INTRODUCTION

“One who maintains cleanliness keeps away diseases ’’ --Sam Veda

‘Cleanliness is next to Godliness ‘’ ---Mahatma Gandhi

The human population world over is increasing day by day. The elementary necessity of this hugely increasing population is food, water, clothing, housing, and health care facilities. To accommodate the need of this enormously expanding population there are related inventions happening every day. This has resulted in a rapid growth of health care establishments promoted by government and private sector across the globe. This has helped in treating various incurable diseases, controlling, and eradicating several deadly ailments. Moreover, these facilities have provided immunization and protection for communicable and easily spreading diseases globally. The booming healthcare industry has proved to be a boon for mankind in present era and for future as well.

The positive side of this massively developing health care facilities are welfare and wellbeing of mankind, other organisms, and environment, however since every coin has other side similarly there is another side of this aspect which has in present era emerged out as cause of worry for environmentalists and health care authorities globally. In the process of pursuing good health and wellbeing related issues the health care industries are producing huge amount of waste. This Bio-Medical waste is generated in the process of medical investigation and surgical operations, disposing this waste is challenging as it is expensive and time consuming. The undisposed waste may cause hazardous effects to healthiness and wellbeing of mankind.

Biomedical waste is distinct from normal trash or general waste. Medical investigation and treatment facilities during the course of their operations generate hazardous chemicals and radioactive materials as waste material. Biomedical waste is also different from normal municipal or household waste as it is mostly non-biodegradable in nature. In health care facilities during treatment of ailments, the waste generated causes problem for living organisms and immediate surrounding environment. Improper and untimely disposal of biomedical waste causes adverse impact on the wellbeing of individuals involved and the community as whole. Health care establishments generate biomedical waste or health care waste, during diagnosis, treatment, laboratory testing, surgeries, and research facilities. The Biomedical waste generated depend upon a few factors such as type of medical centre, occupancy level of patients, specificity of treatment of medical centre, techniques used in treatment, infrastructure, and resources of centre, location of centre etc.
The biomedical waste is distinct from all other wastes and is considered as hazardous due to two main reasons – the toxicity of waste which can be life threatening and contamination that may cause spread and outbreak of communicable diseases. Biomedical Waste can be discarded blood, sharps, unwanted microbiological cultures, identifiable body parts, human or animal tissues, used bandages, discarded gloves, surgical instruments etc.… Proper and timely disposal of biomedical waste is of utmost importance as it may cause various infectious diseases and/or cause water or soil pollution thereby disturbing the balance of ecosystem. Previous studies related to biomedical waste suggest that certain biomedical waste materials may contain plastics or other no biodegradable substances which can take long period for disposal or sometimes may not be disposed fully, causing damage to environmental health.

As there is an utmost need of attention on this emerging issue, the researcher has chosen the topic for study which in future will be helpful in various other related studies. The said study will be conducted in some health care units of Mumbai Metropolitan city and rural areas of Kalyan taluka.

Mumbai formally known as Bombay the capital of Maharashtra state is one of the fastest growing metros in the world. It is a very densely populated city, located on the western coast of India on the shore of Arabian Sea. It is said to be the financial and commercial capital of the country as it has experienced rapid growth over the past twenty years in all the fields. Medical and health care field is one of the fastest growing industry apart from all other fields. There are numerous general, multi-specialty, private and government hospitals in Mumbai. According to the data collected from Municipal Corporation of Greater Mumbai (MCGM), there are more than 70 municipal hospitals more than 1000 private hospitals and approximately 1000 diagnostic centers, clinics and urban health centers, and veterinary treatment centers in Mumbai. Previous studies and their findings state that these medical treatment centers generate huge amount of biomedical waste every day. MCGM is one of the largest local governments in the Asian continent. It was established as India’s first municipal corporation in 1882. It has been working as a leading municipal corporation in field of socio environmental development of citizens. The work of effective collection and disposal is solid waste management in Mumbai Metropolitan city is under control of MCGM (Municipal Corporation of greater Mumbai). It is required to understand how effectively the objective of MCGM related to minimizing waste and effective disposal of Bio-Medical Waste is being fulfilled with several laws and bylaws being administered for ensuring efficient disposal of waste products. Although MCGM controls and manages safe and harmless disposal of
biomedical waste it is evident through various studies and findings that awareness level regarding biomedical waste handling is very low at all the levels of the society. Studies also put light on the fact that of these hospitals despite government rules and regulations do not have proper infrastructure, technical capabilities and financial ability for the effective disposal of biomedical waste.

Kalyan taluka (part of Mumbai Metropolitan and Regional Development Authority, MMRDA) is in Thane district of Maharashtra with an area of 276 square miles. The area has cosmopolitan population. The density as per 2011 census is 279 persons per square mile. In the recent 2011 Census, population of Kalyan taluka was found to be 12,76,614 people. Kalyan is a developing area under smart city project initiated by Government of India, which requires overall development in all directions including minimizing the waste production, proper disposal and treatment of all type of waste. Various studies related to biomedical waste management have been done and finding of these studies suggest that due to low level of awareness in the society despite of government rules and regulations, there is lack of planning and measures in handling the biomedical waste and its management.

According to the data collected from studies, quantum of waste that is generated in India is estimated to be 1-2 kg per bed per day in a multispeciality hospital and 600 gm per day per bed in a general practitioner’s clinic.

Previous studies relating to the topic state that Biomedical waste disposal and management is scientific, costly, high on effort and different from all other type of wastes disposal and of generic waste disposal. It is sometimes clubbed with municipal waste; house hold waste or other wastes. Studies done in past reveal that only few medical establishments have proper arrangements however many centers do not properly manage the disposal of biomedical waste. As this type of waste is of great harm to human health if left undisposed properly. Thus, there is need to carry out research about generation, collection, quantity, types, disposal, and treatment of biomedical waste.

**Definition of Biomedical waste**

“Biomedical waste is the type of waste that contains infectious or potentially infectious materials, which is generated during biomedical activities, such as the diagnosis, prevention, or treatment of certain diseases. Generally biomedical waste is generated in hospitals, health clinics, nursing homes, pathological laboratories, medical research laboratories, clinics of physicians, clinics of dentists, and veterinarians, home health care, and funeral homes.”

According to Biomedical Waste (Management and Handling) Rules, 1998 of India
“Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.

According to definition given by centre for excellence of ministry of environment and forest, Government of India

“Bio-medical waste means “any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals.”

The biomedical waste according to WHO (World Health Organization) may contain 75-90% of waste which may be similar to normal municipal waste or to domestic waste. This fraction may include general waste and comprises of paper, plastic packaging, food waste etc., which is less harmful to the environment as it is comparative easy to handle.

Remaining 10-25% is infectious/ hazardous biomedical waste that requires special handling and treatment as it may have harmful effects on organism and environment if left untreated. This fraction of biomedical waste comprises of sharps, infectious agents, hazardous chemicals, genotoxic waste, radioactive waste, and some other harmful materials.

If these two categories of biomedical waste are not separated and handled separately and properly, the entire biomedical waste gets infected and hence is of great threat for environmental health.

According to WHO, there are ten basic categories of Biomedical waste

| 1. Infectious waste |
| 2. Pathological waste and anatomical waste |
| 3. Hazardous pharmaceutical waste |
| 4. Hazardous chemical waste |
| 5. Waste containing heavy metals |
| 6. Waste due to pressurised containers |
| 7. Sharps |
| 8. Genotoxic waste / Cytotoxic waste |
| 9. Radioactive waste, |
Operational definition of the terms –

Analytical study is specific type of scientific study which involves thinking skills, evaluation of facts and information related to research being conducted. In this groups or subjects are equated to approximate the relation.

Biomedical waste is type of waste generated specially in health care units during the process of diagnosis, treatment, surgery, immunization and research processes and is infectious in nature which may cause environmental toxicity if left untreated.

Handling practices in context to biomedical waste are the processes which are used for collection, separation, storage, transport, treatment, and disposal of biomedical waste.

Perspective is the way of thinking about any problem or situation to judge it correctly and accurately.

Environmental toxicity is related to harmful effects of various physical, chemical, and biological substances on living organisms and immediate surrounding at present and in future as well.

Minimize means to reduce. In context to biomedical waste the word is used to reduce harmful effects of waste on environment.