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### Sperm processing: a simplified swim-up method using a syringe

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#### INTRODUCTION:

The simplicity and cost-effectiveness of intrauterine insemination (IUI) validates the procedure as a first-line treatment for infertility. Several sperm washing techniques are used for IUI, depending on sperm parameters. The challenge lies in the development of an efficient, but affordable and simple sperm purification method, with minimal equipment and procedural steps.

#### AIM:

This study investigated a simplified sperm swim-up (SW) method and consisted of two sections: i.e. comparing three volume syringes (5ml - SW-5; 10ml - SW-10 and 20ml - SW-20) combined with the standard swim-up procedure. Hereafter, the SW method which resulted in the highest harvested sperm sample was then further compared to processing with the commercial SEP-D kit.

#### MATERIALS AND METHODS:

Semen samples (n=25 for baseline & n=20 for subsequent experimentation) were obtained from patients and donors participating in the Reproductive Biology Laboratory's donor registry programme. Only samples from HIV-1 sero-negative males with a sperm morphology  $\geq 4\%$ ,  $>15 \times 10^6$  sperm/ml, progressive motility  $>40\%$  and 3 ml volume were included in the study:

- (I) Each semen sample was divided into three equal aliquots, and prepared using the SW-5, SW-10 and SW-20. A volume of 1 ml PureSperm™ Wash was aspirated in the syringe followed by 1 ml of semen, placed at 45° angle and incubated for 60 min at 37°C.
- (II) Semen samples were split into two equal aliquots and processed using the SW-10 (10 ml syringe) procedure compared to the commercial SEP-D kit.

Post-processed semen analyses included: sperm concentration and motility for both experiments while sperm morphology, vitality, plasma membrane integrity and DNA fragmentation (Halosperm® G2) were also evaluated in the second experiment.

#### RESULTS:

The results indicated that semen processed using the SW-10 method resulted in a significantly higher sperm concentration ( $28.47 \times 10^6$ /ml) and progressive motility (77.54%), when compared to the SW-5 ( $15.97 \times 10^6$ /ml and 50.62%) and SW-20 ( $19.16 \times 10^6$ /ml and 46.52%) procedures ( $p < 0.001$ ). When comparing the post-processed sperm samples obtained through the SW-10 procedure compared to the commercial SEP-D kit, a significant increase ( $p < 0.005$ ) in sperm motility (87.05% vs 75.35%) and concentration ( $17.10 \times 10^6$ /ml vs  $14.35 \times 10^6$ /ml) was observed. The SW-10 method yielded a sample which contained a statistically higher number of spermatozoa with intact plasma membranes (82.31% vs 72.00%, for Eosin and Nigrosin stain and 79.47% vs 70.05% for the Hypo-osmotic swelling test) ( $p < 0.0001$ ), as well as less DNA fragmentation (13.70% vs 23.20%) ( $p < 0.0001$ ). No statistical differences were observed with regards to normal morphology ( $p < 0.479$ ).

#### CONCLUSION:

The SW-10 method yielded higher quality spermatozoa in comparison with the commercial SEP-D kit. This method is simplistic, with no centrifugation steps and few disposables needed. The method can be easily implemented in applicable patients in developing countries with limited resources. This research can be considered as an office-based or part of a series of low-cost ART procedures designed for use in resource-constrained settings.