International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

Study of Cow Urine and Medicinal Plant Extract as an Antibiotic Agent - A Review

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Abstract: ***The cow urine distillate has antibacterial and antifungal activities the inhibitory activity can be used in the control of bacteria and fungi of various origins. The test was done in vitro. Same result may be obtained in vivo also. Now a day's urine therapy treatment was developed in the medical sectors. Further studies analyze which components are responsible for antimicrobial activity and animal model could reveal antibacterial and antifungal activity of cow urine distillate in vivo. Phyto chemical investigation of cow urine sample and medicinal plant extracts will definitely prove the presence of active phytoconstituents like alkaloids, anthraquinones, flavonoids, tannins and saponins; which are the main constituents promoting antimicrobial activity. The present work proved that the CUD serves as a bioenhancer for antimicrobial activity by testing against different antibiotics. Therefore, cow`s urine has potential to cure several major adverse diseases, as this imparts the vital therapeutic effect of CUD. The plant-based origin of cellulose nanoparticle is renewable, abundant, sustainable and nature polymer, can be used for the encapsulation of cow urine. It makes the encapsulated CNPs to become a potential use in the field of medicine in particular with the drug release. The strategy of encapsulation makes the delivery advantages for toxic, fragile and poorly soluble compounds, and also possible to minimize the side effects. With these advantages encapsulated CNPs can go for the potential antimicrobial applications in medical field for the efficient production of implants, face masks, bandages, skin replacements, artificial blood vessels, supporting materials for enzyme immunization and nanoparticles. The cellulose obtained from other natural sources, may use to imitate the present study and enhance the potential effect of the encapsulated cow urine. Similarly, nanomaterials demonstrated recently have potential to carry the biomolecules; can make use of with cow urine.***

Keywords: Cow urine, Medicinal plants, Cellulose Nanoparticle

1. Introduction

The cow is a mobile medical dispensary and cow urine is a panacea of all diseases. Cow urine is the one of the ingredients of 'Panchagavya' is capable of treating many curable as well as incurable diseases and has been used extensively in ayurvedic preparations since time immemorial as cited in ancient holy texts like Charaka Samhita, Sushruta Samhita, Vridhabhagabhatt, Atharva Veda, Bhavaprakash, Rajni Ghuntu, Amritasagar, etc (Ipsita Mohanty 2014).

Cow's urine was known as gomutra has many advantages in curing several diseases. It has a unique place in Ayurveda and was described as an effective medicinal substance or secretion of animal origin with innumerable therapeutic properties (Suchiritha Kannappan Mohanvel 2017).

Cow urine has different curative properties such as for skin disease, leprosy. Furthermore, in the treatment of falling body parts, discharging lymph's and organism infested organs, use of cow's urine along with some other ingredients has been recommended for bath, anointing and intake (Rajendran 2010). Panchagavya consist of five major components such as urine, milk, ghee, curd, and dung obtained from cow. All the five products possess medicinal properties and are used singly or in combination with some other herbs against many diseases. This kind of alternative treatment, termed as cowpat. This is beneficial even for threatening diseases such as cancer, AIDS and diabetes, and tuberculosis (Suchiritha Kannappan Mohanvel 2017). Presence of urea, creatinine, carbolic acid, phenols, calcium and manganese have strongly explained for exhibition of antimicrobial and germicidal properties of cow urine. On the other hand, uric acid's antioxidant property and allantoin correlates with its anticancer effect. Urine consumption improves immunity is due to presence of swarn kshar and fastens wound healing process which is due to allantoin (Ipsita Mohanty 2014).

Cow urine-based preparations are able to counter viral, microbial, and fungal ailments. These potions promote powerful antimicrobial, antiviral, antiallergic, and antioxidant activity. So, the current research is mainly centered on the exploration of the antimicrobial powers of cow urine and also its phytochemical properties (Farida P. MinocheherhomjiI 2014).

Non-compensated diseases due to various bacterial infections account for the large number of morbidity and mortality cases worldwide. Inconsequential and unsystematic use of antibiotics are fueling the process of evolution of Multiple Drug Resistance (MDR) bacterial strains, making this problem worst at such a level that a common infection could be a life threatening one in today's scenario. This forced the scientific community to look after the alternative remedies, keeping in mind the problem of evolution of resistant strains and undesirable side effects of synthetic antibiotics. Phyto-medicines are the right and the only alternative to this problem 1. In fact, according to W.H.O reports, more than 80% of the population of developing countries depends directly on plant-derived

medicines or remedies for their different ailments as primary health care. Plant-derived drugs (crude extract) are preferred to synthetic drugs for being economical, harmless, and effective (Vikas Pahal 2016).

Plants defend themselves from various microbial infections by using products of secondary metabolites like: alkaloids, flavonoids, phenols, volatile essential oils, terpenes etc. These secondary metabolites have also been shown to possess antimicrobial activities against human pathogens. Literature is full of evidences which demonstrate the promising effects of these metabolites against many pathogenic bacteria. These naturally occurring phytochemicals have unique built-in chirality due to which they can bind or manipulate the functioning of biologically important enzymes and receptors, which is the reason why they are as effective as bactericidal agents.

The main objective is to provide new use of the bio-active fraction as a bio-enhancer and as a bioavailability facilitator. In another objective of the invention is to provide method for improving activity and bioavailability of antibiotics, drugs and other molecules using active fraction from cow urine distillate. Still another objective of the invention is to provide a process for the extraction of the active fraction form the cow urine. The invention relates to new use of a known abundantly available cow urine distillate as an enhancer of antibiotic action on the target. The molecule of invention helps in the absorption of antibiotics across the cell membrane in animal cells, gram positive and gram-negative bacteria. Similar activities can also be obtained by using the distillate of the urine of cow at 40-50ºC. and from the concentrate, which is lyophilized and dissolved for further use.

Biochemical Analysis of Cow Urine

The biochemical estimation of cow urine has shown that it contains sodium, nitrogen, Sulphur, Vitamin A, B, C, D, E, minerals, manganese, iron, silicon, chlorine, magnesium, citric, succinic, calcium salts, phosphate, lactose, carbolic acid, enzymes, creatinine and hormones. Any deficiency or excess of these substances inside the body causes disorders. Cow urine contains all of these substances with having a balanced proximate composition. Therefore, consumption of cow urine restores the balance of these substances and thus helps in curing from incurable diseases (Ipsita Mohanty 2014).

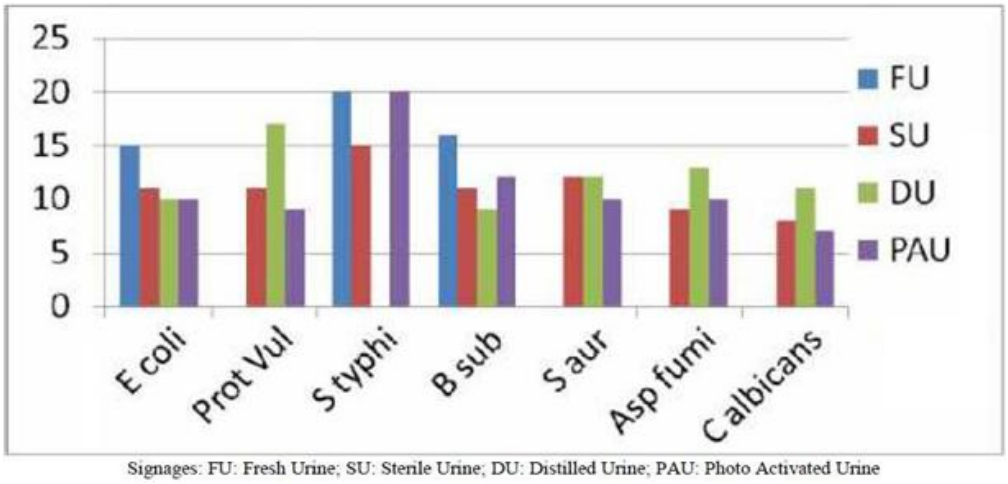
The cow urine distillate (CUD) is used as a bioavailability facilitator for anticancer therapy directly or in combination with anticancer molecules. The bioactive fraction enhances the activity of antibacterial agents, anticancer agents, and antituberculosis agents and helps the antibiotics and other molecules to act better on the target by transferring the compound across the membrane to the target site (Suchiritha Kannappan Mohanvel 2017).

Cow urine as Bio-enhancer Agent

Bioenhancers are defined as substances that increase the bioavailability and bio efficacy of active substances with which they are combined without having any activity of their own at the dose used (Vikas Pahal 2016). Cow's urine is an activity enhancer and availability facilitator for bio active molecules such as antibiotic, antifungal and anticancer drugs. This distillate helps in absorption of antibiotic across the cell membrane in animal cells, gram positive and gram-negative bacteria at 40-50°C, transport across the gut wall by two to seven times. It also increases the activity of gonadotropin releasing hormone conjugate with bovine serum albumin (GnRH-BSA) and zinc. The GnRH-BSA conjugate has a deleterious effect on reproductive hormones and estrous cycles of female mice. So, concentrated cow urine acts as a bio-enhancer of immunization efficacy to modulate these effects (Ipsita Mohanty 2014).

Antimicrobial Activity of cow urine

Cow urine has found therapeutic applications since days of yore. Cow urine is consumed by the majority of the rural population as a traditional remedy in almost the whole Indian continent. Cow urine-based preparations are able to counter viral, microbial, and fungal ailments. These potions promote powerful antimicrobial, antiviral, antiallergic, and antioxidant activity. The current research is mainly centered on the exploration of the antimicrobial powers of cow urine and also its phytochemical properties (Farida P. MinocheherhomjiI 2014).



Signages: FU: Fresh Urine; SU: Sterile Urine; DU: Distilled Urine; PAU: Photo Activated Urine

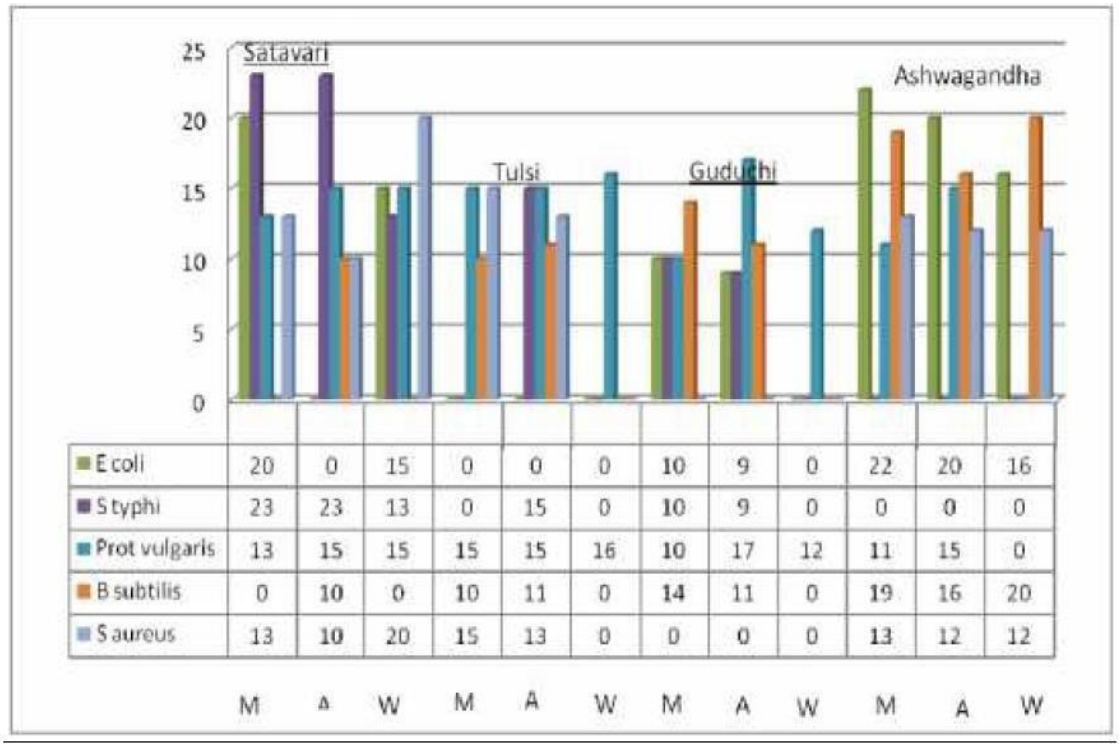
Figure: Antimicrobial activity of different samples of cow urine

Antimicrobial Activity of Medicinal Plants

Medicinal plants represent rich source of antimicrobial agents and can be used medicinally in different countries and are a source of many potent and powerful drugs. A wide range of medicinal plant parts is used for extract as raw drugs and they possess varied medicinal properties. The different parts used include root, stem, flower, fruit, twigs exudates and modified plant organs. While some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local used, many other raw drugs are collected in larger quantities and traded in the market as the raw material for many herbal industries (Satish 2008).

First plant which is used for the study Ashwagandha, importance of *W. somnifera* which produces effects in the CNS by acting via GABA receptor system. *Withania* prevents myelosuppression induced by CPA, AZT, PD and increases immunity. *Withania* is anti-inflammatory (carrageenin- induced) and it has hepatoprotective effects against alcohol and CCl4. *W. somnifera* has anti- granuloma activity. Withaferin A has anti-tumor effects against Ehrlich ascites carcinoma, Sarcoma-180. The plant extract inhibits the aging process. The antioxidant effects of *W. somnifera* depend on the presence of steroidal lactones, withanolides, which are the main active components (Paolo Scartezzini 2000).

Second plant which is used for the study, Tulsi (*Ocimum sanctum* Linn) is preeminent, and scientific research is now confirming its beneficial effects. There is mounting evidence that tulsi can address physical, chemical, metabolic and psychological stress through a unique combination of pharmacological actions. Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint and exposure to cold and excessive noise. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties. Tulsi's broad-spectrum antimicrobial activity, which includes activity against a range of human and animal pathogens, suggests it can be used as a hand sanitizer, mouthwash and water purifier as well as in animal rearing, wound healing, the preservation of food stuffs and herbal raw materials and traveler's health. Cultivation of tulsi plants has both spiritual and practical significance that connects the grower to the creative powers of nature, and organic cultivation offers solutions for food security, rural poverty, hunger, environmental degradation and climate change. The use of tulsi in daily rituals is a testament to Ayurvedic wisdom and provides an example of ancient knowledge offering solutions to modern problems (Cohen 2014).



	M	A	W	M	A	W	M	A	W	M	A	W
E coli	20	0	15	0	0	0	10	9	0	22	20	16
S typhi	23	23	13	0	15	0	10	9	0	0	0	0
Prot vulgaris	13	15	15	15	15	16	10	17	12	11	15	0
B subtilis	0	10	0	10	11	0	14	11	0	19	16	20
S aureus	13	10	20	15	13	0	0	0	0	13	12	12

Figure: Antimicrobial activity of methanol, acetone and aqueous extracts of medicinal plants

Third plant which is used for the study is Shatavari, *Asparagus racemosus*, belongs to family Liliaceae and commonly known as Satawar, Satamuli, Satavari found at low altitudes throughout India. The dried roots of the plant are used as drug. The roots are said to be tonic and diuretic and galactgogue, the drug has ulcer healing effect probably via strengthening the mucosal resistance or cryoprotection. It has also been identified as one of the drugs to control the symptoms of AIDS.

A. racemosus has also been successfully by some Ayurvedic practitioner for nervous disorder, inflammation and certain infectious disease. However, no scintific proof justify aforementioned uses of root extract of *A. racemosus* is available so far. Recently few reports are available demonstrating beneficial effects of alcoholic and water

extract of the roots of *A. racemosus* in some clinical conditions and experimentally induced disease e.g. galactogougue affects, antihepatotoxic, immunomodulatory effects, immunoadjuvant effect, antilithiatic effect andteratogenicity of *A. racemosus.* The detailed exploration of pharmacological properties of the root extract of *A. racemosus* reported so far (Shashi Alok 2013)**.**

Synergy of Cow urine and Antibiotics as Bioenhancer

Antibiotics are molecules that kill, or stop the growth of microorganisms, including both bacteria and fungi, nowadays modern pharmaceutical research is concerned with all aspects of identifying new chemical substances with new mode of action. Scientists is doing to modified conventional dosage form for the propose of increasing potency of drug, reducing the cost and amount of drug, increasing bioavailability decrease the side effect and improving the patient compliance. They are followed the novel drug delivery technique, modified dosage form. The development of bacterial resistance to presently available antibiotic has necessitated the need to search for few antimicrobial agents. Gram positive bacteria such as *S. aureus* is mainly responsible for post-operative wound infection, toxic shock syndrome, endocarditis, osteomyelitis and food poisoning. Gram negative bacterium such as *E. coli* is present in human intestine and causes lower urinary tract infection, cholecystic or septicaemia. Different antibiotics exercise their inhibitory activity on different pathogenic organisms. Multiple drug resistance in human pathogenic microorganisms has been developed due to indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of infectious diseases. The development of antibiotic resistance is multifactorial, including the specific nature of the relationship of bacteria to antibiotics, the usage of antibacterial agent, host characteristics and environmental factors.

Drug resistant microbe such as methicillin-resistant *S. aureus* (MRSA) is a major cause of nosocomial infections. MRSA infections are very difficult to cure because MRSA strains are resistance against almost all clinically available antibiotics. For most MRSA strains, glycopeptides-type drugs such as vancomycin are the only effective antimicrobial agents. Multidrug-resistant *Enterobacteriaceae,* mostly *Escherichia coli,* produces extended-spectrum β lactamases (ESBLs) such as the CTX-M enzymes. These enzymes were named for their greater activity against cefotaxime than other oxyimino-beta-lactam substrates such as ceftazidime, ceftriaxone, or cefepime have emerged within the community setting as an important cause of urinary tract infections (UTIs). Some plants exhibit significant potency against human bacterial pathogens. However, at present, plant extracts are rarely used as antimicrobials or as a systemic antibiotic and this may be due to their low level of activity, especially against gram-negative bacteria. A bioenhancer is an agent capable of enhancing the bioavailability and the efficacy of a drug with which it is co-administered, without any pharmacological activity of its own at the therapeutic dose used. They tend to decrease the dose activity drug of drug required for the optimal end point of the treatment strategy, bypass the need to use injectable route of administration to a large extent, might help in overcome the resistance to antimicrobials and saving the precious raw materials for the manufacturing of medicines (Vedamurthy Joshi 2016).

Cellulose Nanoparticles Encapsulated Cow Urine for Effective Inhibition of Pathogens

Cellulose nanoparticles (CNPs) are also known as nanospheres, nano whiskers, whiskers, and nano powders depending on the method of preparation. The processes utilized to prepare CNPs can be differentiated into debilitation and pre-treatment of extracted CNPs from microfibrils and biosynthesis of microfibrils from cellulose-based materials. The advantages of CNPs are their low cost, widespread availability, non-toxic nature, higher specific strength and low density, which enable their use in a variety of applications, including nanocomposites and filtration media. Accordingly, CNPs have been applied broadly in pharmaceutical and food industries. CNPs can also serve as multi-functional agents such as engineering composites, paper, aerogels and biomedical materials. The properties of CNP-reinforced composites are influenced by the CNPs themselves, a scattering of the microstructure and production conditions. Moreover, CNPs exhibit greater strength and higher percolation ability in polymer matrices. In addition, the mechanical properties of composites have greater impaction because the CNPs are dispersed in the polymer matrix. During the encapsulation there are some limitations, such as it need a proper optimization, otherwise will attain the fragile condition and also cause the variations with the size. Another limitation is due to the soluble nature, solubility varies based on the solvents in the reaction media or cellular milieu. Further, preparation of CNPs having a lesser diameter (<100 nm) is challenging, because it tends to be agglomerated during the processing (Koh Hann Suk 2017).

2. Conclusion

The cow urine distillate has antibacterial and antifungal activities the inhibitory activity can be used in the control of bacteria and fungi of various origins. The test was done in vitro. Same result may be obtained in vivo also. Now a day's urine therapy treatment was developed in the medical sectors. Further studies analyze which components are responsible for antimicrobial activity and animal model could reveal antibacterial and antifungal activity of cow urine distillate in vivo. Phyto chemical investigation of cow urine sample and medicinal plant extracts will definitely prove the presence of active phytoconstituents like alkaloids, anthraquinones, flavonoids, tannins and saponins; which are the main constituents promoting antimicrobial activity. The present work proved that the CUD serves as a bioenhancer for antimicrobial activity by testing against different antibiotics. Therefore, cow`s urine has potential to cure several major adverse diseases, as this imparts the vital therapeutic effect of CUD.

The present results clearly indicate that photoactivated cow urine exhibited high inhibitory potential against all human pathogenic bacterial strains tested. In this assay, photoactivated cow urine showed a great degree of antibacterial activity, comparable to that of antibiotics. The presence of certain volatile and nonvolatile components in urine is responsible for the antimicrobial activity. Also, it has been reported that antibacterial activity of photoactivated

urine may be due to its acidic ph. However, that was not the case in the present study as pH of cow urine used was rather alkaline.

Beside this, the presence of amino acids and urinary peptides may enrich the bactericidal effect by increasing bacterial cell surface hydrophobicity. Photoactivated cow urine possesses higher antimicrobial activity than fresh cow urine due to formation of some inhibitory compounds, such as formaldehyde, sulfinyl, ketones and some amines during photo stimulation. In conclusion, photoactivated cow urine possesses potential antibacterial activity and deserves attention for further studies on development of new drugs.

The plant-based origin of cellulose nanoparticle is renewable, abundant, sustainable and nature polymer, can be used for the encapsulation of cow urine. It makes the encapsulated CNPs to become a potential use in the field of medicine in particular with the drug release. The strategy of encapsulation makes the delivery advantages for toxic, fragile and poorly soluble compounds, and also possible to minimize the side effects. With these advantages encapsulated CNPs can go for the potential antimicrobial applications in medical field for the efficient production of implants, face masks, bandages, skin replacements, artificial blood vessels, supporting materials for enzyme immunization and nanoparticles. The cellulose obtained from other natural sources, may use to imitate the present study and enhance the potential effect of the encapsulated cow urine. Similarly, nanomaterials demonstrated recently have potential to carry the biomolecules; can make use of with cow urine.

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