Introduction

The present study aimed to elucidate the therapeutic effects of human mesenchymal stem cells (MSCs) against testicular damage produced by methotrexate (MTX) in male experimental rats.

Methods

A total of 66 male rats were used. The normal control group consists of six rats and other two groups namely the Methotrexate alone treated group and the stem cell treated treatment groups had 30 rats each. The experimental animals were injected with methotrexate 20 mg/kg I.P as a single dose on day 1 and MSCs were also given on day 1 at a dose of 1x10^6 cells intravenously. The efficacy of MSCs to reduce gonadotoxicity induced by methotrexate at 15, 30 and 60 days, was evaluated experimentally in male rats.

Results

The results showed that testosterone levels, spermatic parameters were not affected following treatment with MSCs and MTX induced fertility changes were prevented. Also, superoxide dismutase, glutathione peroxidase and catalase levels were increased 21, 30 and 60 days post treatment of MSCs. Moreover, a decrease in genomic DNA alteration and percentage of fragmented DNA was recorded after MSCs treatment. Methotrexate caused degeneration, necrosis, interstitial edema, and reduction in spermatogenic activity in some seminiferous tubules. The MTX-induced changes in histopathologic findings of testis were partially reversed by treatment with MSCs. Histological examination of testis showed deformities in morphology of testis in test animals with gross damage within the seminiferous tubules in MTX group. The MTX-induced changes in histopathologic findings of testis were partially reversed by treatment of MSCs.

Conclusions

It was concluded that methotrexate is a gonadotoxic agent with a tendency of suppressing semen characteristics and testosterone levels of animals, the presence of MSCs was found to alleviate the toxic effects of MTX. We conclude that MSCs derived from the bone marrow of humans can be an effective therapy of MTX induced gonadotoxicity, thus can contribute to the treatment of infertility.

KEYWORDS

Human stem cells, free radical damage, infertility, sperm counts