

Cow urine based dermal defender: A review

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Abstract

It is indispensable to maintain a healthy skin from infectious microorganisms like Bacteria, Fungi, viruses and parasites. Most common biological agents Bacteria and Fungi plays a prominent role in worsening the skin infections. Antimicrobial and antifungal studies of various natural (herbal extracts) and synthetic compounds are still going on to find out the best results against skin infection causing microbes. For the treatment of skin infections: soaps, creams, ointments and skin care lotions containing chemicals are available but due to certain limitations the people are frequently attracted towards herbal formulative products. Cow urine is profound to have a great therapeutic value. Across many parts of the world, cow urine therapy is highly used and recommended by medicinal practitioners. Cow urine remove dark circles, black spots and pimples says Gujarat government's Gauseva and Gauchar Vikas Board. Due to cow urine's great impact, even branded cosmetic companies started formulating cosmetic commercial products using the cow urine as a constituent in skin care products. Since, numerous researches experimentally proved that cow urine acts as a wide defender of skin.

Keywords: Cow urine; Skin infection; Distillate; Photoactivated; Antimicrobial; Skin care; Cosmetics

1. Introduction

Dermal infections are common among all age groups. It occurs when skin is exposed towards microbes, chemical agents and to some extent it may be also due to malnutrition [1]. Bacterial and fungal infections are highly contagious and spread easily from infected person through close contact or sharing a comb or hairbrush [2], Atopic dermatitis is the chronic condition that causes restless, inflamed skin. If the skin infections remain ignored, it can spread from skin to blood stream. From ancient period, herbs are used for maintenance of skin care and beauty. It has been witnessed that there is a relationship between the beauty and cosmetics [3]. In day to day life, disinfectants like soaps and detergents are useful in hygienic practices to remove dirt, dust, microbes and bad odor from the skin to maintain health and beauty [4]. Still there is an outstanding research are going on medicinal plants because of their less side effects in drugs.

Medicinal plants have imminent health benefits due to the presence of active ingredients present in them which have been widely used to formulate soaps, creams, oils and ointments for treating skin related ailments like acne, ringworm, wound and other skin infections. Nowadays, most of the consumers are strongly refusing the synthetic chemicals in cosmetic products. As there is an increasing demand for natural ingredients containing cosmetic products [5]. For example, An oldest cosmetic product is soap. 65% to 85% of bacteria from human skin can be removed with a good antibacterial soap [6]. Topical Creams and ointments both has a significant role in cosmetics and medicines in skin care. Apart from emollients as ingredients in skin care products, cow urine is also used as an important ingredient in cosmetics

In this hustle and bustle emergency medical era, 70% of pathogenic bacteria are resistant to at least one of the drugs. Attention to effective drugs are hiring to find the better alternative drugs. Ancient and Indian Literature states that Cow

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urine (Sanskrit : Gomutra) has great pharmacological importance. Cow urine is said to be a panacea of all diseases [7]. Some people recognize cow urine as “ water of Life”. Though urine of several domestic animals is of therapeutic value in unani medicine, cow’s urine is described as the best compared to others [8]. Cow urine therapy was not only used in India, but all around globally for several centuries. In addition to this, cow urine is also used as a natural disinfectant in rural villages.

2. Skin Infections

Skin is the largest organ in the body [9]. Each and every individuals skin is different. It is important to acquire the knowledge regarding the skin type and skin infections. There are five different types of healthy skin: Normal, dry, oily, combination (both oily and dry skin) and sensitive. In fact, every individual experiences any sort of skin infection in the lifetime. Skin infections may be either primary or secondary. Bacteria are the most significant culprit for causing various skin infections.

2.1. Bacterial skin infections

Bacterial skin infections are the 28th most commonly diagnosed skin infections in the hospitalized patients [10]. Most of the nosocomial skin infections are caused by bacteria. This kind of skin infection initiate as small, red bumps that gradually get increase in size. It ranges from mild to severe conditions. Some can be easily treated with topical ointments but some requires oral antibiotic. Various types of bacterial skin infections shows in Table 1

Table 1 Type Of Bacterial Skin Infection And Its Causative Organism

S.No	Type of bacterial skin infection	Causative organism
1	Cellulitis	<i>Staphylococcus and Streptococcus</i>
2	Erysipelas	<i>Streptococcus pyogenes</i>
3	Impetigo	<i>Staphylococcus aureus and Streptococcus pyogenes</i>
4	Ecthyma	<i>Beta - hemolytic streptococci</i>
5	Abscess	<i>Staphylococci</i>
6	Folliculitis	<i>Staphylococcus aureus</i>

2.2. Viral skin infections

Virus is responsible for this kind of infection. This also ranges from mild to severe. Different types of viral infections include: Measles, chickenpox, herpes zoster and Molluscum contagiosum. In a study of skin diseases, 145 organ transplanted children are infected with Molluscum contagiosum [11].

2.3. Fungal skin infections

Fungus is responsible for causing fungal skin infection. In this new millennium, there is a drastical increase of fungal infections in various ecosystems [12]. Mostly it develops in the wet and damp areas of the skin such as armpit or feet. They are contagious and non-life threatening. Dermatophytosis caused by dermatophytes penetrate the stratum corneum skin layer by producing long hyphal chains [13]. By undertaking proper medications they can be controlled in their initial stage. Different types of fungal infections include: Ringworm, yeast infection, nail fungus, oral thrush.

2.4. Parasitic skin infections

Parasitic skin infections are caused by parasites. These kind of infections even spread beyond the skin to the bloodstream and organs. Though non-life threatening, It cause an uncomfortable mode throughout its presence. Some of the parasitic infections include: scabies, lice. The most commonest parasitic skin infection scabies is contagious which can be transmitted through personal contact and transmission through fomite is rare [14,15].

3. Cow Urine: A Momentous Gift For Skin Care

In Rigveda, cow's urine is compared to nectar. Cow urine has certain volatile and non-volatile components which might have high Antimicrobial [16] and Anthelmintic activity. Cow urine has also been granted US patents (US Patent No. 6896907,6410059) for its active role as an antibiotic, antifungal and anticancer agent [17]. Cow urine is useful in treating number of diseases like Fever, epilepsy, anemia, abdominal pain, constipation [18] shows in Fig 1. It has immunomodulatory [21], hypoglycemic [22] and cardio-respiratory effects [23]. In ayurvedic pharmaceuticals, cow urine also enhance the properties of many drugs by undergoing repeated trituration. Cow urine prevents the cells from free radicles which damage the healthy cells and induce tumor cells. Cow urine has been used to strengthen the effects of medicinal herbs says "Shan Han Lun " a Chinese pharmaceutical dictionary [24].

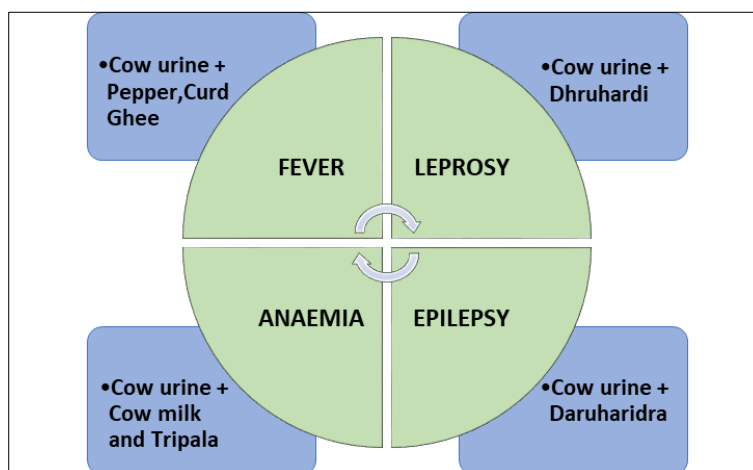


Figure 1 Diseases cured by Cow urine along with subsidiaries [19,20]

3.1. Chemical Composition of Cow urine

The ingredients and percentage of constituents present in the cow urine [25] shows in Table 2. Several researches states that cow urine contains nitrogen, sulphur, phosphate, sodium, manganese, carbolic acid, iron, silicon, chlorine, magnesium, citric, titric, succinic, calcium salts, Vitamins A, B, C, D and E, Minerals, lactose, enzymes, creatinine, hormones, urea and gold acids. Urea is the key chemical in urine, this is the principle behind cow urine being effective fungicide as well as antibacterial agent [26,27]. Cow urine increases the secretion of interleukin-1 and interleukin-2 [28]. Early morning first voided cow urine is more sterile and effective as it contains more macro and micronutrients along with other enzymes [29]. Cow urine contains some of the important components such as pheromones [30], urinary proteins [31], Calcium [32], Estrogen [33].

Table 2 Chemical Composition Of Cow Urine

S. No	Name of the ingredient	Percentage
1.	Water	95%
2.	Urea	2.5%
3.	Minerals, Salts, Hormones and enzymes	2.5%
4.	Ammonium nitrogen	1-1.7ml/kg/day
5.	Calcium	0.1-1.4ml/kg/day
6.	Chloride	0.1-1.1mmol/kg/day
7.	Creatinine	15-20mg/kg/day
8.	Potassium	0.08-0.15mmol/kg/day
9.	Uric acid	1-4mg/kg/day
10.	Allantoin	20- 60ml/kg/day

3.2. Different forms of Cow Urine

There are three different forms of Cow urine. They are

- Fresh Cow urine
- Photoactivated cow urine
- Cow urine distillate

Thus each form of cow urine has its own different benefits.

4. Effective Properties of Cow Urine

4.1. Antibacterial

Cow urine exhibits antibacterial activity against major skin infectious microbes like *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Proteus vulgaris* and *Enterobacter aerogenes* using Disc diffusion method. It is found that cow urine extract of *Azadiractica indica* beneficial in multidrug resistance treatment against *E.coli* and *Klebseilla pneumonia*. Cefixime was used as standard [34,35]. It was confirmed that Cow urine exhibits both the antioxidant and antimicrobial activities [36]. Fresh cow urine has better antibacterial property than compared to its distillate [37].

4.2. Antifungal

Antifungal activity of cow urine distillate was analysed against *Aspergillus niger* and *Aspergillus flavus* and comparison showed maximum growth suppression in *Aspergillus niger* (3 ± 0.14 , 6.3 ± 1.2 and 7.06 ± 0.04 , mm in diameter) than *Aspergillus flavus* (2.03 ± 0.25 , 4.9 ± 0.26 and 6.3 ± 1.2 , mm in diameter, respectively) [38,39]. Inhibition of fungal growth was carried out by comparing the cow urine samples of outdoor and indoor breeding cows. Ultimately, outdoor cow urine inhibited more fungal growth compared to the indoor breeding cow urine [40]. Cow urine inhibits the growth of *Malassezia* a dandruff causing fungi [41].

4.3. Antioxidant

Compared to residue, distillate and re-distillate of cow urine antioxidant activity seen highly in fresh cow urine [42]. It was observed experimentally that DPPH radical scavenging activity and superoxide scavenging activity of cow urine and its distillate inhibited the free radicals. Fresh cow urine seems more active than its distillate in inhibiting the free radicals [43]. Cow urine prevents the cells from free radicles which damage the healthy cells and induce tumor cells.

4.4. Anthelmintic

Helminthes are the main reason for affecting livestock production in tropical areas. It cause chronic diseases in nature [44]. Cow urine concentrate against adult earthworm *Pheretima pashuma* was performed and cow urine concentrate at dose dependent level caused paralysis and death of worms [45].

4.5. Anticancer

Cow urine inhibits the apoptosis of lymphocytes and repair the damaged DNA. It is more effectively used in anticancer therapy [46]. It has been reported that the Re-distillate cow urine acts as an anticancer agent where Amrutha sara made from cow urine made the patient completely recovered from oropharyngeal carcinoma [47].

4.6. Antiseptic

On experimental observations, Cow urine showed the extraordinary wound healing activity [48]. Allantoin is one active constituent present in cow urine. It helps in the regeneration of damaged epithelial cell and helps in enhancement of epithelial cells followed by wound healing activity. Allantoin neutralizes the irritating and sensitizing agents by act as an anti-irritant [49]. Thus cow urine has many positive effects due to certain substances present in it and exhibit various medicinal properties shows in Fig 2 and 3.

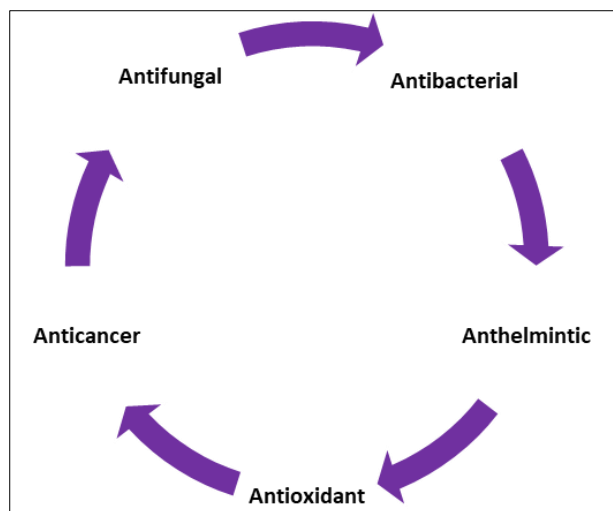


Figure 2 Medicinal properties of Cow Urine

Antimicrobial and Germicidal	•Urea, creatinine, carbolic acid, phenols, calcium and manganese
Antifungal	•Phenolic acids – Gallic, caffeic, ferulic, o-coumaric, cinnamic and salicylic acids.
Antibacterial	• Amino acids and urinary peptides

Figure 3 Substances present in the cow urine and its positive effect

5. Cosmetic Products Made Of Cow Urine

Table 3 Different Cosmetic products made of Cow urine

Cosmetics made of Cow urine	Reference
Face wash	51
Soap	52
Face pack	52
Anti lice shampoo	-
Hair conditioner	53
Antidandruff shampoo	-
Ointment	54
Acne cream	-
Hair tonic	55
Hair fall control	-

Cow urine purifies the blood and treats any kind of skin infections. Microbial Skin infections occurs due to the toxic compounds released by microbes in the skin. Cow urine is used in skin care products to enhance the effectiveness in formulating products to protect the skin. It is used as one of the major ingredients in some of the cosmetic products [50]. Table 3 shows the list of cosmetic products made of cow urine.

Apart from cosmetics cow urine is also incorporated in,

- Anti-aging cream
- Anti-wrinkle cream
- Toothpaste
- Mouthwash

6. Conclusion

Hence, it is evidently acknowledged that cow urine acts as a defender for skin in treating skin infections. From the old golden traditional days, cow urine is used in all sorts of skin infections in many formulations. This created a great impact of cow urine in this modern era. Thus it has been proved that it has enormous properties being an easily available one in nature. Its effective ingredients makes it more content in making medicines and cosmetics. It is not only useful in skin care but also very beneficial in hair care. It also act as a bio enhancer by having Antibacterial, Antifungal & Antioxidant properties. Thus, from the literary works it's strongly agreed that cow urine act as a potential agent against skin diseases. Cow urine would be more efficacious in curing skin related infections of its used in proper concentration.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest.

Author's contribution

Karpagam G, Pavithra K, Kowsalya S, Devadharshni R, Mohana priya P and Ramachandran A.M. contributed to the paper's development.

References

- [1] Jyoti Joshi, Devi P. Bhandari, Rajeswar Ranjitkar, Laxman Bhandari and Paras M. Yadav. Formulation and Evaluation of Herbal soap, Shampoo and Face Wash Gel. J PI Res 2019, 17(1): 112-117.
- [2] Ankita, C. Desmukh, Mr. Mukesh, T. Mohite, Mr. Vaibhav Vaidya. Formulation and Evaluation of Luliconazole Soap Strips for Dermal Infections. Int J all Res Educ Sci Methods 2021, 9(9):1722-1734.
- [3] B.M.Mithal, Text Book of Forensic Pharmacy. Vallabh Prakashan. Delhi,1994, 10.
- [4] Ikegbunam M. N., Metuh R. C., Anagu L. O., Awah N.S. Antimicrobial activity of some cleaning products against selected bacteria. Int Res J Pharm App Sci 2013, 3(4): 133-135.
- [5] Kandasamy R. Formulation of Herbal Bath Soap from Vitex negundo Leaf Extract. J Chem Pharm Sci 2014, 2: 95-99.
- [6] Norrby and Urinary tract infection group, Co-ordinated multicenter study of Norfloxacin Vs Cotrimexazol treatment in symptomatic urinary tract infection. The J. of Infectious Diseases 1987, 155(2): 170 – 77
- [7] Pathak ML, Kumar A. Gomutra -descriptive study. Sachitra Ayurveda 2003, 7: 81-84.
- [8] G. S. Pandey (2009), Chunekar, K. C. Bhav Prakash Nighantu (Indian Materia Medica) of Sri Bhavamisra (e, 1600-1600 AD)-Ath Mutravargh,
- [9] Garry Swann .The Skin is the body's largest organ. J Vis Commun Med 2010, 33(4):148 -149.

- [10] Elixhauser A, Steiner CA. Most common diagnoses and procedures in U.S. community hospitals, 1996, summary. HCUP Research note.
- [11] Eurvard S. Kanitakis J, Cochat P, et al. Skin diseases in children with organ transplants. *J Am Acad Dermatol* 2001, 44: 932-4.
- [12] Matthew C Fisher , Daniel A Henk, Cheryl J Briggs, John S Brownstein, Lawrence C Madoff, Sarah L McCraw, Sarah J Gurr. Emerging fungal threats to animal , plant and ecosystem health. *Nature* 2012, 484(7393):186-194.
- [13] Rebell G, Taplin D. *Dermatophytes, their recognition and identification* , 2nd Ed. Florida: University of Miami Press, 1976.
- [14] L.G. Arlian, R.A. Runyan, S. Achar, S.A. Estes: Survival and infectivity of *Sarcoptes scabiei* var. *canis* and var. *hominis* *J Am Acad Dermatol* 11(1984):210-215.
- [15] Arlian 1G, S.A. Estes, D.L.Vyszenskimoher: Prevalence of *Sarcoptes scabiei* in the homes and nursing homes of scabietic patients *J Am Acad Dermatol* 19 (1988):806-811.
- [16] Shaw SL, Mitloehner FM, Jackson W, Depeters EJ, Fadel JG, Robinson PH, Holzinger R, Goldstein AH. Volatile organic compound emissions from dairy cows and their wastes as measured by protontransfer – reaction mass spectrometry. *Sci. Technol.* 2007, 14: 1310-1316.
- [17] S. P. S. Khanuja, S. Kumar, A.K. Shasany, J. S. Arya, M. P. Darokar, M. Singh and Prachi Sinha et al.,2002. U.S. Patent No.6,896,907. Washington, DC: U.S. Patent and Trademark Office.
- [18] S. Raad, D. V. Deshmukh, S. N. Harke and M. S. Kachole . Antibacterial activity of Cow urine against some pathogenic and non-pathogenic bacteria. *Int. J. Pharm Sci Res* 2013, 4: 1534-1539.
- [19] Ipsita Mohanty, Manas Ranjan Senapati, Deepika Jena, Santawana Palai, Diversified use of cow urine , *Int J Pharm Pharm* 2014, 6(3): 153-158.
- [20] N.K Jain, V.B Gupta,Rajesh Garg, N. Silawat,Efficacy Of Cow Urine Therapy On Various Cancer Patients In Mandasaur District , India- A Survey,*Int J Green Pharm* 2010, 4(1): 29-35.
- [21] Chauhan RS, Singh BP, Singhal LK. Immunomodulation with Kamdhenu Ark in mice. *J. Immunol. Immunopathol* 2001, 71: 89-92.
- [22] Ojewole JA, Olusi SO. Effects of cow's urine concoction on plasma glucose concentration in fasted rats *R. Soc. Trop. Med. Hyg* 1976, 241-245.
- [23] Elegbe RA, Oyebola DDO. Cow's urine poisoning in Nigeria: the cardiotoxic effects of cow's urine in dogs. *Trans. R. Soc. Trop. Med. Hyg* 1976, 127-132.
- [24] R. S. Chauhan and N. Garg (2003). Cow therapy as an alternative to antibiotic. Presented at the Indian Science Congress, Bangalore, Karnataka.
- [25] Gulhane Harshad, Nakanekar Amit, Mahakal Nilesh, Bhople Sunanda, Salunke Amrut, Gomutra (cow urine) : A Multidimensional Drug review article ,*Int. j. Res. Ayurveda Pharm* 2017, 8(5):
- [26] H. Bhadauria. Cow urine- A Magical Therapy. *Vishwa Ayurveda Parishad, Int J Cow Sci.* 2002, 1:3-7.
- [27] K.J. Virender, Cow urine can cure many diseases, *Articles on Ayurveda, Indore Publishers, 2009.*
- [28] R.S. Chauhan. Panchagavya Therapy (Cowpathy) – Current status and future directions. *Indian cow* 2004: 1, 3-7.
- [29] Pescheck-Böhmer F, Schreiber G. Healing yourself using urine. *Urine Therapy: Nature's Elixir for Good Health.* Rochester: Inner Traditions, Bear & Company, 1999. p. 152.
- [30] Tauck SA, Berardinelli JG (2007) : Putative urinary pheromones of bulls involved with breeding performance of primiparous beef cows in a progestin – based estrous synchronization protocol. *J. Anim. Sci.* 85: 1669-1674.
- [31] Gabel M, Poppe S (1986). Protein and amino acid metabolism in the intestinal tract of growing bulls. *Arch. Tierernahr.* 36: 709-729.
- [32] Van Leeuwen JM, De Visser H (1976). Dynamics of calcium metabolism in lactating cows when the calcium content of the ration s is reduced. *Tijdschr Diergensskd.* 101: 825-834.
- [33] Biddle S, Teale P, Robinson A, Bowman J, Houghton E (2007). Gas chromatography -mass spectrometry analysis to determine natural and post administration levels of estrogens in bovine serum and urine. *Anal. China Acta* 2007, 586: 115-121.

- [34] Abubakar U, Adamu T, Manga SB. Control of *Meloidogyne incognita* (koid and white) chitwood (root-knot nematode) of *Lycopersicon esculentus* (tomato) using cow dung and urine. *Afr J Biotechnol* 2004, 3(8): 379-381.
- [35] Rajapandiyam K, Shanthi S, Murugan AM, Muthu GA et al. A: *Azadirachta indica* - cow urine extract, a novel controlling agent towards Clinically significant Multi Drug Resistant Pathogens. *J Appl Pharm Sci* 2011, 01(10):107-113.
- [36] Edwin J, Sheej E, Vaibhav T, Rajesh G, Emmanuel T. Antioxidant and Antimicrobial activities of cow urine. *Glob J Pharm* 2008, 2(2): 20-22.
- [37] Sahu Rekha, Lalchand, Gupta Rakshapal And Rout Omprakash, Benefits of cow urine – A review, *International Journal of Recent advances in Multidisciplinary research* 2017, 4(9): 2833-2835.
- [38] Athasivam AK, Muthuselvam M and Rajendran R: Antimicrobial Activities of Cow Urine Distillate against Some Clinical Pathogens. *Glob J Pharmacol* 2010, 4 (1):41-44.
- [39] Charmi P Shah, Patel DM, Dhama Paras D, KakadiaJanak et al. Invitro Screening of Antibacterial Activity of Cow Urine Against Pathogenic Human Bacterial Strains. *Int J Curr Pharm* 2011, 3(2):91-92.
- [40] Athasivam AK, Muthuselvam M and Rajendran R: Antimicrobial Activities of Cow Urine Distillate against Some Clinical Pathogens. *Global Journal of Pharmacology* 2010, 4 (1):41-44.
- [41] Charmi P Shah, Patel DM, Dhama Paras D, KakadiaJanak et al. Invitro Screening of Antibacterial Activity of Cow Urine Against Pathogenic Human Bacterial Strains. *Int J Curr Pharm* 2011, 3(2):91-92.
- [42] Kumar S. Analysis on the natural remedies to cure dandruff/skin disease-causing fungus - *Malassezia furfur*. *Adv BioTech* 2013, 12:1-5.
- [43] Edwin Jarald, Sheeja Edwin, Vaibhav Tiwari, Rajesh Garg and Emmanuel Toppo, Antioxidant and Antimicrobial activities of cow urine, *Glob J Pharmacol* 2008, 2 (2):20-22.
- [44] Dewanjee S, Maiti A, Kundu M and Mandal SC. Evaluation of Anthelmintic activity of crude extracts of *Diospyros peregrina*, *Coccinia grandis*, *Schmia wallichii*. *Dhaka Univ. J Pharm Sci* 2007, 6: 121-123.
- [45] Prashith Kekuda T.R, Nishanth B.C, Praveen Kumar S.V, Kamal D, Sandeep M, Megharaj H.K (2010). Cow urine concentrate: A potent agent with Antimicrobial and Anthelmintic activity, *J Pharm Res*, 3(5), 1025-1027
- [46] Ambwani S. Molecular studies on apoptosis in avian lymphocytes induced by pesticides. PhD Thesis Submitted to Department of Biotechnology and Molecular Biology, College of Basic Sciences and Humanities, GBPAUT, Pantnagar, India, 2004.
- [47] Dhama K, Chauhan R S and Singhal L (2005) Anticancer activity of cow urine: current status and future directions. *Int J cow Sci* 1(2): 1-25.
- [48] Sanganal JS, Jayakumar K, Jayaramu GM, Tikare VP, Paniraj K, Swetha R. Effect of cow urine on wound healing property in wister albino rats. *Vet World* 2011, 4:317-21.
- [49] Available online website at <https://www.akema.it/pdf/ALLANTOIN.pdf>
- [50] Vaishali Gautam, Bhakti Rawtal, Sangeeta Sahasrabuddhe. Cow urine – A Potential Ayurvedic Ingredient in Cosmetics, *Int j sci dev* 2021, 6(1):153-158.
- [51] Nimish Wagale, Gitesh Gunjal, Gauri Undegaonkar, Aditya Godse, Onkar Kahate, Swami Dhamane, Prof. Vivek Nagnath. Face wash from cow urine, *Int J Adv Res Sci Eng* 2018, 7(3): 562-566.
- [52] K.S. Tyagi, D.P. Singh, T.C.Sharma and R.K.Gupta: Rural entrepreneurship through Cow based products, *Interdiscip Inter J* 2018, 11:01-05.
- [53] Chhangani J.A, Krishnamurthi. K, Tiwari S.G, Rai M.M: A New formulation of cow urine based polyherbal soap and its Antifungal activity Against *Candida albicans*, *Indian J Biol* 2016, 3(2):111-117.
- [54] S.P. Wate, D.B. Raut, N.J. Duragkar and M.R. Tajne. Wound Healing Effect of Ointments Containing Cow Urine Concentrate on Rats. *Res J Pharm Technol* 2011, 4(5): 748-749.
- [55] Gulave .K.R, Hrithik .R Gupta, Shubham .CKarpe, Prathiksha.S. Devadkar, Khushi .B Gupta. Function and Evaluation of Hair tonic from cow urine, Fenugreek seeds, *Aloe barbadensis miller*: *Int J Innov Sci Res Technol* 2020, 5(5):30-34.