

Analysis of students' knowledge about the biological hazards present in the work of cosmetologist

Niczyporuk M.*^{1A-F}, Juśkiewicz I.^{2A-E}, Knaś M.^{3A,C,E,F}

1. Department of Esthetic Medicine, Medical University of Białystok, Poland
2. Student of Cosmetology, Lomza State University of Applied Sciences, Poland
3. Department of Cosmetology, Lomza State University of Applied Sciences, Poland

A - Conception and study design; **B** - Collection of data; **C** - Data analysis; **D** - Writing the paper; **E** - Review article; **F** - Approval of the final version of the article; **G** - Other (please specify)

ABSTRACT

Introduction: The cosmetologists' health complications can be induced by their work conductors. The presence of numerous biological harmful factors in their future workplace requires from graduates the faculty of cosmetology extensive knowledge about health threats and prevention methods.

Purpose: The survey aimed to get to know and compare the knowledge of students of the first and third year of Cosmetology at the Lomza State University of Applied Sciences on the biological hazards present in cosmetologist's work.

Materials and methods: 50 female students (24 first-year students and 26 third-year students) took part in the survey.

Results: In almost all cases, responses from third-year Cosmetology showed a higher level of knowledge of biological infections which may threaten in the beauty parlor for themselves and their clients. Also, in the area of preventing the spread of these infections, they had a higher knowledge than their younger friends.

Conclusions: The level of knowledge of third-year students is significantly higher than the knowledge of first-year students in Lomza State University of Applied Sciences. It is satisfactory that first-year students who already started education in this field, they know biological threats.

Keywords: Cosmetology, biological hazards, students' knowledge

DOI

***Corresponding author:**

Marek Niczyporuk, M.D., Ph.D.
Department of Esthetic Medicine, Medical University of Białystok
3 Akademicka Str., 15-267 Białystok, Poland
e-mail: niczy.ma@gmail.com

Received: 05.10. 2018
Accepted: 21.12.2018
Progress in Health Sciences
Vol. 8(2) 2018 pp 131-136
© Medical University of Białystok, Poland

INTRODUCTION

The cosmetologist profession is associated with exposure to microbiological agents. These are mainly viral, bacterial, parasitic and mycological etiology threats. Therefore, it is important to comply with health and safety procedures [1]. Infections can also be associated with bioaerosols, i.e., a variety of complexes of biological materials particles suspended in the beauty parlour air [2].

Both cosmetologist and clients can become infected with various types of bacteria that are physiological flora of other people, as well as pathogenic microorganisms: *Staphylococcus*, *Streptococcus*, *Pseudomonas*, *Mycobacterium*, *Propionibacterium* [2-6], viruses: herpes, human papilloma [7], as well as in contact with the blood which is responsible for systemic diseases of hepatitis B virus and C, and HIV[8]. Due to the fact that the cosmetologist often do procedures in the area that may be infected by fungal pathogens there is a risk of transferring the infection with dermatophytes and yeast-like fungi: *Pityrosporum*, *Microsporumcanis*, *Trichophyton tonsurans*[9]and *Candida albicans* [10]. Moreover, in the beauty parlour is a risk of parasites: scabies (*Sarcoptes scabiei*) [11,12] and lice (*Pediculus humanus*) infections [13].

The crucial issue for the young cosmetologists is to have the widest possible knowledge about the risk of infections with biological agents present in the beauty parlour, as well as their prevention. Therefore, the aim of this work was to show and compare the knowledge of students of the first and third year of Cosmetology about the biological hazards present in their future workplace.

MATERIALS AND METHODS

The study was approved by the Senate Committee on Ethics of Research of the Lomza State University of Applied Sciences (nr 76000, 4/2013).

The study was conducted in the period of April-June 201, among 50 female students (24 of first-year students and 26 of third-year students) in the Cosmetology of the Lomza State University of Applied Sciences, using the own questionnaire.

22 respondents were aged 18-20, 24 aged 21-25, 3 people aged 26-30, and 1 person was over 30 years old. 10 respondents came from the village, 8 people from the town, 6 people from the city to 20,000 population, 10 people from the city to 50,000 population and 16 people from the city above 50,000 population.

The survey consisted of 4 demographic questions and 20 questions related to the topic of the article.

RESULTS

On the question "What biological factors, in your opinion, are present in the profession of cosmetologist?" 87.5% I-year and 92.3% III-year students indicated that these are bacterial factors, 16.6% I-year and 23% of third-year students indicated that they are viral factors, and 50% I-year and 80.7% of third-year students that they are mycological factors. No one from the first year indicated any parasitic factors, while from the third year it was indicated by 53.8% of female students.

On the question "What are the transmission routs of biological agents in a beauty parlour?" 66.6% I-year and 84.6% of third-year students answered that direct contact, 8.3% I-year and 19.2% of third-year students that the oral way, 41.6% I-year and 57.6% of students of the third year that airborne path, 4.1% I-year students and 7.6% of third-year students that iatrogenic way, 83.3% I-year and 96.1% of third-year students that by the blood, 0% I-year and 7.6% of students of the third year suggest that vectors (e.g. ticks, insects) can be one of the transmission routes. Moreover, 58.3% respondents first and third year students wrote that the transmission is possible by using everyday objects.

On the question "What kind of microorganisms are you able to infected during your work cosmetologist?" 0% I-year and 11.5% of third-year students answered that it can be the mumps virus, 4.1% I-year and 11.5% of third-year students wrote it can be that influenza virus, 0% I-year and 3.8% of third year respondents informed that it is the measles virus, 8.3% I-year and 42.3% of students of the third year think that it is the herpes simplex virus, 4.1 % I-year and 26.9% of third-years students suggest the molluscum contagiosum virus infection, 41.6% I-year and 96.1% of third-year students answered the hepatitis B virus, 58.3% I-year and 96.1% of students of the third year disclosed the hepatitis C virus, 16.6% I-year and 42.3% of third-year students wrote the hepatitis A virus, 16.6% I-year and 69.2% of students of third year the hepatitis E virus, 33.3% I-year and 65.3% of students of the third year the human papilloma virus, 75% I-year and 88.4% of students of the third year the HIV, 75% I-year and 96.1% third year students mentioned the skin mycosis, 75% I-year and 96.1% third year students pointed out the nails mycosis, 4.1% I-year, 15.3% of third-year, of students highlighted the Salmonella infection, 8.3% I-year and 15.3% of third-year of students answered- tuberculosis, 25% I-year and 46.1% of third-year of students answered- bacteria from the group of staphylococcus, but 20.8% I-year and 42.3% of third-year students said-the bacteria from the group of streptococcus.

On the question "What biological factors, in your opinion, can be transmitted through the blood when performing cosmetic procedures that may lead to an interrupted continuity of the skin?" 16.6% I-year and 65.3% of third-year students answered that there may be transmitted the hepatitis A virus, 79.1% I-year and 92.3% of third year students answered that it can be hepatitis B virus, 91.6% I-year 96.1% of third year students wrote that it is the hepatitis C virus, 8.3% I-year and 46.1% of third year students suggested the hepatitis E virus, 12.5% I-year and 57.6% of third year students highlighted the human papilloma virus, 62.5% I-year and 96.1% of third-year students recorded that the right answer is human immunodeficiency virus.

On the question "Do you know how to prevent infections in a beauty parlour" 12.5% I-year and 34.6% of third year students answered that the way of prevention is vaccination, 37.5% I-year and 88.4% of third year students propose taking care of cleanliness in the beauty parlour, 75% I-year and 84.6% of third-year students suggested personal hygienic procedures implementation, 4.1% I-year and 34.6% of third-year students that- short-cut nails, 8.3% I-year and 26.9% of third-year students that- not using tips, 4.1% I-year and 38.4% of students of the third year that by not wearing jewelry at work. 50% I-year and 84.6% of third year students evaluated that using protective clothes, 8.3% I-year and 38.4% of third-year students-using eye protection, 20.8% I-year and 53.8% of third year students- the using face mask or 79.1% I-year and 88.4% of third year students chose that by the one-use gloves as a method of prevention, 70.8% I-year and 84.6% of third year students proposed by using one-use tools, 75% I-year and 92.3% of third year students suggested washing and disinfecting hands and surfaces, 83.3% I-year and 96.1% of third-year students mentioned that disinfection of reusable tools and equipment, 91.6% I-year and 96.1% of third-year students marked sterilizing reusable tools and equipment can be the way of prevention of infection, 50% I-year and 88.4% of third-year students that wrote down disposing of hazardous medical waste, and finally 45.8% I-year and 76.9% of third-year students highlighted washing and disinfecting dirty clothes.

The next one question was "During which cosmetology procedures at the University there was toted an unintended violation of skin continuity?" 29.1% I-year and 7.6% of third-year students gave answer this event can be caused by adjusting eyebrows with tweezers, 95.8% I-year and 76.9% of third-year students that it may occur during face cleaning procedure, 66.6% I-year and 46.1% of third-year students marked mesotherapy procedure, 33.3% I-year and 34.6% of third-year students wrote that it can be an effect of depilation procedure, 41.6% I-year and 50% of third-year

students suggested the manicure procedure, 66.6% I-year and 69.2% of third-year students answered that it can be the pedicure procedure.

On the question "Does the practical classes during cosmetology study at the University, in your opinion, adhere to the sanitary rules in force at the cosmetologist's workplace?" 54.1% I-year and 96.1% of third-year students that "Yes", 8.3% I-year and 0% of third-year students that "No", 25% I-year and 3.8% of third-year students that "It is difficult to say" and 12.5% I-year and 0% third year students that they "Do not know".

On the last question, "Do you think the level of knowledge received at the University on the prevention of infections in a beauty parlour is sufficient?" students of the first and third year of Cosmetology have chosen 100% answer "Yes".

DISCUSSION

The beauty parlour is a place where there is a risk of infection by pathogenic microorganisms. For this purpose, the personnel is obliged to carry out the process of decontamination (washing, disinfection, sterilization), consisting of the elimination of all pathogenic microorganisms. All stages of this process complement each other and are equally important. Thanks to the decontamination process, the tools are biologically safe for both- the client and the staff. Correctly carried out decontamination procedure prevents the spread of diseases to a large extent [14]. The first stage is the washing process as sanitizing, i.e. the elimination of the bigger amount of microorganisms as possible from objects by using available washing agents. The second stage is disinfection, which consists in reducing the number of microorganisms using specialized biocides (chemical disinfection) that remained on the surface of the tools and accessories used in the office after the washing process. For disinfecting process, we use fungus-virucidal and bactericidal preparations. It is important that the products should be compatible with the latest Polish Office for Registration of Medical Devices and Biocidal Products as well as the European Union requirements. Reusable tools should be disinfected after each use. Due to disinfection, the vegetative forms of microorganisms become destroyed, but there are still spores, or spore forms. The third stage is sterilization, after which we receive sterile items, without any forms of microorganisms [15]. All tools which can injury the skin continuity, my contact with blood, or other secretions and excreta should be subjected to such a procedure. Such tools are primarily accessories for manicure and pedicure, tweezers, pliers, files, chisels or scissors. In the beauty parlour, according to legal requirements, sterilization is carried out in an

autoclave with using saturated steam under the pressure [16,17].

The risk related to the use of tools in beauty parlour can be divided according to the Spaulding classification into three groups: high, medium and low probability of transferring the infection. The first group includes tools that may injury the continuity of tissues. The medium risk group includes tools that should not injury the continuity of the tissue (although this may happen) e.g.: pliers. All the tools from high and medium risk groups must be strictly subjected to a full decontamination process. The last group are devices which do not have contact with the skin, so likelihood of transmission of infections is minimal in this group. For such tools, it is enough to wash and disinfect them [15,18].

In order to guarantee the high quality of services, based on the safety of cosmetic procedures carried out in a beauty parlour, employees must ensure and maintain appropriate hygiene and sanitary standards. Presented questionnaire was aimed at getting to know and compare the knowledge of students of the first and third year of Cosmetology Lomza State University of Applied Sciences. The results of the study confirmed that students of cosmetology are aware that there is a possibility of being infected with microorganisms in the beauty parlour. According to respondents, there is the biggest possibility of being infected with mycosis of nails and skin. 75% I-year and 96.1% of third-year students marked such a response. The next one threats in the beauty parlour are the hepatitis C virus (58.3% I-year and 96.1% of third-year students), hepatitis B virus (41.6% I-year 96.1% of third-year students), human papilloma virus (33.3% I-year 65.3% of third-year students) and HIV infection (75% I-year 88.4% of third-year students). 25% I-year and 46.1% third year students selected the answer with staphylococcal infection but 20.8% I-year and 42.3% of third year students picked up the answer with streptococcal infection. Comparing our results to the results published by Aleksiejczuk et al. in which the level of knowledge of students at the Cosmetology of Higher Vocational School in Suwałki was assessed, we observed that students from Suwałki most often feared the risk of mycosis (75.5% of respondents), hepatitis B virus (66.7% of respondents), human papillomavirus (59.8% of respondents), human immunodeficiency virus (HIV) (57.8% of respondents), staphylococcus (56.9% of respondents), hepatitis C virus (48% of respondents) and streptococcus (46.1% of respondents) [19].

An important topic is also whether the students are aware of what infection can come through direct contact with the affected client's skin. In this study, the respondents indicated onychomycosis (95.8% I-year and 96.1% of

students of the third year), tinea of the hands (91.6% of the respondent of the first year and 92.3% of the respondents of the third year), trichomycosis (83.3% I-year and 88.4% of students of the third year), candidal infection (41.6% I-year and 61.5% of respondents of the third year) and varicella virus infection (29.1% I-year and 65.3% of respondents of the third year of Cosmetology). In the Aleksiejczuk et al. publication the highest percentage of students showed skin tinea (77.5% of respondents), onychomycosis (71.6% of respondents), allergic contact dermatitis (60.8% of respondents), scabies (58.8%) and contact dermatitis with irritation (52.2%) [19]. As we can see the student responses in both surveys, in both universities, are slightly different, but in both institutions the largest number of students is afraid of various types of fungal infections. It should also be known that cosmetical procedures can cause viral infections, especially HPV [20].

During some cosmetic procedures unintentional disruption of the skin may occur. The survey answers we have obtained indicate the biggest risk of it may be during manicure and pedicure. Manicure was indicated by 79.1% respondents of the first year and 100% of respondents of the third year. However, pedicure was indicated by 91.6% of first year students and 100% of third year students. In the next places, the students indicated piercing (75% I-year and 96.1% of respondents of the third year), tattoo (87.5% I-year and 100% of respondents of the third year), permanent makeup (91.6% I-year and 96.1% of respondents of the third year) and needle mesotherapy (33.3% I-year and 96.1% of third-year students). According to Suwalki students the most common cosmetic procedure which affect continuity of skin was also a manicure (85.3% of respondents), pedicure (indicated 82.4%), ear piercing (84.3%), permanent make-up (selected 72.5%), and micro-needle mesotherapy which was indicated by 71.6% of respondents [19].

The knowledge about the prevention of biological hazards in a beauty parlour is crucial at cosmetologist's work. The most frequently selected answers were the response regarding the sterilization of reusable tools and equipment (91.6% I-year and 96.1% of respondents of the third year) and the answer regarding the disinfection of reusable tools and equipment (83.3% I-year and 96.2% of third year students). In the next place there were the answers a was surface disinfection (75% I-year and 92.3% of respondents of the third year) with using a single-use gloves (79.1% I-year and 88.4% of third year students). It is also important to wash and disinfect hands (75% of people from the first year, 92.3% from the third year). According to Aleksiejczuk et al. research students of Higher Vocational School in Suwałki, the most often chose answers regarding disinfection

and sterilization and the answer about using of single-use gloves (93.1% of respondents) [19].

Analysis of the results obtained from the conducted research has shown that the knowledge of students of the third year is at a higher level than the knowledge of first-year students. In almost all cases, responses from third-year Cosmetology students showed a higher level of orientation in the subject of biological infections that may threaten the beauty parlour both for themselves and their clients. Also, in the area of preventing the spread of these infections, they had higher knowledge than their younger friends. The cosmetologist is obliged to observe the appropriate rules of occupational hygiene in the cabinet so as to minimize the potential risk of any hazards [20-26]. It is believed that any service which accidentally can affect the continuity of the skin can cause an infection if hygiene is not observed.

CONCLUSIONS

The level of knowledge of third-year students is significantly higher than the knowledge of first year students in Lomza State University of Applied Sciences.

It is satisfactory that first-year students who already started education in this field, they have knowledge about biological threats.

Conflicts of interest

The authors declare that there are no conflicts of interests regarding the publication of this study.

REFERENCES

1. Dylewska-Grzelakowska J. Kosmetyka stosowana [Cosmetics applied], Warszawa: Wydawnictwo WSiP, 2008p.14-6 (Polish).
2. Ozonek J, Pawłowski A. (red): Polish Environmental Engineering five years after joining the European Union. 2009;2(59):31-40.
3. Flis A, Pikul A. Danger in the beauty parlour–infectious diseases. Think-Studenckie Internetowe Czasopismo Naukowe, Wyższa Szkoła Informatyki i Zarządzania w Rzeszowie, 2013; 4(16):1-14. (Polish)
4. Dutkiewicz J, Śpiewak R, Jabłoński L. Biological factors of occupational danger. Classification, exposed professional groups, measurements, prevention], Lublin: Wydawnictwo Ad Punctum, 2018 p.10-98.(Polish)
5. Hudzik G. How to work safely and hygienically and provide services. A guide for beauty parlours, hairdressers, tattoo and wellness. WSSE, Katowice 2014, [cited 2018 Sep 01]. Available from:www.wsse. katowice.pl/index.php?c=getfile&id=28 (Polish)
6. Zych MA, Górka EB, Jankiewicz U, Kowalczyk P, Stępień W. Diseases caused by microorganisms living on the skin. Med Rodz 2013;4:158-63. (Polish)
7. Ghadgepatil SS, Gupta S, Sharma YK.Clinico epidemiological study of different types of warts. Dermatol Res Pract 2016; 2016: 7989817.
8. Muszyński Z. Drobnoustroje skóry człowieka–wskazówki dla kosmetologów [Human skin microbes - tips for cosmetologists]. Homines Hominibus 2010; 6:55-64.(Polish)
9. Trzmiel D, Lis-Święty A, Bergler-Czop B. Klinika zakażeń grzybiczych skóry i jej przydatków w praktyce lekarza rodzinnego - problem ciągle aktualny [The clinic of fungal infections of the skin and its appendages in the practice of the family doctor - a problem still valid]. Med Og Nauk Zdr 2011;17(4):212-7.(Polish)
10. Staniszewska M, Bondaryk M, Kowalska M Magda U, Łuka M, Ochal Z, Kurzątkowski W.Patogeneza i leczenie zakażeń Candida spp [Pathogenesis and treatment of Candida spp]. Postępy Mikrobiol 2014; 53(3):229-40. (Polish)
11. Wiercińska E. Scabies ubiquitous neglected skin disease. Zakażenia, 2017;4:50-5.(Polish)
12. Brzeziński P. Onset of scabies in soldiers–own research and historical features. Lek Wojsk 2009;2:67-72.(Polish)
13. Szymanek M, Wojnowska D, Krasowska D. Forensics–still a current clinical problem. Przegl Lek 2009;4:206-8. (Polish)
14. Koradecka D. Occupational Health and Safety. Warszawa: Centralny Instytut Ochrony Pracy, 2008 p. 14-52. (Polish)
15. Domański M. Hygiene at the beauty parlour part 2. Cabines Pol 2015;68:69-72.(Polish)
16. Domański M. Sterilization of tools in a beauty parlour]. Cabines Pol 2015;68:74-7.(Polish)
17. Jabłońska-Trypuć A. Disinfection and sterilization of tools in a beauty parlour. Kosmet Estet 2014;1:73-9.(Polish)
18. Jakimiak B, Röhm-Rodowald E. Profilaktyka zakażeń, w tym zakażeń HCV, w sektorze ochrony zdrowia – wymagania sanitarne ze szczególnym uwzględnieniem zagadnień dekontaminacji, w tym dezynfekcji i sterylizacji[cited 2018 Sep 01]. Available from:www.psse-slupca.pl/images/hk/zaklady/profilaktykazakazen.pdf. (Polish)
19. Aleksiejczuk A, Niczyporuk W, Bagińska M, Wasilewska I. Assessment of students' knowledge about health risks occur in gat the cosmetologist's work], [w:] Grajek Z, Knaś M, Sęk A. (red): Contemporary threats to public health and safety, Wydawnictwo Uczelniane Państwowej Wyższej Szkoły Zawodowej im. Edwarda F. Szczepanika w Suwałkach, Suwałki 2016 p.49-78. (Polish)
20. Sidharth S, Rahul A, Rashmi S. Cosmetic Warts: Pseudo-Koebnerization of Warts after

- Cosmetic Procedures for Hair Removal. *J Clin Aesthet Dermatol* 2015;8(7):52-6.
21. Starzyk E, Zachwieja P. Cosmetic legislation in Poland and the European Union. Warszawa: Wydawnictwo Wyższej Szkoły Zawodowej Kosmetyki i Pielęgnacji Zdrowia w Warszawie, 2010 p.30-2.(Polish)
 22. Regulation of the Minister of Health of February 17, 2004 on detailed sanitary requirements to be met by hairdressers, cosmetics, tattoo and biological regeneration] (Dz. U. z 2004 r., nr 31, poz. 273)[cited 2018 Sep 01]. Available from:<http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU2-0040310273>(Polish)
 23. Act of December 5, 2008 on the prevention and control of infections and infectious diseases in humans. (Dz. U. z 2013 r., poz. 947 z późn. zm.) [cited 2018 Sep 01]. Available from: <http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20130000947>(Polish)
 24. Announcement of the Speaker of the Sejm of the Republic of Poland dated 19 October 2016 regarding the publication of a uniform text of the Act on preventing and combating infections and infectious diseases in humans. (Dz. U. 2016 poz. 1866)[cited 2018 Sep 01]. Available from: <http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20160001866>(Polish)
 25. Regulation of the Minister of Health of 22 April 2005 on harmful biological factors for health in the work environment and health protection of Workers professionally exposed to these factors. (Dz. U. Nr 81, 716 z późn. zm.) [cited 2018 Sep 01]. Available from:<http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20050810716>(Polish)
 26. The Act of 14 December 2012 on waste. (Dz. U. 2013 poz. 21) [cited 2018 Sep 01]. Available from: <http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu20130000021>(Polish)