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Sperm Activation of Asthenospermic Infertile Patient by Using Swim-up and Swim-down Techniques

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Abstract

The study included ten semen samples collected from infertile patients with asthenospermia . Each sample was divided into two equal parts where the sperm were activated by swim up techniques up on a part of the sample while the second part was used to activate the sperm by swim down . The results showed a significant decrease ($p < 0.05$) in both the recovered sperm concentration and the concentration of leukocytes after activation with both techniques compared with their values before activation . A significant increase was observed in the percentage of sperm motility style A+B and a significant decrease in sperm motility percent style C after activation compared with their values before activation. The significant difference was not observed ($p > 0.05$) when comparing between the two techniques . There was also no significant difference ($p > 0.05$) in the percentage value of the abnormal sperm percent before and after activation. The study concludes that the techniques of swim up and swim down are effective in activating the sperm of infertile patients who are infected with asthenospermia .

Key words: *swim up, swim down, sperm activation*

Inrtoduction

Assistive Reproductive technologies have developed rapidly in recent years . These technologies have grown and became with therapeutic value for the infertile couples in both developed and developing countries . According to statistics on Intra cytoplasmic sperm injection (ICSI), the number of children are that borne by using ICSI was only 237809 in 2004 [1] .

Intra Uterine Insemination (IUI) technique using which is the sperm of the husband is another technique of assisted reproduction which is the first choice for its ease , efficiency and low costs . IUI is used for infertility due to cervical factors , male infertility factors, mild endometriosis , and unexplained infertility . The high pregnancy rates resulting from the use of the IUI technique with the husband's sperms and the low rates of failure and risk made it the most common : pregnancy rates reached 8 – 20% per cycle [2]. In IUI technique , is injected recovered motile sperms after activation . IUI is acceptable when the activated sperm concentration is 0.8 -5 million / ml and pregnancy rates may be increased if the number of motile sperm are higher than the amount mentioned [3] . A recent study confirmed that the pregnancy ratios index is based on the total number of motile sperm which is depoited in the uterus , the age of the wife , the appropriate timing of insemination , the duration of sperm preparation and the choice of appropriate and technique for infertility factor [4] .

Swim up technique is the most common technique of sperm activation to suit most male infertility factor, while activation of the sperm by using the swim down technique is effective as it is the natural movement of the sperm. Asthenozoospermia is the most important factor of male infertility [5] . Therefore, the present study aimed to activate the sperm of infertile patients who suffer from asthenospermia by using swim up and swim down techniques to compare the efficiency of two mentioned techniques for activation the sperms of the asthenospermia .

Material and Method

Ten samples of seminal fluid were collected from infertile patients who suffered from asthenospermia by masturbation after a period of interruption of intercourse for three days . Seminal Fluid Analysis was performed for all semen samples according to the WHO method [6]. Each semen sample was divided into two equal parts to perform sperm activation with Swim up and Swim down

techniques .

1- Swim up technique

Placed 1 ml of semen with 1 ml of activation medium (Ham`F-12) in a tube and mix well to be tilted at a 45c° angle in an incubator at 37 c° for half an hour .The top of the medium layer was transferred to a new tube to be centrifuged rapidly at rpm 2000 for 10 minutes .The upper layer was discharged and covered the sperm pellet in the bottom of centrifuged tube with 0.5 ml of Ham`F-12 medium . They were left for half an hour in the incubator at 37 c° and then a drop was taken from the top centre and examined under a microscope to evaluate the studied sperm parameters.

Swim down technique

It was placed 1 ml of semen with 1ml of the activation medium of the Ham`s F-12 in a tube and mix well to be placed at 37°c in a incubator vertically at 90° angle for half an hour. The upper layer was discharged, the lower layer was centrifuged with 2000 rpm for 10 minutes . The upper layer was then ignored and sperm pellet deposited in the bottom of the centrifuge tube was covered with 0.5 ml of Ham`s F-12 where it was left for half an hour in the incubator at 37°c , then a drop was taken from the upper medium center and examined under a microscope to evaluate the studied sperm parameters.

Results

The results revealed in table-1- a significant decrease ($p< 0.05$) in the concentration sperm after sperm activation by the swim up and swim down techniques compared to the sperm concentration before activation , while significant difference was not observed in the concentration sperm between the two techniques, but the sperm concentration recovered by using swim down technique was insignificant ($p>0.05$) higher than those recovered by swim up technique . In terms of sperm motility at grade activity A+ B, a significant increase ($p < 0.05$) was observed in the sperm motility percent after activation by using swim up and swim down techniques which was compared to the values of sperm motility before activation. While the percentage for the sperm motility percent of grade C , the results were showed a significant decrease ($p<0.05$) in percentage of the sperm motility grade with swim down technique compared to its values before activation, while there was insignificant differences ($p>0.05$) was observed in swim up technique compared to sperm motility percent grade C compared to before activation . No significant difference ($p>0.05$) was observed in the percentage for abnormal sperm after activation compared with before activation. A significant decrease ($p<0.05$) was observed in the leukocytes concentration after activation by using swim up technique and swim down technique compared with value before activation , while no significant difference ($p>0.05$) was observed between the concentration of leukocytes between the two techniques which is used to activate sperm infertility patients who are suffering from asthenospermia.

Table (1) : **The sperm parameters before and after the activation by using swimming up and swim up and swim down techniques**

Sperm parameters	Before activation	After activation	
		Swim up technique	Swim down technique
Sperm Concentration (million/ ml)	44.9±14.3 a	11.7±5.5 b	14.4±6.5 b
Sperm Motility Percent grade A +B	12.5±8.5 a	23.0±10.3 b	30.0±11.05 b
Sperm Motility Percent grade C	58.0±10.8 a	51.0±8.09 ab	45.0±11.05 b
Abnormal Sperm Morphology	30.0±15.09 a	21.0±11.0 a	21.0±10.0 a
Leukocytes concentration (million / ml)	2.7±0.9 a	0.2±0.1 b	0.9±0.3 b

Different letters mean significant differences ($p < 0.05$)

Discussion

With the progress of reproductive technique in human, the need is required for improved sperm activation and development the increasing of the highly active motile sperm for contribute in improved external fertilization processes. For example, IUI requires activation of the sperm and isolating of the active sperm from the rest of the sperm[7].

There are several effective ways to separate active sperm such as swim up technique , glass wool column technique , and density gradient [8]. All of these technique effectively separate active sperm from seminal plasma, but their efficiency varies with the variety of sperm parameters . The ratio of active sperms normal sperm morphology and the degree of DNA of the recovered sperm were differed significantly with difference of the techniques [9]. The swim up technique is repesented to isolate the sperm from the sperm pellet after washing and centrifugation , it is the considered a basic and standard technique for normospermia and infertility patients, as well as for the treatment of female infertility factors [10].

The washing process is necessary to remove prostoglandins, inflammatory agents and pus cells [11]. The technique of swimming up and other techniques are designed for obtaining motile and normal sperms. It is not necessary for these sperms to be of the highest quality , but it is important that they be able to produce acceptable pregnancy rates [12].

Swim up technique does not require much experience or many rare and complex materials, so it is most practical technique for its ease and low cost [13]. The increase in the number of motile sperms after the activation of sperm naturally leads to an increase in the number of normal sperm morphology [14]. Another positive aspect of swim up technology is the removal of immotile sperms , pus cells and immature cells , which enhances the benefits of activation and preparation technique of sperm for artificial insemination [15]. The results of the current study showed an increase in the total number of motile sperm, the percentage of forward motile sperms (grade A +B) in the swim up technique was 23 % while in the swim down it was 30%. One study has indicated that the effect of the concentration of total recovered motile sperm after perform of swimming techniques and IUI processes when less than 10 million / ml is low , and when the concentration of recovered motile sperm is more than 30 million / ml , pregnancy rates are very high and mild ratio when the concentration of recovered motile sperm is between 10 and 30 million / ml [16].

The swim down technique is considered the best in term of removal of the abnormal sperm, dead sperm and other cell residues. The swim down technique shares with the other technique to got a small number of motile sperm, so this technique is preferred for people with normal sperms parameters and couples whose wives suffer from female infertility factors [17].

The results of the present study showed that there was an insignificant increase in the percentage of motile sperm with progressive motility (A +B pattern) and a significant decrease in the percentage of motile sperm with no progressive motility (C pattern) when using swim down compared to swim up technique and this resulte consistently agree with the results of other study which is indicated that there was a significant increase in the number of sperm of the forward motility when using the technique of swim down compared to those sperm obtained by using swim up technique [18]. The swim up and swim down techniques considered as easy and highly efficient in terms of sperm activation and high – quality sperm separation for Artificial Insemination [19]. It was concluded from this study that the recovered sperm which is obtained after activation of the sperm by using swim up and swim down techniques with a high degree of activity qualify them for use in Artificial Insemination and the possibility of obtaining good pregnancy ratios.

Conclusion

A significant increase was observed in the percentage of sperm motility style A+B and a significant decrease in sperm motility percent style C after activation compared with their values before activation. The significant difference was not observed ($p > 0.05$) when comparing between the two techniques . There was also no significant difference ($p > 0.05$) in the percentage value of the abnormal sperm percent before and after activation. The study concludes that the techniques of swim up and swim down are effective in activating the sperm of infertile patients who are infected with asthenospermia.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Directorate of Education Babylon, Iraq and all experiments were carried out in accordance with approved guidelines.

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