CHAPTER –I
INTRODUCTION AND
RESEARCH METHODOLOGY

CHAPTER-I

INTRODUCTION AND RESEARCH METHODOLOGY

CHAPTER –I

INTRODUCTION AND RESEARCH METHODOLOGY

1.1 Introduction:

There is an old saying "Cleanliness is next to Godliness" which reveals that we have to keep ourselves and our environment clean. From last two decades the world has facing the problem of population growth in number of countries. To satisfied the needs of people, number of industries have increased, which results into pollution and causing health problems. In order to maintain the health of the people the number of hospital are increasing, as a result of which there is maximum generation of waste. Today also in number of developed and developing countries, collection, transportation, treatment and disposal of this waste are the major challenges for government, organizations and other institutions. In India the condition is same. There are different types of wastes depending on the generation resources which can be classified into household waste or municipal waste, industrial waste or hazardous waste, Hospital waste and biomedical waste.

Hospital waste is categorized as one of the most dangerous wastes in the world. The term Hospital waste is refers to any waste that is generated during medical activities such as diagnosis, monitoring, and Immunization or treatment of human beings. It includes viruses and bacteria that potentially cause diseases, which are produced by hospitals, clinics, doctor's offices and other types of healthcare institutions. (RaheleTabasi,GovindanMarthandan, March 2013)

Medical care is very important for our life and health, but waste generated from medical activities causes a real problem for human being and environment. Improper management of waste generated in health care facilities causes a direct health impact on the community, the healthcare workers and on the environment. As the hospital number is increased , large amount of potentially infectious and hazardous waste are generated in the hospitals per day.There is serious threat to environment and to human health if disclosure to such waste. So it is essential to give proper attention on treatment and management of hospital waste before to its final disposal. There is a required to create awareness amongst the personnel involved in hospitals so it is helpful to create healthy atmosphere in the environment (Praveen Mathur, Sangeeta Patan And Anand S. Shobhawat,2012)

1.2 Global scenario of hospital waste Management (HWM)

Hospitals have becomes a complicated organizations because the waste generated from the hospitals becomes a serious problem worldwide. WHO first focus on the hospitals waste when it called the conference where members from different 19 countries were meet at Bergen in 1983.Medical specialists, administrators and hospital engineers participated in this meet and they found that there is requirement of a system approach regarding to awareness, segregations and decline in hospital waste. If we see today government are also involving in hospital waste management. There are different practices of management of hospital waste in developed countries like America, Europe. In Europe waste is segregated at the point of generation. And they introduced a legislation on incinerator to control the pollution from the incineration in 1995. They focus their attention to minimize the waste by reuse, recycling segregation and proper management of hospital waste. .In Latin America more work is required to reduce the exposure by the waste worker. In North America most of the hospital waste are burn: into the hospital incineration and then disposed of in landfills and public sewers. Some new technologies, such as, gas-paralysis, microwave disinfecting, bio-oxidation autoclaving, plasma-treatment technology etc., are practice (International Journal of Environmental Biology 2013).Problems regarding to hospital waste management in developing countries like India, Africa, and south East Asia are due to the poor or lack of funding and lack of national regulation of disposal of waste.(S.Mohankumar,2011)

Amount and composition of hospital waste generated

Table no.1.1

Amount of hospital waste generated in various countries

Country	Quantity (Kg/bed/day)
U.S.A	4.5
Spain	3.0
U.K	2.5
France	2.5
India	1.5

* (Source: Hem Chandra, 1993)

2

Table no 1.2 Amount of Hazardous/non-hazardous

Hazardous	15%
a)Hazardous but non infective	5%
b)Hazardous and infective	10%
Non hazardous	85%

(Source: Hem Chandra, 1993)

The above table shows the amount of hospitals waste generated in different countries in kilograms per day per bed and percentage of hazardous waste and nonhazardous waste. Here we observed that the maximum waste is generated in USA that is about 4.5 kg/day/bed. As compared to other countries India produced less waste that is 1.5 Kg .Also the only 15% of waste is hazardous with total waste and 85% of non hazardous.

1.3 Indian scenario of hospital waste management:

India is a developing country and major problems regarding to hospital waste are lack of proper attention on this problem.(Mukesh Yadav,2001)It is found that hospitals could not manage the waste properly. Mismanagement of healthcare waste disposal causes a threat to the surrounding environment in future. Medical waste was often mixed with general waste and disposed off in municipal solid waste for landfill.(S.Mohankumar&Dr.K.KKottaiveeran,2011)

3

Table No:1. 3State wise estimated Quantity of infectious waste in India (1994-99)

The following table 1.3 shows the BMW generated from different states in India

State/Union Territories	Total No of beds	Reference period	% Share of each state in waste generation		Estimated Quantity of infectious Biomedical waste generation (kg/day)		Increase from1994 to 1999 (%)
			1993	1998	1993	1998	
AndhraPradesh	75910	1998	4.5	8.4	6698	18977.5	183.3
Arunachal Pradesh	2476	1992	0.4	0.3	619	619	0.00
Assam	16000	1991	2.1	1.8	3164	4000	26.4
Bihar	44642	1992	4.9	4.9	7273	11160.5	53.5
Goa	4741	1999	0.6	0.5	911	1185.3	30.1
Gujarat	78664	1995	9.9	8.7	14746	19666	33.4
Haryana	11440	1999	1.2	1.3	1757	2860	62.8
Himachal Pradesh	9316	1999	0.7	1.03	963	2329	141.9
Jammu & Kashmir	5515	1999	1.4	0.6	2051	1378.8	32.8
Karnataka	56558	1998	6.4	6.2	9482.25	14139.5	49.1
Kerala	106967	1999	13.0	11.8	19300	26741.8	38.6
Madhya Pradesh	28724	1992	3.0	3.2	4534	7181	58.4
Maharashtra	**126378**	**1999**	**13.2**	**13.9**	**19730**	**31594.5**	**60.1**
Manipur	2532	1999	0.2	0.3	299	633	111
Meghalaya	3300	1999	0.3	0.4	467	825	76.7
Mizoram	1777	1998	0.2	0.2	326	444.3	36.3
Nagaland	1987	1999	0.2	0.2	263	496.8	88.9
Orrisa	16780	1999	2.4	1.9	3624	6617.3	15.8
Punjab	26469	1999	2.5	2.9	3668	12064.8	80.4
Rajasthan	48259	1999	3.4	5.3	5115	350	135.9
Sikkim	1400	1999	0.1	0.2	144	15250	143.1
TamilNadu	61000	1990	8.2	6.7	12195	560.5	25.1
Tripura	2242	1998	0.3	0.3	433	18612.5	29.5
Uttar Pradesh	74450	1986	7.9	8.2	11820	17314	57.5
Weat Bengal	69256	1999	9.2	7.6	13692	279.8	26.5
Andaman &Nicobar	1119	1999	0.1	0.1	144	518.8 .	94.3
Chandigarh	2075	1999	0.1	0.2	125	46.8	315.0
Dadra & Nagar Haveli	187	1998	0.01	0.02	18	78	159.7
Daman & Diu	312	1999	0.03	0.03	38	6006.3	105.3
Delhi	24025	1997	3.2	2.7	4693	50	28.0
Lakshwadeep	200	1999	0.01	0.02	18	894.8	177.8
Pondicherry	3579	1999	0.4	0.4	652	800	37.2
India	908280	1999	100	100.0	149051	227070	52.3

Source: Compiled and calculated from CPCB(2001:c) and CPHI(2002)

From above table it is observed that Maharashtra contributed the largest amount of BMW in India from year 1994 tc 1999 as the total number of beds are also more in Maharashtra..

Table no1.4 State wise estimated Quantity of infectious waste in India

State	Bio-Medical Waste Generation and Disposal (Kg./day)					
	2007-08		2008-09		2009-10	
	BMW Generation	BMW Disposal	BMW Generation	BMW Disposal	BMW Generation	BMW Disposal
Andaman &Nicobar	518.41	518.41	963.67	963.67	407	407
Andhra Pradesh	13000	12100	14200	13000	14500	13018
Arunachal Pradesh	-	-	1368.54	1368.54	60	60
Assam	3973.9	1019.2	5130	1129	4595	2599
Bihar	3280	2336	3384	2403	3572	3095
Chandigarh	1640	1640	1029	1029	1201	1201
Chhattisgarh	2608.87	2608.87	4386.87	4386.87	5852	5701
Daman	-	90	9700	4000	65	65
Delhi	8879.5	8879.5	8522.93	8522.93	9859	9859
Goa	1074.11	1074.11	1179.55	1179.55	2438	2438
Gujarat	25747	10000	25765	15000	16565	16565
Haryana	6110.38	6041.38	6067	5994	7069	6868
Himachal Pradesh	922	922	1128	1128	1278	1278#
Jharkhand	10733.5	6189.8	28975.26	11724.12	5415	4763
J&K	1281	436	6646.5	NA	4827	2634
Karnataka	40796	29163	60018	42462	62241	43971
Kerala	165444	52726	55425	47806	32884	29438
Lakshadweep	-	-	-	-	40	40
Madhya Pradesh	4682.214	4449.034	4072.8	3654.9	65231	4713

Maharashtra	31996.1	30298	42860.8	42860.8	40197	40197
Manipur	30558.7	30558.7	503.24	503.24	412	412
Meghalaya	372.76	359.86	1000.5	1000.5	578	578
Mizoram	315.8	180.1	821.47	798.27	631	560
Orissa	4382.42	3090.7	4240.56	3344.47	5089	3542
Punjab	5507.86	4865.76	5941.49	5547.57	6903	6903
Rajasthan	31399	18620	32779.51	30448.21	19591	11816
Tamilnadu	44478	27279	16516	16041	21418	21418
Tripura	483	Not Assessed	478	NA	553	Not assessed
Uttarakhand	2211.85	1191.3	2200	1176	1872	740
Uttar Pradesh	35222	13500	35763	14000	44392	42237
West Bengal	24582.75	13523.25	23498.25	9256	23571	12472
	506745	288203.8	409114.4	295271.88	405702	291983

Source CPCB (2010)

Table 1.4 shows the biomedical waste generation and disposal in Kg/day from year 2007 to 2010.It is observed that Kerala generates maximum waste and Maharashtra is on second rank in year in year 2007-08. In year 2008- 09 Karnataka was on first rank, Kerala on second rank and Maharashtra on third rank in waste generation. But in Maharashtra whatever the waste generates was disposed. In year 2009-10 Madhya Pradesh generates maximum waste about 65231kg/day/ bed and very negligible amount of waste was disposed about 4713kg/day/bed. Second was Karnataka which generates 62241Kg/day/bed and disposed nearly about 43971kg of waste. Maharashtra was on fourth rank generates 40197kg/day/bed and disposed almost all the waste.

Table No.1.5 State wise Number of Health Care units violating BMW Rules

States	No. of Health Care units violated BMW Rules		
	2007-08	2008-09	2009-10
Andaman &Nicobar	-	Nil	-
Andhra Pradesh	567	343	-173
Arunachal Pradesh	-	-	0
Assam	54	-	208
Bihar	1327	1247	1221
Chandigarh	-	384	32
Chhattisgarh	57	27	20
Daman	Nil	Nil	0
Delhi	527	64	165
Goa	0	1	1
Gujarat	552	274	224
Haryana	88	201	143
Himachal Pradesh	20	38	15
Jharkhand	256	202	192
J&K	229	778	332
Karnataka	1293	2292	344
Kerala	-	932	1547
Lakshadweep	-	-	-
Madhya Pradesh	738	409	510
Maharashtra	**3171**	**4019**	**4667**
Manipur	531	531	40
Meghalaya	2	-	0
Mizoram	6	Nil	0
Nagaland	-	Nil	0
Orissa	98	146	105
Puducherry	10	23	23
Punjab	94	147	170
Rajasthan	1558	1106	946
Sikkim	-	Nil	-
Tamilnadu	1329	499	507
Tripura	Not assessed	NA	Not assessed
Uttarakhand	85	72	288
Uttar Pradesh	2457	2710	532
West Bengal	4041	1695	632

Source (CPCB 2010)

Above Table no.1.5 shows the state wise number of hospitals violating BMW rules during the year 2007 to year2010 respectively. Maximum number of hospitals which were violating the biomedical rule is from Bihar, Maharashtra, Tamilnadu and West Bengal. In West Bengal it was in descending order

Central pollution Control Board of India has enforced rules for handling, segregation transportation, treatment and disposal of hospital waste. But due to lack of awareness of HW among hospital staff and management they violate the rules.

1.4 Hospital waste management in Maharashtra

In Maharashtra condition of hospital waste management is nearly same as in other state of India. There is no proper system for collection, transportation and treatment of HW or sometimes the system is not strictly followed by the hospital staff. Segregations of hospital waste is not done properly because of lack of training and regulatory control. In cities like Pune, Pimpri Chinchwad Municipal Corporation and Nagpur only incineration is practiced. There is no proper arrangement for ash disposal.(MPCB,2004)Only in Maharashtra the waste collecting rate is depends upon the amount of waste generated in kilogram as in other state it depends upon the number of bed in the respective hospitals.

The following table shows the list of BMW generated in different district of Maharashtra. From table it is seen that the waste generation rate is maximum in kalyan . It is about 27600Kg/M and quantity treated is about 26900Kg/M and remaining is disposed. In Sangli, Miraj and Kupwad Corporation about 10.5MT/M biomedical waste is generated per month from different hospitals and all the quantity is treated. In Aurangabad, Amravati, Nasik region waste is treated and disposed. In Bhiwandi and Ulhasnagar there is no any treatment given to hospital waste.

Table1.6: Region wise generation of biomedical waste of the Maharashtra:

Region	Name of the corporation	Estimated BMW generated	Quantity of BMW treated	Quantity of BMW and its disposal mode
Amravati	Akola	447 Kg/M	154 Kg/M	293Kg/D disposal on dumping site
	Amravati	368 Kg/M	168 Kg/M	Nil
Aurangabad	Aurangabad	938 Kg/M	880 Kg/M	58 Kg/M
	Nanded	-----	----	_____
Pune	Pune	1500Kg/D	1400 Kg/D	_____
	PimpriChinchwad	545 Kg/D	545 Kg/D	_____
	Solapur	677 Kg/D	677 Kg/D	----
Kalyan	Kalyan and Dombivili	27600 kg/M	26900 kg/M	2600 kg/M
	Bhiwandi	7670 kg/M	-----	----
	Ulhasnagar	12180 kg/M	----	----
Nashik	Nashik	2200 Kg/D	1700 Kg/D	500 Kg/D
	Malegoan	450 Kg/D	Nil	450 Kg/D
	Jalgaon	400 Kg/D	Nil	400 Kg/D
	Ahmednagar	584 Kg/D	513 Kg/D	71 Kg/D
	Dhule	361.6 Kg/D	361.6 Kg/D	Nil
Navi Mumbai	NaviMumbai	235.30 Kg/D	350 Kg/D	---
Thane	Thane	6692 Kg/M	4014 Kg/D	959 Kg/M
	Mira Bhayandar	1822 Kg/M	1265 Kg/M	585 Kg/M
Kolhapur	Kolhapur	5.5 MT/M	5.5 MT/M	Nil
	Sangli,Miraj&Kupwad	10.5 MT/M	10.5 MT/M	Nil

Source:MPCB,2005

1.5 Hospital waste management in Sangli City:

Sangli is well known for hospitals. There are number of hospitals in Sangli city. A very few hospitals in Sangli has their own recycling and treatment plant. Some collecting agency like Sangli, Miraj,Kupwad municipal corporation and Surya central treatment facility center is associated with number of hospitals. It collects the waste from different hospitals from Miraj and Sangli city respectively. There are different Instruments like Incinerator, Autoclave Disinfection unit by using Sodium Hypochlorite and Shredder are used for treatment of the hospital waste.

Table no 1.7: Information of Hospitals in Sangli city.

Sr.No.	Particulars	Figures
1.	Total number of hospitals	449
2	Number of common treatment facility centers	2
3	Total number of hospitals applied for BMW authorization granted	166
4	Number of authorization granted	163
5	Total number of beds	3438
6	Number of hospitals – a)above 500 beds	1
	b)above 200& less than 500	1
	c)above 50 & less than 200	6
	d)less than 50	441

Source: Biomedical Waste (M&H) rules 1998, Regional office Kolhapur document.

Table 1.7 shows the information of the hospitals in sangli city.More than 95% of hospitals in Sangli city having beds below 50 numbers. Some of them are yet to be covered

under BMW rules.(Kolhapur regional report) only two hospitals in Sangli city have there own recycling plant. From which Barati hospitals plant is in working condition and Civil hospitals recycling plant is now in not in working condition.

1.6. Research Methodology:

Research Methodology deals with, how a particular research is carried out, what are the different criteria used to select the topic for research, how is the area and locale of the research finalized, what are the different tools used for collection of data, what will be the sample size, how will be the design of research, what are the different techniques used for presentation, analyses of data and interpretation of data, what will be the pattern of report writing and bibliography.

1.6.1 Selection of Research Topic:

Waste becomes a big issue regarding to human health and serious environmental implications. Collection transpiration and disposal of hospital waste is unscientific. Hospital waste disposal is also become an important problem. Due to lack of proper segregation practices and lack of proper training to the hospital staff this problem become more complicated. Every day relatively large amount of potentially infectious and hazardous waste is generated in health care hospital which may create harmful diseases in human being. This work throws a light on need of hospital waste management. Hence the researcher cecided to study the hospital waste management in selected hospitals in Sangli city.

1.6.2. Statement of the Problem:

Today hospitals play a vital role in our life and health, but waste generated from medical activities cause a real problem for nature and humans. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment. Indiscriminate disposal of hospital waste possess serious threats to environment and to human health that requires specific treatment and management prior to its final disposal. It also intends to create awareness amongst the personnel involved in healthcare unit. Due to Lack of segregation practices, results in mixing of hospital wastes with general waste making the whole waste stream hazardous. Inappropriate segregation ultimately results in an incorrect method of waste disposal. Due to this points there is need to find suitable solutions for Management of hospital wastage and

disposal of it. So the researcher decides to work on the problems in hospital wastage. Hence the title- "A Study of Hospital Waste Management in selected Hospitals with reference to Sangli City"

1.6.3. Objectives of the study:

The main objective of the study is to study the hospital waste management in hospitals at Sangli city; this main objective will be fulfilled by studying the following sub objectives-

1. To study the management of hospital waste in selected hospitals at Sangli city.
2. To study the awareness of hospital staff regarding to hospital waste
3. To study the role of waste collecting agencies towards hospitals waste in Sangli city.
4. To study the process of collection, transportation, treatment and disposal of hospital waste in Sangli city.

1.6.4 Scope and importance of the study:

The geographical scope of present study is restricted to the selected hospitals in Sangli city. The topical scope covers the management issues leading to hospital waste in Sangli. The analytical scope covers the fulfillment of the objective set for the study. The social scope covers to change the attitude and behavior of the society towards the hospital waste in Sangli. The study is important through the aspect of proper management of the hospital waste in Sangli. The study is also important through the aspect relating to Segregation Practices of hospital waste, Proper, Poor Regulative Measures, Waste-picking and Reusing, Top Management Commitment, Inadequate Awareness and Training Programs, The study also enlightens the issues of environment and health. It also puts light on the processing of hospitals waste leading to sustainable development

1.6.5 Hypotheses of the study:

The researcher postulates following hypotheses to test.

1) H_0: There is significant association between number of the beds in the hospitals and waste generation rate.

   H_1: There is no any significant association between number of the beds in the hospitals and waste generation rate.

2) **H₀**: Segregation of hospital waste is independent on training and discipline

provided to hospitals staff.

H₁: Segregation of waste not independent on training and discipline provided to the hospital staff.

1.6.6 Collection of Data:

The researcher has selected the descriptive type research method for research purpose. The data has collected from primary and secondary sources. Data was collected in following manner.

1. **Primary Data** : The researcher has use following tools for collection of primary data:
   a) Questionnaire method.
   b) Interview method
   c) Informal discussion with Hospital management members

Primary information was collected through questionnaires, on the basis of hypothesis and objectives of the study.

- **Structured interview schedule for doctors:** the researcher has collected information through questionnaire and structured interview schedule of doctors from selected samples

- **Structured Interview schedules for administration head of the hospitals :** The researcher collected information through

- **Structured Interview schedules for processing units:** The researcher collected information through structured interview schedule

- **Informal discussion with waste management staff members:** the researcher collected the information through informal discussion with management staff members, patient .

2. **Secondary Data Sources** The researcher reviewed existing literature on hospital waste management and also examined the reports. Review of literature was conducted by referring to the relevant literature and seeking information on internet. The sources of secondary data on HWM were,

i) Management Journals

ii) Books

iii) Other Publications on HWM

iv) Governments Publications and reports

v) News papers.

vi) Government Records

vi)Internet

Table No. 1. 8: Methodology of collection of data and tools used:

METHODOLOGY	RESEARCH TOOL/METHOD	JUSTIFICATION
Technique applied	1. Interview Schedules. 2. Observation 3. Informal Discussion.	To collect personal views and ideas. To understand the practical aspect of phenomena occurring around. To collect informal information.
Tools used	Questionnaire	To collect specific idea and opinion about an issue.
Sampling method	Stratified sampling	Data from different strata is collected as per availability, willingness and positive response.

1.6.7 Sampling Technique

Stratified Random sampling technique has used for selecting different hospitals. Proportionate allocation method of sampling has used for selecting the sample size of each strata. The segments will be based on the category of hospitals. The researcher has used average of respective strata for each particular

According to IMA (Indian Medical Association) Sangli total number of register hospitals in Sangli city is 240. Out of which 65 hospitals such as Aurvedic, Homeopathic and general practitioners has a negligible waste, based on their daily operations So the total population of the study is 175 hospitals.

Sample size: Researcher has determined the sample size by considering the whole population .Here the total population is 175 hospitals, researcher consider here 35% sample size from whole population and it is about 64 hospitals. So sample size for the study is **64 hospitals**

The population used for the study is finite but it is heterogeneous Using Stratified sampling method different category of the hospitals were selected.. Proportionate allocation of each strata is calculate with respect to total population by using the formula

$$n_i = \frac{n*N_i}{N}$$

Where, n_i – Number of sample hospitals from each strata

n – Total number of hospitals in each strata

N_i- Total number of sample hospitals

N- Total population

Table No1.9 Classification of Strata

Types of Hospital (Strata)	Total no .of hospitals	Sample size (n)
Orthopedic	24	9
Maternity	25	9
Physician	15	5
Dental(DNT)	25	9
Surgeon	29	11
Neurologist	06	2
Pediatric	16	6
ENT	15	6
Skin	06	2
Pathology	14	5
Total population	175	64

Source: AMA 2011

1.6.8 Data analysis and interpretation:

Filled questionnaire were numbered serially and checked for consistency of data. The questions and the responses were codified. Quantitative data analysis was carried out. The data was represented in tabular and graphical form wherever necessary. Correlations and associations were calculated using statistical techniques. Hypothesis were tested using appropriate statistical tools such as chi-square test and correlation.

The statistical primary data collected from different hospitals as specified in strata was processed on a computer under expert supervision, similarly application specific computer software were used for graphical presentation and statistical analysis. The analysis methods included are-

.Tabular analysis using Excel and windows -2007: In the present study the tabular analysis was carried out to study the characteristics of sample. Simple statistical tools like percentage and average were used.

Limitations:

The study was conducted in selected hospitals in Sangli city where maximum waste was arising. The response from some hospitals was not up to the mark. The information provided by the hospitals was not sufficient. The findings were based on the limited sample size. The information from the processing unit had limitations.

1.6.9 Chapters in brief:

The Researcher has organized the thesis in following chapter scheme.

Chapter 1 titled 'Introduction and Research Design' has covers the Introduction to the study, Research Problem, Hypothesis, Objectives, Scope and Significance of the study and Research Methodology

Chapter 2 comprises 'Review of Literature' which represents the reviews that researcher has reviewed from different thesis, reports, Research papers, Books, Newspapers and related websites

Chapter 3 elaborates the 'Conceptual framework of the study: In this chapter the researcher elaborate the concept of hospital waste management, types of waste, Processing of waste management, Impact of hospital waste on human health are discussed. Current

situation of management of hospital waste at Global level, Indian scenario of hospital waste management, and Maharashtra's position regardingto waste management.

Chapter 4 titled as '**Data Presentation, analysis and interpretation.**' This chapter presents the data analysis and interpretation of data, classification and tabulation of data.

Chapter 5 titled as '**Findings, Suggestions and conclusion** 'has present the findings extracting from of data analysis. Suggestions and conclusions of the study.

Researcher gives his findings based on the data analysis and writes conclusions for different hospitals regarding to hospitals waste management and processing units, also in this chapter researcher gives useful Suggestions for the waste management practices. At the end of the Thesis, researcher put forth the bibliography which contains list of references referred by the researcher during the research period. He also adds annexure of important information.

References:

1. Rahele Tabasi,Govindan and Marthandan,(March-2013) Clinical Waste Management: A Review on Important Factors in Clinical Waste Generation Rate Faculty International Journal of Science and Technology Volume 3 No.3,

2. Praveen Mathur ,SangeetaPatan And AnandS.Shobhawat(2012) Need of Biomedical Waste Management System inHospitals – An Emerging issue – A Review Department of Environmental Science, MDS University Ajmer (India).Vol. 7(1), 117-124

3. International Journal of Environmental Biology(2013),Mukesh Yadav Hospital waste a major problem Vol. 8 No. 4, 143-146

4. S.Mohankumar & Dr.K.KKottaiveeran (2011)Hospital Waste Management and Environmental Problems in India International Journal of Pharmaceutical & Biological Archives; 2(6):1621-1626

5. Maharashtra pollution control board(August2000)Report on status of some common facilities for collection, treatment and disposal of biomedical waste in Maharashtra

6. National Journal of Integrated Research in Medicine Awareness Of Healthcare Workers Regarding Biomedical Waste Management (BMW) At Tertiary Care Government Hospital In Dhule (Maharashtra).

7 Hem Chandra(1993), An environmental Hazard and its management, International society of Environmental BotanistVol.5 No.3

8. Report of Maharashtra Pollution control Board (2005)

9. Report of BMW (H &M) rule 1998, regional office Kolhapur