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The nephrotoxicity of concurrent use of enalapril and gentamicin in rats (Article)

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Abstract

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Objective: The present study was aimed to assess the concurrent administration of Enalapril (ENAL) and Gentamicin (GM) in the kidney of rats. **Methods:** Sixty male Sprague Dawley rats were divided into 4 main groups (n=15) according to the administered dose. Each main group was further subdivided into three subgroups according to the day of sacrificing (n=5). Group (C) was administered daily with normal saline as control, Group (E) was treated with oral ENAL, Group (G) was treated with 75 mg/kg GM, and Group (EG) was treated with GM and ENAL. The handling of the experiment persisted daily for 15 days, and the investigational examination carried out on days 5, 10, and 15. **Results:** The result showed that GM nephrotoxicity augmented with the period of the experimental study, there was rising in the levels of serum creatinine and blood urea nitrogen on the 10th day and persisted in rising significantly during the period on the 15th day of the experiment. Administration of ENAL showed no significant alteration from those of controls. While the concurrent administration of ENAL and GM showed that ENAL gradually increased GM nephrotoxicity, these physiological retrogressions were accompanied with intensive renal histopathological deteriorations. **Conclusion:** The present study has revealed that the concurrent administration of ENAL enormously aggravated the functional and histological nephrotoxicity of GM in rats. © 2018 The Authors.

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drinking on gentamicin-
mediated nephropathy in ratsYamada, M. , Hishida, A. ,
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(1992) *Renal Failure*

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-
- 1 Geetha, K., Ramarao, N., Sindhu, B., Umamaheshwera Rao, V.
Nephroprotective, nephrocurative activity of Mimosa pudica root against gentamicin induced nephrotoxicity
- (2015) *International Journal of Pharmacy and Pharmaceutical Sciences*, 7 (4), pp. 173-177. Cited 6 times.
http://innovareacademics.in/journals/index.php/ijpps/article/download/1437/pdf_710
-
- 2 Moulds, R.F.W., Jeyasingham, M.S.
Gentamicin: A great way to start ([Open Access](#))
- (2010) *Australian Prescriber*, 33 (5), pp. 134-135. Cited 25 times.
<http://www.australianprescriber.com/upload/pdf/articles/1129.pdf>
doi: 10.18773/austprescr.2010.062
- [View at Publisher](#)
-
- 3 Cuzzocrea, S., Mazzon, E., Dugo, L., Serraino, I., Di Paola, R., Britti, D., De Sarro, A., (...), Salvemini, D.
A role for superoxide in gentamicin-mediated nephropathy in rats
- (2002) *European Journal of Pharmacology*, 450 (1), pp. 67-76. Cited 188 times.
doi: 10.1016/S0014-2999(02)01749-1
- [View at Publisher](#)
-
- 4 Kim, S.Y., Moon, A.
Drug-induced nephrotoxicity and its biomarkers ([Open Access](#))
- (2012) *Biomolecules and Therapeutics*, 20 (3), pp. 268-272. Cited 48 times.
<http://pdf.medrang.co.kr/BT/2012/020/BT020-03-03.pdf>
doi: 10.4062/biomolther.2012.20.3.268
- [View at Publisher](#)
-
- 5 Kalayarasan, S., Prabhu, P.N., Sriram, N., Manikandan, R., Arumugam, M., Sudhandiran, G.
Diallyl sulfide enhances antioxidants and inhibits inflammation through the activation of Nrf2 against gentamicin-induced nephrotoxicity in Wistar rats
- (2009) *European Journal of Pharmacology*, 606 (1-3), pp. 162-171. Cited 90 times.
doi: 10.1016/j.ejphar.2008.12.055
- [View at Publisher](#)
-
- 6 Al-Attiyah, Z.M., Al-Ani, I.M., Abdul-Kareem, H.N., Matlop, E.I.
The Effects of angiotensin-converting-enzyme inhibitor (Captopril) on gentamicin nephrotoxicity in rats
- (2013) *J Med Health Sci*, 2, pp. 80-87.
-
- 7 Silan, C., Uzun, Ö., Çomunoğlu, N.Ü., Gökçen, S., Bedirhan, S., Cengiz, M.
Gentamicin-induced nephrotoxicity in rats ameliorated and healing effects of resveratrol ([Open Access](#))
- (2007) *Biological and Pharmaceutical Bulletin*, 30 (1), pp. 79-83. Cited 55 times.
http://www.jstage.jst.go.jp/article/bpb/30/1/79/_pdf
doi: 10.1248/bpb.30.79
- [View at Publisher](#)
-

- 8 Marbut, M.M., Rajab, H.K., Al-Mahmood, S.M.
Significance of palpitation among hypertensive patients receiving captopril
(2009) *Med J Tikrit*, 15, pp. 32-37.
-
- 9 Makmor-Bakry, M., Hamdan, N.
Effect of angiotensin converting enzyme inhibitors and angiotensin-II receptor blockers on proteinuria of hypertensive patients in standard care practice
(2015) *International Journal of Pharmacy and Pharmaceutical Sciences*, 7 (11), pp. 40-43.
http://innovareacademics.in/journals/index.php/ijpps/article/viewFile/7110/pdf_1287
-
- 10 Bhardwaj, S., Balgir, P.P., Goel, R.K.
Pharmacogenomics and personalized management of hypertension
(2015) *J Critical Rev*, 2, pp. 1-6. Cited 2 times.
-
- 11 Delles, C., Jacobi, J., John, S., Fleischmann, I., Schmieder, R.E.
Effects of enalapril and eprosartan on the renal vascular nitric oxide system in human essential hypertension (Open Access)
(2002) *Kidney International*, 61 (4), pp. 1462-1468. Cited 38 times.
<https://www.journals.elsevier.com/kidney-international>
doi: 10.1046/j.1523-1755.2002.00260.x

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-
- 12 Francischetti, A., Ono, H., Frohlich, E.D.
Renoprotective effects of felodipine and/or enalapril in spontaneously hypertensive rats with and without L-NAME (Open Access)
(1998) *Hypertension*, 31 (3), pp. 795-801. Cited 59 times.
<http://hyper.ahajournals.org/>
doi: 10.1161/01.HYP.31.3.795

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-
- 13 Klotman, P.E., Boatman, J.E., Volpp, B.D., Baker, J.D., Yarger, W.E.
Captopril enhances aminoglycoside nephrotoxicity in potassium-depleted rats (Open Access)
(1985) *Kidney International*, 28 (2), pp. 118-127. Cited 17 times.
doi: 10.1038/ki.1985.130

View at Publisher
-
- 14 Ali, B.H., Bashir, A.A.
Comparative modulating effects of captopril, diltiazem, dietary calcium and pyridoxal-5'-phosphate on gentamicin-induced nephrotoxicity in the rat
(1993) *General Pharmacology*, 24 (5), pp. 1279-1283. Cited 12 times.
doi: 10.1016/0306-3623(93)90381-7

View at Publisher
-
- 15 Chowdhury, M.S., Saha, S.K., Eva, E.O., Sarker, M.M.
A study on the effect of captopril on gentamicin induced nephrotoxicity in rats
(2018) *Mymensingh Med J*, 27, pp. 57-67.
-

- 16 Walker, P.D., Barri, Y., Shah, S.V.
Oxidant mechanisms in gentamicin nephrotoxicity
(1999) *Renal Failure*, 21 (3-4), pp. 433-442. Cited 164 times.
doi: 10.3109/08860229909085109
[View at Publisher](#)
-
- 17 Patel Manali, B., Deshpande, S., Shah, G.
Evaluation of efficacy of vitamin e and N-Acetyl cysteine in gentamicin-induced nephrotoxicity in rats ([Open Access](#))
(2011) *Renal Failure*, 33 (3), pp. 341-347. Cited 24 times.
doi: 10.3109/0886022X.2011.560987
[View at Publisher](#)
-
- 18 Hayashi, T., Watanabe, Y., Kumano, K., Kitayama, R., Yasuda, T., Saikawa, I., Katahira, J., (...), Shimizu, K.
Protective effect of piperacillin against nephrotoxicity of cephaloridine and gentamicin in animals ([Open Access](#))
(1988) *Antimicrobial Agents and Chemotherapy*, 32 (6), pp. 912-918. Cited 40 times.
doi: 10.1128/AAC.32.6.912
[View at Publisher](#)
-
- 19 Vijay Kumar, K., Naidu, M.U.R., Shifow, A.A., Ratnakar, K.S.
Probucol protects against gentamicin-induced nephrotoxicity in rats
(2000) *Indian Journal of Pharmacology*, 32 (2), pp. 108-113. Cited 47 times.
-
- 20 Nakahama, H., Fukuhara, Y., Orita, Y., Yamauchi, A., Takama, T., Kamada, T.
Furosemide accelerates gentamicin accumulation in cultured renal cells (LLC-PK1 cells)
(1989) *Nephron*, 53 (2), pp. 138-141. Cited 9 times.
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-
- 21 Rankin, L.I., Luft, F.C., Yum, M.N., Sloan, R.S., Dinwiddie Jr., C.B., Isaacs, L.L.
Comparative nephrotoxicity of SCH 21420 and amikacin in rats ([Open Access](#))
(1979) *Antimicrobial Agents and Chemotherapy*, 16 (4), pp. 491-494. Cited 23 times.
doi: 10.1128/AAC.16.4.491
[View at Publisher](#)
-
- 22 Dellinger, P., Murphy, T., Pinn, V., Barza, M., Weinstein, L.
Protective effect of cephalothin against gentamicin induced nephrotoxicity in rats ([Open Access](#))
(1976) *Antimicrobial Agents and Chemotherapy*, 9 (1), pp. 172-178. Cited 52 times.
doi: 10.1128/AAC.9.1.172
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-
- 23 Nicolau, D.P., Freeman, C.D., Belliveau, P.P., Nightingale, C.H., Ross, J.W., Quintiliani, R.
Experience with a once-daily aminoglycoside program administered to 2,184 adult patients ([Open Access](#))
(1995) *Antimicrobial Agents and Chemotherapy*, 39 (3), pp. 650-655. Cited 503 times.
<http://aac.asm.org/>
doi: 10.1128/AAC.39.3.650
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- 24 Dahl, A., Rasmussen, R.V., Bundgaard, H., Hassager, C., Bruun, L.E., Lauridsen, T.K., Moser, C., (...), Bruun, N.E.

Enterococcus faecalis infective endocarditis a pilot study of the relationship between duration of gentamicin treatment and outcome ([Open Access](#))

(2013) *Circulation*, 127 (17), pp. 1810-1817. Cited 47 times.
doi: 10.1161/CIRCULATIONAHA.112.001170

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- 25 Mandell, G.L., Bennett, J.E., Dolin, R., Schwartz, D.A.
Principles and practice of infectious disease
(1997) *Arch Pathol Lab Med*, 121, p. 908.

- 26 Smetana, S., Khalef, S., Kopolovic, G., Bar-Khayim, Y., Birk, Y., Kacew, S.
Effect of interaction between gentamicin and pyridoxal-5-phosphate on functional and metabolic parameters in kidneys of female Sprague-dawley rats

(1992) *Renal Failure*, 14 (2), pp. 147-153. Cited 8 times.
doi: 10.3109/08860229209039124

[View at Publisher](#)

- 27 Al-Attiyah, Z.A.
(1996) *The Concomitant Effect of Gentamicin and Angiotensin-Converting-Enzyme Inhibitors (Captopril) on the Renal Structure and Function*
M.Sc. Thesis, Al-Mustansiriah University, Baghdad, Iraq

- 28 Maldonado, P.D., Barrera, D., Medina-Campos, O.N., Hernández-Pando, R., Ibarra-Rubio, M.E., Pedraza-Chaverrí, J.
Aged garlic extract attenuates gentamicin induced renal damage and oxidative stress in rats

(2003) *Life Sciences*, 73 (20), pp. 2543-2556. Cited 97 times.
www.elsevier.com/locate/lifescie
doi: 10.1016/S0024-3205(03)00609-X

[View at Publisher](#)

- 29 Yanagida, C., Ito, K., Komiya, I., Horie, T.
Protective effect of fosfomycin on gentamicin-induced lipid peroxidation of rat renal tissue

(2004) *Chemico-Biological Interactions*, 148 (3), pp. 139-147. Cited 62 times.
doi: 10.1016/j.cbi.2004.05.005

[View at Publisher](#)

- 30 Abdel-Raheem, I.T., El-Sherbiny, G.A., Taye, A.
Green tea ameliorates renal oxidative damage induced by gentamicin in rats

(2010) *Pakistan Journal of Pharmaceutical Sciences*, 23 (1), pp. 21-28. Cited 37 times.
<http://www.pjps.pk/CD-PJPS-23-1-10/Paper-4.pdf>

- 31 Schortgen, F., Lacherade, J.-C., Bruneel, F., Cattaneo, I., Hemery, F., Lemaire, F., Brochard, L.
Effects of hydroxyethylstarch and gelatin on renal function in severe sepsis: A multicentre randomised study

(2001) *Lancet*, 357 (9260), pp. 911-916. Cited 557 times.
<http://www.journals.elsevier.com/the-lancet/>
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Modulation of gentamicin nephrotoxicity by chronic inhibition of angiotensin-I-converting enzyme in rat

(1989) *Archives of Toxicology*, 63 (1), pp. 47-53. Cited 15 times.
doi: 10.1007/BF00334634

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- 33 Luft, F.C., Aronoff, G.R., Evan, A.P., Connors, B.A., Weinberger, M.H., Kleit, S.A.
The renin-angiotensin system in aminoglycoside-induced acute renal failure

(1982) *Journal of Pharmacology and Experimental Therapeutics*, 220 (2), pp. 433-439. Cited 24 times.

- 34 Hirth-Dietrich, C., Stasch, J.-P., Ganten, D., Luft, F.C.
Renal effects of captopril and nitrendipine in transgenic rats with an extra renin gene
([Open Access](#))

(1994) *Hypertension*, 23 (5), pp. 626-631. Cited 29 times.
<http://hyper.ahajournals.org/>
doi: 10.1161/01.HYP.23.5.626

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- 35 Patzer, L.
Nephrotoxicity as a cause of acute kidney injury in children ([Open Access](#))

(2008) *Pediatric Nephrology*, 23 (12), pp. 2159-2173. Cited 71 times.
doi: 10.1007/s00467-007-0721-x

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