

Histological studies on the protective effects of ginger against cisplatin – induced testicular toxicity in male albino rats

Thesis

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Summary and Conclusion

Chemotherapy with cisplatin can have profound and long-lasting effects on spermatogenesis, so almost all patients under this chemotherapy show temporary or permanent azoospermia based on the applied dose of cisplatin. This work aimed at investigating the protective effects of ginger against cisplatin-induced testicular toxicity in male albino rats and to discuss the possible mechanisms underlying these effects.

Twenty four male albino rats were used in this study. They were divided into:

Group 1: eight animals served as control group;

They received one ml saline 0.9 % Na Cl daily for twenty six successive days by a gastric tube and were injected intraperitoneally with 6 ml saline at day 21 of the experiment. They were sacrificed at the same time of the experimental groups.

Group 2: eight animals served as cisplatin group.

They received one ml saline 0.9 % Na Cl daily for twenty six successive days by a gastric tube, at day 21 of the experiment, each rat was injected intraperitoneally by a single dose of cisplatin equivalent to 12 mg/kg (20 ml vial contains 10 mg cisplatin).

Group 3: eight animals served as cisplatin and ginger group.

They received ginger extract (in form of tablets 400 mg each) dissolved in saline orally in a dose equivalent to 310 mg/kg daily for twenty six successive days by a gastric tube.

At day 21 of ginger extract administration, each rat was injected intraperitoneally by a single dose of cisplatin equivalent to 12 mg/kg .

At the end of experimental period, at day 26, rats from all groups were weighed then dissected and both testes from each animal were obtained and weighed, the right testes were processed for light microscopic study. The left testes were cut into small cubes and processed for electron microscopy.

The present study showed the toxic effect of cisplatin on the testis. There was a significant decrease in body and testicular weights when compared with control group and shrinkage of seminiferous tubules confirmed by a significant decrease in the tubule diameter when compared with control group. There were distortion in seminiferous tubules, wide interstitial spaces in between, depletion, degeneration and vacuolization of spermatogenic cells with exception of spermatogonia which resist cisplatin toxicity in addition to thickening and separation of basement membrane from overlying cells. There was a significant decrease in the number of normal seminiferous tubules when compared to control group.

The electron microscopic examination confirmed what's seen by light microscope and showed degenerated cells with small condensed nuclei or devoid of nuclei, degenerated cytoplasm in primary spermatocytes, distorted shrunken early spermatids with degenerated cytoplasm, low electron dense nuclei in some late spermatids in addition to non nucleated degenerated cytoplasmic remnants.

In ginger and cisplatin group, there was a significant increase in body and testicular weights when compared with cisplatin group, however there was a significant decrease in body and testicular weights when compared with control group. Some seminiferous tubules appeared in relatively normal morphology, there was a significant increase in seminiferous tubule diameter when compared to cisplatin group and a

significant decrease in seminiferous tubule diameter when compared to control group . The tubules were separated by wide interstitial spaces, surrounded by partially separated basement membrane, lined by many layers of spermatogenic cells with relatively dispersed cells in some areas of the seminiferous tubules, spermatogenic cells were nearly normal with presence of vacuolated cytoplasm. There was a significant increase in the number of normal tubules when compared to cisplatin group and a significant decrease in the number of normal tubules when compared to control group .

The electron microscopic examination showed normally appearing spermatogenic cells, kept adherent to each other with normal cellular arrangement and architecture, primary spermatocytes containing round nucleus with finely granular nucleoplasm and clumped chromatin and normal electron dense cytoplasm, early spermatid containing central round nucleus with finely granular nucleoplasm and chromatin accumulation and scattered mitochondria in the cytoplasm, spermatid at “Golgi phase” with prominent acrosomal vesicle in association with the nucleus, some early spermatids containing small nuclei and peripherally located mitochondria, late spermatid with elongated nucleus in addition to sertoli cell resting on the basement membrane with indented euochromatic nucleus and cytoplasm rich in mitochondria.

However, some areas of degeneration and vacuolation were present.

Conclusion

The present study showed that ginger could exhibit partial protection against cisplatin induced testicular atrophy.

Recommendation

1. Further experimental work aiming at elaboration of the precise mechanisms behind the toxic effect of cisplatin by using the apoptotic markers
2. More experiments with increasing the dose of ginger or prolongation of administration period may be beneficial for patients taking chemotherapeutic drugs.
3. More experiments using cisplatin in small doses may decrease its side effects.