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LONGITUDINAL STUDY OF THE FREQUENCY OF BODY MODIFICATIONS, ATTITUDES TOWARDS THEM AND KNOWLEDGE ABOUT THE COMPLICATIONS OF SUCH PROCEDURES AMONG PHARMACY STUDENTS

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ABSTRACT

Body modifications consist in changing the appearance. They gain more and more popularity. The most popular forms of body modification are tattooing and piercing. The aim of the study is a longitudinal assessment of the prevalence of body modifications in the form of tattoos and piercings among students of pharmacy at the Medical University of Lublin and their knowledge about the possible complications of such interventions.
The study was conducted using a validated questionnaire. The study with the participation of first-year pharmacy students was conducted in 2017, and with the participation of sixth-year pharmacy students in 2022. Participation in the study was voluntary and anonymous.
The respondents approved the modification in the form of piercings in the ears to the greatest extent, and invasive body modifications to the least extent. The percentage of people having body modifications has not changed significantly over time, but their awareness of the possible complications of such procedures has increased. Piercings and tattoos, in the opinion of pharmacy students, are not stigmatizing.
The knowledge of future pharmacists about the possible complications of piercing and tattooing increases with the duration of their studies.
Keywords: body modifications, tattooing, piercing.

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INTRODUCTION

Body modifications consist in changing the appearance. These include: hairstyle, makeup, nail art, permanent makeup, tattoos, piercings, scarifications, subdermal implants with protruding spikes, bone deformities, cutting or amputation of various parts of organs, silicone implants, or split tongues. The most popular forms of body modification are: hair dyeing, tattooing and piercing [1,2]. Such methods of modifying the appearance have been used in many cultures of the world for thousands of years. Their meaning evolves from the stigmatization of slaves, through the distinction of rulers, priests and chiefs, to the mindless desire to distinguish themselves from other members of the community [3]. Until the 1990s, body modifications were used by subcultures as a manifestation of their individuality or as a provocation [4]. Later, the number of tattooing and piercing procedures increased, and this custom began to cover wider and wider social strata [1,4].

The reasons for "decorating" one's own body are different. Among them, one can single out the desire to chase fashion, the need to improve one's appearance, mask scars, the desire to be beautiful. People with tattoos often express the need to have a "work of art" on their body. One of the most important motivations is to show your individuality and feelings. The reasons for making modifications can also include a protest against parents and society. Other reasons are the desire to belong to a certain social circle, the confirmation of feelings. The reason for tattooing and piercing can also be the individual's personal experiences, and body modifications are something of a catharsis. Another reason may be the need to test your pain capabilities, experience pain and the associated release of endorphins. Endorphins cause a sense of pleasure, which can be addictive. The amount of modification can also be determined by the quality of previous experiences and the type of memories from previous treatments, especially in the case of tattooing.

The occurrence of body modifications is also influenced by culture and tradition in a given region of the world. Body modification can also be performed for no specific reason, under the influence of psychoactive substances [5]. Common sites for body piercing are ear lobes, eyebrows, noses, tongue, navels, nipples, and the genitals [6]. Genital piercing is used as decoration and for direct sexual stimulation, tattoos in this area can be used to emphasize sexuality. Knowledge about possible health complications of such procedures is also developing (HIV, HCV, HBV, bacterial, fungal infections, formation of keloids, ulcerations, contractures, impaired patency of natural body orifices and articulation disorders) [7,8]. However, there are professional groups endowed with social trust that have a dress code. Their appearance and behavior inspire trust and respect. Pharmacists belong to this group.

OBJECTIVE

The aim of the study is a longitudinal assessment of the prevalence of body modifications in the form of tattoos and piercings among students of pharmacy at the Medical University of Lublin and their knowledge about the possible complications of such interventions.

METHOD

A proprietary questionnaire was used to collect the data.

The research tool includes questions about age, gender, origin from the city, small town or village (Tab.1.). The second part includes questions about the number of piercings with an indication of their location and the number and number of tattoos. The last part contains questions about the attitude of the respondents to this type of modification in other people and the knowledge of possible complications of piercing and tattooing

In order to determine the internal structure of the original Body Modification Questionnaire, an exploratory factor analysis was conducted. The reliability of the method was assessed on the basis of Cronbach's α coefficient. Correlations (Pearson's r) of individual statements with the overall result were also estimated. The analyzes were carried out using the IBM SPSS Statistics v. 25 package.

The proposed Body Modification Questionnaire consists of 5 questions concerning attitude to body modifications (Tab. 2.) to which the subject must respond. Expressing the opinion to what extent the subject likes or dislikes a given body modification is made on a 5-point Likert scale, where 1 means I definitely like it, 5 means I definitely don't like it.

Tab.1

Body Modification Questionnaire.

Number	Question	Possible answers
1	Age	Fill in question……
2	Gender	a woman b. man
3	Place of residence	a village b. city up to 50,000 residents c. a city with over 50,000 inhabitants residents
4	Do you have a tattoo/tattoos?	a. yes b. no
5	If you answered yes to question 4. Please answer question 5-6 5. How many tattoos do you have?	a.1 b. 2 c. 3 d. 4 or more
6	Are your tattoos visible to other people?	a. yes b. no 7. Do you have one piercing in each ear? a. I don't have earrings in my ears b. yes c. I have 1 earring in only one ear d. I have more than one earring in one ear and none in the other ear e. I have more earrings than one in each ear
7	Do you have one piercing in each ear?	a. I don't have earrings in my ears b. yes c. I have 1 earring in only one ear d. I have more than one earring in one ear and none in the other ear e. I have more earrings than one in each ear
8	If you answered d or e in question 7, please answer question 8 How many earrings do you have in your ears in total?	a.2 b. 3 c. 4 d. 5 or more
9	Do I have an earring/earrings in places other than my ears?	a. yes b. no
10	Where are your earrings? (you can select more than one answer)	a. ears nose c. language d. lips e. navel f. eyebrows g. other place
11	What is your opinion on tattoos?	1 I definitely like them 2 I like them 3 they don't bother me 4 I don't like them 5 I definitely don't like them

Tab.1 cont

Body Modification Questionnaire.

12	What is your opinion on earrings?	1 I definitely like them 2 I like them 3 they don't bother me 4 I don't like them 5 I definitely don't like them
13	What is your opinion on the presence of piercing in body parts other than the ears?	1 I definitely like them 2 I like them 3 they don't bother me 4 I don't like them 5 I definitely don't like them
14	What is your opinion on other body modifications, e.g. subdermal implants, split tongue?	1 I definitely like them 2 I like them 3 they don't bother me 4 I don't like them 5 I definitely don't like them What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?
15	What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?	1 I definitely like them 2 I like them 3 they don't bother me 4 I don't like them 5 I definitely don't like them
16	Do visible body modifications at the doctor or pharmacist bother you?	a. yes b. depends on mods, some yes and some no c. no d. I have no opinion
17	Do you know a doctor or pharmacist with visible body modifications (piercings, other tattoos)?	a. yes b. no
18	If you answered yes to question 18, please answer question 19 Does the presence of body modifications at your doctor affect your relationship with him/her?	a. yes b. no
19	Do you know about the negative health effects or possible infections when performing body modifications?	a. yes b. no
20	What health effects/infections can occur during body modification procedures? (you can select more than one answer)	a. treatments are always safe b. treatments are safe if performed by a person with appropriate qualifications c. HBV infection d. HCV infection e. HIV infection f. cytomegalovirus infection g. bacterial infection of the modification site h. sepsis

Tab. 2

Questions of the Attitude to Body Modification Questionnaire.

	Questions
1	What is your opinion on tattoos?
2	What is your opinion on earrings?
3	What is your opinion on the presence of piercing in body parts other than the ears?
4	What is your opinion on invasive body modifications, e.g. subdermal implants, split tongue?
5	What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?

STUDY PARTICIPANTS AND PROCEDURE

The psychometric properties of the proposed scale and descriptive statistics were developed based on the results obtained by a group of 253 students who voluntarily participated in the validation of the research tool. 253 students of the Faculty of Medicine and the Faculty of Pharmacy took part in the validation.

RELIABILITY AND DISCRIMINATORY POWER

The reliability of the scale, estimated as internal consistency, was assessed on the basis of Cronbach's α coefficient. Its value was 0.708 [95% CI=0.648-0.762]. It is assumed that for the scale to be considered reliable, the Cronbach's α coefficient should be greater than 0.6. The obtained result indicates a satisfactory consistency of the method and allows its use in research.

The discriminatory power of the items is satisfactory. The correlations of individual statements with the overall result of the questionnaire ranged from 0.414 (question 5) to 0.627 (question 3) (Tab. 3).

Tab. 3

Cronbach's alpha reliability coefficients.

Question	Item correlation Total	Cronbach's alpha after item removal
What is your opinion on tattoos?	0.464	0.661
What is your opinion on ear piercings?	0.379	0.692
What is your opinion on the presence of earrings in places other than the ears?	0.627	0.599
What is your opinion on invasive body modifications, e.g. subdermal implants, split tongue, body incisions?	0.473	0.657
What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?	0.414	0.688

ACCURACY

Exploratory factor analysis (EFA) was performed to assess factor validity.

EFA was performed by principal components method. Oblimin rotation was used for the degree of skewness delta = 0 (non-orthogonality of the factors was assumed). The validity of the choice of the factor analysis model was formally confirmed by the Kaiser-Meyer-Olkin KMO index (0.654) and the Bartlett sphericity test ($\chi 2$ = 201.595; $p<0.001$). EFA allows for a two-factor solution that explains 66.17% of the variance. Charge values ranged from 0.615 to 0.851. The two-factor solution is confirmed by the analysis of the scree chart (Fig. 1.).

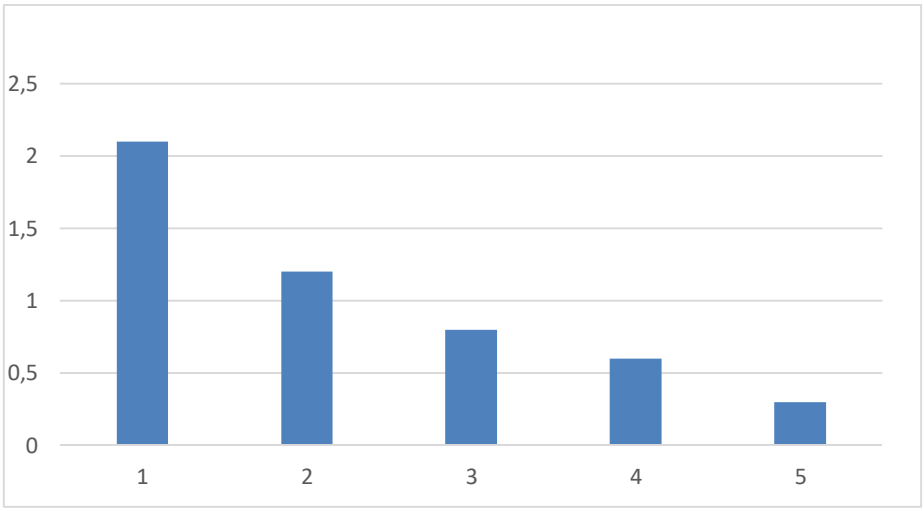

Fig.1 Scree diagram.

The proposed structure shows that the first factor consists of question 1 and question 2. The second factor consists of questions 3, 4 and 5. The first factor refers to more acceptable, especially in Europe, methods of body modification: tattoos or ear piercing. Questions 3, 4 and 5 refer to less common and more controversial body modification practices in this part of the world.

Validation studies have shown that the proposed questionnaire is a reliable tool for measuring attitudes towards body modification [9].

The results obtained in the first and last year of pharmaceutical studies were evaluated in the STATISTICA program, which is at the disposal of the Medical University of Lublin. Differences where $p<0.05$ are considered statistically significant.

RESULTS

In 2017, 70 students of the first year of pharmacy at the Medical University of Lublin participated in the study, and in 2022 42. There are 105 students per year. Participants of the study in 2017 were 19-21 years old (M 19.86), and in 2022 they were 24-26 years old (M 24.64). In the study in 2017 62 women (88.6%) and 8 (11.4%) men took part in the survey, and in 2022 37 (88.1%) women and 5 (11.9%) men.

In 2017, 20% (14 people) of the respondents came from rural areas, 10% (7 people) from cities with up to 50,000 inhabitants, and 70% (49%) from cities with > 50,000 inhabitants. In 2022, 21.4% of the respondents (9 people) came from rural areas, 9.5% (4 people) from cities with up to 50,000 inhabitants, 29 people (12.18%) from cities >50,000 inhabitants.

In 2017, 6 people (8.5%) admitted to having tattoos, and in 2022, 5 people, i.e. 11.9% of the study group. In 2017, 2 people answered that they had one tattoo, 2 that they had 2 tattoos, and 2 answered that they had 4 or more tattoos. In 2022, 2 people indicated that they had 1 tattoo each, 1 that they had 2 tattoos, and 2 that they had 4 or more tattoos. In both studies, 60% of people with a tattoo answered that it was in a place invisible to other people.

In 2017, 30 people (43%) answered that they had no piercings vs 10 people (23.8%) in 2022.

In 2017, 50% of respondents had 1 earring in each ear vs. 57.1% in 2022.

In 2017, 2% had more than 1 piercing in their ears vs 1.7% in 2022. In both periods, nearly 52% had a total of 2 piercings. In 2017, 1.4% had a total of 3 piercings vs. 14.3% in 2022. In 2017, 1.4% had a total of 4 piercings vs. 4.5% in 2022.

In 2017, 1.4% had 5 or more piercings, and in 2022, 5% had 5 or more piercings.

In 2017, none of the study participants had piercings in places other than ears, and in 2022, 2.4% of respondents had piercings in places other than ears (1 person has an earring in the nose).

The overall score of the questionnaire is the sum of the points obtained in the individual Questions of the Attitude to Body Modification Questionnaire. The tested person can get a maximum of 25 points. The minimum number of points is 5. The average score is assessed, the higher it is, the more negative the attitude towards body modifications (the subject approves body modifications to a lesser extent).

The mean score was 14.80 (SD=3.17; Me=14.00). The distribution of results for the entire sample deviates from the normal distribution ($W = 0.944$; $p < 0.001$).

The results for the whole group in individual questions are indicated in the table below. The respondents approved the modification in the form of ear

piercings to the greatest extent, and invasive body modifications, e.g. subcutaneous implants, split tongue, body incisions, to the least extent (Tab.4.).

Tab. 4

Results of the Attitude to Body Modification Questionnaire.

Question	M	Me	SD	Min	Max
What is your opinion on tattoos?	12.62	3.00	1.02	1.00	5.00
What is your opinion on earrings?	21.98	2.00	0.88	1.00	5.00
What is your opinion on the presence of piercing in body parts other than the ears?	33.18	3.00	0.92	1.00	5.00
What is your opinion on invasive body modifications, e.g. subdermal implants, split tongue?	44.06	4.00	1.05	1.00	5.00
What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?	52.96	3.00	1.16	1.00	5.00

M-mean; Me-median; SD-standard deviation; Min-minimum; Max-maximum

It was shown that the group of sixth year students approved tattoos to a slightly greater extent, but the difference between the groups was not statistically significant. In the case of question 2 concerning ear piercings, it was shown that such practices were much more approved of by the respondents from the group of first-year pharmacy students ($p<0.001$) (Tab. 5).

Tab. 5

Results of the Attitude to Body Modification Questionnaire (Mann-Whitney test).

	First year students		Sixth year students		p
Question	M	SD	M	SD	
What is your opinion on tattoos?	2.57	1.01	2.79	1.04	0.234
What is your opinion on earrings?	1.82	0.75	2.62	1.05	<0.001
What is your opinion on the presence of piercing in body parts other than the ears?	3.17	0.86	3.19	1.16	0.985
What is your opinion on invasive body modifications, e.g. subdermal implants, split tongue?	4.22	0.93	3.46	1.24	<0.001
What is your opinion on cultural practices related to body modification, such as sawing teeth, lengthening the neck, deforming the bones?	3.02	1.13	2.75	1.28	0.097

Opinions about piercings in places other than the ears were similar in years 1st and 6th. On the other hand, invasive body modifications were assessed significantly more negatively by first year students than by sixth year students ($p<0.001$). There were no significant differences between the study groups in the assessment of body modifications related to culture and tradition.

In both groups, nearly 70% of respondents admitted that they knew a doctor or pharmacist with visible body modifications. At the same time, 80% of them assessed that their presence does not affect their relationship with this doctor/pharmacist. In both groups, 10% admitted that these modifications affected the relationship with the doctor/pharmacist, while 10% had no opinion. There were significant differences in the answers regarding possible infectious complications after body modification between the first and sixth year students (Fig. 2). The sixth year students were more aware of infectious complications of piercing and tatooing.

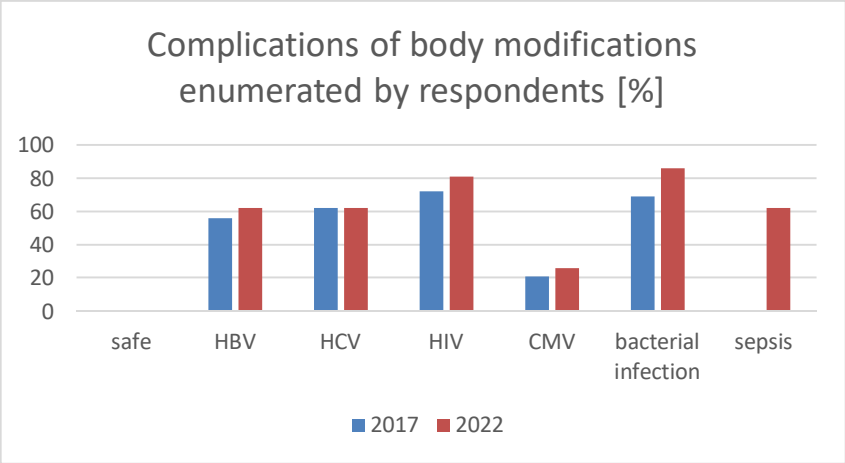

Fig. 2 Knowledge of complications of tattooing and piercing among pharmacy students in 2017 and 2022.

DISCUSSION

Despite the smaller number of survey participants in 2022, the percentage of women and men remained the same in both surveyed periods. The 2017 survey was conducted during a lecture. In 2022, however, due to the state of epidemic threat, it was decided to conduct the survey online. This communication channel is more often negatively received, messages with links to surveys are ignored and deleted. Some people are tired of consumer surveys. Therefore, it is not surprising that the response rate was 40% [10].

In both analyzed periods, the percentage of participants living in rural areas, in small and large cities, remained similar.

Similar low percentages of respondents had tattoos in both study periods (8.5% vs 11.9%).

According to the literature, the prevalence of piercing in highly developed countries ranges from 4.3% to 51%. The prevalence of tattoos ranges from 4.3% to 73% [11].

Unemployment, nonaffiliation to a church, eating disorders and lack of partnership correlate positively with body modifications [12,13,14]. People at the age of 14 to 24 years display the highest rate of body piercings or tattoos (females, 41%; males, 27%) [13]. Tattooing correlates with the perception of reduced mental health and both, tattooing and body piercing correlate highly with increased "sensation-seeking" behavior [12].

In the past tattooing in Europe was associated with being in prison. Also, contemporary data indicate that high levels of tattooing are among prisoners in Europe and North America (14.7%), Asia Pacific (21.4%), and Latin America (45.4%) [15].

The pejorative meaning of tattoos identifying people after being in prison is disappearing. Increasingly, young people make body modifications under the influence of impulse, emotions, peer group pressure and psychoactive substances (alcohol, drugs). The memory of the historical conditions of tattoos of prisoners of concentration camps and ghettos is fading away. Undoubtedly, blood type tattooing turns out to be useful in saving lives.

Currently, the tattoo is used in medicine for permanent marking for radiotherapy [16]. Nipple-areolar tattooing is well accepted as part of breast reconstruction [17].

In baldness, tattoo-like procedures are performed to create a 'drawing of hair' on the skin. In cosmetology, permanent makeup is popular, especially eyebrow microblading, the technique of which, as in the case of tattooing, is injection of pigments. The question of the harmfulness of tattoo pigments is raised in some publications [18]. Carbon particles (carbon black) are almost exclusively found in black tattoos. The azo and polycyclic pigments create nearly all colors of the visible spectrum. They may contain heavy metals, by-products and impurities which may exhibit health concerns [18]. There is a change in the color of black tattoos to blue and red tattoos to red over time. This is because tattoo colorants are transported with lymph to other organs and can be found in any other organ of the human body. Thus, tattooing entails a complex reaction of the skin that triggers the immune system and launches manifold transport processes [19].

Many publications on tattoos and piercings focus on their relationship with risky sexual behavior, the use of psychoactive substances, psychiatric disorders, criminal records and alcohol abuse [20,21,22].

Meanwhile, the look: tattoos, piercings, make-up and hairstyle are nowadays a code for society. A person without well-groomed hair, make-up, and neat clothing does not meet the criteria of the dress code imposed in many workplaces. The same people often want to distinguish themselves a bit from many other employees in uniforms, put on several earrings or place a tattoo in a visible place. In some environments, having a tattoo and piercings is an expression of following fashion, staying young not aging [23].

Our study shows that pharmacy students do not have negative associations with tattoos, and they like piercing. However they care a lot about their grooming and how their looks are perceived by patients. Only 8.5% of them had tattoos on the first year at the university and 11.9% on the senior year. They had mainly earrings throughout the study period. This is probably because pharmacists are one of the professional groups endowed with social trust. The opinion of a pharmacist helps to make decisions regarding the drugs and supplements used, i.e. products intended to save and maintain health and well-being.

There is an extensive literature on the health effects of body modification [24, 25]. In a Polish study conducted at the Medical University of Gdansk 86% of the medical students indicated the risk of HCV virus infection during tattooing, and only 34% of students from other Tricity universities were aware of this danger [24]. In our study it was visible, that with age the interviewed students knew more about possible infectious complications (on the senior year 62% of students knew the risk of HBV and HCV infection, 80% knew about the risk of HIV, 21% about CMV and 83% about the possibility of bacterial infection as a possible complication of tattooing or piercing).

There is evidence that many individuals regret their body modifications [23]. *Tempora mutamur et nos mutamur in illis.* In response specialist publish data about possibilities of tattoo removal with laser therapy [26,27,28] or high intensity ultrasound [29].

CONCLUSIONS

Piercings and tattoos do not stigmatize. Despite the knowledge about possible complications caused by body modifications, their acceptance among pharmacy students is common.

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