EVALUATION OF MICROBIAL CONTAMINATION FROM TOOLS USED IN BEAUTY SALONS IN DIFFERENT MARKETS OF ISLAMABAD

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ABSTRACT

The beauty industry includes the sales of cosmetics, perfumes, skin and hair care products, as well as services from beauty salons, spas, and, in some cases, health clubs and cosmetic surgery. Global sales of beauty-related products and services exceed $159 billion USD annually, with women making up the majority of consumers. The top-selling beauty products are those that focus on hair care, generating nearly $40 billion USD each year. Other major segments in the industry include skin care products, which generate about $23 billion USD annually, encompassing items like moisturizers and anti-aging treatments.A total of 42 samples were collected from different categories of salons across various markets in Islamabad. Samples were taken from tools like scissors, combs, hair brushes, and electric trimmers using sterilized swab sticks.The findings underscore the importance of maintaining high standards of hygiene in hair salons to prevent the spread of potentially harmful microorganisms. Regular disinfection and sanitation of salon tools are essential to reduce the risk of microbial contamination and protect the health of both clients and staff. Roadside barbers showed higher contamination levels compared to formal salons. This was attributed to the lack of disinfectants, sterilization techniques, and reuse of tools like razors without proper cleaning.

Keywords

Cosmetics, perfumes, skin, hair care, beauty salons, spas

INTRODUCTION

The beauty industry encompasses sales of cosmetics, perfume, and products for skin and hair care. Beauty salons and spas are considered the service sector of the beauty industry. In addition, some economists include health clubs and cosmetic surgery in their definition of the market. Worldwide sales of beauty-related products and services are estimated to be in excess of $159 billion US dollars (USD) each year. Most research shows that sales to women account for a huge majority of the sum. According to business analysts, the best-selling beauty products are products that clean and beautify hair. Hair care is estimated to bring in nearly $40 billion USD each year. Other leading products of the beauty industry are related to skin care and cosmetics. Skin care is estimated to generate sales of about $23 billion USD yearly, which includes purchases of moisturizers and anti-aging ointments. Cosmetics are estimated to bring in about $18 billion USD each year. The beauty industry has very deep roots in history. Some of the earliest records of man include some type of body adornment. Throughout history, people have sought ways to make themselves more noticeable and more beautiful. The main thing that seems to constantly change is how different cultures define human beauty. The beauty industry has been a natural outgrowth of the human need to improve their looks, based on modern perceptions of beauty (www.wisegeek.com, Accessed 05 December, 2020).

Hairdressing as an occupation dates back thousands of years. Ancient art drawings and paintings have been discovered depicting people working on another person's hair. Greek writers Aristophanes and Homer both mention hairdressing in their writings. In Africa, it was believed in some cultures that a person's spirit occupied his or her hair, giving hairdressers high status within these communities. The status of hairdressing encouraged many to develop their skills, and close relationships were built between hairdressers and their clients. Hours would be spent washing, combing, oiling, styling and ornamenting their hair. Men would work specifically on men, and women on other women. Before a master hairdresser died, they would give their . combs and tools to a chosen successor during a special ceremony (Sherrow, 2006). The beauty industry has grown so much that it can be hard to keep track of the treatments that are available. 'Beauty therapists' who do everything are long gone. Many independent salons specialize in a small range of treatments, from nail art to tanning, while even in the larger spa salons no single staff member is likely to do everything (www.directlineforbusiness.co.uk, Accessed 12 December, 2020).

Depending upon their services, such as hair cutting, dying, styling, waxing, nail treatments, facial and skin care treatments, tanning, massages and complementary care such as aromatherapy salons can be broadly categorized into following types.

Pakistan's hair and beauty industry is large and profitable. Yet, it is unregulated. The actual number of salons and spas is hard to come by since most small business enterprises shy away from registration in order to avoid taxation.

Only 40 beauty salons from across the country are registered with the Securities and Exchange Commission of Pakistan (SECP), the Islamabad-based financial regulatory authority. While according to the Punjab Revenue Authority, there are approximately 287 salons in the province that are taxpayers, yielding about three to four million rupees a month. Hairdressing and beauty salons are classified as public service establishments dealing with hair and cosmetic treatments for men and women and such services may pose potential health concerns to their clients including the risk of infections and sometimes injury (Barn and Chen, 2011;Enemuor et al.,, 2013;Stanley et al., 2014). Hairdressing has increased in popularity over the last few decades because of increases in disposable personal income and peer pressure among mainly young people to conform to the latest hair fashions, generally initiated by sporting and film celebrities (Moore and Miller, 2007). The microbiological risk in a beauty center varies depending on the activity and crucially, on the level of implementation of hygiene procedures, such as the use personal protective equipment (PPE), and the sanitization, sterilization and

disinfection of instruments and medical devices (Mancini et al., 2017). Microbiological risk in the beauty centers is rarely addressed and remains an important problem. Razor sharing and shaves from the barbers have been identified as an important risk for blood-borne viruses spread in several investigations carried out all over the world. In many parts of Africa and Asia, the widespread cultural practice of shaving at a shop or roadside barber is an underestimated route of blood-borne viral disease transmission (Amodio et al., 2009). Cosmetic products such as shampoos, creams, hair dyes, sprays, and hair conditioners that contain hundreds of chemicals are being used in barbers' and hairdressers' salons. Chemicals with their allergenic and irritant effects frequently cause health problems such as respiratory tract reactions, asthma, dermatitis, rhinitis, and ocular diseases in barbers. It is also known that chemicals affect hairdressers' reproductive health and contribute to indoor air pollution (Mandiracioglu et al., 2009). The objectives of the study were to evaluate microbial contamination on tools used in hair dressing salon and to isolate and identify pathogenic bacteria and fungi associated with hair dressing tools.

Material and Methodology

The study was conducted in the Islamabad metropolitan area, the most populous metropolitan region in Pakistan. Islamabad and Rawalpindi are situated in the Potohar region of northern Punjab, against the backdrop of the Margalla Hills. The area has a high concentration of hair salons, local barbershops, and roadside barbers operating with basic setups like a chair and a mirror. The study aimed to evaluate microbial contamination on hair salon tools such as scissors, combs, hair brushes, and electric trimmers from various markets in Islamabad. The laboratory work was carried out in the Multidisciplinary HI-Tech Lab, Islamabad.

A total of 42 samples were collected from different categories of salons across various markets in Islamabad. Samples were taken from tools like scissors, combs, hair brushes, and electric trimmers using sterilized swab sticks. The swab sticks were stored in sterile casings to avoid contamination and labeled appropriately. All samples were immediately transported to the HI-Tech Laboratory Islamabad for culture and processing, following standard methods (Wormser and Stratton, 2008).

·Bacterial samples were cultured on Nutrient Agar Medium (NAM).

·Fungal samples were cultured on Sabouraud Dextrose Agar Medium (SDA).

·Antifungal agents were added to NAM to prevent fungal growth.

Swab sticks and culture media were sterilized in an autoclave at 15 psi pressure and 121°C for 15 minutes.

BACTERIAL CULTURING NUTRIENT AGAR MEDIA

Nutrient Agar (Oxoid CM0003) was prepared by dissolving 28 g of media constituents in 1 L of distilled water. The pH was adjusted to 6.8 ± 0.2 using a pH meter. The medium was sterilized at 121°C for 20 minutes, cooled, and poured into sterile Petri plates in a biosafety cabinet. Plates were allowed to solidify and stored in a refrigerator until use.

Bacterial samples were cultured by swabbing the sample on the surface of the NAM plate in a steady motion, ensuring full contact of the swab with the medium. Plates were incubated at 37°C for 24 hours.

To analyze bacterial characteristics and prevent contamination, isolates were cultured in pure form. Bacterial cultures grown on NAM were re-cultured to obtain pure isolates using the same preparation method described above.

RESULTS

The study focused on the isolation and identification of microorganisms found on tools in hair salons. A total of six bacterial species were identified from these tools, reflecting the microbial diversity present in such environments. The bacterial isolates included Staphylococcus aureus (2 isolates), Staphylococcus epidermidis (1 isolate), Bacillus subtilis (1 isolate), Bacillus cereus (1 isolate), and Klebsiella species (1 isolate). These bacteria are commonly found in various environments, and their presence in hair salon tools may indicate potential contamination risks.

In addition to bacterial isolates, six fungal species were also identified from the hair salon tools. The fungal isolates included Aspergillus species (2 isolates), Penicillium species (1 isolate), Mucor species (1 isolate), Chrysosporium species (1 isolate), and Candida species (1 isolate). Fungi can thrive in various environments, especially in warm and humid conditions, making them a concern for hygiene in settings such as hair salons.

The presence of these bacterial and fungal species on hair salon tools highlights the potential health risks associated with inadequate sanitation practices. Certain bacteria, like Staphylococcus aureus, can cause infections, while fungal species such as Candida may lead to skin infections or other health issues. The identification of these microorganisms serves as an important step in understanding the microbial load in hair salons and the need for effective cleaning protocols.

Overall, the findings underscore the importance of maintaining high standards of hygiene in hair salons to prevent the spread of potentially harmful microorganisms. Regular disinfection and sanitation of salon tools are essential to reduce the risk of microbial contamination and protect the health of both clients and staff.

Bacterial and fungal contamination in roadside barbers and formal salons was assessed through various microbiological techniques. Bacterial colonies were isolated on Nutrient Agar and identified using gram staining, selective media such as Mannitol Salt Agar (MSA) for Gram-positive bacteria and MacConkey Agar for Gram-negative bacteria, along with biochemical tests. Staphylococcus aureus, which fermented mannitol on MSA, and Klebsiella spp., which demonstrated lactose fermentation on MacConkey Agar, were identified. Fungal contamination was examined using Sabouraud Agar for culturing and lactophenol cotton blue staining for microscopic identification. Non-dermatophytic fungi, including Aspergillus and Penicillium spp., were the predominant species, with Candida spp. found as opportunistic fungi. Higher contamination levels were observed in roadside barbers compared to formal salons, likely due to inadequate disinfectant use, poor sterilization practices, and the reuse of tools like razors without proper cleaning.

DISCUSSION

The findings of this study confirm the potential health risks associated with inadequate hygiene in hair salons. The presence of pathogenic bacteria like Staphylococcus aureus and opportunistic fungi such as Candida spp. indicates significant contamination risks.

Similar results have been observed in studies conducted in Iran, Nigeria, and other regions, where Staphylococcus spp., Bacillus spp., and various fungal species (Aspergillus, Penicillium) were frequently isolated from salon tools. Inadequate sterilization methods and poor hygiene practices were consistently identified as the primary contributors to contamination.

Fungal contamination was found to be more prevalent than bacterial contamination. The humid conditions in salons, combined with inadequate cleaning practices, create an ideal environment for fungal growth. The reuse of razors and other tools without sterilization, particularly by roadside barbers, significantly increases the risk of bloodborne infections and other communicable diseases.

The study underscores the urgent need for regulatory enforcement of hygiene standards in salons. The lack of autoclave use or effective sterilization methods further highlights the gap in infection control practices. Awareness campaigns and training workshops for salon operators could help mitigate the spread of infections.

CONCLUSION

Beauty salon may provide a good medium for the growth and transfer of pathogenic microorganism which are dangers for public health. The study showed that tools (Hair brush, Combs, Scissors, and trimmers) used in beauty salon which contain microbial contamination, these microorganisms has sever rick to cause infection in healthy individual. These beauty salon tools serve as carrier and reservoir of microorganism and transmitted from person to person due to lack of knowledge of Beauty salon staff about sterilization and hygiene practice. So there should be need to training of Beauty salon staffs about specific infection control practices and implementation of these practices and appropriate measures should be put in the Beauty salon to prevent the spread of infections via salons and adopt hygiene practices in beauty salons to reduce the rate of infection.

RECOMMENDATIONS

To reduce bacterial and fungal contamination risks in hair salons, it is crucial for federal, state, and local governments to establish and enforce infection control guidelines. Public health agencies should conduct regular training sessions for salon workers on proper sterilization techniques and hygiene practices. Access to sterilization equipment, such as autoclaves, should be subsidized for small-scale salons and barbershops to ensure proper disinfection. Routine inspections must be conducted to monitor compliance with hygiene standards. Additionally, public awareness campaigns should encourage customers to demand hygienic practices, including the use of disposable tools or personal grooming kits. Implementing these measures will significantly reduce contamination risks, ultimately improving public health outcomes.

REFERENCES

1. Borda, L. J. and T. C. Wikramanayake (2015). "Seborrheic dermatitis and dandruff: a comprehensive review." Journal of clinical and investigative dermatology 3(2).
2. Coulibaly, O., et al. (2015). "High dermatophyte contamination levels in hairdressing salons of a West African suburban community." Mycoses 58(2): 65-68.
3. Dadashi, L. and R. Dehghanzadeh (2016). "Investigating incidence of bacterial and fungal contamination in shared cosmetic kits available in the women beauty salons." Health promotion perspectives 6(3): 159.
4. Edward, S. M., et al. (2015). "Detection of Fungi in Hair-brushes in Beauty Salons at Jatinangor." Althea Medical Journal 2(4): 516-520.
5. Enemuor, S., et al. (2013). "Evaluation of bacterial and fungal contamination in hairdressing and beauty salons." African Journal of Microbiology Research 7(14): 1222-1225.
6. Ferri, C., et al. (2015). "Hepatitis C virus syndrome: A constellation of organ-and non-organ specific autoimmune disorders, B-cell non-Hodgkin's lymphoma, and cancer." World journal of hepatology 7(3): 327.
7. Gow, N. A. and B. Yadav (2017). "Microbe profile: Candida albicans: a shape-changing, opportunistic pathogenic fungus of humans." Microbiology 163(8): 1145-1147.
8. Hemraj, V., et al. (2013). "A review on commonly used biochemical test for bacteria." Innovare Journal of Life Science 1(1): 1-7.
9. Janmohammadi, F., et al. (2016). "Evaluation of Bacterial and fungal Contaminations in Barbershops in Kamyaran city, Iran-Summer 2015." INTERNATIONAL JOURNAL OF MEDICAL RESEARCH & HEALTH SCIENCES 5(9): 368-371.
10. Mabuka, J., et al. (2012). "HIV-specific antibodies capable of ADCC are common in breastmilk and are associated with reduced risk of transmission in women with high viral loads." PLoS pathogens 8(6): e1002739.
11. Mackowiak, P. A., et al. (2007). "A febrile illness with generalized papular rash involving the palms and soles." Clinical infectious diseases 44(5): 755-756.
12. Mancini, L., et al. (2017). "A descriptive survey on microbiological risk in beauty salons." Microchemical Journal.
13. Martins, N., et al. (2014). "Candidiasis: predisposing factors, prevention, diagnosis and alternative treatment." Mycopathologia 177(5-6): 223-240.
14. Mowad, C. M. (2016). "Contact dermatitis: practice gaps and challenges." Dermatologic clinics 34(3): 263-267.
15. Stanley, M. C., et al. (2014). "Evaluation of Microbial Contamination of Tools Used In Hair Dressing Salons in Michael Okpara University of Agriculture, Umudike, Abia State." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 13(7): 22-27.
16. Stout, J. E., et al. (2011). "Pedicure-associated rapidly growing mycobacterial infection: an endemic disease." Clinical infectious diseases 53(8): 787-792.
17. Suuronen, K. (2009). Metalworking Fluids: Allergens, Exposure, and Skin and Respiratory Effects, Finnish Institute of Occupational Health.
18. Takwale, A., et al. (2001). "Tinea capitis in two elderly women: transmission at the hairdresser." British Journal of Dermatology 144(4): 898-900.
19. Uslu, H., et al. (2008). "Mycological examination of the barbers' tools about sources of fungal infections." Mycoses 51(5): 447-450.
20. Vary, J. C. (2015). "Selected Disorders of Skin Appendages—Acne, Alopecia, Hyperhidrosis." Medical Clinics of North America 99(6): 1195-1211.

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CONFLICT OF INTEREST

None Declared

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.