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Exploring the Parallels between Cumulative Toxicity of Newspaper Ink and Dushi

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ABSTRACT:

Objectives: Acharya Sushruta classified Dushi Visha as a poison from inanimate, animate, or artificial sources, known for its chronic accumulation in the body, leading to gradual deterioration. Newspapers are commonly used for food packaging but pose a risk of ink contamination, potentially causing various health issues over time. This review explores parallels between the cumulative toxicity of newspaper ink and Dushi Visha. **Data source:**The review examined Dushi Visha from Bruhatrayee and Laghutrayee, while health effects of newspaper ink were reviewed using e-resources like Google Scholar and PubMed. **Review Methods:** This review links newspaper ink's toxicity with Ayurvedic Dushi Visha, merging classical texts and modern health research. **Results:** Newspaper ink, with lead, naphthylamines, aromatic hydrocarbons, and AhR agonists, leads to neurotoxicity, cardiovascular diseases, kidney diseases, cancers, liver failure or death. These mirror Dushi Visha's effects, linking newspaper ink to its cumulative toxicity. **Conclusion:** Dushi Visha prevention and treatment can guide efforts to reduce cumulative toxicity from newspaper ink. Awareness among food businesses, small hotels, and consumers about the risks of using newspapers for food packaging is crucial. Regulatory measures should promote safer alternatives for packaging materials.

KEYWORDS: AhR agonists, Cumulative toxicity, Food packaging, Dushi visha, Newspaper ink, Naphthylamine.

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INTRODUCTION:

The use of newspapers and journals in food packaging has become a major issue in recent years. Street food is frequently produced by the roadway in severely unsanitary conditions, and it is also marketed and given to clients wrapped in discarded newspapers. Furthermore, it is well acknowledged that the quality of paper used in newspapers is of poor quality (1). Today, street food trading is a burgeoning industry in many developing countries, including India. According to the national policy for cityfied street food seller, in India total number of street seller is estimated at around 10 million. Some studies also approximated that street vendors constitute approximately 2% of the people of a urban center, this number is likely to increase further. So, when common street food eaters consume street food wrapped in newspapers, they may consume low or high concentrations of harmful trace metals, especially when the food is moistened or fried in cooking oil (2). Therefore, packaging becomes important for protecting food from contamination of ink. In India, newspapers are often used as packaging material to package, serve and transport food. Also, newspaper is generally used because it is of low-cost. This is a danger to food safety, because the ink used to print newspapers or magazines may not be of standard quality, and that it may contain dangerous chemicals in high or low amounts (3). Food Safety and Standards Authority of India (FSSAI), has approved a packaging policy that will ban the use of newspaper to pack the food. The new regulations came into force on July 1, 2019. The Food Safety and Standards Authority of India (FSSAI) has advised food vendors and consumers to stopover the use of newspapers for packing, serving, and storing food items. The ink used in newspapers contains various bioactive materials with known bad health effects, which can contaminate food and lead to health issues when ingested. Also, the directive noted that printing inks may contain chemicals, including lead and heavy metals that can percolate into the food which can exhibit serious health hazards over time (4,5).

Materials and methods:

Data source:

Detail review of Dushi visha was done from Bruhatrayee and Laghutrayee. For review of newspaper ink health effects e-resources like Google scholar, pubmed were used. Keywords like newspaper ink, cumulative toxicity, health effects were used.

Review Methods:

This review examines the similarities between the cumulative toxicity caused by newspaper ink and the ancient Ayurvedic concept of Dushi Visha. Utilizing both classical Ayurvedic texts and modern scientific research, we investigate the health implications of prolonged exposure to newspaper ink.

Results:

Newspaper Ink Composition (6):

The inks used for printing the newspaper are composed of 4 basic components.

Table No. 1: Newspaper Ink Components and its use

Sr.No	Component	Use
1	Pigment	For imparting color to the ink.
2	Resin	To bind the ink into a film that adheres to the printed surface.
3	Solvent	To facilitate the flow of ink for transferring it to the printing surface.
4	Additive	This alters the physical properties of the ink to adapt to various conditions.

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1. **Pigments:** These are the substances that give color to the ink. Carbon black is a common pigment used in black newsprint ink, while other pigments are used for colored inks. Ink pigments are tiny but considerably adsorptive. They frequently consist heavy-metals like Cadmium (Cd), Mercury (Hg), Lead (Pb), and Chromium (Cr) which are harmful to health when inhaled over a long duration (7,8). When this newspaper is disposed into the water, it can result in impurity of aquaculture and may affect humans through the food chain system (9).
2. **Solvents**: Solvents are liquids that dissolve pigments and enable ink to spread evenly on the printing press. Examples of solvents include mineral oils, vegetable oils, and other types of oils. These oils are referred to as the "vehicle" in ink and were traditionally made primarily from petroleum oil. However, they are now predominantly manufactured using soybean oil.
3. **Resins:** Resins are included in ink to assist in consolidating the pigments and adhering them to the surface of the newspaper.
4. **Additives:** Different additives can be incorporated into ink to enhance its characteristics. For instance, drying agents are often added to facilitate rapid drying after printing, while other chemicals may be included to optimize overall performance.

Health effects of newspaper ink-

Aromatic Hydrocarbons: Aromatic hydrocarbons like benzo(a)pyrene are established carcinogens. Contact with these substances can result in conditions such as lung cancer and other health complications. An experiment conducted in Manchester, England, found that the ink used in newspapers, particularly through rotary letterpress technology, could cause lung cancer among workers exposed to ink (10).

Naphthylamine: Another component of newspaper ink that has been linked to cancer, particularly bladder cancer (11,12).

Ink Solvents: Solvents commonly used, such as di-isobutyl phthalate, ethanol, and dimethyl sulfoxide, can potentially lead to adverse health effects including neurotoxicity, cardiovascular diseases, and kidney problems.

Heavy Metals: Regular ingestion or inhalation of ink pigments containing heavy metals such as cadmium, mercury, lead, and chromium can pose significant health risks (13,14). Exposure to elevated levels of trace metals such as chromium, copper, manganese, and zinc in food can lead to non-carcinogenic health risks such as neurological disorders and liver disease (15), while cadmium contamination has been associated with an elevated risk of breast cancer after menopause (16).

AhR Agonists: Extended exposure to AhR agonists can lead to a range of health issues including reproductive problems, neurological issues, and potentially cancer.

Synthetic colors: Known for their potency as carcinogens and ability to disrupt the endocrine system, these substances have been implicated as risk factors in a wide array of diseases. These include reproductive disorders, neurological issues, diabetes, and various forms of cancer.

Dushi Visha:

The term "*Dushi Visha*" originates from the root word "*Dusha,*" which signifies impurity and possessing qualities or characteristics that can corrupt or contaminate (17). According to *Acharya Sushruta* and *Vagbhata*, *Dushi Visha* refers to any poison derived from plant or animal sources, as well as *Kritrima Visha* (artificial poisons), which remain in the body after partial expulsion or have been partially neutralized by antidotes, wind, or

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sunlight. *Dushi Visha* is defined as a poison that possesses significantly lower potency in comparison to the ten classical properties of poison. These poisons accumulate or remain hidden in the body due to their reduced effectiveness across all ten characteristics. Their low potency results in delayed and cumulative toxic effects on the body. Because of their *Avarana* (enveloping) action through *Kapha dosha,* these poisons typically do not cause sudden death but persist in the body for extended periods (18,19).

***Samprapti* (Pathogenesis) of *Dushi* Visha**:

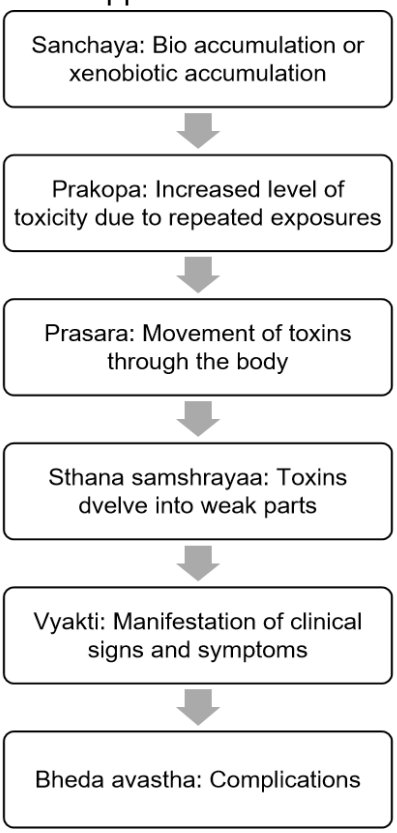
Sushruta has mentioned six stages of pathogenesis, known as *Kshatkriyakaal.* These stages are: *Sanchaya, Prakopa, Prasara, Sthansanshraya, Vyakta and Beda* (20).

***Nidana* (aetiology) of *Dushi Visha* (21):**

From a classical Ayurvedic perspective, the causative factors *(hetu)* for *Dushi Visha* are:

1) ***Sthavar Visha****:* Poisonous substances of plant origin.
2) ***Jangam Visha****:* Poisonous substances of animal origin.
3) ***Kritrima Visha****:* Artificial or man-made poisons.
4) ***Virudhaahar***: Incompatible food combinations or improper diet.
5) ***Ajirna****:* Indigestion or impaired digestive function.
6) ***Vegarodha***: Suppression of natural urges.
7) ***Manasika Bhava***: Psychological factors such as stress, fear, and emotional disturbances.

Similarly, according to *Ayurveda,* continuous intake of food with chemical preservatives, incompatible food combinations *(Viruddha Aahar),* repeated exposure to dusty or chemically polluted industrial areas *(Vihara)*, prolonged exposure to pesticides, excessive anger or emotional disturbances, and prolonged engagement in activities can lead to the accumulation of harmful chemical substances (toxins) within the body. This process is referred to as bio-accumulation or xenobiotic accumulation. This stage is called *Sanchaya* (accumulation). The accumulated toxins after repeated exposure increase the level of toxicity inside the body, which then enters into the *Prakopa stage* (i.e., stage of aggravation). After that the collected toxins will move over the whole body is called *Prasara Awastha.* During the movement of these toxins, they will dwell to a weak or defective part of the body. Then aggravated toxins will vitiate *Dosha* followed by vitiation of related *Dhatu* respectively, where precursory symptoms will appear. Then after long period of *Sthana Samshraya*, enters into *Vyakta Awastha* where whole clinical features of related diseases will see. If appropriate medication not performed in this stage, various kinds of complications will be seen with the stage of *Beda Awastha* including different symptoms like fever, burning sensation, hiccup, diarrhea, fainting etc. complications will appear.



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***Poorvarupa* (Prodromal features):**
Excessive sleepiness, heaviness of the body, yawing, laxity of joints,*Romaharsha* (horripilation) and *Angamarda* (body ache*),* catalepsy (22).

Lakshana* (Sign and symptoms*):
According to various classical texts, various clinical features of Dushi Visha have been mentioned in the following table (Table no 2).

Table no 2 - Clinical features of Dushi Visha:

Sushruta Samhita (23)	Ashtanga hridaya(24)	Yog ratnakar(25)
Avipaka	Bhinna Purisha	Bhinna Purisha Varna, Annamada
Arochaka	Bhinna Varna	Mukha Daurgandhya
Anna mada	Rakta dushti	Arochaka, Avipaka
Mandala	Trishna	Trishna, Moha
Kotha	Arochaka	Mamsa kshaya
Moha	Murccha	Chardi, Murccha
Pad shopha (swelling of lower extremities)	Vami	Pada shopha
Kara Shopha (swelling of upper extremities)	Gadgadavak	Kushtha
Asya shopha (swelling of oral cavity)	Moha	Shukra kshaya
Dakodara (ascietes)	Dooshyodara	Gadgadya
Chardi (emesis)		Jathara
Atisara (diarrhea)		Unmada
Vaivarnya		Shwasa
Murccha (fainting)		Jwara
Vishamajwara		
Trishna (thirstiness)		
Unmada(psychosis)		
Aanaha (distention of abdomen)		
Shukra kshaya		
Gadgadya		
Kushtha		

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Table no 3 - Clinical manifestations of *Dushi Visha* when lodge in the deeper *Dhatu* (26)

S.N.	*Dhatus*	Clinical features
1	*Rasa*	*Annadwesh* (loss of appetite), *Ajirna, Angamarda* (body ache), *Jwara* (fever), nausea, *Tripti* (fullness of abdomen), feeling of heaviness, cardiac manifestation, *Pandu, Srotavarodh, Karshya* (emaciation), *Virasata* (altered sensation of taste), tiredness, wrinkling of skin, *Palitya* (greying of hair)
2	*Rakta*	*Visarpa, Kustha, Tilkalak, Vyanga, Indralupta, splenomegaly, Raktaj Gulma, Arsha, Arbud, Raktapitta, Raktapradara, Mukhapaak, Lingapaak, Gudapaak*
3	*Mamsa*	*Arsha, Arbud, Adhimamsa, Adhijivha, Upajivha, Galashundika, Upakusha, Mamsasamghat, Galaganda, Gandamala, Oshtha Prakop*
4	*Medo*	*Medovriddhi, Galaganda, Arbud, Granthi, Madhumeha, Atisthaulya, Atisweda*
5	*Asthi*	*Adhyasthi (osteoma), Adhidanta (odontoma), prickling pain in bone (Suchibheda in Asthi), Asthishool, Kunakh*
6	*Majja*	*Darkness in front of eye, Murccha (fainting), Bhram, feeling of bulkiness on joint, Netrabhishyanda*
7	*Shukra*	*Klaibya (sterility), Apaharshan (impotence), Shukrashmari (spermolith), Shukrameha*

Table 4: Symptoms of Dushi Visha according to Dosha predominancy (27)

Sr.No	Dosha predominancy	Symptoms
1	Vata	Moha, Arati, Trishna, Murccha, Galagraha, Phena Chardi
2	Pitta	Kasa, Jwara, Vamadhu, Trishna, Klama, Daha, Atisara, Tama
3	Kapha	Shwasa, Kandu, Lalasrava, Vamana, Galagraha

Complication (Dushi Visha Upadrava) (28)

1) *Jwara* (fever)
2) *Daha* (burning sensation)
3) *Hikka* (hiccup)
4) *Kampana* (tremor)
5) *Shukra kshaya (*decrease in sperm count)
6) *Shopha* (inflammation)
7) *Atisara* (diarrhea)
8) *Murccha* (fainting)
9) *Hridrog* (cardiac manifestation)
10) *Unmad* (psychoisis)
11) Kampana (tremor)

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Table No 5- Shows correlation of symptoms of Newspaper ink toxicity and *Dushi Visha*

Newspaper Ink toxicity	Dushi Visha
Neurological disorders (23)	*Kampana* (tremor) (17), *Moha,Arati,Murcha* (fainting) (16)
Reproductive issues	*Klaibya (sterility) (15), Apaharshan (impotence) (15), Shukra Kshaya (*decrease in sperm count) (17)
Malignancy	*Arbuda, Granthi (15),*
Cardiovascular diseases	*Hridrog* (cardiac manifestation) (17)
Kidney problems	*Shukrashmari (spermolith) (15)*
Liver disease (23)	Dakodara (ascietes) (15)

Preventive measures:

Awareness

The prolonged exposure to ink components, including heavy metals and other toxic compounds, can lead to their gradual buildup in the body, potentially causing chronic health effects over time. Therefore, it is crucial to raise awareness among food businesses, small hotels, and consumers about the potential harmful effects of using newspaper as packaging material. Additionally, it is essential to implement appropriate measures to regulate the practice of using newspapers for food packaging and promote the adoption of alternative packaging materials that are safe and suitable for food contact. This proactive approach aims to safeguard public health and minimize the risks associated with exposure to harmful substances from newspaper ink.

Alternatives

1) Glass packaging
2) Cornstarch packaging (29)
3) Bamboo food packaging (30)
4) Palm leaf packaging
5) Bioplastics (PLA) (31)
6) PHA food packaging (32)
7) Stainless steel (33)
8) Cellulose packaging
9) Gelatin films
10) Mushroom-based packaging

Regulations

FSSAI has notified the Food Safety and Standards (Packaging) Regulations, 2018 which strictly prohibits the use of newspapers or similar materials for storing and wrapping food. As per this regulation, newspapers should not be used to wrap, cover or serve food nor should they be used to absorb excess oil from fried food. FSSAI urges consumers, food vendors and stakeholders across the nation to immediately discontinue the use of newspaper as food packaging material and recommends the adoption of safe and approved food packaging materials as well as food-grade containers, to ensure the safety and well-being of consumers.

DISCUSSION:

Certain types of poisons, such as arsenic, mercury, lead, and other heavy metals, have the ability to accumulate in the body over time, a condition known as cumulative poisoning. This accumulation means that even repeated intake of these poisons in small amounts can lead to chronic poisoning. These poisons can exist in various forms including physical states, chemical combinations, and mechanical combinations (34). In modern science, the exact definition

of cumulative toxicity may not be standardized, but it generally refers to the gradual accumulation of a substance in the body over time, leading to chronic toxic effects. This concept can be correlated with chronic poisoning, where repeated exposure to a substance, even in small amounts, results in harmful health effects due to its cumulative presence in the body. So, after exposure to those organic or inorganic substances for a long period,it will show different kinds of toxic effects in different organs which may lead to the stage of failure. In modern scientific terms, Dushi Visha aligns with the concept of bioaccumulation, where chemical substances such as pesticides interfere with the body's normal functions. These substances enter the body directly or indirectly from various sources. Therefore, the cumulative toxicity associated with newspaper ink can indeed be correlated with Dushi Visha or bioaccumulation.

CONCLUSION:

Preventive measures and treatments for Dushi Visha can form strategies to mitigate the cumulative toxicity of newspaper ink. Additionally, there's an imperative to raise awareness among food businesses, small hotels, and consumers about the hazards of using newspapers for food packaging. Regulatory measures should be implemented to control the use of newspaper packing materials, promoting the adoption of alternative sources for food packaging.

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REFERENCES:

1. Bormann, F., Adzinyo, O., Letsa, L.: Safety and hygiene status of street vended foods in Ho, Ghana. Journal of Hospitality Management and Tourism. 7(2), 25-32 (2016). DOI: 10.5897/JHMT2015. 0151
2. Ekhator, O.C., Udowelle, N.A., Igbiri, S., Asomugha, R.N., Igweze, Z.N., Orisakwe, O. E.: Safety evaluation of potential toxic metals exposure from street foods consumed in mid-west Nigeria. Journal of Environmental and Public Health (2017). https://doi.org/10.1155/2017/8458057
3. Bilitewski, Bernd, Rosa Mari Darbra, and Damià Barceló, eds. Global risk-based management of chemical additives I: Production, Usage and Environmental Occurrence. Vol. 18. Springer Science & Business Media. (2012).
4. Leach, R.H.; Pierce, R.J.; Hickman, E.P.; Mackenzie, M.J.; Smith, H.G. The printing ink manual. Springer 1993, 1.
5. Charan, B.; Madhumita, G. Assessment of Strengthening the Role of-Food Safety and Standards Authority of India (Fssai) Amidst Burgeoning Online Food Delivery Platforms: New Regulations, Challenges and The Way Forward, Review. Studies in Indian Place Names 2020, 40, 2869-2879.
6. Suslick, K.S. Kirk-Othmer encyclopedia of chemical technology. J. Wiley & Sons: New York 1998, 26.
7. Bohonowych, J.E.S.; Zhao, B.; Timme-Laragy, A.; Jung, D.; Di Giulio, R.T.; Denison, M.S. Newspapers and Newspaper Ink Contain Agonists for the Ah Receptor. Toxicological Sciences 2008, 102, 278-290, https://doi.org/10.1093/toxsci/kfn011. Hydrocarbons 20.
8. Tarnow, P.; Hutzler, C.; Grabiger, S.; Schön, K.; Tralau, T.; Luch, A. Estrogenic Activity of Mineral Oil Aromatic Used in Printing Inks. PLOS ONE 2016, 11, https://doi.org/10.1371/journal.pone.0147239. 21.
9. Sonone, S.; Jadhav, S.; Singh Sankhla, M.; Kumar, R. Water Contamination by Heavy

Metals and their Toxic Effect on Aquaculture and Human Health through Food Chain. Letters in Applied NanoBioScience 2020, 10, 2148-2166.

10. Leon, D.A.; Thomas, P.; Hutchings, S. Lung cancer among newspaper printers exposed to ink mist: a study of trade union members in Manchester, England. Occupational and Environmental Medicine 1994, 51, 87 94. http://dx.doi.org/10.1136/oem.51.2.87.
11. Hendry, W.F.; Blandy, J.P.; Glashan, R.W.; Hall, R.R.; Wallace, D.M.A.; Baxter, P.J.; Couch, J.A.; Finch, W.M.; Howe, D.W.; Parkes, D.H.G.; Westbrook, M.B. Occupational Bladder Cancer: A Guide for Clinicians: The Baus Subcommiuee on Industrial Bladder Cancer. British Journal of Urology 1988, 61, 183 191. 27.
12. Konety, B.R.; Carroll, P.R. Urothelial carcinoma: cancers of the bladder, ureter, & renal pelvis. Smith's General Urology. 17thed. New York: Mc Graw-Hill Companies 2008, 308-327.
13. Zheng, N., Wang, Q., Zhang, X., Zheng, D., Zhang, Z., Zhang, S.: Population health risk due to dietary intake of heavy metals in the industrial area of Huludao city, China. Science of the Total Environment. 387(1-3): 96-104 (2007). https://doi.org/10.1016/j.scitotenv.2007.07.044 9.
14. Farmer, J.G., Broadway, A., Cave, M.R., Wragg, J., Fordyce, F.M., Graham, M.C., ..., Bewley, R.J.: A lead isotopic study of the human bioaccessibility of lead in urban soils from Glasgow, Scotland. Science of the total environment. 409(23): 4958-4965 (2011). https://doi.org/10.1016/j.scitotenv.2011.08.061
15. USEPA US Environmental Protection Agency: Supplementary guidance for conducting health risk assessment of chemical mixtures. Washington, DC: United States Environmental Protection Agency Risk Assessment Forum Technical Panel.2000)). 11.
16. Itoh, H., Iwasaki, M., Sawada, N., Takachi, R., Kasuga, Y., Yokoyama, S., ... Tsugane, S.: Dietary cadmium intake and breast cancer risk in Japanese women: a case–control study. International journal of hygiene and environmental health. 217(1): 70-77 (2014). https://doi.org/10.1016/j.ijheh.2013.03.010
17. Illustrated MaharsiSusruta-Susruta Samhitaharya by KavirajaAmbikaDuttashasrti. Chaukhambha Sanskrit sansthan Varanasi 2015: 32.
18. AgadTantra Dr. P.V.N.R.PrasadChukhambha Sanskrit Sansthan, Varanasi 3rd ed 2016: 40.
19. KavirajaAtridevagupta. Acharyavagbhata AstangaHridyam. Chaukhambhaprakashan Varanas 2016: 787.
20. Shastri Ambikadutta, Sushruta Samhita. vol.1. Sutrasthan 21/36. Varanasi; Chaukhamba Sanskrit Sansthan; 2019. p.121.
21. Tripathi Bramhananda, Astanghrdaya. Uttarsthan 6/3. Delhi; Chaukhamba Sanskrit Pratishthan; 2019. p.921.
22. Shastri Ambikadutta, Sushruta Samhita of Maharshi Sushruta. Vol.1. Kalpasthan 2/30. Varanasi; Chaukhamba Sanskrit Sansthan; 2019. p.33.
23. Shastri Ambikadutta, Sushruta Samhita of Maharsi Sushruta. Vol.1. Kalpasthan 2/30-32. Varanasi; Chaukhamba Sanskrit Sansthan; 2019. p.33.
24. Tripathi Bramhananda, Astanghrdaya. Uttarsthanam 35/34-36. Varanasi; Chaukhamba Sanskrit Pratishthan; 2019. p.1147

25. Sashtri Laxmipati, Yogaratnakara. Vishanidanam, Varanasi: Chaukhamba Prakashan; 2008. p.465.
26. Shastri Ambikadutta, Sushruta Samhita of Maharsi Sushruta. Vol.1. Sutrasthan 25/10-17. Varanasi; Chaukhamba Sanskrit Sansthan; 2019.p.134
27. Shukla Vidyadhar, Tripathi Ravidatta, Charak Samhita of Acharya Charak. Vol. 2. Chikitsasthan 23/28-30. Delhi; Chaukhamba Sanskrit Pratishthan; 2012. p.544-545.
28. Shastri A., editor, Sushruta Samhita, Kalpsthana, 2/31, Varanasi, Choukhamba Sanskrit Sasnthana.
29. Krishnan, R.; Jones, J.; Helliblau, M. U.S. Patent No. 10,654,303. Washington, DC: U.S. Patent and Trademark Office. 2020.
30. Hermawan, D.; Lai, T. K.; Jafarzadeh, S.; Gopakumar, D. A.; Hasan, M.; Owolabi, F. T.; Khalil, H. A. Development of seaweed-based bamboo microcrystalline cellulose films intended for sustainable food packaging applications. BioResources 2019, 14, 3389-3410.
31. Song, W.; Yang, M.; Zhao, Y.; Zhu, M.; Zhu, Y.; Ren, H.; Tian, S.; Miao, Z.; Qian, L. Imidazolium functionalized cellulose filter paper derived from waste newspaper and its application in removal of chromium (VI). Reactive and Functional Polymers 2020, 157, https://doi.org/10.1016/j.reactfunctpolym.2020.104776.
32. Saini, S.; Chutani, P.; Kumar, P.; Sharma, K.K. Development of an eco-friendly deinking process for the production of bioethanol using diverse hazardous paper wastes. Renewable Energy 2020, 146, 2362-2373, https://doi.org/10.1016/j.renene.2019.08.087.
33. Modiano, P. Invisible Ink: A Novel. World Republic of Letters, 2020
34. C.K. Parikh, Text book of medical Jurisprudence forensic medicine and Toxicology. 7th ed. New Delhi; CBS publisher and distributers; 2016. pp.7.

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