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The Using of Phenolic Extract of *Cyperus Esculentus* in Reducing the Nephrotoxicity of Gentamicin in Albino Male Rats

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Abstract:

The idea of the research was to evaluate the effect of phenolic extract in reducing the toxicity of gentamicin induced renal failure. *Cyprus esculentuse* is very important medical plants used for many treatments for illness peoples, so it's widely used over the world.in this study we used (84) male rats and classified for six groups, each group contain (14) rats .Group (1) rats were drenched basic meal , Group (2) rats were drenched phenolic extract187.62 mg/kg/day of Cyprus for two months as negative control , Group (3) rats were injected 120 mg/kg/day gentamicin for 15 days as positive control , while the treatment groups as following: group (4) rats were drenched phenolic extract187.62 mg/kg/day of Cyprus for two months and then injected 120 mg/kg/day gentamicin for 15 days .Group (5)rats were injected 120 mg/kg/day gentamicin for 15 days and then drenched phenolic extract187.62 mg/kg/day of Cyprus for two months . Group (6) rats were injected 120 mg/kg/day gentamicin for 15 days and drenched phenolic extract187.62 mg/kg/day of Cyprus for two months in the same time. After the time of experiment the animals scarified and the samples collected and tissue removed for histological study .the results show significant effect of this medical plant in reducing the toxicity of gentamicin inducing renal failure.

Keywords: tiger nut , nephrotoxicity , gentamicin accumulation

Introduction:

Antibiotics were very widely used in our life to treatment the most known diseases .one of the most famous antibiotics was "gentamicin"(1), which used for treatment many clinical diseases like "bacterial infections" also when mixed with other drugs give good effects in the treatment of many infections (1).but its used restricted due to its toxic effects like "ototoxicity , nephrotoxicity" (2,3) .the accumulation of gentamicin in the body especially in nephrons lead to sever and toxic effects(2) . many researches proved the toxic effects of this drug on many organs in the body (4).there are many treatments used for the reducing the toxicity of drugs ,and the best in use was "herbal medicine" (5) and tiger Nut "Cyperus esculentus" had many healthy features to give improved life and give good treatment for many diseases (6) .its activity came from the highly contents of effective nutrients and elements like "potassium" which play an important role in "nerve conductions , heart rhythm , muscle contractions" (7) .the milk of this plant is "very nutritive" and considered "a good source" for power (8) .also the highly content of vitamin C proved as good "antioxidant, which promotes iron absorption and helping vitamin E

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maintenance which the last essential for immunological system" (9). The oil content of tiger nut uses as "anti-oxidant, anti-arthritic, analgesic" (10).also has many positive effects on reproductive system especially "sex hormones",which led to "enhances testosterone hormone inBPH induced rats"and enhances semine profile (11).many studied listed this plant benefit for "bones ,Tissue repair" ,besides its sharing in "ATP formation and activity glucose" (7,12).

2-Material and Methods:

2-1-Exprmintal animals:

Eighty four male rats, weighting (250-300) g were used in this research .housed in animal house of university of Karbala/ college of pharmacy with, which given free access to food and water ad libtum. These animals divided into six groups:

-Group (1) rats were drenched basic meal,

- Group (2) rats were drenched phenolic extract187.62 mg/kg/day of Cyprus for two months as negative control,

-Group (3) rats were injected 120 mg/kg/day gentamicin for 15 days as positive control, while the treatment groups as following:

-Group (4) rats were drenched phenolic extract187.62 mg/kg/day of Cyprus for two months and then injected 120 mg/kg/day gentamicin for 15 days.

- Group (5) rats were injected 120 mg/kg/day gentamicin for 15 days and then drenched phenolic extract187.62 mg/kg/day of Cyprus for two months.

- Group (6) rats were injected 120 mg/kg/day gentamicin for 15 days and drenched phenolic extract187.62 mg/kg/day of Cyprus for two months in the same time.

At the end of experiment all animals scarified and the blood samples collected for biochemical assessments.

2-2-Biochemical assessments:

1- Dependent Glutathione Peroxidase (GPx) 2-Determination of serum reduced glutathione (GSH) 3- Catalase 4- Uric acid 5- Neutrophil Gelatinase associated Lipocalin Rat (NGAL)

2-3 Statistical Analysis:

The result were represented as mean ± SE. Differences between control and other experimental groups were tested for statistical significance using SPSS version (20) one-way analysis of variances (ANOVA). $P \leq 0.05$.

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3-Results:

The following table show the significant effect of phenolic extract of *Cyperus esculentus* in reducing the toxicity of gentamicin on some kidney parameters and antioxidants in all treatment groups.

Table (3-1) the effect of phenolic extract in reducing the toxic effect of gentamicin in male rats.

parameters / groups	NGAL	Uric acid	GPx	Glutathione	Catalase
Normal saline	5.198±0.381	4.275±0.177	233.00±4.841	47.352±1.907	13.033±0.104
Positive control	13.623±0.248	6.623±0.188	435.389±11.931	78.463±2.685	20.181±0.529
Negative control	5.875±0.396	5.023±0.089	305.703±3.803	55.098±1.976	12.473±0.397
Gentamicin +phenolic extract	11.040±0.353	6.040±0.044	364.627±8.201	71.765±2.685	16.776±0.307
Phenolic extact+gentamicin	10.596±0.215	6.040±0.044	359.418±4.426	68.431±1.976	16.300±0.210
Gentamicin +phenolic extract(together)	7.959±0.236	5.596±0.151	322.294±5.741	54.098±1.172	14.773±0.202

- Similar litters mean no significant difference between groups at $P \leq 0.05$.
- Different litters mean there is significant difference between groups at $P \leq 0.05$.

4-Discussion:

The following study show significant effect of cyperus phenolic extract in reducing the toxic effect of gentamicin in all parameters of kidney and antioxidants values. From the table above there are significant differences between groups in (uric acid , NGAL, Glu , GPx ,Catalase), this is a good proof for healing effect of cyperus against the toxicity of gentamicin .our kidneys show excretion of "xenobiotic and its metabolites" in urine and they are "vulnerable" to damage by "xenobiotic" (13,14).the

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levels of serum NGAL and uric acid give good indicator for kidney activities and functions (15).So this plant enhanced these values and return them to normal as Hassan showed(16) .creatinine results from creatin degrading in muscle tissues and consider as index of renal function in clinical cases (17,18),also the beneficial effect of cyperus esculentus approved by Oguwike et al.(19) who listed the enhancement effect of cyperus esculentus on kidney function which returned to its phytochemical compositions. Also the results agreed with the findings of Nwawuba and Okechukwu (20) who listed that renal dysfunction by any toxin like streptozocin can enhanced and reversed by *Cyperus esculentus.* On the other hands the elevation in serum creatinine and urea was very clear in the results and this consistence with many studies of gentamicin toxicity like (21) they show the nephrotoxicity of gentamicin due to increased serum creatinine and urea also "the tubular necrosis". Also (22) show only low dose of this "agent" led to "acute kidney injury". Branislava Medić et al.(23)also the effects of this extract on antioxidants(catalase , GPx , Glu.).

5-Conclusion:

Our results show significant effect of phenolic extract of *cyperus esculentus* in reducing the toxicity of gentamicin on renal parameters (NGAL, uric acid) and antioxidants (catalase, Glu. ,GPx).

6-References:

1-2019. Critically important antimicrobials for human medicine, 6th revision. Geneva:

462 World Health Organization. Licence: CC BY-NC-SA 3.0 IGO,

2-Juan Carlos Jado 1 , Blanca Humanes 1, María Ángeles González-Nicolás 1,2, Sonia Camaño 1,José Manuel Lara 3, Beatriz López 3, Emilia Cercenado 4, Julio García-Bordas 3, Alberto Tejedor 1,2and Alberto Lázaro . Nephroprotective E_ect of Cilastatin againstGentamicin-Induced Renal Injury In Vitro andIn Vivo without Altering Its Bactericidal E_ciency. Received: 7 August 2020; Accepted: 1 September 2020; Published: 3 September 2020.Antioxidants.MDPI.

3-Chen Y, Huang WG, Zha DJ, Qiu JH, Wang JL, Sha SH, Schacht J. Aspirin attenuates gentamicin ototoxicity: from the laboratory to the clinic. Hear Res. 2007 Apr;226(1-2):178-82. [PubMed]

4- Connolly M, McAdoo J, Bourke JF. Gentamicin-induced anaphylaxis. Ir J Med Sci. 2007 Dec;176(4):317-8. [PubMed]

5- Reddy K S 2007 India wakes up to the threat of cardiovascular diseases J. *Am Coll Cardiol*.1370.

6- Taha Bazine and Şahane Funda Arslanoglu. TIGER NUT (CYPERUS ESCULENTUS); MORPHOLOGY, PRODUCTS, USES AND HEALTH BENEFIT .

Review Volume 3 - Issue 4: 324-328 / October 2020. Black Sea Journal of Agriculture ;Open Access Journal ;e-ISSN: 2618 – 6578.

7- Mohdaly AARAA. 2019. Tiger Nut (*Cyperus esculentus* L.) Oil. In: Ramadan MF, editor. Fruit Oils: Chemistry and Functionality. Egypt: Springer International Publishing; p. 243-269.

8- Oyetoro AOA, Ogundipe OO, Adeyeye SAO, Akande EA, Akinyele AB. 2019. Production and evaluation of tigernut (Cyperus esculentus) milk flavored with moringa oleifera leaf extract. Current Res in Nutr and Food Sci, 7: 265–271.

9- Roselló-Soto E, Garcia A, Fessard A, Barba FJ, Munekata PES, Jose ML, Remize F. 2019. Nutritional and microbiological quality of tiger nut tubers (Cyperus esculentus), derived plant-based and lactic fermented beverages. Ferment, 5(1): 3.

10- Krichene D, Artieda DA, Zarrouk M, Astiasarán I. 2016. Review on Cyperus esculentus: from food safety to pharmacotherapeutics. Int J Pharmacy, 3(1): 211–216.

11- D. I. Izunwanne1*, J. N. Egwurugwu1 and C. L. Emegano1. Effect of Tiger Nut Meal on Some Sex Hormones and Sperm Cells in Androgen-induced Benign Prostate Hyperplasia in Adult Male Wistar Rats. Journal of Advances in Medicine and Medical Research :32(14): 74-82, 2020; Article no.JAMMR.57911 :ISSN: 2456-8899***(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614,***

12- Achoribo ES, Ong MT. 2017. Tiger nut (*Cyperus esculentus*): Source of natural anticancer drug? Brief review of existing literature. EuroMedit Bioml J, 12: 91–94.

13-Airaodion AI, Megwas AU, Ekenjoku JA, Ngwogu KO, Ngwogu AC. Nephro- and hepato-toxicity of common household insecticides used in Nigeria. International Research Journal of Gastroenterology and Hepatology. 2020;3(2):21-28.

14-Brzóska MM, Moniuszko-Jakoniuk J, Piłat- Marcinkiewicz B, Sawicki B. Liver and kidney function and histology in rats exposed to cadmium and ethanol. Alcohol and Alcoholism. 2003;38(1):2–10.

15-Airaodion AI, Ngwogu KO, Ngwogu AC,Megwas AU, Ekenjoku JA. Nephrotoxicity of Monosodium Glutamate (MSG) in Wistar rats. International Journal of Advances in Nephrology Research. 2020;3(1):1-10.

16-Hassan HA. The potential effect of tiger nut oil on some haemato-biochemical blood indices in male albino rats. Egyptian Journal of Experimental Biology. 2007;3:49-54.

17-Airaodion AI, Alabi OJ, Ogbuagu EO, Atiba FA, Olawoyin DS,. Nephro and hepatotoxic effect of air freshener in Wistar rats. Asian Journal of Research in Nephrology. 2020;3(2):1-9.18-Perrone RD, Madias NE, Levey AS. Serum creatinine as an index of renal function:New insights into old concepts. Clinical Chemistry. 1992;38(10):1933–1953.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 14820 - 14825
Received 25 April 2021; Accepted 08 May 2021.

19-Oguwike FN, Eluke BC, Eze RI, Asika CM, Nwosu PN, Nwafor C, Onumonu C. The effects of *Cyperus esculentus* (Tiger nut) on haematological and biochemical profile of male Hypercholesteremic Subjects in Uli, Anambra State Nigeria. Greener Journal of Medical Sciences. 2017;7(4): 036-041.

20-Nwawuba SU, Okechukwu FC. The effect of *Cyperus esculentus* (Tiger nut) oil onliver, kidney and hematological biomarkers in low dose streptozocin and high fat dietexposed male Wistar rats. International Journal of Food Science and Nutrition.2018;3(4):148-152.

21- Alsharidah, M.; Abdel-Moneim, A.-M.H.; Alsharidah, A.S.; Mobark, M.A.; Rahmani, A.H.; Shata, A.; Abdellatif, A.A.H.; El-Readi, M.Z.; Mohany, K.M.; Al Rugaie, O. Thymoquinone, but Not Metformin, Protects against Gentamicin-Induced Nephrotoxicity and Renal Dysfunction in Rats. Appl. Sci. **2021**, 11, 3981.

22-Huang, H.; Jin, W.W.; Huang, M.; Ji, H.; Capen, D.E.; Xia, Y.; Yuan, J.; Paunescu, T.G.; Lu, H.A.J. Gentamicin-Induced Acute Kidney Injury in an Animal Model Involves Programmed Necrosis of the Collecting Duct. J. Am. Soc. Nephrol. **2020**, 31, 2097–2115.

23-Branislava Medić1, Marko Stojanović1, Branislav Rovčanin2, Dušan Kekić3, Sanja Radojević Škodrić4, Gordana Basta Jovanović4, Katarina Savić Vujović1, Nevena Divac1,Radan Stojanović1, Miroslav Radenković1 & Milica Prostran1. Pioglitazone attenuates kidney injury in an experimental model gentamicin-induced nephrotoxicity in rats. (2019) 9:13689Scientific Reports .