materials of anatomists but may have infection risks to people who handle them at the time of embalming and dissection [20]. Infectious pathogens in the cadavers that are present have risks like *Mycobacterium tuberculosis*, hepatitis B and C viruses, HIV and prions that cause transmissible spongiform encephalopathies [21-27]. The embalming fluid used in anatomy departments contains fixatives, disinfectants, glycerol, salts and water. There is not an adequate data about the efficiency of embalming fluids used commonly. Being the member of anatomy department, one of the important risks of infections is from the cadaver. Special care must be taken to reduce risks to a minimum. Safe working conditions for handling cadavers can be provided through proper education, use of protective clothing and practice of hygienic measures. Dissection laboratory directors must stay up to date on the most recent literature in the field to help ensure the safety of all educators, researchers and students under their charge. In our study we tried to report the presence of any bacteria especially staphylococci in the cadaver used for dissection. A fixative agent used in the process of embalming was 10% formalin with added glycerol, water and some disinfectants (Figure 6).

Figure 6 Blood agar plate showing growth of *Staphylococcus saprophyticus*

It was seen in the present study that despite dissecting formalin treated bodies' variety of micro-organisms were cultured from the samples taken. An inadequate amount of data is available on the antimicrobial abilities of embalming fluids [28]. However from previous studies it has been seen that several disease causing agents may remain viable in cadavers, despite the use of fixative agent [29,30]. But some important pathogens like HIV are killed during embalming of appropriate duration. Few studies have been done to check the disinfecting efficiency of fluids that are used for embalming. Tabaac et al. documented the presence of micro-organisms on formalin-embalmed cadavers while Hayashi et al. in their study reported absence of bacteria or yeast like fungi from cadavers embalmed with the same technique [31,32]. The biological risk of fixed cadaver in manipulation and the dissemination of pathogenic microorganisms during anatomy teaching, research and dissection procedures is also reported by some studies. Kabadi et al. also identified *Staphylococcus aureus*, *Enterococcus faecalis* and *Streptococcus pyogenes* by sampling the clothes of students who handled the cadavers [33].

CONCLUSION

The summary of the present study is that there are viable bacteria recovered from the samples taken from embalmed cadaver. It can be a threat to students, faculty and who use these human cadavers as learning methodology as well as for anatomists and other handlers worldwide who handle these cadavers. It is concluded that present embalming procedures are inadequate for disinfecting of bodies; hence universal precautions should be practiced to prevent infection and cross contamination. Protocols must be developed for safe use of human cadavers in medical learning and Dissection laboratory directors must stay up to date on the most recent literature in the field to help ensure the safety of all educators, researchers and students.

REFERENCES

[1] Ramesh G, et al. Detection of microorganisms on formalin fixed and stored pathology tissues: A microbiological study. *Journal of oral and maxillofacial pathology: JOMFP,* Vol. 21, No. 1, 2017, pp. 64.

[2] Tabaac B, et al. Bacteria detected on surfaces of formalin fixed anatomy cadavers. *Ital J Anat Embryol*, Vol. 11, No. 8, 2013, pp. 1-5. 2013, pp. 1-5.

[3] Morgan DJ, et al. Transfer of Multidrug-Resistant Bacteria to Healthcare Workers' Gloves and Gowns after Patient Contact Increases with Environmental Contamination. *Critical Care Medicine*, Vol. 40, No. 4, 2012, pp. 1045-1051.

[4] O'Sullivan E and Mitchell BS. An improved composition for embalming fluid to preserve cadavers for anatomy teaching in the UK. *Journal of anatomy*, Vol. 182, No.2, 1993, pp. 295.

[5] Watson R. General and medical microbiology: summary of biochemical tests. University of Wyoming; 2013.

[6] Morgan O. Infectious disease risk from dead following natural disasters. *Revista panamericana de salud pública*, Vol. 15, No. 5, 2004, pp. 307-312.

[7] Iorio NL et al. Methicillin-resistant Staphylococcus epidermis carrying biofilm formation genes: detection of clinical isolates by multiplex PCR. *International Microbiology,* Vol. 14, No.1, 2011, pp. 13-17.

[8] Zeeuwen PL, et al. Microbiome and skin diseases. *Current Opinion in Allergy and Clinical Immunology,* Vol. 13, No. 5, 2013, pp. 514-520.

[9] Mathieu A, et al. Life on human surfaces: skin metagenomics. *PLos One,* Vol. 8, No. 6, 2013, pp. e65288.

[10] Fredricks DN. Microbial ecology of human skin in health and disease. *Journal of Investigative Dermatology Symposium Proceedings,* Vol. 6, No. 3, 2001, pp. 167–169.

[11] Tomic-Canic M, Perez-Perez GI and Blumenberg M. Cutaneous microbiome studies in the times of affordable sequencing. *Journal of Dermatological Science,* Vol. 75, No. 2, 2014, pp. 82–87.

[12] Grice E and Segre J, The human microbiome: our second genome. *Annual review of genomics and human genetics*, Vol. 13, 2012, pp. 151–170. [Crossref]

[13] Scott E and Bloomfield SF, The survival and transfer of microbial contamination *via* cloths, hands and utensils. *Journal of Applied Bacteriology*, Vol. 68, No. 3, 1990, pp. 271–278.

[14] Larson E. Skin hygiene and infection prevention: more of the same or different approaches?. *Clinical Infectious Diseases*, Vol. 29, No. 5, 1999, pp. 1287–1294.

[15] Zapka CA, et al. Bacterial hand contamination and transfer after use of contaminated bulk-soap refillable dispensers. *Applied and Environmental Microbiology*, Vol. 77, No. 9, 2011, pp. 2898–2904.

[16] Fendler EJ, et al. The impact of alcohol hand sanitizer use on infection rates in an extended care facility. *American Journal of Infection Control*, Vol. 30, No. 4, 2002, pp. 226-233.

[17] Hilburn J, et al. Use of alcohol hand sanitizer as an infection control strategy in an acute care facility. *American Journal of Infection Control,* Vol. 31, no. 2, 2003, pp. 109-116.

[18] White C, et al. The effect of hand hygiene on illness rate among students in university residence halls. *American Journal of Infection Control,* Vol. 31, No. 6, 2003, pp. 364-370.

[19] Lax S and Smith DP, Longitudinal analysis of microbial interactions between humans and the indoor environment. *Science Magazine*, Vol. 345, No. 6200, 2014, pp. 1048-1052.

[20] Aziz MA, et al. The human cadaver in the age of biomedical informatics. *The Anatomical Record: An Official Publication of the American Association of Anatomists,* Vol. 269, No. 1, 2002, pp. 20–32.

[21] Weed LA and Baggenstoss AH. The isolation of pathogens from tissues of embalmed human bodies. *American Journal of Clinical Pathology*, Vol. 21, No. 12, 1951, pp. 1114-1120.

[22] Brown P and Gajdusek DC. Survival of scrapie after three years internment. *Lancet,* Vol. 337, No. 8736, 1991, pp. 269–270.

[23] Roth D, et al. Detection of hepatitis C virus infection among cadaver organ donors: Evidence for low transmission of disease. *Annals of Internal Medicine*, Vol. 117, No. 6, 1992, pp. 470–475.

[24] De Craemer D. Postmortem viability of human immunodeficiency virus-implications for the teaching of anatomy. *New England Journal of Medicine*, Vol. 331, No. 19, 1994, pp. 1315.

[25] Healing TD, Hoffman PN and Young SEJ. The infection hazards of human cadavers. *Communicable Disease Report. CDR review*, Vol. 5, No. 5, 1995, pp. R61–R68.

[26] Kappel TJ, et al. The viability of Mycobacterium tuberculosis in formalin fixed autopsy tissue: Review of literature and brief report. *Hum Pathol,* Vol. 27. No. 12, 1996, pp. 1361–1364.

[27] Cattaneo C, et al. Prevalence of HIV and hepatitis C markers among a cadaver population in Milan. *J Clin Pathol,* Vol. 52, No. 4, 1999, pp. 267–270.

[28] Demiryurek, et al. Infective agents in fixed human cadavers: a brief review and suggested guideline. *The Anatomical Record: An Official Publication of the American Association of Anatomists,* Vol. 269, No. 4, 2002, pp. 194-197.

[29] De Craemer. Postmortem viability of human immunodeficiency virus implications for the teaching of anatomy. *New England Journal of Medicine*, Vol. 331, No. 19, 1994, pp. 1315-1316.

[30] Kaufman M. Dangerous dissections: the hazard from bodies supplied to Edinburgh anatomists, winter session. *Journal-Royal College of Physicians of Edinburgh*, Vol. 35, No. 3, 2005, pp. 268-274.

[31] Tabaac B, et al. Bacteria detected on surfaces of formalin fixed anatomy cadavers. *Italian Journal of Anatomy and Embryology,* Vol. 118, 2013, pp. 1-5.

[32] Hayashi S, et al. saturated salt solution method: a useful cadaver embalming for surgical skill training. *Medicine (Baltimore),* Vol. 93, pp. e196.

[33] Kabadi CJ, et al. Potential pathogen transmission on medical student anatomy laboratory clothing. *Medical Student research Journal,* 2013, pp. 30-35.