Objectives. The present study was designed to assess whether apoptosis-related genes as *parp-1* and *bax* could be targets for treatment of diabetes mellitus and whether vitamin D may exert beneficial effects. **Methods.** Vitamin D_3 treatment for 4 weeks, starting after 4 weeks of the diabetes duration. The expression of *parp-1* and *bax* genes was estimated on mRNA levels using real time quantitative polymerase chain reaction. **Results.** After 8 weeks, diabetic rats had weight loss, while blood glucose was increased about 4.9-fold compared to control group. Vitamin D_3 administration to diabetic animals had no effect on these parameters. It was found that total serum alkaline phosphatase activity was significantly elevated in diabetic rats as compared to control animals and was restored by vitamin D_3. Diabetes was accompanied by reduction of nicotinamidadenindinucleotide, a substrate of poly-ADP-ribosylation, level by 31.7% as compared to control rats, which was not reversed in response to vitamin D_3 treatment. In diabetic hearts, the mRNA expression level of *parp-1* gene was 2.8-fold higher compared to control rats and partially decreased by vitamin D3 treatment. Less significant alterations were observed in diabetic hearts for the mRNA expression level of *bax* gene that was 2.0-fold higher compared to control animals and vitamin D_3 normalized it. These results indicate that cardiomyocytes have a tendency to apoptosis. **Conclusions.** The findings suggest that investigated genes can be targets at the transcriptional level for vitamin D action that may be contributed to the improving metabolic/signaling pathways induced by diabetes mellitus.

Keywords: bax gene; mRNA expression; parp-1 gene; type 1 diabetes mellitus; vitamin D3.