

BIOLOGICAL ACTIVITIES OF COW URINE: AN AYURVEDIC ELIXIR

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ABSTRACT

Cow urine therapy and all traditional system's from Indian system of medicine have a strong scientific base. Cow urine has been described in 'Sushrita Samhita' and 'Ashtanga Sangraha' to be the most effective substance/secretion of animal origin with innumerable therapeutic values. Ancient books on ayurveda states that consumption of cow urine increase resistance to diseases by up to 104%. In India, drinking of cow urine has been practiced for thousands of years. Panchagavya is a term used in Ayurveda to describe five important substances obtained from cow namely Urine, Dung, Milk, Ghee and Curd. Many people use Panchgavya in some rituals (puja) and for medicinal purposes. It is also used in Yajur Veda for ark as a medicine. A work carried out on modern approaches has showed that cow urine has different activities like antioxidant, anti-diabetic, wound healing property, immunomodulator, also act as bioenhancer to increase the efficacy of antibiotics, nutrients and anticancer drugs like taxol.

KEYWORDS: cow urine, ayurvedic uses, modern activities displayed.

INTRODUCTION

Cow (*Bos indicus*) urine/gomutra has been elaborately explained in Ayurveda and described in "Sushruta Samhita", "Ashtanga Sangraha" and other Ayurvedic texts as an effective medicinal substance/secretion of animal origin with innumerable therapeutic properties.^[1] Bhav Prakash Nighantu describes gomutra as the best of all types of animal urine (including human) and enumerates its various therapeutic uses.^[2] Persons who drink gomutra regularly are said to live a healthy life, remaining unaffected by the vagaries of old age, even at age 90.^[3] Gomutra is called "Sanjivani" and "Amrita" in Ayurveda. In addition, it has applications as a biopesticide in organic farming along with cow dung, cow's milk and other herbal ingredients. Gomutra is not a toxic waste material. 95% of it is water, 2.5% consists of urea, and the remaining 2.5% is a mixture of minerals, salts, hormones and enzymes.^[4] Traditional medicines, whether from Ayurveda or Siddha are based on classical texts and systems, practices and products handed down over generations going back to Charak, Sushruta, Vagabhatta, the Ashtangahridaya and the Samhitas. Several medicinal properties of cow urine have been mentioned and in Indian tradition cow urine is believed to have therapeutic properties.^[5] The laboratory analysis of cow urine shows that it contains nitrogen, sulphur, phosphate, sodium, manganese, iron, silicon, chlorine, magnesium and mineral as its mineral content; malic, citric, tartaric, succinic, carboxylic acids; calcium salts, Vitamins A, B, C, D, E; lactose, enzymes, creatinine, hormones and gold acids - all needed in

smaller amounts by the human body to balance the "tridosha" - vata, pitta and Kapha.

The various mineral and chemical constituents present in cow urine are attributed with different biochemical roles in the body.^[8] For example nitrogen remove blood abnormalities, toxins and is a natural stimulant of urinary system; sulphur support peristaltic movement in large intestine and purified blood; copper control unwanted fat; iron help in production of haemoglobin and erythropoiesis; phosphorus helps in removal of stones from urinary tract; sodium purifies blood and acts as an antacid; potassium cures rheumatism and increase appetite, muscular strength, stamina and activeness; manganese prevents growth of germs, tissue necrosis; calcium is a blood purifier and strengthens bones; gold is a germicidal and increases immunity. Our body contains many micronutrients that give us strength for life, but these micro-nutrients are flushed out of our body when we urinate. Cow urine meets the deficiency of these micronutrients in the body. It maintains the balance of these substances in our body and cures even the so called incurable diseases.^[6]

Virtues of cow urine as described in Ayurveda

Cow urine (gomutra) has been described to have Rasa as Katu-Tikta-Kashaya; Guna as Tikshna, Laghu, Kshar; Virya as Ushna. Its Dosaghnata is Vata-Kaphashamaka. Cow urine in Ayurveda has been described to possess Therapeutic uses as Shula, gulma, udara, anaha, kandu, akshi & mukharoga, kilasa, vatavyadhi, bastiroga, kusta, kasa, swasa, shotha, kamla, pandu etc.

It was also found that Cow's urine contains various inorganic elements including silver, traces of gold, Na-K in ratio of 4:1 (36%: 9% in dried urine), apart from app. 3% urea. Further important findings were, that fresh cow-urine contains 50-100 mg, Oestrogens /100 ml; 20-200 µg of corticosteroids/100 ml and 0.05-0.15 mg of 17-Ketosteroids /100 ml (Apte, 2002).

Processing of different herbs with Gomutra in various formulations is done regarding its Ushna and Tikshna property. By virtue of these properties Gomutra makes the active ingredients in a formulation to get absorbed, reach the site of action faster and thus act faster. Due to the ability of gomutra to reduce kapha and meda; it not only increases the absorption of active ingredients, but also plays a vital role in scraping the unwanted fats and deposited lipids. This also helps to clear the various channels in our body system. As Gomutra is agnideepan, It helps to increase digestive power of our system which subsequently helps to maintain the body.

Gomutra balances tridoshas. According to Ayurveda the cause of all the diseases are 'tridoshas' or the imbalance of three factors i.e. mucous, bile and air. Cow urine has a direct effect on the functioning of liver. Liver purifies the blood and imparts disease-resistance power to the body. Some micro-nutrients are present in our body, which gives the strength to life. Micro-nutrients are flushed out through the urine and gradual loss of these micronutrients leads to ageing of our body cells. Cow urine meets the whole requirement of the nutrients in the body as it has all the micro-nutrients in it which are required for a healthy life. Thus cow urine can stop the aging process and is also been termed as Elixir.

Cow urine is also known as 'Medhya' and 'Hradya', which suggests that it provides strength to brain and heart. In this way cow urine protects heart and brain from damages that occur due to mental tension and protects these organs from diseases and disorders. Excessive use of the modern medicine has some effects as it leaves residue in the body. Cow urine destroys the toxic effects of these medicinal residues and makes the body disease free. Electric currents or rays, which are present in the environment, keep our body healthy. These rays are present in the form of very small currents that enter the body through the element copper, which is present in the body. Copper is also present in the cow urine, which has the property of attracting the electric waves and thereby keeping our body healthy.

Gomutra exhibits the property of Rasayana tattwa responsible for modulating various bodily functions, including immunity. It augments B- and T-lymphocyte blastogenesis; and IgG, IgA and IgM antibody titers in mice. It also increases secretion of interleukin-1 and interleukin-2.^[9] Phagocytic activity of macrophages, and is thus helpful in the prevention and control of infections. Antimicrobial and germicidal properties of gomutra are due to the presence of urea (strong effect), creatinine,

swarnkshar (aurum hydroxide), carbolic acid, other phenols, calcium and manganese. Its anticancer effect is due to uric acid's antioxidant property and allantoin. Immunity is improved by swarnkshar; and wound healing is promoted by allantoin. Cardiovascular health is maintained by a number of its components: kallikrein is a vasodilator; the enzyme urokinase acts as a fibrinolytic agent; nitrogen, uric acid, phosphates and hippuric acid act as diuretic agents; ammonia maintains the integrity of blood corpuscles; nitrogen, sulfur, sodium and calcium components act as blood purifiers; while iron and erythropoietin stimulating factor maintain haemoglobin levels. Renal health is maintained by nitrogen, which acts as a renal stimulant, and urinary components which act as diuretic agents. Its anti-obesity effect is due to the presence of copper ions; calcium promotes skeletal/bone health. Aurum hydroxide and copper act as antidotes for various poisons in the body.^[10]

Biological Activities of Cow Urine as Described in Modern Science

Antioxidant activity

In vitro study was conducted to elucidate the antioxidant activity of cow urine by using two methods viz DPPH radical scavenging activity and superoxide scavenging activity.^[11] Ascorbic acid was used as standard. Free radical scavenging activity of cow urine, its distillate and ascorbic acid by DPPH and NBT method (in vitro) was found to be 2.9 µmol, 5.0 µmol, 3.0 µmol and 3.0 µmol, 5.1 µmol, 2.9 µmol, respectively.^[12] An antioxidant is a chemical that prevents the oxidation of other chemicals and the formation of free radicals. They protect key cell components by neutralizing the damaging effects of free radicals, which are natural by-products of cell metabolism.^[13] Free radical reaction is an important pathway in a wide range of biological. A vast amount of circumstantial evidence implicates free radicals as the mediators of wide range of diseases including diabetes, ageing, cancer, etc.^[14] The revealed antioxidant property of cow urine and its distillate may provide intervention against oxidative threats, both in health and disease. The result suggests that the antioxidant action is attributed to the free radical scavenging activity of urine components and these components may prevent the process of aging. The antioxidant status of re-distilled cow's urine is contributed mainly by volatile fatty acids (1500 mg/L) as revealed by the GC-MS studies. These fatty acids and other antioxidants might cause the observed protective effects.^[15]

Anti-diabetic Activity

The sacred Indian cow, *Bos indicus* known as "Kamadhenu" in Indian scripts, is believed to be a "mobile hospital" for the treatment of many diseases. The effect of a distillate of cow urine was studied in vivo in rats for its anti-diabetic activity. Diabetes was induced by administration of streptozotocin (50 mg/kg body wt., i.p.) dissolved in citrate buffer (0.1 M, pH 4.5). The anti-diabetic effect of cow urine distillate (three different

doses) and a standard drug, glibenclamide (0.25 mg/kg, p.o.), was studied in these diabetic rats. The parameters used in the study included assessment of fasting blood glucose levels, serum lipid profiles, liver glycogen levels and initial and final changes in body weight. The cow urine distillate produced a significant ($P < 0.05$) reduction of the elevated blood glucose, serum cholesterol and serum triglycerides levels when compared with the diabetic control. The treatment with cow urine distillate also showed a significant increase in HDL levels and a gain in body weight when compared with the diabetic control.^[16] Glycogen synthesis in the rat liver and skeletal muscles was impaired during diabetes.^[17] The decreased glycogen levels may probably be due to the lack of insulin in the diabetic state, which results in the inactivation of the glycogen synthase systems. In the recent investigation, a significant increase in glycogen levels was observed in the treated groups, which might be due to the reactivation of the glycogen synthase system. Oxidative stress has been shown to play an important role in the etiology of diabetes which causes pancreatic injury and could be responsible for the increased blood glucose^[18-19]

Antibacterial Activity

Antibacterial activity of cow urine distillate was analyzed (in vitro) against the *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Salmonella typhi*. 5, 10 and 15 μ l Concentrations of cow urine distillate discs were taken for the study. Among the three concentrations highest antibacterial activity was noted in 15 μ l concentration when compared with 5 and 10 μ l. Maximum antibacterial activity was observed in *Pseudomonas aeruginosa* (12.6 ± 0.05 , 13.8 ± 0.18 and 15.4 ± 1.23 , mm in diameter, respectively) and *Salmonella typhi* (12.3 ± 1.23 , 13.6 ± 0.17 and 15.4 ± 1.23 , mm in diameter, respectively) when compared with other bacterial species and the standard antibiotic (ampicillin).^[20] A US patent was obtained by CSIR (Council for Scientific Industrial Research) India which claimed a novel pharmaceutical composition present in cow urine distillate which is effective as an antifungal and antibacterial.^[21]

Antifungal Activity

Antifungal activity of cow urine distillate was analyzed (in vitro) against *Aspergillus niger* and *Aspergillus flavus*. When the two fungal organisms were compared, maximum growth suppression was observed in *Aspergillus niger* (8 ± 0.14 , 11.3 ± 1.2 and 12.6 ± 0.04 , mm in diameter, respectively) than *Aspergillus flavus* (7.3 ± 0.25 , 10 ± 0.26 and 11 ± 1.2 , mm in diameter, respectively).^[20] A similar result has been reported by Prashith Kekuda et al.^[22] Cow urine distillate at various concentrations was tested for antifungal activity. The growth reduction in percentage was taken into consideration and antifungal effect was evaluated. 5% Cow urine distillate was more effective against *Mucor* sp. (37.1%) followed by *A.oryzae* (10.2%) and *A. niger* (5.4%).

Immunomodulatory Effect

Olusi and Ojewole^[23] found that oral administration of cow's urine concoction in rats causes the activation of the third complement component in the serum. The product of this activation has some histamine-releasing effects and causes a characteristic acute fall in neutrophil and monocyte counts in the peripheral blood which is reversed within four hours. The importance of these observations to the areas of the world where cow's urine concoction is used for the treatment of childhood convulsion is discussed. Kumar et al.^[24] investigated the blastogenic activity of lymphocytes and effect of in-vivo cow urine treatment on it so as to find out their potential to mount protective immune response against diseases in chicks. There was maximum increase in lymphocyte proliferation activity during first two weeks of development. During the experimental period cow urine enhanced the T- and B-cell blastogenesis by 1.81% and 2.21%, respectively. However, Chauhan et al.^[25] reported that cow urine significantly enhances T- and B-cell proliferative activity in mice. Ylonen et al.^[26] reported that a total of two main allergens were found in cow dander (20 and 22 kD) and one in cow urine (20 kD). The 20 kD components were shown to be the most important allergen in cow antigen extracts. The specificity of immune system depends upon the number and activity of lymphocytes. Chauhan et al.^[25] studied the immunomodulatory effect of cow urine in mice and found that cow urine enhances both T- and B-cell blastogenesis and also increases the level of IgG. Kumar (2001)^[27] and Chauhan et al.^[28] reported increase in both cellular and humoral immune responses due to cow urine. Study was planned to investigate the blastogenic activity of lymphocytes and effect of in-vivo cow urine treatment on it so as to find out their potential to mount protective immune response against diseases. They showed cow urine marginally unregulated lymphoblastogenesis in developing stages of chicks. This means immune system develops at an early stage and neonatal mortality can be reduced with the use of cow urine. Hayakawa and Takenaka^[29] examined the potential for preparing template DNA in polymerase chain reactions (PCR) from urine in Japanese macaques (*Macaca fuscata*). Microsatellite band patterns from urine samples showed close agreement with those of blood and faecal samples, and only a few microlitre of urine yielded a template DNA for PCR.

Anticancer Activity

Anticancer potential of cow urine therapy has been reflected by several case reports and practical feedback of patients for the treatment of cancer. Cow urine enhances the immunocompetence and improves general health of an individual; prevent the free radicals formation and act as anti-aging factor; reduces apoptosis in lymphocytes and helps them to survive; and efficiently repairs the damaged DNA, thus is effective for the cancer therapy. Experimentally it has been proved that among all sorts of urines, the urine of the Indian cows is most effective.^[30] The anticarcinogenic activity of cow's

urine was evaluated using two stages in Swiss albino mice, induced by a single application of 7,12-dimethylbenz[a]anthracene (104 µg/100µl) and one week later, promoted by repeated application of croton oil (1% in acetone/thrice a week) till the end of experiment (16 weeks). The tumour incidence, tumour yield, tumour burden and cumulative number of papillomas were found to be higher in the control (without cow urine treatment) as compared to experimental animals (cow urine treated). The difference in the values of the results of experimental groups were statistically analyzed and found to be significant in comparison to the control group ($p < 0.05$). So the present study demonstrates the chemo preventive potential of cow urine on DMBA-induced skin tumorigenesis in Swiss albino mice.^[31]

Anticlastogenic Activity

The anticlastogenic activity of redistilled cow's urine distillate was studied in human polymorphonuclear leukocytes (HPNLs) and human peripheral lymphocytes in vitro challenged with manganese dioxide and hexavalent chromium as established genotoxicants and clastogens, caused statistically significant DNA strand break, chromosomal aberration and micronucleus formation. Three different doses of cow urine distillate: 1 µl/ml, 50µl/ml and 100 µl/ml were used in the study. The redistilled cow's urine distillate was found to possess strong antigenotoxic and anticlastogenic properties against HPNLs and HLC treated with Cr+6 and MnO₂. This property is mainly due to the antioxidants present in cow urine distillate. DNA strand break, chromosomal aberration and micronucleus formation could be protected by redistilled cow's urine distillate.^[32]

Hepatoprotective Activity

Effect of cow urine distillate on liver function was studied in vivo in rats intoxicated with carbon tetrachloride (CCl₄). Hepatotoxicity was induced by a 1:1 (v/v) mixture of CCl₄ in olive oil (5 ml/kg i.p). The mechanism of liver injury is through the production of toxic trichloromethyl free radicals (CCl₃.) by liver microsomes during the metabolism of CCl₄.^[33] Free radicals are highly reactive and bind covalently to cell molecules, leading to cell necrosis. Due to the enzymatic activation by CCl₃ free radicals, elevation of SGOT, SGPT, ALP, GGT, and total bilirubin levels occurs^[34-35], which was evidenced by the elevation of the above markers ($P < 0.05$) in CCl₄-treated animals as observed in the study. Protective effect of cow urine distillate (in three dose levels) and standard drug Silymarin (100 mg/kg, p.o) on liver function were studied in intoxicated rats. The cow urine distillate decreased the levels of SGOT, SGPT, ALP, GGT, and total bilirubin in a dose-dependent manner ($P < 0.05$) as silymarin. Pretreatment with cow urine distillate reduced the elevated enzyme levels in a dose dependent manner, indicating that it interferes with the action of CCl₃ free-radicals produced.^[36] Since hepatoprotective properties of cow urine distillate were found in this study, the possible

mechanism of cow urine distillate by which the liver function is protected may be attributed to its antioxidant property contributed mainly by volatile fatty acids and free radical scavenging.^[35]

Wound Healing Property

The wound healing activity of cow urine was studied in Wistar albino rats. The efficacy of wound healing property was evaluated by excision wound model. The parameter studied was the rate of wound contraction. The studies on excision wound healing revealed that all the groups showed decreased wound area from day to day. On day 4th, the external application of urine showed significant increase in wound healing in male and female rats compared to all other groups. However, on 14th post wounding day, Group I and VIII animals showed that 0 % and 0.40.4 % of healing was left, which may be due to normal immunity of the animals, whereas nitrofurazone-treated animals showed 0 % and 0.50.3 % healing. The study revealed that the cow urine on external application to the wound, hastened the wound healing process. It can be said that cow urine has a potential to heal the wound from the first day of application.^[37]

Activity against Leishmaniasis

Cow urine has anti-Leishmania donovani effect in vitro. Leishmaniasis or kala-azar, a disease which is highly endemic in the Indian sub-continent, is caused by an intracellular protozoan parasite Leishmania donovani. To confirm the diagnosis of kala-azar the causative organism need to be cultured and maintained in in-vitro or in-vivo culture system. Maintenance of this parasite in animals costs the lives of the laboratory animals and for in-vitro culture maintenance foetal calf serum (FCS) is used as growth supplement in these media. In last couple of years, a few alternatives of (FCS) have been reported as growth supplements. Recently, human urine has been reported use human urine an alternative to FCS. The cow urine distillate has shown anti-Leishmania donovani effect in-vitro.^[38]

Bioenhancing Property

Bioenhancers are the compounds which enhance the bioavailability of drugs in the body. Cow urine has shown this property.^[39] Cow urine distillate is more effective as a bioenhancer than cow urine, and increases the effectiveness of antimicrobial, antifungal and anticancer drugs.^[40] It also increases the activity of gonadotropin releasing hormone conjugate with bovine serum albumin (GnRH-BSA) and zinc.^[41] Cow urine has bioenhancing activity for rifampicin, the front-line antitubercular drug increasing its action up to sevenfold against *Escherichia coli*, and up to 11-fold against Gram-positive bacteria. Cow urine distillate enhances the transport of antibiotics, e.g., rifampicin, tetracycline, and ampicillin, across the gut wall as well as across artificial membranes. Transport enhancement varies from approximately twofold to seven fold.^[42] The GnRH-BSA conjugate has a deleterious effect on reproductive hormones and estrous cycles of female mice; cow urine

concentrate acts as a bioenhancer of immunization efficacy to modulate these effects.^[41] Cow urine exhibits antitoxic activity against cadmium chloride and can be used as a bioenhancer for zinc, Zn²⁺. Mature male mice, *Mus musculus*, exposed to cadmium chloride only, showed 0% fertility rate. However, the animals which were given a combination of cadmium chloride + cow urine + zinc sulfate showed 90% fertility rate with 100% viability and lactation indices. Besides this, the fertility index was also found to be 88% in the group treated with cadmium chloride and cow urine.^[43] Cow urine has been granted US Patents (No. 6,410,059 and 7,235,262) for its medicinal properties, particularly as a bioenhancer and as an antibiotic, antifungal and anticancer agent.^[44-45] It also increases the potency of taxol (paclitaxel) against MCF-7, a human breast cancer cell line, in *in vitro* assays (US Patent No. 6,410,059).^[44]

Anti-urolithiatic Activity

Urolithiasis is extremely painful and the third prevalent disorder of urinary system.^[46] Life time risk for renal calculi is 7-12% among general population.^[47] Alteration in crystallization conditions of urine is responsible for stone formation.^[48] Genetic factor, diet, sedentary lifestyle, climate, and urinary tract infection are common risk factors.^[49] The studies have shown that consumption of high dietary oxalate is a major risk factor for stone formation.^[50] The most common metabolic abnormality among the recurrent stone formers is hypercalciuria.^[51] In humans, almost 80% calculi are composed of calcium oxalate and calcium phosphate whereas uric acid, cystine and magnesium ammonium phosphate (struvite stone) are forming the rest of the calculi.^[52] To investigate the anti-urolithiatic effect of cow urine ark (medicinal distilled cow urine) *in vivo* study had been done in which ethylene glycol (EG) induced renal calculi formed. 36 male Wistar rats were randomly divided into 6 equal groups. Group I animals served as vehicle control and received distilled water for 28 days. Group II to VI animals received 1% v/v EG in distilled water for 28 days. Group II served as EG control. Group III and IV (preventive groups) received cow urine ark orally for 28 days in doses of 1 mL/kg and 2 mL/kg, respectively. Group V and VI (treatment groups) received 1 mL/kg and 2 mL/kg cow urine ark orally, respectively from 15th to 28th days. 24-Hour urine samples were collected on day 0 and 28. Urine volume and oxalate levels were measured. On day 28, blood was collected for biochemical parameters. Animals were sacrificed and kidneys were harvested, weighed and histopathologically evaluated for calcium oxalate crystals. To calculate the percentage of inhibition of mineralization, simultaneous flow static *in-vitro* model was used. Here EG significantly increased urine oxalate, serum creatinine, urea level in blood; kidney weight and CaOx deposits. Provision of cow urine ark resulted in significantly lower levels of urine oxalate, serum creatinine, blood urea and CaOx depositions as compared to Group II. (*p* value < 0.05). It also significantly restored kidney weight. (*p* value < 0.05). Cow urine ark inhibited 40% and 35%

crystallization of CaOx and calcium phosphate, respectively. Cow urine ark is effective in prevention and treatment of EG induced urolithiasis in Wistar rats.^[53]

Besides, the activity mentioned above based on modern experimentation, cow urine also possess the activity of detoxifying certain herbs. Poisons can be refined and purified if soaked in gomutra for 3 days. For example, Dhatura (Dhatura metel) seeds (with shell peeled off) are considered purified after soaking in gomutra for 12 hours. Cow urine can be used for purification of guggul (*Commiphora mukul*), loha (iron) and bhalataka (*Semecarpus anacardium*), detoxification of aconite (*Aconitum napellus*) and also for purification and detoxification of silver.^[54]

Toxicity Studies of Gomutra Ark

Acute toxicity study on gomutra ark has been carried out. Male Wistar rats weighing 150-200 g were divided into five groups of six animals each. All groups were given GoA in increasing doses. Group 1 received the GoA at a dose of 2 ml/kg, Group 2 received GoA at a dose of 4 ml/kg, Group 3 received GoA at a dose 8 ml/kg, Group 4 received GoA at a dose of 16 ml/kg, and Group 5 received GoA at a dose of 32 ml/kg. The single dose of GoA was administered orally after overnight fasting. The animals were observed continuously for 2 h, and then occasionally for further 4 h and finally overnight. Animals were observed for tremors, clonic convulsions, tonic extensions, catatonia, spasticity, opisthotonus, ataxia, sedation, ptosis, respiration. Further photoactometer was used to observe any change in motor activity, whether it is increased or decreased. The mean weight of the rats in different groups was recorded after 1 month, 2 months, and 3 months. When single dose in various doses 2, 4, 8, 16, and 32 ml/kg were given to various groups, the signs such as tremors, convulsions, catatonia, spasticity, opisthotonus, ataxia, ptosis were not observed even at the dose of 32 ml/kg, which is 32 times more than dose used in the study. Also, respiration was normal when GoA was used in high dose. The mean Photoactometer readings of the control group was found 152.83 ± 33.58 , Group 1 was 146.67 ± 34.81 , Group 2 was 166.00 ± 48.8 , Group 3 was 159.16 ± 57.7 , Group 4 was 161.67 ± 47.9 , and Group 5 was 140.33 ± 52.3 . The differences were found statistically insignificant.

Chronic toxicity studies were also carried out. Animals were divided into two groups of six animals each. First group was control and received laboratory food *ad libitum*. The second group was given GoA 1 ml/kg twice daily. The various parameters which were observed were weight, food intake, any gross change in behavior, motor activity. The mean weight of rats in Group 1 (control) was found 174 ± 22.69 g at 0 month and 172 ± 18.41 g at the end of 3 months, whereas the mean weight of rats in Group 2 (GoA) was found 184.16 ± 25.38 g at 0 month and 175 ± 17.60 g at the end of 3 months. This difference was statistically insignificant. In acute toxicity study, no toxicity was observed even when cow urine was given 32

times of the study dose, which suggests that cow urine is having very high therapeutic index. Although no histopathological studies were undertaken, it was surmised that GoA is safe in animals. There was no significant change in the weight of rats after 3 months of GoA, which suggest that GoA does not cause weight gain.^[55]

CONCLUSION

From the above discussion, it can be concluded that cow urine comes with a bunch of health benefits. It has several different activities like antioxidant, anti-diabetic, wound healing property, immunomodulator, also act as bioenhancer to increase the efficacy of various antibiotics nutrients and anticancer drugs. Cow urine therapy is capable of curing several curable and incurable diseases, so it is used for many health problems worldwide including India. Its therapeutic potentials are now achieving a major attention in various drug therapy researches and projects. The healing properties of cow urine have been referred to in ancient texts of Ayurveda as India's natural medicine and has been given the status of elixir. So it is, however, to pertinent to mention that cows.

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