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Possible oxidative stress and inflammatory response evoked by 5-HT1B/1D agonist in rat kidney

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Aim: Ischemic/reperfusion injury is the common cause for acute kidney injury. The aim of the present study is to investigate the effect of 5HT1B/1D agonist on the renal ischemic injury in rats.

Method: Ischemia/reperfusion injury was induced by a 45-minute occlusion of the bilateral renal pedicles and a 24-hour reperfusion. Our experimental groups consist of sham, control, and treatments that received three doses of sumatriptan (5, 10, 20 mg/kg). Nitric oxide kit, selective and non-selective inhibitor of nitric oxide synthase (NOS), aminoguanidine, and L-NAME were used to determine the role of Nitric oxide system. Superoxide dismutase (SOD) and malondialdehyde (MDA) of the tissue were measured to investigate the role of inflammation. Histopathological study of the kidney was performed too.

Result: Serum creatinine (Cr) and blood urea nitrogen (BUN) were measured after 24 hours of reperfusion. Sumatriptan in doses of 10, 20 mg/kg increased Cr and BUN significantly. There was a significant increase ($P<0.05$) of nitric oxide (NO) level in the treatment group compared with the level of the control group. Comparing to sumatriptan alone, the result of aminoguanidine administration showed a significant decrease ($P<0.01$) in BUN and ($P<0.05$) Cr. Besides, there was a significant increase ($P<0.05$) in BUN level, but not in Cr level when both L-NAME and sumatriptan administered within one hour. We also observed a reduction of SOD level ($P<0.05$) and increased serum level of MDA ($P<0.001$); furthermore, the histopathological result indicates kidney damage.

Conclusion: The study conducted showed an increase in kidney damage due to use of sumatriptan. We proved that NO plays a significant role in this injury. Also, decreased levels of creatinine and blood urea nitrogen in response to the aminoguanidine injection showed that inducible NO was involved in this injury.

Recent Publications

1. Sharma Shree G, et al. (2013) Renal cortical infarction following treatment with sumatriptan in a kidney allograft recipient. American Journal of Kidney Diseases 61(2):326–329.
2. Ishikawa Ken, et al. (2012) Effect of selective inhibition of renal inducible nitric oxide synthase on renal blood flow and function in experimental hyperdynamic sepsis. Critical Care Medicine 40(8):2368–2375.
3. Schneider Markus P, et al. (2010) Protective role of extracellular superoxide dismutase in renal ischemia/reperfusion injury. Kidney International 78(4):374–381.
4. Chatterjee Prabal K (2007) Novel pharmacological approaches to the treatment of renal ischemia-reperfusion injury: a comprehensive review. Naunyn-Schmiedeberg's Archives of Pharmacology 376(1-2):1–43.
5. Chatterjee Prabal K, et al. (2002) Inhibition of inducible nitric oxide synthase reduces renal ischemia/reperfusion injury. Kidney International 61(3): 862–871).

Biography

Parnia Mobasheran graduated from IAUPS with PharmD in Pharmaceutical Science in 2017. She ranked 7th in the Nationwide Basic Science Exam. At present she is studying German language and completing her Internship at Alborz Health Center. She defended her PharmD thesis based on the effect of sumatriptan administration on renal ischemia reperfusion injury in rat. She has participated in several scientific conferences in the field of Pharmacy and has also attended two summer schools on the topics, Pharmacology and Clinical Pharmacy. She is very interested in pursuing her educational goals and conducting more research in the field of Pharmacology.

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