

AN ASSESSMENT OF THE KNOWLEDGE OF MEDICAL STUDENTS ABOUT LYMPHEDEMA – A SURVEY-BASED STUDY

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ABSTRACT

Introduction: Lymphoedema is a dysfunction of the lymphatic system and a chronic disease. Knowledge about lymphedema is crucial for avoiding risk factors and for early recognition of the first lymphoedema signs. In the study, the authors assess both the knowledge and attitude towards lymphoedema among medical students of the Medical University of Silesia in Katowice. This study aimed to discuss the importance of spreading knowledge about lymphoedema.

Material and methods: The study assessed the knowledge of medical students about lymphoedema by using a dedicated questionnaire. The survey study was conducted from February 2022 to April 2022 and included medical students from the Medical University of Silesia in Katowice.

Results: The questionnaire was completed by 138 medical students in years 1–6. Most students (48.2%) stated that their knowledge was average, and a significant number of students claimed that they had never heard about lymphoedema during their university classes. Statistical analysis revealed that subjective assessment of knowledge and college level were dependent on each other, but there was no correlation with the objective assessment. The results showed that there was no relationship between gender and calculated body mass index (BMI) with either subjective or objective evaluation of knowledge about lymphoedema themed.

Conclusions: Knowledge about lymphoedema among the study participants is insufficient. Appropriate education of medical students is essential, which is crucial for early recognition of the first signs of lymphoedema among students and their future patients. Females and individuals with high BMI with higher risk of developing lymphoedema do not have greater awareness about lymphoedema, which can delay its recognition and early treatment.

Key words: lymphedema, knowledge, prevention and treatment.

INTRODUCTION

Lymphoedema is a dysfunction of the lymphatic system which is defined by the American Cancer Society as a chronic condition resulting from a build-up of lymph fluid under fatty skin tissue [1]. Common signs of lymphoedema include heaviness or fullness, aching and tingling, decreased mobility, or skin hardening [2]. Additionally, clinical observations may reveal lividity, impetigo, or liquid seeping. Obesity is one of the risk factors for lymphoedema [3]. The risk of lymphatic dysfunction increases with elevated body mass index (BMI), and it is almost universal once the BMI exceeds 60 [4]. Other risk factors for lymphoedema include lymph node resection

or radiotherapy, extremity injuries, rheumatoid arthritis, or previous infections.

Lymphoedema is a chronic disease [5]. Therefore, it requires conscientious care to manage the condition [2]. Early detection and prevention of lymphoedema development can be more effective than late-stage therapy [6]. Patient education might enable early recognition of the first signs of lymphoedema. Studies have shown a lack of knowledge of the condition, which could unintentionally engage individuals in various risk behaviours [2]. An analysis carried out in 2021 showed that less than 25% of respondents answered more than half of the risk factor questions correctly, emphasizing the need for increased patient education. Educated patients could comply with the doctor's orders and assure adherence to risk-reducing

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behaviours [7]. The education of patients or whole populations at risk of developing lymphoedema is dependent on the knowledge of healthcare providers [8]. However, participants of an existing study conducted in the United Kingdom pointed out major deficiencies in healthcare workers' knowledge and awareness of lymphoedema. This raised concerns about a potential lack of support, understanding, and treatment directions resulting from poor lymphoedema-themed education among doctors [9].

The authors aimed to assess the knowledge and attitude towards lymphoedema among all years of medical students from the Medical University of Silesia in Katowice to determine if the knowledge level about lymphoedema was sufficient. The study's objective was to highlight the significance of spreading awareness and knowledge about lymphoedema.

MATERIAL AND METHODS

A proprietary questionnaire was used to conduct an anonymous survey among medical students from the Medical University of Silesia in Katowice. The invitations to participate in the survey were sent individually to randomly selected students (210 students) from the 1st to the 6th year via a mailing list. The survey was accessible from 21 February 2022 to 30 April 2022. The inclusion criterion was studying in any year of medicine at the Medical University of Silesia in Katowice, and no exclusion criteria were established. Validation was not conducted because it was a pilot study. Almost all questions in the survey were marked as mandatory, and respondents had to answer them to proceed to the next question. Only one response per person was allowed, and multiple submissions were not possible.

The interactive questionnaire consisted of 20 questions. It was divided into 3 parts: general and socio-demographic questions concerning survey participants, subjective and objective evaluation of knowledge, and self-diagnosis of the possible presence of lymphoedema. Subjective evaluation of knowledge about lymphoedema, its risk factors, and its diagnostics was performed using a 5-point Likert scale (1- very bad, 2- bad, 3- neutral, 4- good, 5- very good). The part with the objective evaluation of knowledge consisted of 5 single-choice questions and 4 multiple-choice questions. Respondents were asked to indicate the main cause of lymphoedema in the world, its characteristic symptoms, and the optimal examination method and to answer true/false questions about whether women are more often affected by lymphoedema than men and if upper extremities are more likely to be affected than lower limbs. The multiple-choice questions were related to the main lymphoedema symptoms, risk factors, treatment methods, and pharmacological adjunctive therapies.

Statistical analysis

The collected data were processed using Statistica 13.0 software by TIBCO Software Inc., Palo Alto, CA, USA. The relationship between the collected quality variables was assessed using an χ^2 test. A *p*-value of less than or equal to 0.05 was considered statistically significant. The null hypothesis was assumed to be that the 2 factors are independent, and the alternative hypothesis was that the 2 factors are dependent on each other. If the *p*-value is less than 0.05, the null hypothesis is rejected in favour of the alternative hypothesis. The interval data are presented as the mean value \pm standard deviation.

Availability of data and materials

The quantitative datasets supporting the conclusions of this article are included in the article.

More detailed datasets are available on request.

RESULTS

A total of 138 students from the Medical University of Silesia in Katowice completed the questionnaire, including 97 females and 41 males. The mean age of the study group was 22.2 years. Among the participants, 41% were years 1–2 of the University course (preclinical), and the remaining 59% of the students were years 3–6 (clinical medicine education). Most of the respondents (31%) came from a city with a population of over 250,000, followed by villages (21%) and cities with a population of up to 250,000 residents (20%). A smaller proportion of participants (15%) were from cities with less than 50,000 residents, and 13% were from cities with 50,000–100,000 residents.

Of the total number of respondents (138 students), 56.5% (78 students) claimed that they had never heard of lymphoedema during their classes at the university. Additionally, 5 of them reported that they learned about lymphoedema for the first time through the survey. The majority of students who had never heard of lymphoedema were from the 1st year (82.8%), and similarly 78.6% were from the 2nd year, 44.7% from the 3rd year, 37.5% from the 4th year, 25% from the 5th year, and 38.5% from the 6th year. Furthermore, 31 students (22.5% of the total number of respondents) admitted that they did not remember whether they had learned about lymphoedema or not. Only a minority of students (*n*=29) were sure that they had attended classes on the topic of lymphatic oedema.

The first analysed relationship was between the year of study and the subjective assessment of knowledge about lymphoedema. None of the students subjectively assessed their knowledge about lymphoedema as "very good". The prevailing 48.2% of students claimed that their knowledge was "average". The most numerous group of students

who assessed their knowledge as “very bad” were from the first year. Furthermore, mostly students from the fifth year claimed that their knowledge about lymphoedema was “good”. The χ^2 test yielded a *p*-score below 0.05. The education level and subjective assessment of knowledge were dependent on each other. Figure 1 presents the percentage of students from each year and their subjective assessment of knowledge.

Another dependence presented in Figure 2 is the graded test results filled by college level. In most cases (75) the students received an average mark. Test results marked as bad were only scored by 2 first-year students and one third-year student. Despite the fact that the prevailing group of students from the fifth and sixth year performed well on the test, the χ^2 test yielded a *p*-score above 0.05, which leads to the conclusion that college level and objective assessment of knowledge are independent of each other.

In the second part of the study, the relationship between sex and subjective (Fig. 3) or objective (Fig. 4) evaluation of knowledge about lymphoedema was investigated.

The majority of both female and male students claimed that their knowledge was average. The second most common result for both sexes was that they assessed their own knowledge as bad. However, the χ^2 test yielded a *p*-score above 0.05, indicating that sex and subjective assessment of knowledge are independent.

The distribution of marks received from the test filled by gender is presented in Figure 4, and it shows that the majority of both men (24) and women (51) received an average grade. Although a higher percentage of men (2.17%) received a bad grade compared to women (0.73%), the conducted χ^2 test resulted in a *p*-score above 0.05, indicating that the sex and objective evaluation of knowledge are independent of each other.

In the survey, respondents were also given an opportunity to name the main sources of knowledge about lymphoedema, its diagnostics, and risk factors. The majority of respondents (52.2%) reported that textbooks and medical literature were their main sources, followed by medical websites, which were cited by 50.7% of students. In third place, research papers from the PubMed database, social

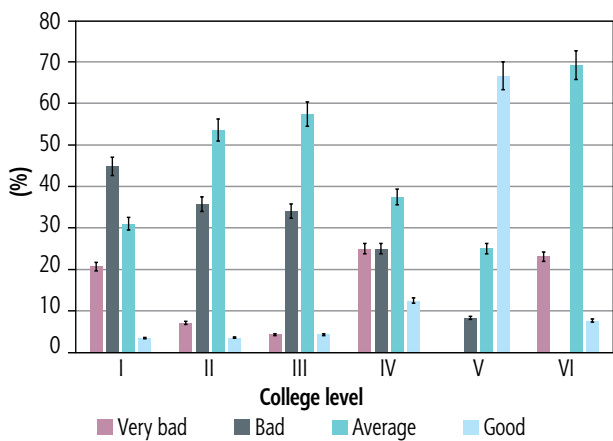


Fig. 1. Percentage of students from all college levels and their subjective evaluation of knowledge

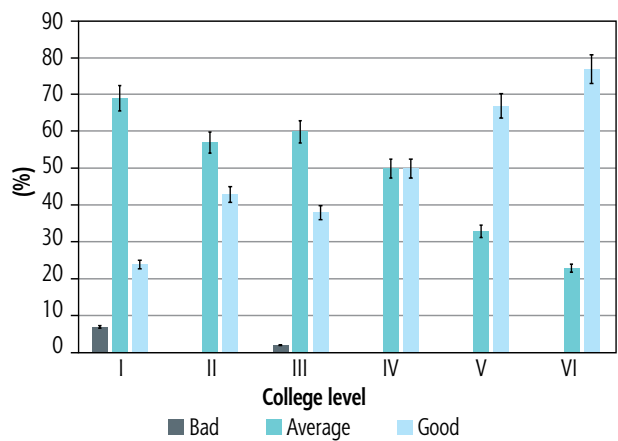


Fig. 2. Percentage of students from all college levels and their objective evaluation of knowledge

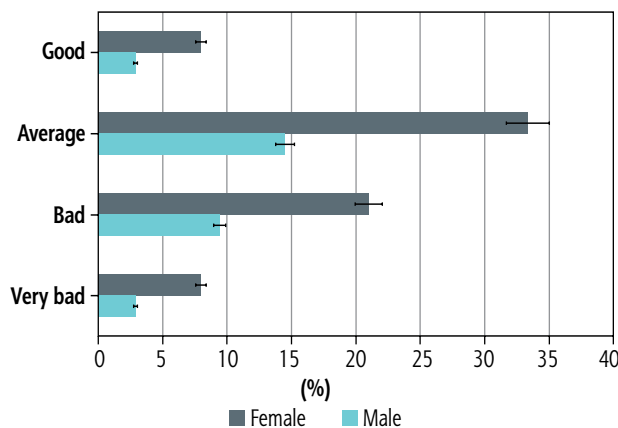


Fig. 3. Correlation between gender and subjective evaluation of knowledge

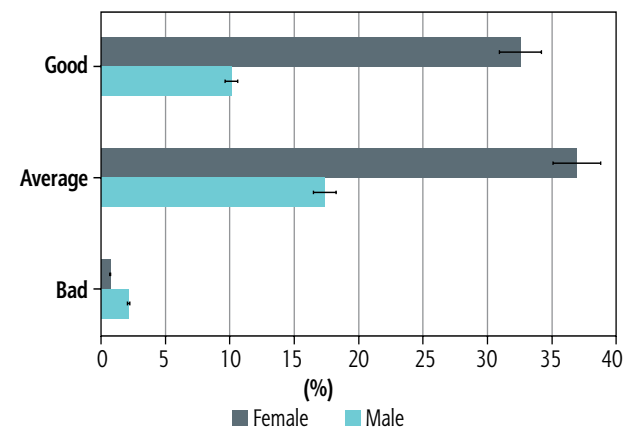


Fig. 4. Correlation between gender and objective evaluation of knowledge

media (Facebook, Instagram), and friends were equally indicated as sources (by 24 respondents, 17.4%). Other sources chosen by students from the Medical University of Silesia were newspapers and daily press (8 people) and doctors, TV programmes, and summertime internship (indicated by one person each).

The study examined the potential correlation between BMI and the subjective level of knowledge about lymphoedema. The results showed that 66.7% of respondents had normal weight, while 19.5% were overweight and 5.1% were classified as obese. Additionally, 8.7% of students were underweight. As depicted in Figure 5, the majority of students with normal weight (44 individuals), overweight (14 individuals), and obesity (4 individuals) assessed their knowledge level as average. Among the obese students, 43% defined their knowledge level as bad, but none assessed their knowledge as either good or very bad. Furthermore, 6 overweight students rated their knowledge level as very bad, while 5 rated it as bad. The majority of underweight students (7 individuals) assessed their knowledge level as bad. However, the χ^2 test indicated a *p*-score above 0.05, suggesting that there is no significant correlation between BMI and the subjective evaluation of knowledge.

As seen in Figure 6, which presents graded test results filled by BMI, in the majority of cases students from all BMI categories received an average mark. 54% of underweight respondents received an average mark, and another 38.5% received a good grade. Of the normal-weight students, 50 received an average mark, and 42 received a good grade. No normal-weight student received a bad grade. Sixteen people, or 59% of overweight students, received an average mark. Another 33.3% received a good mark, and 2 overweight students received a bad mark. The χ^2 test resulted in a *p*-score above 0.05. Body mass index and objective assessment of knowledge are independent of each other.

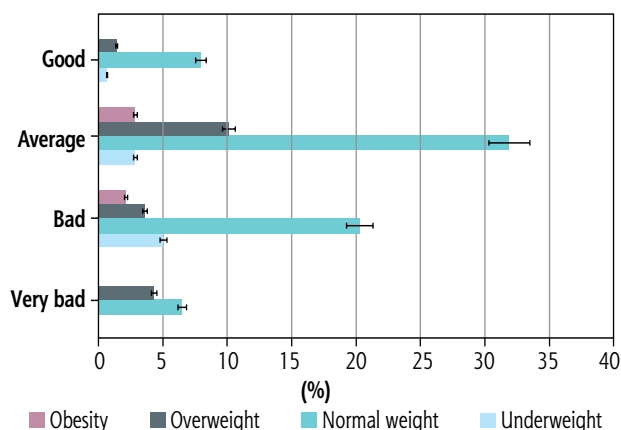


Fig. 5. Correlation between body mass index and subjective evaluation of knowledge

The questionnaire is also a source of knowledge about the health of the students from the Medical University of Silesia. The average BMI calculated for females was 25.36, and for males it was 23.9. Thirty-eight students (27.5% of respondents) claimed that they had limb pain after long standing or sitting. Over 9% of respondents (13 people) reported suffering from oedematous feet and shanks, while 10 students (7.2%) reported having pitting oedema in their feet especially later in the day. Furthermore, 10 respondents (7 women and 3 men) reported a positive Stemmer sign. Four females with positive Stemmer sign subjectively assessed their knowledge as bad, while 3 females assessed their knowledge as average. Among males with positive Stemmer sign, 2 evaluated their awareness about lymphoedema as average and one as bad. Females' objective assessment of knowledge resulted in 2 good grades, 4 average, and one bad (with an average score of 53.64%). The same evaluation among males with positive Stemmer sign yielded 2 average grades and one good grade (with an average score of 56.27%).

DISCUSSION

With the information that lymphoedema is a chronic but controllable disease, individuals from the risk group should be engaged in sustained treatment, implement self-care activities into their everyday life, and avoid risky behaviours. It has been proven that knowledge and proper information given by health specialists play a vital role in engaging patients with therapy, and educated individuals report better life quality and symptom control than other individuals with worse condition-related knowledge [10]. Furthermore, knowledge about lymphoedema is crucial to have efficient communication either with healthcare providers or with close family [11] and other patients coping with the same condition. Educational actions in society could reduce the social stigma of individuals suffering from lymphoedema [12]; this is very impor-

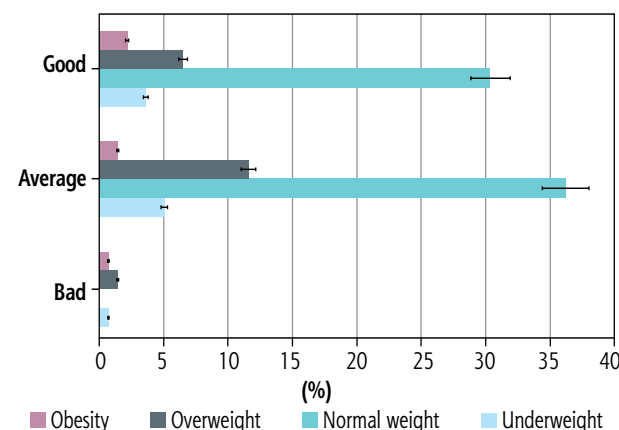


Fig. 6. Correlation between body mass index and objective evaluation of knowledge

tant because lymphatic oedema, as a chronic disease, can affect patients' psyche and lead to a sense of helplessness. Moreover, oedematous extremities have aesthetics repercussions and lower the quality of life [13].

The authors of the systemic review from 2021 concerning healthcare practitioners' knowledge of lymphoedema found 4533 articles with the keywords "lymphoedema" and "knowledge" [8]. After excluding duplicates, and studies focused on parasitological concepts and only on healthcare professionals, there were 16 studies remaining. In 7 studies, the assessment of knowledge was only self-reported or interviewed. Only 2 studies were similar to this study when knowledge was evaluated subjectively and objectively. This study is innovative because, besides the fact that the participants' knowledge was measured twice, the medical students were the subjects, as future healthcare practitioners and as individuals with possible risk of lymphoedema development. This study assessed the knowledge and attitude towards lymphoedema among all years of medical students from the Medical University of Silesia in Katowice. Unfortunately, a significant proportion of the students who took part in our study admitted that they had never encountered the term "lymphoedema" during university classes. The fact that only a little over one-fifth of the total number of respondents were aware of the existence of lymphoedema is alarming. The higher the college level, the higher the percentage of respondents who were aware of the existence of lymphoedema. Despite this awareness, the students did not feel confident in their knowledge about risk factors and methods of diagnosing lymphatic oedema. The vast majority of respondents assessed their own knowledge level as average or poor. Our research highlighted the existing relationship between the year of study and the subjective perception of a higher level of knowledge. This phenomenon means that students who gain knowledge during their studies feel more confident and educated. The higher the year of study, the better the specialized knowledge and the belief that their understanding of lymphoedema is sufficient. However, the truth is that it is insufficient. The research showed that there is no connection between the actual level of knowledge related to lymphoedema and the year of study.

Research conducted in Paris, France, indicated that teaching about lymphatic system pathologies during medical studies is very poorly developed [14]. Knowledge about lymphoedema is dependent on medical specialisation, with higher awareness among oncologists, radiotherapists, and angiologists. This research measured lymphatic oedema-themed knowledge among general practitioners. The authors concluded that 86% of doctors with over 10 years of practice actively search for lymphoedema-related symptoms, compared to only 62% of doctors with less than 10 years of practice. Researchers suggest that this could be due to poor education about this pathology during medical studies or resonance of

sensitivity among older doctors because lymphoedema occurred more often in women treated in the 1980s [14]. Another study carried out in 2015 in Turkey surveyed 314 doctors from primary health care and demonstrated that most physicians did not receive proper education about lymphoedema and breast cancer-related lymphoedema during their medical training or even during their residency period [15]. Our findings showing that education about lymphoedema is insufficient and does not significantly improve during medical studies are consistent with the literature [16], in which a devastating 96% of respondents – oncology nurses from Amman, Jordan – claimed that they did not receive any continuous education about lymphoedema. The researchers reported also that there was no significant relationship between the level of knowledge and years of experience, which leads to the important conclusion that lymphoedema is an underrated and often ignored condition during medical education. The lack of attention given to lymphoedema in medical school and during internships is a concerning phenomenon that can result in delayed diagnosis and harm to patients. A survey conducted in St. John's, Canada, revealed that only one-third of healthcare providers routinely educate patients about lymphoedema and how to reduce the risk of its development [17]. Doctors are described as having a poor understanding of lymphoedema as a pathology. Diagnosing lower limb lymphoedema can be even more challenging than diagnosing upper extremity lymphatic oedema because it can affect both legs without leaving a reference extremity. That is one of the reasons why often less distinct forms of lymphoedema remain undiagnosed [18]. It is essential to provide proper education about lymphoedema to students during their studies and internships. University lecturers should make efforts to establish educational programs during surgical classes and initiate a multidisciplinary approach for lymphoedema research. This initiative may lead to earlier diagnosis and better care for patients, and facilitate cooperation between doctors of various specializations.

Another aspect taken into consideration in the study was the relationship between sex and knowledge about lymphoedema. Both subjective and objective analyses resulted in the same conclusion: most students of both sexes have an average knowledge level about lymphoedema. Statistical scrutiny shows that the evaluation of knowledge (subjective or objective) and gender are independent of each other. The perpending should be divided into 2 parts: students as future doctors and students as subjects potentially suffering from lymphoedema. It is well known that women are more susceptible to lymphatic oedema [10]. Being a member of a risk group should correspond with better knowledge. Having awareness of risk factors would help women lower the verisimilitude of developing full-blown lymphoedema and prompt them to avoid risky behaviours that can worsen their condition. Emerging symptoms noticed by informed individuals

would possibly urge them to seek immediate medical care [2, 19]. Psychological consequences, including worsened body image and lowered quality of life with lymphoedema symptoms, could be lessened in a more educated society [20]. Spreading knowledge would possibly discontinue stigmatization of individuals with oedematous extremities and ease the wearing of compression sleeves in public [2].

The relationship between sex and knowledge about lymphoedema among students in our study was found to be independent. At the other end of the spectrum, the literature reports that among primary care physicians, being female was related to higher knowledge scores in tests about lymphoedema, especially lymphoedema related to breast cancer in oncology patients. This phenomenon was explained by the fact that female breast cancer patients lean towards choosing same-sex clinicians as their attending physicians [15]. The absence of this dependence could be explained by the fact that the same schooling is provided by the university regardless of the student's sex. The difference could occur after completing medical studies – during internship and everyday medical practice where the diversity of patients could vary depending on the localisation of the clinic, work in the public, or the preferences of individual patients.

The final aspect of our study was the relationship between BMI and knowledge about lymphoedema. Obesity is a well-known health concern worldwide. It has been identified as a significant risk factor and cause of non-cancer related lymphoedema [21]. Moreover, recent studies suggest that the interaction between obesity and lymphoedema is reciprocal. Laboratory and clinical studies have shown that the pathological changes in the lymphatic system resulting from obesity are at least partially reversible with weight loss [22]. Obesity prevention and leading a healthy lifestyle are considered ways to reduce the risk factors for lymphoedema. In our survey, respondents represented all BMI categories, and the students mostly received an average score in both subjective and objective evaluations of their knowledge about lymphoedema. We conclude that BMI and knowledge about lymphoedema are independent. Individuals suffering from obesity did not demonstrate a higher level of awareness about lymphoedema despite the fact that they belong to the high-risk group of lymphatic oedema development. Obesity is a well-known predictor of lymphoedema development. It has been proven that a higher BMI predicted abnormal lymphatic dysfunction on lymphoscintigraphy [23]. Excessive body weight negatively impacts lymphatic density in subcutaneous tissue, proliferation of cells, and leads to leakiness of lymphatic vessels. Lymph is unable to be reabsorbed, which can provoke increased subcutaneous adipose deposition [4].

Obesity, as a disease, drives patients into a vicious circle of weight gain and lymphatic system damage. Affected individuals should lose weight to prevent further development of this condition. Students were not aware of the danger of lymphoedema development despite the fact that antecedent

signs occurred. A study conducted in Iowa City, USA, in which higher BMI and greater number of removed lymph nodes were identified as risk factors, reported that patients with more performing risk factors did not present better knowledge about lymphoedema. There was no significant association found between lymphoedema knowledge and concern about potential illness [7].

CONCLUSIONS

Lymphoedema-themed knowledge among medical students of all college years from the Medical University in Silesia, Katowice, is incommensurate. Subjective assessment of knowledge cannot be confirmed in the objective evaluation. Longer duration of study at the Medical University of Silesia increased the level of knowledge about lymphoedema, but it remains insufficient. Lymphoedema can also affect young people, and lymphatic oedema is present in the student community, so education about lymphoedema is crucial. The subjects at high risk of lymphoedema development – females and high-BMI individuals – do not present a significant level of knowledge about lymphoedema, which potentially influences their chances of early lymphoedema diagnosis and treatment.

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