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Original Research Article

Improvement in renal function of Hyperhomocysteinemic rats by panax ginseng

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ABSTRACT

Background: Hyperhomocysteinemia is a condition characterized by elevated levels of homocysteine in the blood, which has been linked to various cardiovascular and renal complications, including impaired renal function. *Panax ginseng*, a widely used medicinal herb, has been shown to possess antioxidant, anti-inflammatory, and vasoprotective properties. However, its potential role in improving renal function in hyperhomocysteinemic conditions remains largely unexplored.
Objectives: Hyperhomocysteinemia is a metabolic disorder characterized by elevated levels of homocysteine in the blood, which is associated with impaired renal function. This study aimed to investigate the potential therapeutic effects of Panax Ginseng on renal function in hyperhomocysteinemic rats.
Methods: Male Wistar rats There were five animals per group. Group 1 functioned as the control group, receiving a typical meal (chow feed) and unlimited water. L-methionine (1.7 g/kg/day, p.o.) was given to group 2 Hyperhomocysteinemia (HHCY Control) once daily.
Results: A modest dosage of Panax ginseng (50 mg/kg body weight) and L-methionine (1.7 g/kg/day, p.o.) was administered orally to the third group (test drug 1). The fourth group (test drug 2) got the same combination of L-methionine (1.7 g/kg/day, p.o.) and Panax ginseng (high dosage, 100 mg/kg body weight). In addition, the second, third, and fourth groups of rats received intraperitoneal doxorubicin injections at a dosage of 5 mg/kg after 1 hour of L-methionine administration at intervals of 15 days in order to produce Hyperhomocysteinemia-mediated nephrotoxicity. After 28 days of the trial, the animals were slaughtered, and the blood levels of homocysteine, creatinine, and urea were measured. We measured the amounts of urea, creatinine, and homocysteine in the serum.
Conclusion: *Panax Ginseng* administration effectively improved renal function and attenuated histopathological changes in hyperhomocysteinemic rats. These findings suggest that Panax Ginseng may have a renoprotective effect in Hyperhomocysteinemia-induced renal dysfunction.

1. Introduction

Hyperhomosysteinemia (HHCY) is a biochemical Change characterized by an unusual increase Homocysteine (HCY) level in the blood:[1] up 15μmol/L and a second most frequent metabolic disorder Amino acid Took. Liver and kidneys end extra Homocysteine from blood.[2] Hypermosistinia Inspects blood clots in veins and arterial. Homocysteine is a Sulphur amino acid identified

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from bladder stones in Vincent du Vigood in 1933, according to Jukes et al.[3] The appropriate functioning of methionine synthase is required for the former route, the methylene tetrahydrofolate reductase enzyme, Folic acid and vitamin B12.[4] The cystothelin beta synthases and methyl tetrahydrofolate reductase enzymes are required in the latter route Intracellular homocysteine.[5] It was also absorbed into the bloodstream and excreted in the urine.[6] Hyperhomocysteinemia is a rare autosomal recessive condition marked by high homocysteine levels in the urine and blood. Enhanced Homesystin Synthesis and Its access intracellular usage increases its flow Blood.[7] Hypermyocysteinemia causes further vitamin deficits, including folic acid B9, pyridoxine B6, and cyanocobalamin (B12). For the reason that of poor plasma B12 levels, those who eat a lot of protein are more likely to develop hypermyocystinia.[8]

It has been estimated that Light weight Hypermosistinia occurs in 5-7% 40% in normal population and patients Disease.[9] General Plasma Homocysteine Level in Blood 5 to 15 μmol /l. Lightweight Hypermosistinia range Serious above 31 to 100 μm / L and 100 μm / L5[6]. In 1969, MC Golfi established a link between hyperhomocysteinemia and atherosclerosis.[10] Hypermosistinia is now well recognized as a substantial, Self-reliant risk factor for myocardial infarction and other vascular incidents. Bright Forest reports that homocysteine effects on atherosclerosis are multi-functional.[11] This includes the Engendering of free oxygen Radical who changes poor density lipoprotein of the sub Endothelial tissue for oxidation low density lipoprotein.[12] Oxidation LDL acts as a further intermediary Swelling litigate in atherosclerosis Oxidation LDL Vascular cell attachment issues molecules although monocytes COO Charm Protein. Monocytes obtain again Macrophage improved, which takes oxidation to LDL obtain concerted into foam cells.[13]

Foam cells are fated Below beneath the endothelium to make fatty line. Other termination of nitric oxide stimulation for free Radical, resulting in endothelial affliction and Contributed to Atherosclerosis. Hypermosistinia Reactive oxygen species, the formation of reasons Development of swelling in lipid peroxide and Vascular endothelium. Patients with kidney disease, Display highly advanced plasma HCY level. Hussey level Reduces the kidney function.[14] Work Homocysteine is a kidney one in the management Area of current research. It has been told that Healthy kidney plays a major role in the approval Excessive homocysteine, as it does with other amino acids.[15] Renal homocysteine clearance and filtration is Influenced by dietary protein intake. Panax ginseng is a fat-soluble drug, commonly known as Ubiquinone It is a naturally occurring lipophilic Antioxidant containing benzoquinone ring. This is is biosynthesized in all tissues of the body and is a major role in mitochondrial respiration.it inhibits lipids Peroxidation by inhibiting the diffusion of lipids Peroxiradicals.[16] Panax ginseng also protects the protein and lipoproteins from oxidation by the same mechanism. Current evidence suggests that Panax ginseng has several Anti-inflammatory effects that reduce secretion proinflammatory cytokines in lymphocytes and Monocytes. It has been reported that Panax ginseng Improves endothelial dysfunction in diabetics.[17]

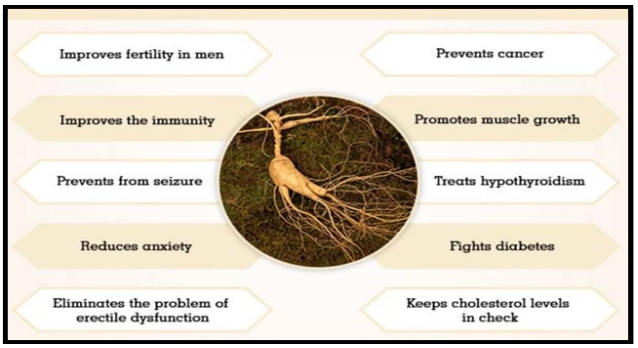

Fig. 1: Uses/benefits

2. Materials and Methods

Methionine manufactured by Sigma Company and Supplied by Praveen Chemicals Mathura, India. Doxorubicin Hydrochloride (DOX) Supplied by Sun Pharma Ltd., India was used in this experiment.[18] Studies were Held in Wistar albino rats of any gender, weight 200-300 grams.[19] Yes they were maintained for the environment 4 weeks before use and adjusted individually in cages under stainless steel wire 12-h light/12-h dark cycle 50% humidity in a room 25±2o C temperature. Animals fed standard pellets diet.[20] They had free access to food and water. NS The institutional animal ethics committee, the Committee for the purpose of Control and Supervision of Experiment on Animals (CPCSEA), approved the experimental procedure.[21]

3. Experimental design

3.1. Induction of Hyperhomosysteinemia

Animals were randomly assigned to four groups follows:

The normal control (n=5) was given specific chow feed and distilled water during the experimental protocol and served as an untreated group.[22] Second group (HHCY Control, n=5) fed on 1.7 g/kg/day p.o. L-methionine through oral gavage. The purpose of such a diet was the reason Hyperhomocysteinemia. third group (trial drug 1, n=5) with Panax ginseng 50.[23] Was treated at low doses of via mg/kg body weight + L-methionine (1.7 g/kg/day, p.o) oral gavage. The fourth group (test drug 2, n=5), received High dose of Panax ginseng (dose: 100 mg/kg body weight) + 1.7 g/kg/day p.o. L-methionine via oral gavage.[24] Additionally,

doxorubicin injection i.p was after 1 hour given at a 5 mg/kg dose body wt. at 2 week intervals To motivate the second, third and fourth groups Nephrotoxicity 28.[25] Experiment Was terminated after days, animals were killed and homocysteine, creatinine And the amount of urea in the serum was determined.[26]

4. Statistical Analysis

All data are presented as the mean ± SEM. Difference Between-group are assessed by one-way ANOVA Dunnett was then tested using graph pad instant version 3.Values of $p<0.05$ were considered significant.

5. Results

Serum homocysteine concentrations in the second group animals (HHCY control), fed L-methionine (1.7 g/kg/day), p.o) were significantly higher than in the first group of rats (Normal Control) Fed Chow Diet (25.28±0.21 Vs.) 4.33 ± 0.28 μmol/L).still had high homocysteine levels observed in a third group of animals (test drug 1), fed less Panax ginseng. Dosage (50 mg/kg body weight) compared to group 2 (25.28±0.21 vs 24.11±0.25 μmol/L).There was a significant difference in homocysteine Levels of group 2 and rats fed the higher dose (100 mg/kg body) Weight) Panax ginseng in group 4 (25.28±0.21 vs.) 11.50 ± 0.29 μmol/L).Similarly, there was an important Decreased blood urea levels in test rats (test drug 1) when compared to group 2 (33.74±3.50 vs.) 47.12 ± 3.71).Large reduction in urea levels (test drug 2) observed compared to group 2 (22.32 ± 1.29 vs. 47.12 ± 3.71).In addition, the serum level of creatinine also Significant reduction was observed in Group 3 (Test Drug.) 1) and group 4 (test drug 2) when compared to group 2 (0.54±0.04 vs. 1.15±0.19), (0.68±0.04 vs. 1.15 ± 0.19).

Table 1: Effect of panax ginseng on renal f unction Hyperhomocysteinemic rats.

S. No	Groups	Serum Level		
		Homocystein- (μmol/L)	Creatinine (mg/dL)	Urea (Mg/dL)
1	Control	10.10±0.43	0.54±0.01	17.60±0.70
2	HHYC	27.30±0.80	1.15±0.19	47.12±3.71
3	Test 1	16.10±0.43**	0.68±0.04*	33.74±3.50**
4	Test 2	10.24±0.73**	0.54±0.04**	22.32±1.29**

The mean and standard deviation (SEM) are used to express the data (Dunnett's test was followed by a one-way ANOVA). **P<0.01 indicates a signification difference when compared to the (HHYC) group. *P<0.05 indicates a significance difference when compared to the (HHYC) group.

6. Conclusion

The study aimed to investigate the potential of Panax ginseng, a lipophilic moiety, in protecting hyperhomocysteinemic rats from renal damage. Four sets of twenty Wistar albino rats were created, with five animals per group. Group 1 was the control group, receiving a typical meal and unlimited water. L-methionine was given to group 2 Hyperhomocysteinemia (HHCY Control) once daily. Panax ginseng (50 mg/kg body weight) and L-methionine (1.7 g/kg/day, p.o.) were administered orally to the third group (test drug).

The fourth group received the same combination of L-methionine and Panax ginseng (high dosage, 100 mg/kg body weight). Intraperitoneal doxorubicin injections were administered at 15-day intervals to produce Hyperhomocysteinemia-mediated nephrotoxicity. After 28 days, blood levels of homocysteine, creatinine, and urea were measured. The HHCY group had significantly higher levels of urea, creatinine, and homocysteine in the serum compared to the normal group. Panax ginseng (50 and 100 mg/kg, p.o.) treated groups decreased these levels in a dose-dependent manner. The fat-soluble moiety of Panax ginseng could be considered as a potential option for nephroprotection in hyperhomocysteinemic rats.

7. Conflict of Interest

None.

8. Source of Funding

None.

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