Abstract

Background: Osteoporosis represents a major public health problem. Some studies have demonstrated the possitive effects of growth hormone and simvastatin on bone metabolism.

Aim: The aim of the present work was to investigate the possible role of growth hormone and simvastatin alone and combined on osteogenic bone changes induced by ovariectomy in rats. Furthermore, study the cardioprotective effects of each drug on myocardial ischemia induced by isoprenaline.

Method: Bilateral ovariectomy was induced in 48 mature female albino rats which were assigned into four main groups. Group I (Sham); Group II (OVX) left untreated for 4 weeks; Group III (OVX+MI) left untreated for 4 weeks followed by induction of myocardial infarction by IP injection of isoprenaline; Group IV (OVX treated + MI) which is further subdivided into 3 subgroups in which treatment was started 4 weeks after ovariectomy and maintained for 6 weeks; subgroup IV-a treated with GH (2.5mg/kg/day) (sc), subgroup IV-b treated with SV (10mg/kg/day) (orally) and subgroup IV-c with combined GH+SV in the same previous doses**.** At the end of the treatment, there was induction of myocardial infarction by IP injection of isoprenaline**.** Bone specific alkaline phosphatase (BSALP), systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), ECG detecting ST segment height were measured. Histopathological examination of right femur, heart and aorta with testing the response of the aortic rings to adrenergic stimulation (phenylephrine) were examined.

Results: Rats of Ovariectomized group (group II) showed significant ($p < 0.05$) increase in SBP, BSALP and significant reduction in cortical and trabecular bone compared to that in group I.

Rats of OVX+ MI Group (group III) showed significant increase of ST segment, significant reduction in SBP and DBP compared to that in group I and II, significant increase in HR compared to that in group II, significant increase in BSALP and significant decrease in cortical and trabecular bone thickness compared to that in group I.

Growth hormone treated group (group IV-a) showed significant decrease of SBP compared to group I and II, significant increase of DBP and decrease of ST segment after MI compared to that in group III, Significant reduction in BSALP and increase in HR with significant increase in cortical and trabecular bone thickness compared to group II.

Simvastatin treated group (group IV-b) showed significant reduction in SBP, DBP and HR compared to that in groups I, III & IV-a. ST segment after MI decreased significantly compared to that in group III. Significant decrease of BSALP and increase of cortical and trabecular bone thickness compared to that in group II, III.

GH+SV treated group (IV-c) showed significant reduction in SBP and DBP compared to that in group I, II, III and IV-a. HR increased significantly compared to that in group II and IV-b. HR and ST segment decreased significantly compared to that in group III. Significant decrease of BSALP and increase of cortical and trabecular bone thickness compared to that in group II and group III.

Conclusion: The current study proved that both growth hormone and simvastatin have antiosteoporotic effect as was evident by histopathological improvement in cortical and trabecular bone thickness more with simvastatin. Also, they have ischemic cardioprotective potential by attenuating isoprenaline-induced ST segment elevations, decreasing previously elevated heart rate, normalization of blood pressure alterations and improvement of altered histopathological changes of the heart tissue more with simvastatin.