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Research Article

The Role of Lactate dehydrogenase C (LDHC) on Semen Parameters and Testosterone Concentration in Male Infertility at Al-Najaf Province

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Abstract: The lactate dehydrogenase C (LDHc) isoenzyme is a key enzyme in spermatogenesis and sperm parameter metabolism. Testosterone is one of the most important factors in germ cell growth. Changes in serum gonadotropins are frequently linked to abnormal spermatogenesis. The goal of this study is to correlate LDHc and serum testosterone levels with sperm parameters. and (regard by enzyme-linked immunosorbent assay (ELISA) kit in fertile and infertile men in Najaf City, Iraq. A total of 90 participants (45 infertile and 45 fertile men) were mean age (40.02) years in control fertility male, whilst were mean age as infertile (40.22) years included in the current study. The patients were sub-grouped into 45 infertile with semen abnormal oligozoospermia, azoospermia. asthenozoospermia and teratozoospermia patients, it used for measuring the concentration and parameters ECM1and serum testosterone by Elisa kit. The statistical analysis revealed that the differences between the two groups were very significant ($p>0.05$). The level of LDHc in the infertile group was lower in concentration than the control group with statistically significant differences ($p<0.0001$*). which the difference between the totals was highly significant by a criterion ($p<0.0001$) 45 in all group. that studied a positive pearson correlation highly significant between serum testosterone (IU mL^{-1}) and seminal extracellular matrix protein 1 (ECM1), (pg mL^{-1}) in all age groups of 45 male infertility at a ($p<0.001$). The findings of this study imply that the concentration LDHc of seminal plasma biomarker is important for sperm count, motility and morphology and that it could be used as a therapeutic method for infertility in relation to testosterone levels.

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INTRODUCTION

Male infertility is defined as a lack of sperm production, poor sperm morphology, decreased sperm motility, or a combination of these factors. Campbell and colleagues Campbell *et al*.[6] Male infertility is a common problem among couples. Couple infertility is caused by the male spouse in roughly half of the instances, mostly owing to spermatogenesis failure. Karavolos *et al*.[15] The importance of lifestyle variables in the development of infertility, such as age, psychological stress, diet, physical activity, coffee, high scrotal temperature, hot bath and cell phone use, has sparked renewed interest in this field of research. Emokpae *et al*.[8]

The presence of lifestyle stresses, such as work, life events (war, earthquake, etc.) or marital infertility, generally, these research show that psychological stress impairs sperm quality. Ilacqua *et al*.[13] LDH isozymes activities in testis enzyme catalyzes the inter-conversion of pyruvat to lactat with the concurrent oxidation-reduction of nicotinamide adenine dinucleotide NADH to NAD+. LDH isozymes activities in testis enzymes catalyze the interconversion of pyruvate to lactate with the concomitant oxidation/reduction of nicotinamide aden LDH-C4 is linked to a certain form of mitochondria seen in spermatogenic line cells as well as spermatozoa's mitochondrial sheath. Varuzhanyan *et al*.[23]

Testosterone is a hormone that increases sperm production and also feeds back to the brain and pituitary to control Gonadotropin-releasing hormone (GnRH)secretion in reproductive organs. Sertoli cells are stimulated by the folicle stimulating hormone (FSH) to assist spermatogenesis and release inhibin B, which inhibits FSH production. Muñoz *et al*.[18]

MATERIAL AND METHODS

This case-control study, ninety participants were collected in fertility center in AL-Saddar Medical-City /Najaf government. Divided into two groups, 45 patients with infertile male and 45 healthy fertile individuals. Their age ranged between 20-49 years, were mean age (40.02) years in control fertility male, whilst were mean age as patients infertile male (40.22) years .The samples collected through the duration of December/2021 till April 2022. All patients diagnosed with seminal fluid examination and diagnostic and and confirmed by Infertility center review. Semen were collected from infertile patients (45 men) in addition to the control group (45 men) by ELISA kit to estimate the seminal plasma LDHc.

Semen collection: Normally human semen can be separated into seminal plasma and spermatozoa. For obtain seminal plasma depleted from sperm the semen was centrifuged which collected from healthy person with proved fertility and from men with infertility. By using ELISA kit to estimate the seminal plasma LDHc.

Blood collection: Blood samples were collected by vein puncture technique obtain 5 mL of blood from both infertile patient and fertile men as control. After that hold the blood in room temperature so as to clot than centrifuge it in 5000 round for 5 min to obtain serum which by using ELISA technique will estimate the concentration of testosterone.

RESULTS AND DISCUSSIONS

Table (1) Indicated highly a significant decrease ($p<0.05$) in serum hormonal and biomarker seminal plasma in infertile comparison with control group (fertile normospermic) which biomarker seminal plasma included ECM1 with mean control (16.51±0.66) and infertile patients with mean (0.56±0.02) whilst serum hormonal include testosterone mean control (18.68±1.08) and infertile patients with mean (2.42±0.18).

Seminal plasma Lactat dehydrogenases C (LDHc): Lactat dehydrogenase C (LDHc) between seminal plasma of control (fertile men) group (infertile men) group. Statistically investigation showed that there are extremely important variances among the two groups show ($p<0.05$). The level of LDHc in the infertile group was lower in concentration by mean (0.56±0.02) than the control group that were (16.51±0.66) with statistically significant differences($p<0.0001$*). Seminal plasma Lactate dehydrogenase C (LDHc) levels in fertile control and infertile patients in seminal plasma. LDHc was measured in seminal plasma of all groups as mean±SD of seminal plasma for these groups, respectively. In normozoospermia as a control group reveled LDHc of oligozoospermia men with mean of (0.62±0.03) pg mL^{-1}, asthenozoospermia men with mean of (0.6±0.03) pg mL^{-1}, azoospermia men with mean of (0.5±0.06) pg mL^{-1}, terato/oligozoospermia men with mean of (0.47±0.01) pg mL^{-1}, astheno/oligozoospermia men with mean of (0.5±0.02) 0 pg mL^{-1} which the difference between the totals is highly significant by a criterion ($p<0.004$*) 45 in all groups. This study found that while sperm quantity is essential, it is not the primary driver of reproductive potential. As a result, the

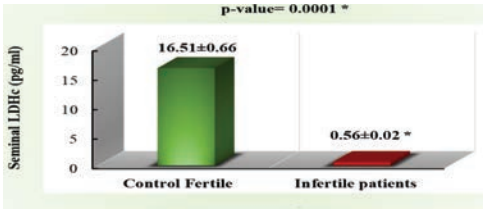

Fig. 1: Comparison of seminal plasma of Lactate dehydrogenase C (LDH-C) in the control fertile male and infertile male*, Is highly significant at p<0.05*

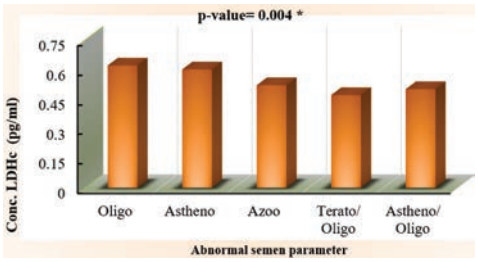

Fig. 2: Comparison of seminal plasma Lactate dehydrogenase C (LDHc) between fertile men group (normozoospermic) and infertile men subgroups. Data are the mean±SD (n = 45 in each group). Is significant at p<0.05*

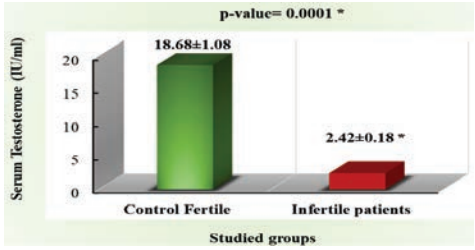

Fig. 3: Comparison of serum concentration of Testosterone Hormone in the control fertile male and infertile male. Is significant at p<0.05

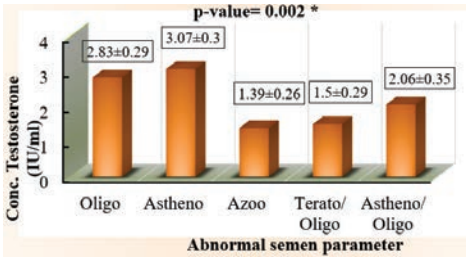

Fig. 4: Comparison of serum Testosterone levels between fertile men group (normozoospermic) and infertile men subgroups. Data are the mean±SD (n = 45 in each group). Is significant at p<0.05*

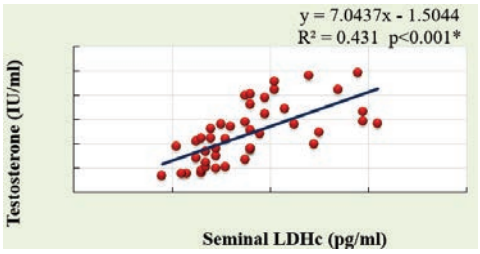

Fig. 5: Correlation between serum Testosterone and seminal Lactate dehydrogenase C (LDH-C) n = 45 . p-value (<0.001).*. Is significant at p<0.01**. Is significant at p<0.05. No significant NS

Table 1: Serum Testosterone and seminal plasma LDHc of fertile and infertile male

Variables	Mean±SE Control N = 45	Mean±SE Infertile patients N = 45	p-value
LDHc (pg mL^{-1})	16.51±0.66	0.56±0.02	0.0001 *
Testosterone (IU mL^{-1})	18.68±1.08	2.42±0.18	0.0001 *

*. Is significantly at p-values <0.01**. Is significanlyt at p<0.05 . No significantly NS.

spermatozoa's functional ability has become increasingly important. Gentiluomo *et al*.[10] Infertile males with a normal ssperm count and the isozyme Lactate dehydrogenase C are more common (LDHc). Nonetheless, we thought that presenting these examples could be of interest to those working in the domains of clinical diagnosis and sperm biology. There has been minimal research on the absence of LDHc in normal spermatogenesis to date. Other lactate dehydrogenase isozymes have been linked to poor accessory gland function in a research. Goldberg On the other hand the presence of LDHc was discovered in sperm with substantial populations of non-motile and defective spermatozoa, implying that additional abnormalities were present. The results of the enzyme-linked immunosorbent assay (Elisa test) of samples support the idea that LDH-C is an enzyme engaged in the mechanism of spermatozoon motility and survival, based on in vitro studies. Babaei *et al*.[5]

Krizova *et al*.[16] showed a statistical highly significant in LDHc activity of oligospermia, asthenozoosperma, azoospermia teratozoospermia subgroups abnormal semen, depending on the sperm motility and morphological or count in semen parameter test and control group Is significant at (p<0.05*) agree with Losano *et al*.[17]

Serum testosterone level: Concentration testosterone between serum of control (fertile men) group and serum of (infertile men) groups. Statistically investigation displayed that there are extremely important variances among the two groups show (p<0.05). The level of LDHc in the infertile group was lower in concentration by mean (2.42±0.18) than the control group that were (18.68±1.08) with statistically significant differences(p<0.0001*). Serum testosterone hormone levels in fertile control and infertile patients in serum. Testosterone hormone was measured in serum of all groups as mean±SD of testosterone hormone for these groups, respectively. In normozoospermia as a control group (Fig. 4) reveled testosterone of olig
ozoospermia men with mean of (2.83±0.29) pg mL^{-1}, asthenozoospermia men with mean of (3.07±0.03) pg mL^{-1}, azoospermia men with mean of (1.39±0.26) pg mL^{-1}, terato/oligozoospermia men with mean of (1.5±0.29) pg mL^{-1}, astheno/oligozoospermia men with mean of (2.06±0.35) pg mL^{-1} which the difference between the totals is significant by a criterion (p>0.002*) 45 in all groups.

This study's findings are in line with those of previous studies. Farman *et al*.[9] However, they were in disagreement with the findings of another research. Abdalla. The majority of male infertility cases are due to sperm shortage or poor sperm quality Alahmar, Decrease in the level of testosterone hormone in control men, which this results found a decrease in Follicle stimulating hormone (FSH) level and testosterone in infertility men the data confirm by Tenuta *et al*.[13]

The mean serum testosterones level in guys with (oligozospermia, asthenozospermia and at least azoospermia, teratozospermia) and in the control group (normozospermic men) were both within allowed ranges. Tendayi *et al*.[14] Lactate dehydrogenase C (LDHc) Correlation with hormone Testosterone According to the observations in (Fig. 5), there was a positive Pearson correlation highly significant correlation R2 = 0.431) between serum testosterone (IU mL^{-1}) and seminal Lactate dehydrogenase C (LDH-C) (pg mL^{-1}) in all age groups of 45 male infertility at a (p<0.001).

CONCLUSION

This study showed that testosterone decrease affects the semen quality and disturbance of spermatogenesis process. However, the seminal plasma Lactate dehydrogenase C (LDHc) isozyme decrease affects the semen.

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