

Impact of Yoga-Conditioned Serum from infertile men on Prostate cancer Cell Characteristics

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Introduction

Infertility affects about 15% of couples worldwide. Additionally, there is an increased likelihood among infertile men to develop both gonadal and extra-gonadal cancers. Oxidative stress (OS) & associated DNA damage, accumulation of DNA adduct (8-OHdG) may lead to *de novo* germ line mutations. 8-OHdG result in global hypo-methylation & genome instability. Loss of genomic integrity, hypermethylation of tumor suppressor genes & hypomethylation oncogene may enhance the risk of cancer in infertile men. OS induced by lifestyle factors, stress, smoking, obesity or infection. Yoga, a mind-body therapy, could improve genomic integrity & factors may reduce susceptibility to cancer. Does yoga intervention reduce the risk of developing cancer that is associated with male infertile men?

Material and methods

A single-arm interventional study was conducted over a three-year period. 40 primary infertile men (mean age 34 ± 2.5) were enrolled from the Andrology Clinic, All India Institute of Medical Science, New Delhi, India and 40 fertile men (mean age 31 ± 2.8) served as fertile control. They underwent a 12-week (1h daily) Yoga intervention. The yoga-primed serum from subjects was used to treat prostate cancer cells (PC-3 cells and LNCap cells) *in vitro*, which was then further assessed for cell proliferation by MTT assay and apoptosis using Annexin-V and PI stain, quantified by FACS. Transwell migration assay and Matrigel invasion assays were done. 8-OHdG, global methylation (5mC) & hydroxyl-methylation (5hmC) levels by ELISA and DFI by SCSA. The sperm Telomere length (TL) and selected genes expression measured using Q-PCR.

Results

The yoga primed serum was used for *in-vitro* cell culture experiment to assess parameters like cell proliferation, migration, invasion and apoptosis. A 72-hour incubation of Prostate cancer cells, the Post-yoga serum from infertile men reduced viable cancer cells by 25% compared to pre-yoga serum. Flow cytometry analysis showed a significant increase ($P < 0.007$) in apoptotic cells in both PC-3 and LNCap cell lines as compared to pre yoga, similarly a significant reduction in cell invasion and migration ($P < 0.005$) of prostate cancer cells indicating that post-yoga serum may have an anti-carcinogenic effect on cancer cells. Additionally, the infertile men showed higher levels of seminal ROS, sperm DFI, and 8-OHdG ($p < 0.001$); however, these levels were significantly decreased after yoga. Also, following a yoga intervention, there was a rise in the percentage of 5mC and TL ($p < 0.004$) in infertile individuals while levels of 5-hmC have decreased. The expression level of gene participating in DNA repair mechanism were assessed and an upregulated expression of *MLH1*, *WT1*, *ERCC1*, *RET* & *SMAD4* was observed after Yoga intervention.

Conclusion

Lifestyle interventions like yoga could improve genomic integrity and increased expression of DNA repair gene and cell-check point genes. Thus, may reduce enhanced susceptibility to develop cancer in infertile men. Enhances the understanding of the link between male infertility and cancer susceptibility, shedding light on shared mechanisms and contributing factors. Yoga primed serum significantly reduced hallmarks of cancer, like cell proliferation, invasion, and migration in prostate cancer cell lines demonstrating the anti-carcinogenic effect of Yoga.