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Historical Articles

## Disinfectants: Use of Different Types of Sanitization Techniques in 18<sup>th</sup> and 19<sup>th</sup> Centuries Britain and India

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**Abstract.** The article focuses on the use of different kinds of disinfectants used for sanitization and cleaning of public and private places for curbing the spread of diseases from one place to another. Multiple methods were employed for disinfection; some of which are easily accessible to the common people while others were particularly used in infirmaries and hospitals at the time of treatment. The article also shows that disinfectants were supplement to medicine and they were used to limit the contagion to a space whereas medicines were not accessible for the treatment of patients. Historically, the eighteenth and nineteenth centuries witnessed an unprecedented development in the field of chemistry which led to the discoveries of different types of antiseptic solutions and disinfectants apparently endorsed by the germ theory.

**Keywords:** Disinfection, Sanitization, Detoxification, Public Health, Medicine, Chemical Compound, Metal.

Amidst the rising number of Covid19 cases across the globe, the health ministries and disease control agencies of different countries have been periodically issuing guidelines and protocols for people to safeguard themselves from the contagion. These guidelines give people psychological satisfaction that if they bring change in their lifestyle and live disciplined public life, then they would soon resume their daily choruses. Medical researchers and health experts have revealed that people are required to be more conscious towards their personal hygiene and use disinfectants/sanitizers frequently in their homes and offices. In this context, the World Health Organization (WHO) and the US Environmental Protection Agency (EPA) have recommended a list of disinfectants, such as hydrogen peroxide, hypochlorous acid, sodium hypochlorite, sodium chlorite, calcium hypochlorite (bleaching powder)<sup>1</sup> detergent powder and soap, to disinfect places. The Indian Ministry of Health and Family Welfare also issued a brochure titled “Covid19: Guidelines on Disinfection of Common Places Including Offices”<sup>2</sup> to explain people what kinds of disinfectants to be used for cleaning indoor and outdoor spaces. The brochure also incorporated the list of cleaning agents (chemical compositions), details of hand hygiene and use of mask to encourage people for adopting clean ways of living.

This article is a chronological study of disinfectants with an objective to trace and analyse how these sanitization methods were employed by administrative authorities and medical institutions in Europe and India during the eighteenth and nineteenth centuries for confining diseases to specific locations. The article also gives an insight into four broad categories of disinfectants that were used in both civil and military firmaments against diseases and to provide clean and hygienic environment to patients in hospitals. It also studies the reasons for the recurring breakout of epidemics in slums of European cities in the nineteenth century despite persistent advocacy for disinfectants. The article also analyses the problem of frequent emergence of diseases in colonies and how they pressurized the colonial administration for pro-active steps to curb contagions.

### GERM THEORY

While people associated with different fields of science had been conducting experiments and analysing data to approve their theories of the existence of diseases causing agents in the air, it was in the nineteenth century that the 'germ theory' got recognition owing to the efforts of scientists and physicians like Ignaz Philip Semmelweis, Louis Pasteur, Robert Koch and Joseph Lister. In this list, Ignaz Philip Semmelweis, the Hungary born physician and scientist, deserves special mention for his astonishing contribution in finding the causes for the death of labouring women in obstetrical and midwifery wards.<sup>3</sup> In 1844, Semmelweis took master's degree in midwifery and applied for the position of assistant to the Clinic of Obstetrics in Vienna General Hospital. While working in the midwifery section of the hospital, Semmelweis observed that "the disease from which Prof. Kolletschka (his friend) had died was identical with that from which I had seen so many lying-in women die."<sup>4</sup> His pathological discovery produced astonishing results as "the mortality of parturient women in the first clinic (where the entry of physicians and students working in mortuary and post mortem restricted) fell from 12% to 3% in the course of two months."<sup>5</sup> This plunge in mortality rate Semmelweis attributed to following a simple practice of hand hygiene before entering the obstetrics wards but his inference was discarded by his colleagues and other physicians.

Although Semmelweis's discovery of pathological agent that cause puerperal fever in lying-in women was received with indifference, Louis Pasteur, Robert Koch and Joseph Lister consistently worked in this field and transformed the perception of people towards pathology

and diseases with their revolutionary ideas and findings. Sterilization of surgical instruments and cleaning the space with disinfectants considerably reduced in-hospitalization and post-operative deaths apparent from an article by a physician George F. Elliott on 'Germ Theory'<sup>6</sup> wherein he credited Professor Lister for his experiment with carbolic acid (phenol) in surgical theatre. Not only this, Prof. Elliott argued that the rooms where patients were taken post-surgery ought to be free from germs and therefore disinfected by means like fumigation, chemical solutions and spraying of germs killing deodorants.

With the progress in healthcare procedures and medicines, the use of disinfectants was voraciously advocated by physicians, microbiologists, biologists and pharmacists to clean laboratories, dormitories, infirmaries, clinics, and areas ravaged by diseases.<sup>7</sup> Hence, disinfectants were used as supplementary chemical compounds that would help in killing germs and curbing the spread of diseases like cholera, smallpox and plague.

### TYPES OF DISINFECTANTS

In the eighteenth and nineteenth centuries, disinfection was carried out in four distinctive ways – a) use of physical agents, b) use of chemical compositions, c) use of biological agents, and d) deodorants. Physical agents were profoundly used for disinfection in the ancient time and remained the prime and easily accessible for the common people in the latter centuries. Some of the common physical agents were -

- i) **Boiled Water** –Boiled water was the most common disinfecting agent in the ancient time. The Greek philosopher Aristotle suggested soldiers and army heads to boil water before drinking while fighting in areas unknown to them. He believed, "everything that may abide by fire had to be put into the fire and the rest had to be immersed in boiling water. He understood the need to avoid disease and instructed Alexander the Great that his armies boil drinking water and bury dung."<sup>8</sup> Not only this, objects and clothes of medical professionals were disinfected by placing them in boiled water for a specific time period and then let them dry in the sunlight. The prevalence of this practice could be assessed from the fact that "in 1797, Viborg recommended heating up to 64-65°C objects which had been in contact with the 'contagious poison' responsible for equine glanders"<sup>9</sup> With the increasing level of contamination of rivers water, it became necessary to employ water filtration techniques for clean water in the

nineteenth century Britain. On the one hand, the industrial waste was released in the rivers and on the other hand, water closets were connected with the main sewers. For instance – after the uplifting of ban on connecting the household water closets to the main sewer in 1815, the city of London faced the problem of clean water because household discharge was directly released in the Thames. Thereafter, the pressure was built on the local administration to supply clean drinking water to people particularly in wake of frequent outbreaks of cholera in sullied, congested pockets of cities in the first half of the nineteenth century. The local authorities took steps in this direction and provided clean drinking water for which investments were made in filters and water treatment technologies. Those areas of the city where pipe water could not be reached, people were encouraged to boil water before drinking.

In India, the practice of boiling water for drinking was quite old and diligently followed in many communities. Health conscious people continued this ancient practice in the eighteen and nineteenth centuries for which they heat water under the sun and then filter it with gravel and charcoal. Boiled water was a necessary component of medicine and dietary chart especially to those who fall sick from critical ailments. In the city of Puri (princely state of Keonjhar), victims of leprosy were given herbal medicine with boiled water and emphasis was laid on incorporating boiled water in diet.

The dietary prescription with their stress on vegetarianism, demonstrate a significant level of Hinduization. The stress on warm and boiled water seems particularly striking perhaps reflects interaction with the colonial medical system.<sup>10</sup>

- ii) **Fire** – In the middle ages, people were scared of dead bodies afflicted from diseases. Incineration of corpses, both human and animals, was perceived as the only way to avert contagion from spreading to others. The belongings of people died from diseases were immolated with the body and the premises where the death occurred sanitized and left unoccupied for nearly three months. Additionally, the family members and the ones who came in contact with the person died of disease (like plague) were forced to burn their clothes else severe punishment was given on failing to comply with the social and cultural norms. Another example of burning clothes came from the eighteenth century when families of

those who died from tuberculosis were mandatorily placed everything in fire.

- iii) **Fumigation** – Sanitization of a place where a person died of contagion was a compulsory practice for which fumigation through herbs was aggressively promoted in the eighteenth century. Burning of odoriferous herbs was a widely accepted practice to chase away insects in the streets and to disinfect clothes and objects of those suffered from mild diseases. The popularity of fumigation for sanitization could be understood from the advisory of English Physician Daniel Layard issued in 1752 during the epidemic of cattle plague ('contagious distemper') – "the fumigation of stables using the following mixture: Wet gunpowder, pitch, tar, brim-stone, tobacco, frankincense, juniper and bay-berries, [...] should be burnt, and the smoke confined in these stables, more than once"<sup>11</sup> Sulphur and Mercury were two chemicals frequently used for fumigation of spaces and to detoxify objects that could not be immersed in boiled water. In India, Susruta wrote in his book *Susruta Tantra* that the fumes of sulphur should be released in rooms used for surgical purposes to purify them from all kinds of impurities.

#### *Disinfection through chemical compounds*

Although there are several literary and non-literary records from the ancient times<sup>12</sup> to testify the use of chemicals for detoxification and purification of spaces and objects, the pre-modern era (around renaissance movement) witnessed extensive research and application of chemicals like sulphur, mercury, sodium, calcium and others for sanitization purposes. In the last phase of the middle ages, Europe became the centre of knowledge with endorsement to the classification of data and emphasis on empirical approach. Practical chemistry received extensive attention along with the documentation and translation of books in many European languages. Georg Pauer, a German thinker, studied chemistry, physics and medicine in the 16<sup>th</sup> century and spent his entire life in understanding of mining and metal production. Similarly, John Pettus, an English scientist, had deep interest in metallurgy and mining that made him the member of Society of Mines Royal and Battery Works in 1651. The impact of these developments could also be seen on chemical disinfectants and their uses -

- i) **Sulphur** - Sulphur and its derivatives were the main disinfectants used for sanitization of not only places but also objects used for the treatment of patients.

Owing to its awful smell and lethal impact on small plants and insects, sulphur dioxide was produced through chemical reaction or by burning the metal in fire. The fumes of sulphur dioxide easily spread in streets, houses and closed spaces. In the last quarter of eighteenth century, fumes of sulphur dioxide were used to disinfect spaces in England where the cattle plague wreaked havoc. The fear of infection was so deeply rooted in the minds of people that many European countries in the nineteenth century passed “rules not to take correspondences or letters from Asian countries like India until they were sanitized in ships before unloading and then dispatched to the addresses after twenty four hours.”<sup>13</sup> Parcels shipped from the disease ridden colonies were first placed in a room and fumes of sulphur dioxide were released and then left them unattended for some-time before starting their deliveries.

- ii) **Mercury** - From the ancient time till the late nineteenth century, chemists and metallurgists observed corrosive properties of mercury that encouraged people to use the metal in medicines for treatments of diseases in both humans and animals. Compounds of mercury were abundantly used for treatments of diseases like leprosy, syphilis, tuberculosis and other kinds of contagious diseases. Robert Koch, the nineteenth century German physician and microbiologist, demonstrated with his experiments that due to corrosive effect of mercury, it can sublimate the multiplication of microorganisms. Although mercury was used in India prior to the British intervention in indigenous cures, the metal was aggressively endorsed by the British Indian government for the treatment of syphilis in European soldiers. In the article “Sexually Transmitted Diseases and the Raj,” R. Basu Roy writes

The mainstay of the treatment of syphilis in the 19th century was mercury. In India, mercurial preparations had been in use for years for the treatment of many non-venereal complaints, and its side effects were well known. In the case of syphilis, the army authorities did not like oral treatment with mercury compounds because of gastrointestinal side effects and the difficulty of securing compliance... In 1903 the expert adviser to the army at the time proposed repeated injections of “mercurial cream”, also known as “grey oil”, a suspension of metallic mercury in oil and fat which had been devised by Lange in Vienna in 1887 The metal was applied to the skin of patients.<sup>14</sup>

- iii) **Copper** – Unlike mercury and sulphur, this metal was primarily used for manufacturing utensils and

objects. People were familiar with corrosive property of copper apparent from its hostility to the growth of algae and fungi. In India, copper utensils were extensively used to store drinking water. In the eighteenth and nineteenth centuries, cholera ravaged several parts of India. *Hakims* and *Veds* recommended to their patients and their family members to store drinking water in copper utensils because the metal was known for its anti-microbial properties.

- iv) **Potassium Permanganate (Condy’s Fluid)** – Crystals of Potassium Permanganate were dissolved in water to prepare a solution called Condy’s Fluid in which saucer and utensils of patients were dipped for some-time before placing them in running clean water. The solution was used to soak in the clothes of sick people and to spray on furniture kept in the rooms of patients. Besides, the solution was used to disinfect rooms, halls, galleries and compounds of hospitals and even kept in hospital toilets to sanitize the hands of doctors. Henry Bollmann Condy, an Englishman chemist and industrialist, prepared Condy’s fluid in 1857 to be used externally as well as internally. Condy recommended not to use this fluid with carbolic acid because of their opposite properties. The fluid was purchased in abundance by cargo companies in the nineteenth century for the purification of ships. The British government released advisories for the cargo shipping companies to disinfect their coolie ships coming from cities like Calcutta and Bombay in the wake of frequent outbreaks of epidemics like cholera and plague. Consequently, the manufacturers exploited the growing concerns of epidemics in Britain and advertised their disinfectant products in newspapers - Advertisements that appeared in the Kingston newspaper – *The Gleaner* – during 1860s and 1870s proclaimed that Condy’s fluid was strong enough to be used ‘To purify Bilge Water in Ship’s Well To parity with the Interior or Hold of a Ship.’<sup>15</sup>
- v) **Carbolic Acid (Phenol)** – Carbolic acid gained popularity for its qualities of disinfection and antiseptic to treat wounds and other kinds of injuries. Joseph Lister, the British surgeon, acknowledged Louis Pasteur’s contribution of microbes and introduced carbolic acid as an antiseptic solution for sterilizing of surgical instruments. Lister widely used carbolic acid to minimize post-surgical infections. Owing to its highly inflammable qualities, carbolic acid was given to people in crystalline solid form. Crystals were dissolved in water to prepare a solution

used for washing clothes, furniture, utensils, and to clean hands of attendants, sick and children. During the Bombay Epidemic 1896-97, the British Indian government made steam disinfection mandatory near the quarantine centre and people coming to these centres were bound to take bath. Besides, they were given douche of 2 per-cent solution of carbolic acid. Clothes of patients and suspected people were immersed in 1-1000 solution of perchloride of mercury for ten minutes.<sup>16</sup>

The pure form of carbolic acid was used for surgical purposes and its lotion was applied on ordinary sores and ulcers. The significance of carbolic acid at the breakout of cholera could be assessed from the report – ‘Cholera: Its Nature, Detection and Prevention’ published in *Public Health Reports* in 1910. The report highlights multiple uses of the acid including

In the room with the patient, there should be a tub or other large vessel containing five per cent solution of carbolic acid crystals for the immediate reception of soiled linen... the stools and vomit of the patient should be disinfected at once by adding an equal volume of five per cent carbolic acid solution, five per cent formaldehyde solution, or milk of lime.<sup>17</sup>

- vi) **Chlorine gas** – Carl Wilhelm Scheele discovered chlorine in 1774 and studied its properties that resulted in its massive industrial use like bleaching agent in paper and textile mills. Considering the exclusive quality to disinfect, chlorine was used to clean portable water and to disinfect sewages but it did not find much use in hospitals and infirmaries since it caused irritation in eyes and lungs. Chlorine gas was obtained through several methods but the one most often used was adding water to chloride of lime (bleaching powder) in small quantities. For the purpose of disinfecting rooms occupied by sick people, chlorine gas was obtained in large quantities using several chemical agents.
- vii) **Different kinds of Acids** – Due to corrosive properties of different types of acids on some metals and stones, the use of such chemical liquids was aggressively adopted in the ancient times. Among them, wine, alcohol, ink, lemon, sodium tartrate, sulphuric acid and vinegar were commonly used as medicines and disinfectants. For instance – vinegar was given to people having complaints of abdominal pain and wounds. Lemon was advised to people for the treatment of many skin problems excluding leprosy and other deadly contagions.

#### *Disinfection through biological agents*

This is one of the oldest techniques of disinfection in which decomposable and disintegrable matter is buried in soil to suppress the foul odour. Human bodies, carcasses of animals and excreta are buried deep to expedite enzymatic degradation and to cut off oxygen supply that was assumed to activate chemical reaction and release unpleasant smell in the atmosphere. This practice apparently discards the concept of disinfection through fire owing to the acceptance of some unscientific explanations. For instance - in many cultures, it was believed that bodies of people died from contagious diseases ought to be buried instead of burning them in woods as the smoke emerged out of pyre had pathogens that spread rapidly in the air. These pathogens reach to human beings through air and cause infection.

#### *Disinfection through Deodorants*

This kind of practice for disinfection was perceived essential to counter the spreading of diseases that might be caused by unattended carcasses of animals that release unpleasant odour. Deodorants have the capability to subsume filthy smell with fragrance but lose their potentiality to remain effective disinfectants. Some examples of deodorants were brown paper, tar fumes, acetic acid, ammonia, roasted coffee and pastilles.

#### DISINFECTANTS, SLUMS AND PERSONAL HYGIENE IN BRITAIN

These methods of cleanliness and decontamination had profound impact on exterminating diseases and to reduce the circumference of epidemics to certain pockets or cities. However, it is equally important to take into account that the use of chemical agents for sanitization in the nineteenth century worked well in major metropolitan cities of Europe like London, Manchester, Bristol, Paris and others. Since these cities witnessed the mushrooming of dark and filthy slums infested with pathogens at the time of industrial revolution, the disinfectant solutions emerged as potent tools for the government authorities to curtail the spreading of diseases and to safeguard the premises of upper class people. In the article “The Public’s View of Public Health in mid-Victorian Britain,” the authors argued the sanitary reforms in the 1830s, 40s, 50s and 60s bounded authorities for providing better hygienic conditions to the city dwellers and induced perceptual change among them for living healthy life. For example – in the cholera epidemic

of 1848-49, people did not resist against cleanliness drive as they had objected to in the cholera outbreak of 1831-32. In 1848-49, people “allowed cholera victims to be removed to Houses of Recovery or special hospitals. These institutions were operated, on official anti-contagionist lines, not to isolate victims as such, but to remove them from the poisonous conditions which had produced their disease.”<sup>18</sup> With regard to personal hygiene and home cleanliness in the slum, it was found that “certain families were clean and wholesome while their immediate neighbors were filthy and verminous.”<sup>19</sup>

This aspect of personal and social hygiene opens up the seamy side of institutional and governmental negligence. Instead of putting onus on individuals for their inability to adopt clean ways of living owing to poverty, it criticized utilitarian approach for affixing people’s habits with their birth. To highlight the administrative failure in providing better facilities, examples of local governments and their indifference towards improving the constantly increasing slums ought to be cited. For instance – during the outbreak of cholera in 1831-32, Liverpool was one of the worst overcrowded cities with extremely poor amenities and a large section of the population living in slums. More than half a million people migrated to Liverpool from Ireland in the first half of the nineteenth century that put a lot of pressure on the city’s infrastructure. Since the population density was very high in slums and basic amenities like disposal of waste and supply water were almost absent, cholera spread at a rapid pace in which 1523 people died out of 4977 cases in the city.<sup>20</sup> One of the main reasons for such pitiable conditions of industrial towns was the corruption and strong class biasness apparent from the sanitary works undertaken in the nineteenth century. While Chadwick’s Sanitary Report (1842) recommended providing, better amenities to people living in filthy slums where atmospheric impurities accelerated diseases, the local governments worked on “piped water, glazed sewers, street widening, drainage and paving were to be found first in the areas where rate payers, local councillors traded or lived.”<sup>21</sup>

#### DISINFECTANTS, INDIGENOUS MEDICINES AND COLONIAL INDIA

British colonies offered more complex conditions with limited access to medicine and sanitization products. Britishers were dependent on natives for various kinds of menial works including cleaning of toilets, disposal of sewages, fetching water from wells and domestic chores. In the absence of modern disinfectants, British administrators and soldiers were vulnerable

to native diseases even in their cantonments. J. R. Martin, Presidency Surgeon of Bengal and later President of the EIC’s Medical Board, argued that the natives lack habits of personal hygiene owing to their deep rooted belief in religion. On the one hand, Martin admired the efforts of William Bentinck for his utilitarian approach to introduce social and cultural reforms in India; on the other hand, he vehemently criticized the Bengalis for their poor hygiene habits and wrote

The natives have yet to learn that the sweet sensations connected with cleanly habits, and pure air, are some of the most precious gifts of civilization. Neither did they seem to be impressed by the importance of pure water. Everywhere one finds the tanks in an impure and neglected condition.<sup>22</sup>

The concerns of Surgeon Martin did not vanish even after lapsing of several decades and investments in healthcare with the opening of hospitals and dispensaries. E Carrick Freeman captures the fear of British people and challenges they have to face in India

Owing to the primitive habits of natives, the face of the country, wherever the population is at all dense, as little may be regarded as little better than one huge latrine. The purifying and germicidal agencies which tend to counteract the evils of this state of affairs are the intense heat and light of the sun, extreme dryness of the air in many parts and length, volume, and rapid flow of the great rivers.<sup>23</sup>

In this regard, Sir William Moore, Surgeon General with the Bombay government, prepared a comprehensive manual titled *A Manual of Family Medicine and Hygiene for India*, published in 1889 to educate British men and women in domestic (indigenous) medicine and their preparations. He also elaborately discussed the management of room occupied by sick, application of local disinfectants, preparing medicines from indigenous items in emergency and instructions on protecting oneself during epidemic. On the non-availability of modern medicines and sanitary products, Surgeon Moore prepared a list of medicines with their Hindustani names that could be easily purchased from local bazars –

English Names	Hindustani Names
Alum	Phitkarree
Camphor	Kafoor
Sulphur	Ghundak
Potash, Nitrate of, Salt Petre	Shora

Source - *A Manual of Family Medicine and Hygiene for India*.

The manual comprehensively explained the need to

dispose discharge of sick like vomit, urine, and bowels during epidemic outbreak, disinfection of rooms with proper ventilation and charcoal; disinfecting clothes, utensils and furniture with chemical compounds like carbolic acid or Condy's fluid (if available) or with boiled water to kill germs. Moore also emphasized on personal hygiene especially in tropical climate.

The complexity could also be understood from the fact that on January 18, 1924, E. H. Hankin<sup>24</sup> wrote a letter highlighting the major challenges for British troops and officers owing to the lack of awareness for sanitization among Indians. Based on his personal experiences, Hankin pointed to the autocratic and hierarchical system as obstacle in providing safe environment during cholera outbreak. Hankin discovered that filters used for cleaning drinking water could not kill germs that cause cholera. Hence, military officers, administrators, soldiers, engineers and others, who came alone or with their families to colonies to serve the British Empire, had to be trained in indigenous items that could be used as alternatives of western products.

Although the British administered Indian cities witnessed infrastructure development, they were still far behind to their counterpart cities in England especially in terms of decongestion plans, sanitary works, drinking water supply and drainage system. Owing to the poor infrastructure in the Indian cities, British families were taking necessary precautions to stop the incursion of diseases in their residences for which they exclusively invested in disinfectants. Dining tables, cutlery and crockery were cleaned with dish bar and detergents. In case any family member was ill, tableware were not only cleaned with dish bar but also shown to steam heat or immersed in boiling water. These conditions provided favourable environment to druggists and chemists to exploit the demand of English medicines and chemicals compounds in India.

Consequently, British pharmacies selling western medicine started to sprout in major Indian cities to meet the requirements of British officers who gave preference to modern methods of treatments over indigenous techniques of cure and prevention. On tracing the history of pharmacies in India, it is found that the first chemist shop named Bathgate was opened in 1811 at Lal Bazar in Calcutta followed by opening of a pharmaceutical company in 1812 by the two British surgeons John Robinson and James Williamson who primarily dealt in apothecary and surgical instruments. Assessing the drug list of pharmaceutical company Thomson and Taylor, it is found they dealt in more than "three thousand items which included surgical instruments, chemical, physical and pharmaceutical apparatus, dental goods,

electrical apparatus, microscopes, bacteriological goods, spectacles, photographic goods, medicine chests, foods and dietary preparations, aerated waters, proprietary preparations, toilet and nursery requisites, patent medicines, wines and spirits, and hospital requisites."<sup>25</sup> These items were promoted through catalogues that were circulated with newspapers. Medical journals like *Chemist and Druggist* regularly published advertisements of those products that might see huge sales in the Indian market considering the country's climate and paucity of resources. Products used for sanitization had good demand in the market owing to perpetual fear of contamination and frequent outbreaks of epidemics.

## CONCLUSION

Disinfectants remain integral to the activities of people knowingly or unknowingly inherited from their ancestors. As and when new compounds hit the market, people resist to their adoption but gradually homogenize them in their lives considering their benefits. Analysing the history of disinfectants, it is not wrong to say that these compounds and techniques of disinfection in the past were primarily targeted at controlling diseases from spreading to others but their utility has changed in the contemporary times as precautionary items to protect people and to maintain personal hygiene. Families, in metro cities, use disinfectants on daily basis to clean floors, toilets and bathrooms that ensure healthy and illness free lives. Demand of disinfecting products spirals with the rapid circulation of information and the onslaught of seasonal diseases. In the present times, it becomes imperative to depend on chemical disinfectants for protection against pathogens.

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