Analisis ekspresi protein Outer Dense Fiber 1 (ODF1) dan ODF2, aktivitas spesifik Na+,K+-ATPase, Ca2+-ATPase dan dinein ATPase spermatozoa, serta korelasinya pada pria infertil astenozoospermia = Analysis of protein Outer Dense Fiber 1 (ODF1) and ODF2 expression, the specific activity of the Na +, K + -ATPase, Ca2 + -ATPase and dynein ATPase, and its correlation in asthenozoospermia infertile men

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Abstrak

Astenozoospermia merupakan penyebab umum terjadinya infertilitas pria. Motilitas spermatozoa didukung oleh homeostasis sel dan energi yang dihasilkan dari hidrolisis ATP. Na+,K+-ATPase dan Ca2+-ATPase bekerja pada transpor aktif ion di membran plasma untuk pertahanan homeostasis melalui regulasi proses metabolisme. Motilitas spermatozoa berawal pada proses morfogenesis di testis dan maturasi di epididimis serta memerlukan protein-protein fungsional seperti outer dense fiber (ODF) 1 dan 2. Aktivitas motorik terlaksana oleh protein kompleks dinein dengan ATPase dinein yang membebaskan energi dari ATP.

Dalam penelitian ini dilakukan analisis ekspresi protein Outer Dense Fiber (ODF) 1 dan 2 serta aktivitas enzim Na+,K+-ATPase, Ca2+-ATPase dan dinein ATPase spermatozoa pada pria infertil astenozoospermia. Analisis semen dilakukan secara mikroskopik disertai uji viabilitas dan HOS. Aktivitas enzim diukur berdasarkan kemampuan ATPase melepaskan fosfat anorganik dari ATP dan ditentukan sebagai aktivitas spesifik. Sebagai kontrol digunakan spermatozoa normozoospermia.

Didapati bahwa motilitas spermatozoa astenozoospermia (AG) cenderung lebih rendah dibanding dengan normozoospermia (NG). Hampir seluruh parameter, baik motilitas (VAP, VSL dan VCL), ekpresi dan kekompakan protein ODF1 dan ODF2 serta aktivitas spesifik Na+,K+-ATPase dan dinein ATPase, mengalami kecenderungan penurunan pada AG dibandingkan NG, kecuali aktivitas spesifik Ca2+-ATPase yang mengalami peningkatan secara bermakna pada AG dibandingkan NG. ODF berkorelasi positif dengan motilitas, Na+,K+-ATPase, morfologi, viabilitas dan integritas membran pada kelompok NG.
<hr><i>Asthenozoospermia is a common cause in male infertility. Sperm motility and cell homeostasis are supported by energy generated from the hydrolysis of ATP in the cells, mediated by ATPases such as Na+, K+-ATPase, Ca2+-ATPase and dynein ATPase. In addition, sperm motility is initiated by the process of morphogenesis in the testis and maturation process in the epididymis. The morphogenesis of spermatozoa tail requires proteins such as outer dense fiber proteins (ODF) 1 and 2.
This study aims to evaluate the expression of Outer Dense Fiber (ODF) 1 and 2 protein, as well as the activity of the Na+,K+-ATPase, Ca2+-ATPase and dynein ATPase in asthenozoospermia infertile men. Microscopic semen analysis was carried out by CASA, equipped with the viability and HOS test. ATPase activity was determined based on its ability to release inorganic phosphate (Pi) from ATP and Pi concentration was measured as the intensity of the blue color of phosphomolibdate with a spectrophotometer.

In the AG group, almost all parameters, both motility (VAP, VSL and VCL), expression and density of protein ODF1 and ODF2 and the enzyme specific activities of Na+,K+-ATPase and dynein ATPase, experienced a downward tendency compared to the NG group. However, the specific activity of Ca2+-ATPase exhibited significant increase in the AG compared to the NG group. ODF correlates positively with motility, Na+,K+-ATPase, morphology, viability and membrane integrity in the NG group.</i>