Objectives: Sperm preparation procedures improve the percentage motility and motion characteristics. However, it is unclear whether these changes result in an increased rate of acrosome reaction. We studied whether sperm preparation by the swim-up technique selects a sperm population with an intact acrosome and with membrane integrity and how subsequent in vitro capacitation influences the acrosome status of these selected spermatozoa.

Design: Prospective study of samples from normospermic men recruited at a tertiary care institution in which the men served as their own controls.

Materials and Methods: After receiving institutional review board approval, we recruited 15 healthy men with proven fertility who provided semen samples by masturbation. Each sample was divided in three aliquots, each of which was analyzed for sperm concentration, percent motility, and motion characteristics by a computer-assisted semen analyzer. Semen specimens were divided into three equal aliquots: one aliquot received no further treatment (control); the second was processed by the swim-up technique (swim-up group), and third was processed by the swim-up technique and then incubated in a modified-BWW medium with 3% HSA at 37°C under 5% CO₂ for 3 hours (capacitation group). Acrosome status was evaluated by fluorescein iso-thiocyanate-conjugated peanut lectin in conjunction with the viability stain Hoescht-33258; membrane integrity was determined by the hypo-osmotic swelling test. Differences were considered significant at P <0.05.

Results: Percent sperm motility, viability and all motion parameters except linearity were significantly greater in swim-up (P <0.05) and capacitated specimens (P <0.05). The frequency of spermatozoa with an intact acrosome was similar between the control and swim-up groups. However, the percentage of spermatozoa undergoing the acrosome reaction was significantly greater in the capacitated group compared with both the control (P <0.05) and swim-up groups (P <0.001). Sperm membrane integrity in specimens isolated by the swim-up technique was significantly higher compared with the control group (P = 0.03).

Conclusions: Sperm washing using swim-up technique yields a highly motile and viable sperm population with intact membranes. However, this technique cannot isolate a sperm population from the original ejaculate that has an intact acrosome, and in vitro sperm capacitation significantly increases the percentage of spermatozoa capable of undergoing acrosome reaction.

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