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GOMUTRA (COW URINE): A MULTIDIMENSIONAL DRUG REVIEW ARTICLE

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ABSTRACT

Gomutra is important part of Indian tradition. It is not only holy but also has various important medicinal uses. Classical treatises in *Ayurved* i.e. *Charaka, Sushruta* and *Vagbhata Samhita* has described *Ashta mutra* (eight types of urine) along with their properties, indication and formulations. Cow urine is one of them. Cow urine is one of the five contents of *Panchagavya which obtain from cow* (urine, milk, ghee, curd and dung). Cow based treatment is called as *Panchagavya Chikitsa* (Cowpathy). In this modern era, the diseases related to life style like cancer, autoimmune diseases, diabetes, AIDS etc. are increasing day by day. Irrational use of antibiotics is also responsible for increase in antibiotic resistant infectious diseases. Gomutra (Cow urine) is scientifically proven to act as an immunomodulator along with its bacteriostatic action. Various actions and researches on cow urine are summarized in this article. However, more studies experimental as well as clinical can throw better light on it.

Keywords: *Gomutra*, cow urine, *Panchagavya*, Immunomodulator

INTRODUCTION

Cow urine has a special significance in Indian tradition. Cow urine is said to have a spiritual cleansing effect as well. Cow urine has been described as water of life or *"Amrita" (*beverages of immortality), the nectar of the God. "*Panchagavya*" is a combination of cow urine, milk, dung, ghee and curd. Indian cow breeds are unique and distinct species, popularly known as "*Kamdhenu*" (One who can complete all wishes of mankind) and "*Gaumata*, (Cow is called as mother). It has high socio-cultural values, plays significant role in rural economy, represent cattle wealth and bio-diversity. In Charaka Samhita, Sushruta Samhita and Vangbhat, described eight types of animal urines that can be used in medicine. Urine of cow is used in therapeutics. All these *mutras* (eight types of urine from different animals) are sharp, hot, pungent, bitter with salty as a secondary taste, light and promotive of evacuation. They relieve *Kaphaja* and *Vataja* disorders, those caused by *krimi* (worms), *meda* (excessive adiposity), *visha*(poisoning), *gulma* (gaseous swelling of the abdomen), *arsha* (piles), skin diseases including leprosy, *shopha* (swelling), *Agnimandya*(loss of appetite), pallor, heart disease. They are *dipaniya* and *pachaniya* (digestive and carminative) in function[1] The ancient Indian system of medicine, *Ayurveda*, has mentioned importance of *panchgavya* in the treatment of various human diseases. Apart from high medicinal values, *panchgavya* is also used in agriculture, organic farming as natural manure pesticides, fertilizer, pest repellants and as alternate energy resources [2]. Cow being mother of all living entities gives all pleasures to everyone[3] All the products of cow are used as a medicines. Several curable and incurable diseases can be managed by use of cow urine as a medicine. The *Ayurvedic* classical texts, such as *Charka Samhita*, *Bhavprakash* and *Sushrut Samhita*, have described theses indications for cow urine[3]. Though modern medicine has helped us to eradicate and cure several diseases of mankind and animals; But the existent of incurable diseases like cancer, acquired immunodeficiency syndrome(AIDS), diabetes, rheumatoid arthritis, side effect of allopathy medicine, increasing trends of antibiotic resistance and chemical and bio pesticides causing dietary risk has made the situation more critical than ever before. Thus it has become the matter of concern for the scientist and researcher to develop novel therapies. Cow urine has proven to be cost effective, with minimum adverse reaction when compare to modern medicine[4] All the five products such as urine, milk, ghee, curd and dung obtained from cow contain various medicinal properties, and are used singly or in combination with different medicinal herbs against many diseases including AIDS, Cancer, and Diabetes.[5.]

Cow urine contains nitrogen, sulphur, phosphate, sodium, manganese, iron, silicon, chlorine, magnesium, maleic, citric, tartaric and calcium salts, vitamin A, B, C, D, E, minerals, lactose, enzymes, creatinine, hormones and gold acids. Ingredients of cow urine are similar with human body. Hence consumption of cow urine is useful to maintain the balance of these substances and cures incurable diseases[6].

Medicinal Properties of Cow urine has been granted by US, as Patents (No. 6,896,907 and 6,410,059); bioenhancer, antibiotic, antifungal, and anticancer agent properties are particularly

mentioned in those patents. Cow urine increases potency of "Taxol" (paclitaxel) against MCF-7, a human breast cancer cell line, in *in vitro* assays (US Patent No. 6,410,059).[7]

Mythological belief about Cow Urine

Lord *Shiva* narrated "Benefits of Urine Therapy" to Mother *Parvati* which has been referred in the ancient book "*Dammar Tantra*" in Vedas. In ancient booksurine is referred as "*Shivambu*" (Auto urine) meaning water of *Shiva.*

Therapy of urine is the ancient method of treatment. The powerful practice of healing "Self-urine therapy" has been referred in "*Shivambukalpa Vidhi*" part of 5000 years old document called *Dammar Tantra* linking this practice to Vedas the sacred Hindu texts. Reference of urine therapy is also found in almost all the volume of *Ayurvedic literature* and in one of the volume of *Bhavaprakasha* urine is termed as "*Vishaghna*" (Anti Poisonous) killer of all poisons and "*Rasayan" (Rejuvenative)* which can rejuvenate even old person and purify blood and cures all skin diseases.[8]

Cow urine destroys the diseases that are caused by poison (Toxin). Various poisonous chemicals can be purified with the help of cow urine. Cow urine increases the immunity power by increasing resistance power against diseases in human body. [9]

Table 1: Properties and use of *Gomutra* (Cow urine) according to *Ayurveda*

Acharya	Qualities	Effect on Doshas	Other effect on body
Charaka[10]	Sweet	Decrease Vata, Pitta and Kapha	Wormiside, use in various skin disorders, beneficial in leprosy, itching and ascites
Susruta[11] *Sutra*	Pungent, sharp, hot, light, alkaline	Decrease Vata and Kapha	Promotes intellect and digestive power, beneficial in colic, digestive disorders, constipation, useful as purgative and for non lubricant enema

Uses of cow urine in purification and detoxification process[12]

1. Purification of guggul (*Commiphora mukul*)
2. Detoxification of aconite
3. Detoxification of dhatura (*Dhatura metel*)
4. Detoxification and purification of silver
5. Purification of loha(*Iron*)
6. Purification of Swarna(*Gold)*
7. Purification of Tamra(*Copper*)
8. Purification of Naga(*Lead*)
9. Purification of bhallataka(*Semicarpus anacardium*)
10. Purification of Abhraka(*mica*)
11. Purification of Kharpar(*Calamine*)
12. Purification of Rajavarta(*Lapis lazuli*)
13. Detoxification and purification of Kuchala (*Strychnos nuxvomica*)

Some important formulation in which gomutra is used [12]

1. Ashwinikumarras
2. Arshakuthar rasa
3. SanjivaniVati
4. Mandurvatak
5. Punarnavamandur
6. Panchamrutlohamandur
7. Tryushanadimandur
8. Agnimukhmandur
9. PanchagavyaGhrita
10. KasisadiTaila

Table 2: References of Gomutra (Cow urine) in classical Ayurvedic text and its use[13, 14]

Sr. No.	Use of *Gomutra* (Cow urine) in various formulation/other description
1	8 types of urine and each of its properties and indications
2	*TailaPanchaka* use in *Gulma*
3	*Daruharidra(berberisaristata + Gomutra(CU)* *Rasanjan + Gomutra* use in *Kushta*(Leprosy)
4	*Swarnamakshik + Gomutra in Kushta*(Leprosy)
5	*Chitrakadilepain Kushta*(Leprosy) *Mansyadilepa*
6	*Karvir(neriumindicum) + Gomutra in Kushta*(Leprosy)
7	*Tiktekshvakaditaila* use in *Kushta*(Leprosy)
8	*Kanakshiritaila* use in *Kushta*(Leprosy)
9	*Kakodumbar + Bakuchibij + Chitrakmul* use in *Kshvitra*(Vitiligo)
10	*LashunadyaGhrita(ghee)* use in *Unmada(Psychiatric disorder)*
11	*SiddharthakGhrita* use in *Unmada(Psychiatric disorder)*
12	*PanchagavyaGhrita* use in A*pasmara(Psychiatric disorder)*
13	*MahapanchagavyaGhrita* use in *Apasmara(Psychiatric disorder)*
14	*Katabhyaditaila* for local application in *Apasmara(Psychiatric disorder)*
15	*Gomutra* use for bath in *Apasmara(Psychiatric disorder)*
16	*GomutraNasya*(inhalation) in *Apasmara(Psychiatric disorder)*
17	*Gomutra + Haritakichurna(powdered of Terminalia chebula)* use in *Kaphajshotha(~swelling)*
18	Milk + *Gomutra* drink in *vatajshotha*
19	*Siddha* milk + *gomutra* for *virechan(~Purgation)* in *Pittodar*
20	Cow urine use in *Kaphodar(~one of type of Ascites)*
21	*Rohitakadi yoga* in *Udara(~Ascites)roga*
22	*Gomutr* is *pathya(good for health)* in *Udara(~Ascites)*
23	*Chitrakghrita* use in *Udara(~Ascites)*
24	*Patoladichurna + gomutra* in *Udara(~Ascites)*
25	*Narayan churna + gomutra* in *Udara(~Ascites)*
26	*Hapushadyachurna + gomutra* in *Udara(~Ascites)*
27	Milk + *Gomutra* use in *Udara*(~Ascites)

28	*Guda + Haritaki + Gomutra* in *Arsha(Piles)*
29	*Mahish*(buffalo) *Ghrita + Gomutra + Daruharidra* use in *Pandu(Anaemia)*
30	*Gomutra*+ Milk for *virechan* in *Pandu*
31	*Gomutra + Haritaki* use in *Kaphaj Pandu*
32	*Mandurvataka* use in *Pandu(anaemia)*
33	*PunarnavaMandur* use in *Pandu(Anaemia)*
34	*PashanbhedadiGhrita* use in *Ashmari(Renal Stone)*
35	*KatphaladiKashay*(Decoction) use in *Hrudrog(Heart disease)*
36	*Pippalyadichurna(Powdered) + Gomutra* use in *Hrudrog(Heart disease)*
37	*Sarshapa+ Gomutra*use in *Urusthambha*
38	*Shyonakadilepa* use in *Urusthambha*
39	*GuduchyadiTaila + Gomutra* use in *VatajYonovyapad*
40	*Gomutra* use in *KaphajShotha*
41	*Gomutra* use in purification of *Bhallatak*
42	*Gomutra* use in *Pratisaran Karma* in Scar mark
43	*Guggulu + Gomutra* use in *Urusthambha* *Shilajit + Gomutra*
44	*Karanja + Sarshapa + Gomutra* use in *Urusthambha*
45	*Kukkutpurish + Gunja + Haridra + Pippali + Gomutra* use as a *Arshoghna lepa*
46	*Gomutra + Haritaki + Honey* use in Internal Piles
47	*Gomutra + chitrak + Trikatu(Suntha,Marich,Pippali)* use in *Kshwitra(Vitiligo)*
48	*Mahanil Ghrita* use in *Kshwitra(Vitiligo)*
49	*Haridra(curcuma longa) + Gomutra* use in *Kushta(Leprosy)*
50	*Karavir(Nerium indicum) + Vidanga(Embelia ribes) + Gomutra* use as a lepa in *kushta(Leprosy)*
51	*Vajraka Taila* use in *Kushta(Leprosy)*
52	*Trikatu + Gomutra + Kshar + Mushkakadi Gana* use as *Basti(medicated enema)* in *Kaphaja Udara(~Ascites)*
53	*Mahavriksha kshira + Sura(~type alcohol) + Gomutra* use as *Virechan* in *Dushyodara*
54	*Eranda Taila*(oil of ricinus communis) + *Gomutra* use in *Udara(~Ascites)*
55	*Gomutra* use in *Kaphaprakopak Vikara* in *Basti*
56	*Gomutra* use in *Lekhana Basti*

Chemical composition of cow urine [15]

Water – 95%
Urea – 2.5%
Minerals, Salts, Hormones, Enzymes – 2.5%

Healthy cow urine has volume of 17-45 ml/Kg/day with specific gravity ranging from 1.025- 1.045. Its pH ranges between 7.4 to 8.4 with seasonal variations. Urea nitrogen and Total nitrogen varies between 23-28 ml/kg/day and 40-45 ml/kg/day respectively. Other important constituents are given in table below.

Table 3: Chemical constituents of healthy cow urine

Ammonia nitrogen	1-1.7ml/kg/day
Allantoin	20-60ml/kg/day
Calcium	0.1-1.4ml/kg/day
Chloride	0.1-1.1mmol/kg/day
Creatinine	15-20mg/kg/day
Magnesium	3.7mg/kg/day
Potassium	0.08-0.15mmol/kg/day
Sodium	0.2-1.1mmol/kg/day
Sulphate	3-5mg/kg/day
Uric acid	1-4mg/kg/day
Leucocyte	<15micro It

In healthy cows' urine does not contain protein, glucose and haemoglobin.

Urea is a Strong Antimicrobial Agent and it is end protein metabolism, while uric acid has antimicrobial activity and it helps to control infections. Copper in healthy cow urine controls fat deposition, Iron is responsible for producing RBC while sodium and potassium plays major role as body electrolyte. Other important ingredients with their functions are as follows

1 Creatinine - it acts as an Antibacterial
2 Aurum hydroxide - Antibacterial, improves immunity, acts as antidote
3 Enzymeurokinase - It is responsible for dissolving the blood clot, improvement of heart disease, blood circulation
4 Colony Stimulating factor - Effective for cell division & multiplication
5 Erythropoietin stimulating factor is major stimulating factor for production of Red blood cells.
6 Gonadotropin - Promotes menstrual cycle, sperm production
7 Anticancer substances- Prevents multiplication of carcinogenic cells

Enzymes[15]

1 Lactate-Dehydrogenas - 21.780 unit |lt
2 Alkaline Phosphotase - 110.110 KA Unit
3 Acid Phosphotase - 456.620 XA unit
4 Amylase - 90.236 unit
5 Vit-C - 216.408mg|lt
6 Vit-B1 - 444.125 microgram|lt
7 Vit-B2 - 0.6339mg|lt
8 Protein - 0.1037gm|lt
9 Uric Acid - 135.028mg|lt
10 Creatinine - 0.9970 g|lt
11 Lactate - 3.7830 milimole|lt
12 Phenol - 4.7580mg|100ml
13 Free volatile phenol - 0.7130mg|100ml
14 Compound volatile phenol - 1.3420mg|100ml
15 Aromatic hydroxy acid - 2.7030mg|100ml
16 Calcium - 5.735 milimol|lt
17 Phosphorous - 0.4805milimol|lt

Latest research on cow urine

Cancer is the most dangerous disease cause to the human, which can be treated by following treatment modalities like chemotherapy, surgery, radiotherapy and immunotherapy along with new treatment modalities like recent molecular approaches

of gene therapy, but the success rate is not very high and moreover, its well-known side effects cause to the patients to be treated. Alternate medicinal therapies have also been claimed to be helpful in the prevention and control of cancer. Cow urine therapy has also found that possess anti-cancer properties and for that US granted patent in the field of cancer treatment by its virtues of bioenhancing the activity of anti-cancer drugs. The cow urine therapy has tremendous potential in the field of medicine and has not been exploited to the extremes. Its now time to made public awareness about the important uses of cow urine therapy. Whatever may be the final result of treatment but scientific validation of those claims is required.[16]

A study mentions the determinative role of cow urine distillate in helping the immunodeficient subjects in obtaining higher level of cell-mediated and humoral immune protection for better protection for overcoming different infections.[17] Gomutra Ark is obtained from distillation process of the cow urine. Results from *Gomutraark (*~cow urine distillate) and Cow urine are near about similar. it found that the chemical and medicinal properties of cow urine are preserved in *Gomutra ark*. There is very negligible content of ammonia in *Gomutra ark* of cow urine and it is easy to palatable and acceptable for patients. study found that cow urine distillate that is *Gomutra Arka* has antioxidant potential. *Gomutra ark* has also antioxidant and immunomodulatory effect.[18]

Prevention of antibiotic resistance

There are various ways to developed resistant against antimicrobial drugs. Now a days the use of antibiotics has been increased tremendously. There are so many drugs which found ineffective against various bacteria and viruses. Vancomycin resistant *Enterococcus*, and ciprofloxacin resistance *P. aeruginosa* are some of the examples. Different study has been shown that CU (Cow Urine) is much effective against the drugs resistant bacteria and viruses. Minimum inhibitory concentration (MIC) values for Cow urine extract of *A. indica* was 12.68 mm (*E. Coli*), 9 mm (*K. pneumonia*) and along with this there is >8.66 mm zone of inhibition for MDR *S. aureus*, *P. aeruginosa* and *P. vulgaris*.[19,20]

Fungicide and Biofungicide

Various experiments show fungicidal effect against various species of *C. tropicalis, Aspergillus Malassezia*, and *C. glabrata*. CU inhibit the growth of *Malassezia* fungi (90-95%) which is responsible for causing dandruff for a longer time (4-5 days). Also CU shows significant effect in various microorganisms which is responsible different diseases in crops. Study found that Lemon Juice extract and Neem leaves extract less effective than CU [21]. CUC (cow urine concoction) 5% showed maximum antifungal activity against *A. niger* (93%), *A. oryzae* (92.67%) and *A. flavus*(83%).[22]

Antiseptic

Cow urine shows significant effect in wound healing activity in Wistar albino rats. Study found that CU urine heal wound faster 1% w/w nitrofurazone ointment locally.[23]

Anthelmintic Activity

CUC was better than piperazine citrate as anthelmintic agent at both 1% and 5% concentrations.[24]

Bioenhancer

A 'bioenhancer'/'biopotentiator' is substances that increase the bioavailability and bio-efficacy of active substance with which they are combined without having any activity of their own at the dose used. *Ayurveda,* has mentioned '*yogvahi*' principle to describe the bioenhancing properties of medicines. It increases the oral bioavailability, results in lowering their dose and side effects. By integrating Ayurvedic science with modern methods of research, we can develop more viable drug formulations [25] CU which can be used as bioenhancer in antifungal, antimicrobial, and anticancer agents[26]. In Ayurveda *Rasayana* medicine have properties to increase body immune system thus CU contains the similar *Rasayana tatva* and also serves as bioenhancer [27] CUD (Cow urine Distillate) is more effective bioenhancer than CU. CUD increase the transport of antibiotics by 2-7 folds like tetracycline, rifampicin, and ampicillin across the intestinal wall [28]. It also enhances the potency of taxol against MCF-7 cell lines. It increases the bioavailability of rifampicin by 80-fold in 0.05 microgm/ml concentrations and clotrimazole by 5 fold in 0.88 µ g/ml concentration. The activity of rifampicin increases by about 5-7 folds against *E. coli* and 3-11 folds against Gram-positive bacteria, when used along with CU [24]. Potency of paclitaxel has been observed to increase against MCF-7, a human breast cancer cell line in *in-vitro* assays. The bio-enhancing ability of CU is by providing the absorption of drugs across the cell membrane. US Patent is also granted for bioenhancer along with antibiotics, antifungal and anticancer activity (6896907,6410059) of CU.

Various properties and activity of CU has been applied and widely used in various *ayurvedic* formulations. *Panchagavyaghrita, Lashunadhghrita, Sidhartakghrita* are used for psychiatric illness and abdominal tumor. Other formulations like *Mandurvatak, Darvighrita, and Punnarvamandur* also contains Cow Urine. CU is used as adjuvant along with *Hareetakyadiyog, Swarnkshiryadyog, Swarnmakshikbhasma, Gvakshyadichurana* and many other formulations. *Ghritas* (Medicated cow Ghee) are also available as semisolid preparations while *bhasms*, *yogs*, and *churans* are in the powder form.

Anticancer Properties

CU has antioxidant properties and is a free radical and thus it neutralizes the oxidative stress. CU helps by repairing the damaged DNA and is therefore, effective as anti-cancer therapy. [29]

Chemopreventive potential of CU was observed in a study, which was conducted on 70 Swiss albino mice for 16 weeks. Papilloma were induced by 7, 12 dimethyl benzanthracene and later promoted by repeated application of croton oil. In mice treated with CU, the incidence of tumor (papilloma), tumor yield, and its burden was statistically less than the untreated group [30] Effect of Cow Urine on various types of cancers was studied by Jain and his coworkers. Decrease in severity of various clinical symptoms (pain, inflammation, burning sensation, difficulty in swallowing, and irritation) was decreased from day 1 to day 8 with CU therapy. Percent of patients with severe symptoms decreased from 82.16to 7.9 on day 8, patients with moderate symptoms increased from 15.8 to 55.3 and with mild symptoms, patients increased from 1.58 to 36.34. The severity of symptoms decreased further with continued CU therapy [31]

Immuno-stimulant

The use of herbs and minerals (like *chavanprash* and *panchgavya*) for improving the overall resistance of the body against common infections and pathogens has been a guiding principal of *Ayurveda*. Ancient Ayurvedic treatises say that

consuming CU daily increases the resistance to diseases by up to 104%. This has also shown enhancement in humoral, and cell-mediated immune response in mice [32]

Wound healing activity of cow urine in DM induced rats

Study demonstrated that cow urine ark significantly increases wound healing in diabetic wound patient. Thus, it helps in accelerating wound healing in diabetic patients because of its property of enhancing granulation tissue formation. [33]

Anti-urolithiatic effect of cow urine

Cow urine ark showed significant effect against renal calculi and restoration of compromised renal function. This type of action of CU might be due to it reduce excretion of calcium oxalate and inhibit process of crystallization. Further experimental studies are needed to know its mechanism of action.

Mechanism of action of cow urine

CU have different fractions like antimicrobial activity due to the presence of certain components like volatile and nonvolatile ones [34] Presence of creatinine, urea, *swarnkshar* (aurum hydroxide), phenols, carbolic acid, calcium, and manganese has strongly explained the germicidal and antimicrobial properties of CU. Presence of amino acids and urinary peptides may enhance the bactericidal effect by increasing the bacterial cell surface hydrophobicity. CU enhances the phagocytic activity of macrophages. fresh CU contain higher amounts of phenols than CU distillate (CUD) makes it more effective against microbes. After photo-activation, few biogenic volatile inorganic and organic compounds such as CO2, NH3, CH4, methanol, propanol and acetone, and some metabolic secondary nitrogenous products are also formed [35] Photo-activated CU (PhCU) is highly acidic than fresh CU this may be responsible for increase in bactericidal action. Inorganic substances in cow urine such as phosphorus, chloride and dimethylamine may also play an important role. CU prevents the development of antibacterial resistance by blocking the R-factor, a part of plasmid genome of bacteria CU contains phenolic acids (gallic, caffeic, ferulic, o-coumaric, cinnamic, and salicylic acids) which have antifungalcharacteristics [36.] Antioxidant property of uric acid and allantoin present in CU correlates with its anticancer effect. CU reduces apoptosis in lymphocytes and helps them to survive better This action may be due to the free radical scavenging activity of the urine components, and these components may prevent the process of aging. It efficiently repairs the damaged DNA. Daily consumption of CU improves immunity due to the presence of *swarnkshar* and fastens the wound healing process, which is due to allantoin[7] CU enhances the immunocompetence by facilitating the synthesis of interleukin-1 and -2, augments B - and T- lymphocyte blastogenesis, and IgA, IgM and IgG antibody titers [37] Early morning first voided CU is more sterile and have more macro and micronutrients along with other enzyme/urea content could be more effective.

CONCLUSION

On analyzing different result on cow urine in various research article it concludes that cow urine and its concoction is really multidimensional drug. *Ayurveda* already told that fresh cow urine of indigenous cow is the best.

More well-planned experimental, animal studies in human/animal subjects are required gather more data about to assess its potential as an effective anti-cancerous, antimicrobial, anti diabetic, anti-urolithiatic, anti-psychotic etc. agent as most of the studies quoted are *in vitro* studies.

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