:

4. To know if there is a relation between the infection by mumps after puberty and the result of seminal fluid analysis.
5. To determine the presence of anti-sperm antibodies (ASAs) in male serum and semen.
6. To know the relation between mumps in puberty and the ASAs in semen and serum of infertile males.

Patients and methods:-

A cross sectional study carried in subfertility care and IVF center in Erbil city in Iraqi Kurdistan from November 2013- September 2014.

200 infertile males were included in the study, a complete questionnaire form prepared for each person included: name, age, address, occupation, both medical and surgical history and history of mumps and orchitis after puberty.

A semen specimen was collected and analyzed for semen parameters: liquefaction time, volume, viscosity, sperm motility, sperm concentration, morphology according to WHO guidelines.

The seminal fluid analysis of semen was classified the seminal fluid to normal and abnormal according to WHO guideline

Standard tests	Normal values
Volume	≥ 2.0 ml
PH	7.2-7.8
Sperm concentration	$\geq 20 \times 10^6$ / ml
Total sperm count	$\geq 40 \times 10^6$ / ejaculate
Motility	50% or more with forward progression or 25% or more with rapid Progression within 60 minutes of ejaculation.
Morphology	30% or more with normal forms
White blood cells	$\leq 1.0 \times 10^6$ / ml

Normal values of seminal fluid analysis. Cited from (WHO, 1999) (14).

Serum and semen collected from males for detection of antisperm antibodies by using EIISA (enzyme linked immunosorbent assay) used for detection ASAs in the serum of males and also for detection ASAs in male seminal fluid qualitatively.

Results:-

The mean age of infertile male participated in the study was (33.905 year) with maximum and minimum age was (51 year, 22 year) respectively.

This study shows that among 200 male the frequency of males with history of mumps after puberty was 26 which represents about 13% of infertile male whom participated in the study.

In table (1) shows that among 26(13%) of infertile males with history of mumps after puberty 16 infertile which represents about (61.54%) they have abnormal SFA and 10 out of 26 infertile males with history of mumps which represents about (38.46%) have normal SFA.

Table(1) the relation between the occurrence of mumps after puberty and the result of SFA

Total numbers of infertile males	The number of infertile males with history of mumps	Number of males with history of mumps and abnormal AFA	Number of males with history of mumps and normal AFA
200	26(13%)	16(61.54%)	10(38.46%)

The result of this study shows that ASAs was positive in the serum of 12(46.15%) males out of 26 males with history of mumps after puberty as shown in table (2).

Table (2) the incidence of ASA in serum in males with history of occurrence of mumps after puberty

Total numbers of infertile males	Total numbers of males with history of mumps after puberty	Number of male with positive ASAs in the serum		Number of male with negative ASAs in male serum	
		frequency	percentage	frequency	percentage
200	26	12	46.15%	14	53.85%

Table (3) shows that from 26 infertile males with history of mumps after puberty ASAs found in the semen of 18(54.55%) males.

Total numbers of infertile couples	Total numbers of couples with unexplained subfertility	Number of males with positive ASAs in the semen		Number of males with negative ASAs in male semen	
		frequency	percentage	frequency	percentage
200	26	18	69.23%	8	30.77%

Discussion:-

In this study the percentage of abnormal SFA which includes(oligozoospermia, azoospermia, and asthenozoospermia)was 16(61.54%).

Epididymo-orchitis is the most common complication of mumps in post-pubertal men, affecting about 20–30% of cases and may contribute to infertility or subfertility through impaired sperm parameters. Mumps epididymo-orchitis has resulted into oligozoospermia, azoospermia and asthenozoospermia (15).

Significant oligo-asthenozoospermia or azoospermia after recovery from postpubertal mumps orchitis, with or without a history of reduction in testis size, is probably because of mumps-induced damage to the seminiferous tubules (16).

In current study the incidence of ASAs in serum was 12 which represents about 46.15% of total 26 patients with mumps while the percentage of ASAs in semen was 18 which represents about (69.23%)of 26 male with history of mumps after puberty.

The exact mechanism by which the mumps virus elicited antisperm antibodies is unknown, although animal models have shown that acute orchitis may be a causative factor in anti-sperm antibody production (13).

Antibodies against sperm can prevent their motility through the female reproductive tract or prevent the process of fertilization (17).

Males as well as females can make antibodies that react with human sperm. In males, it is found in seminal plasma, serum and on the surface of sperm, which cannot be detected in a routine semen analysis. In female it is found in circulating blood and in cervical mucus. Antisperm antibodies also found in homosexual males and in cases of testicular trauma, varicocele, mumps orchitis, spinal cord injury, congenital absence of the vas and vasectomy (18)

The causal link between mumps orchitis and sperm antibodies has been rather unclear. Although these antibodies were suspected to impair fertility after mumps orchitis, their increased levels and involvement have never been convincingly established. In one study done by the application of the indirect immune fluorescent test to 1340 patients with fertility problems revealed sperm antibodies in seven patients who had suffered mumps orchitis after puberty. In two of these men, sperm antibodies were found on the third week after the onset of mumps, but no such activity could be detected during the first week of the disease (19).

Infertility can result from antibodies either directly binding to sperms or affecting the spermatogenesis due to allergic orchitis. ASA can interfere with sperm motility by immobilizing the sperm or interfering with sperm mucus interaction or disturbing sperm transport. (20, 21).

The presence of sperm anti-bodies interfere with the process of fertilization in vivo and in-vitro, and reduce the chances of pregnancy by about 18 per cent if present in males partners (22).

Conclusions:-

Mumps can cause infertility in male if they infected after puberty due to the rupture of testis blood barrier and can affect the sperms either by decreasing the count or motility so it can lead to oligozoospermia or asthenozoospermia , mumps also can lead to production of antibodies against sperm and can be detected either in blood or seminal fluid and these antibodies mostly it affect the motility of sperm in the seminal fluid or the movement of sperm in female reproductive canal and this result in infertility.

Recommendations:-

1. All children should take the vaccine against through MMR (Mumps, Measles, Rubella) vaccine in childhood and it's better to be repeated before puberty.
2. The parents must do a serological test for IgG against mumps for their son to be sure that the child is immunized against mumps.
3. Each couple with infertility the seminal fluid analysis must be a routine part for infertility investigation
4. Each male with abnormal seminal fluid analysis better to look for autoantibodies against sperm in blood or seminal fluid.

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