

Significant role of fomites in spreading of viral disease and its preventive measures

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Abstract— Threats of viral infection are increasing day by day. Viruses multiply by using host cell machinery and it has either DNA or RNA as a genetic material. Till date most of the viruses are mystery among the scientist. Present paper deals with the significance role of fomites in spreading of viral disease. A fomite is any non- living object or sources that, come in contact with infectious agent or contaminated with pathogen, and in turn transfer infection or disease to new host. Fomites exposure mainly includes a secondary path of contamination or exposure like oral or direct contact for pathogen to infect the new host e.g. People unknowingly touch surface in many places daily, and in this way they can prone to infection by touching infected places and surface, and following their facial mucosal membrane.

Keywords— *Viral diseases, spreading, levels of infection, fomites, modes of infection, precautions.*

1. INTRODUCTION

Viruses are microscopic, obligatory, infectious organism. The threats of viral infection are increasing day by day. Viruses multiply by using host cell machinery and it has either DNA or RNA as a genetic material. Till date most of the viruses are mystery among the scientist. Present paper deals with the significance role of fomites in spreading of viral disease. A fomite is any non-living object or sources that, come in contact with infectious agent or contaminated with pathogen, and in turn transfer infection or disease to new host. Fomites exposure mainly includes a secondary path of contamination or exposure like oral or direct contact for pathogen to infect the new host e.g. People unknowingly touch surface in many places daily, and in this way they can prone to infection by touching infected places and surface, and following their facial mucosal membrane. Previously fomites route was negligibly

counted in transmission of infection, but recently it has been proved that fomites play an important role also. Viral disease and their transmission is complex and very tedious to trace out.

The fomite route of infection denotes to exposure provided by touching contaminated surfaces inevitably and following contact to facial mucus membrane of the patient [1] [2].

Respiratory viruses like (SARS-CoV, H5N1, and COVID 19) responsible for acute respiratory infections (ARIs) and these are responsible for many epidemic and pandemic diseases. Respiratory viruses are supposed to be resides in mucus membrane; mainly in respiratory secretions of the suffered person and transmit through coughing and sneezing. Previous study suggest that there are three potential route of transmission of any respiratory infection first long range air born route, close contact route and most important through fomites. [1] [3] [4]. Fomites are non- living matter/ object sheltering and potentially able to transmit disease [3] [4].

2. AIM AND OBJECTIVE

Present paper mainly investigating the significant role of fomites in disease transmission and trace out routes of virus transmission to prevent/ or diminishing its further infection. Present study may help helpful like a precautionary tool or helpful in breaking chain of infection at community level.

Infectious Disease Transmission Routes:

1. Vector-borne: Pathogens like malaria, yellow fever, dengue intervention: insecticides, environmental mitigation, bed nets, window screens, insect repellents
2. Common Vehicle: Pathogens: norovirus, enterovirus, rotavirus, poliovirus, rhinovirus, hepatitis A Interventions: water and food quality standards, hand and environmental hygiene, donor blood and organ screening, equipment sterilization. (Iatrogenic; contaminated medical susceptible host

- device, blood, or tissue) (Food borne; contaminated foodstuffs , susceptible host)
3. Airborne: Pathogens: influenza, measles, and rhinovirus, respiratory syncytial virus
Interventions: respiration masks, social distancing, closing public locations, blocking expirations, mechanical -alteration, and ultraviolet radiation. (infected host, susceptible host ;susceptible host)
 4. Contact: Pathogens: rotavirus, rhinovirus, norovirus enterovirus, hepatitis, human immune-viruses, Interventions: hand and environmental hygiene, pharmaceuticals, prophylaxis. (Direct; infected host susceptible host) (Indirect; infected host, fomite, t susceptible host) (Vertical; infected host (mother), susceptible host (prenatal child)).

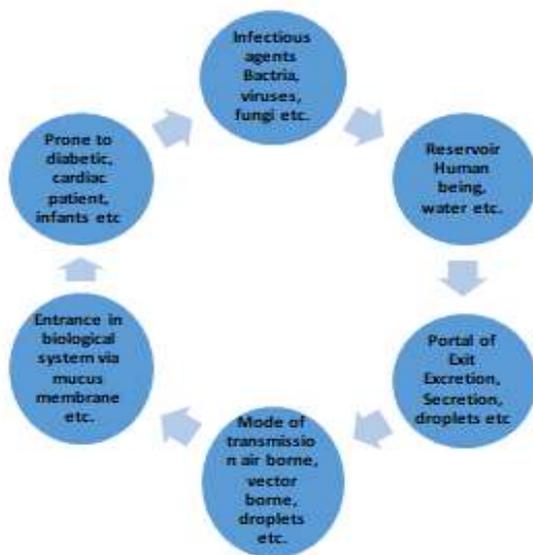


Fig. 1 Transmission of diseases; infection cycle.

Fomite plays a significant task in disease transmission [4]. Any inanimate object which is capable of sheltering, anchor, absorbing and transmitting infectious microorganisms [5][6]. Infected surface contact precautions are in standing instruction manual published by World Health Organization. The complexity of infection is increased due to incomplete knowledge of indirect transmission (fomite route of transmission). Indirect transmission due to intermediate fomite means, person to person transmission via an inanimate object act as a carrier of infectious disease. According to many studies it is confirmed

that there are number of routes fomites can be spread infectious disease, like direct contact with body fluid, hand shake or other body part, fomite; an inanimate object and emitted air born particles of coughing, sneezing, talking etc. [7] [8]. The intensity of infection multiplies due to dense population and their rapid mobility which in turn impossible to trace out disease spread [9].

Viral diseases are managed by complete understanding of their transmission in environment [10], earlier studies confirmed that SARS can be and mostly spreads through fine particles in the air [11]. Fomite based infection mainly include, infected surface in hospitals [12], cross contamination in commercial kitchen during food preparation [13] and from infected clothes in laundry [14], such type of risk can be minimize by maintaining hand hygiene [15].

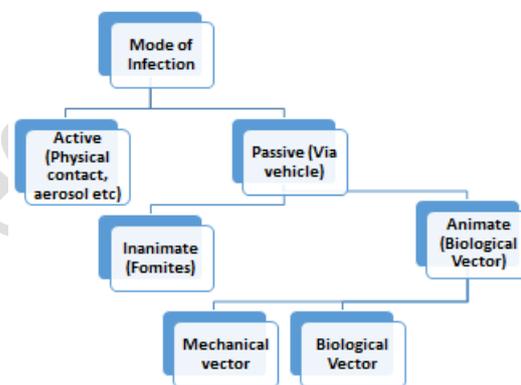


Fig 2 Levels of disease transmission

Transmission of virus can be understood by following steps. Firstly, the infectious micro-organism dropped from a diseased person to the fomite. This may be direct (through coughing, sneezing large droplets are settle) or indirect (through hands; due inadequate hand hygiene), now these infectious agent resided on the surface for a long time and it persist over there, and lastly when it exposed to any susceptible host through any mode by touching hands (adult person touches his face 10 to 25 times in per hour; an average), by mobile phones etc., Influenza viruses are capable to survive for days and potentially strong to spread infection e.g. bank notes[16] . This might be the certain route of transmission of viral diseases. The importance of hand hygiene; washing hands with soap and clean water to minimize risk of infection is well mentioned [17]. Regular hand hygiene may

reduce infectious microorganism on hands [18] studies showed that role of fomites in diseases transmission [19].

To prevent disease transmission it is required to break the chain of transmission, and to trace out its route via, its agent, source, type of transmission, most susceptible host, mode of entry into the host body. Previously Common chlorine and hypochlorite is used for disinfection but recently non-chlorine chemical disinfectants have been introduced in to the market, such as peroxyacetic acid, glutaraldehyde, sodium hydroxide, ozone gas, and calcium oxide [20]. Some of these are commonly used in disinfecting. There are some thumb rule to prevent infection are;

1. Maintain regular hand hygiene: wash hand regularly with soap and clean water.
2. Environmental Cleanliness: clean floor, stair case, door knobs, handles, lift button, doorbell with alcohol based disinfect liquids regularly.
3. Proper disposal of medical waste: Medical waste should be disposed according to their given guideline especially infectious waste.
4. Use of PPE kit: Health practitioners are vulnerable to infection. They must carry PPE (personal protective equipment).
5. Use of face mask: by using mask (e.g. N95) risk of respiratory viral infection can be minimize.
6. Maintain respiratory hygiene/ etiquette: Dispose of tissue paper properly in close lid dustbin. Put tissues paper or cloth over mouth and nose while coughing / sneezing.
7. Adopt left hand rule: To reduce chance of infection use left hand to do work; open door, press buttons in lift; touch flush knob etc.
8. Avoid hand shake: Avoid hand shake it may cause direct infection, instead make habit to greet with NAMSKAAR (Indian ancient method of welcome).
9. Yoga and Pranayama: regular basis of yoga like surya namskar and yogic practice make your body strong, pranayama; respiratory practices; anulom vilom etc. make respiratory system strong and more efficient.
10. Strong immune system: Ancient Ayurveda possess thousands of remedies that enhance one's immune system best eg is chavanprash, tinospora cordifolia, amla, ocimum sanctum etc. Take balanced diet to maintain immunity.

3. CONCLUSION

Viruses are microscopic, obligatory, infectious organism. Many viral diseases are life threatening. Fomites play an important role in spreading the diseases. Present paper discussed the role of fomites in disease transmission. This paper show that fomites are a public health risk when connected with public places, food, currency etc. Author emphasized every persons should maintain personal hygiene and follow some thumb rule presented in above study.

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