ORIGINAL PAPER

CHANGES IN ALCOHOL CONSUMPTION AMONG MEDICAL STUDENTS DURING THE COVID-19 PANDEMIC – RESULTS FROM POLLEK STUDY

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Abstract
Objectives: Social distancing and remote learning as one of the ways to fight against COVID-19 pandemic have affected universities and changed the lifestyle of many students. Psychoactive substances use was one of the way to deal with the anxiety caused by these new settings. Studies published so far have not provided a clear answer on whether COVID-19 leads to changes in the structure of alcohol consumption among medical students. The presented study attempted to answer this question based on the data available from the POLLEK study. **Material and Methods:** The study group included 3 separate groups of medical students (recruited in the following academic years: 2019/2020, 2020/2021, and 2021/2022) with a total number of 899 students. To assess the characteristics of alcohol consumption the authors used a Polish version of the *Alcohol Use Disorder Identification Test* (AUDIT). **Results:** Students surveyed during the lockdown lived in the family home much more often, reported good health, and declared consumption of a smaller number of alcoholic beverages. Their AUDIT scores were statistically significantly (p = 0.04) lower compared to the group surveyed before the pandemic (5 vs. 6, respectively). There were no significant differences in the AUDIT results between other study periods. **Conclusions:** Lockdown due to COVID-19 pandemic might be associated with a decrease in alcohol intake among medical students. This may be due to a different place of residence of students, a family home rather than a dormitory. However, the debate on this topic seems to be still open. Int J Occup Med Environ Health. 2023;36(3):406–16

Key words:
medical students, alcohol consumption, questionnaire study, COVID-19, pandemic, AUDIT

INTRODUCTION

Since 2020, the COVID-19 pandemic has led to many, often very radical, behavioral, health, and economic changes. One of the reasons for these changes was the widespread limitation of contacts and mobility. The introduction of social distancing as one of the most effective preventive measures against COVID-19 has changed the lifestyle of many people [1,2]. The transition to remote learning has affected many universities in the world [3]. The students were affected by worsening the quality of education since the beginning of the pandemic [4]. The stress caused by an unknown and unpredictable health threat has left its mark on the psyche of many people. Moreover, students were reported to be more vulnerable to such circumstances. Those with a prior history of depression and anxiety may be at greater risk of worsening their well-being

during the COVID-19 pandemic [4]. One way to adapt to these new circumstances may be the use of psychoactive substances, including alcohol, which sometimes is even socially acceptable [5]. What is important in the context of the current study, more frequent exposition of medical students to higher levels of distress may cause more prevalent use of psychoactive substances and psychiatric co-morbidities. The results included in authors' previous paper confirmed the existence of the alcohol problem among medical students [6]. In the cited study, 30.9% of medical students were hazardous drinkers (especially male participants and current cigarette smokers).

Apart from the negative aspects of excessive alcohol consumption described so far, data from American college students additionally showed a 2.44 times higher risk of SARS-CoV-2 infection among those who abused alcohol [7]. Moreover, the structure of alcohol consumption during quarantine may translate into academic performance [8]. Unfortunately, studies published so far that analyzed changes in alcohol consumption in the context of the COVID-19 pandemic have not provided a clear answer to the primary research question: has the pandemic translated into changes in the alcohol consumption of medical students? Therefore, the presented study attempted to answer this question based on the data available from POLLEK (POLski LEKarz) study. Although the presented study is not a typical professional cohort, in the authors' opinion, only prospective observation (at an early stage of studies) will allow for a more complete assessment of possible problems in future work (which would not be possible with an ordinary professional cohort of doctors).

MATERIAL AND METHODS
Study design, recruitment, and sampling
The authors present a new analysis of the material collected in the course of the POLLEK study, the principles of which have already been presented in the authors' previous publications [9]. Briefly, starting from the 2019/2020 academic year, all first-year students of the medical faculty of the Medical University of Silesia (MUoS) in Katowice, Poland were invited to the POLLEK study.

The first group of medical students (2019/2020) was recruited during traditional face-to-face classes using self-filled questionnaires which are described later in the text. A large part of the participants was also additionally examined using the electronic version of the questionnaire and the analysis of data from this group was used to validate the tool. Recruitment for the next year (2020/2021) was disturbed by the outbreak of the pandemic. Therefore, in these exceptional circumstances and following the introduction of remote classes, a decision was made to change the recruitment method to the only possible electronic form (as the equivalence of both survey forms has been demonstrated). The last of the analyzed groups (2021/2022) again was surveyed during traditional face-to-face classes, using a self-filled paper questionnaire. Due to the pandemic, we were unable to re-examine the same group of students. Therefore, the only way to assess the impact of the COVID-19 pandemic on alcohol consumption among medical students was to indirectly compare independent study groups over different periods.

The student's consent is required to participate in the study (depending on the mode of conducting the study, whether it was expressed online or offline). From the moment of inclusion, students are subject to prospective observation – in the form of regular control questionnaires and basic anthropometric (weight and height), and blood pressure measurements. In addition to the initial questionnaire (first year), the research project assumes a follow-up on the second and 5th years of studies and then during the postgraduate internship.

Taking into account the differences in the frequency of alcohol consumption between departments in Katowice and Zabrze, which were recorded in the first period of the study, and the lack of respondents from Zabrze in subsequent periods of the study, only students from Kato-

wice were included in further analyses. This decision was made to ensure the maximum homogeneity of the groups and the elimination of uncontrolled disturbing factors that could have been responsible for the different habits of students.

Given the above, current analysis included 3 groups of medical students (1 pre-pandemic and 2 pandemics):

– pre-pandemic group of 355 first-year students recruited in the 2019–2020 academic year (surveyed both in an offline and online way; a response rate of 94.7%);

– lockdown group of 111 students in the 2020–2021 academic year (online only as all classes were switched to remote mode; a response rate of 25.3%);

– post-lockdown group of 433 students surveyed in 2021–2022 (surveyed offline, post-lockdown group; a response rate of 98.6%).

Measurement tools

To measure the characteristics of alcohol consumption the authors used a full 10-items Polish version of the *Alcohol Use Disorder Identification Test* (AUDIT) questionnaire originally developed by the World Health Organization (WHO) [10,11]. This well-known screening tool consists of 3 parts/domains. Each item is scored 0–4 pts and the overall max score is 40 pts. However, items 1–8 are scored on a 5-point 0–4 pts scale while the 9 and 10 are scored on a 3-point scale with possible 0, 2, and 4 pts.

The first domain (items 1–3 with a max subscore of 12 pts) evaluates the frequency and amount of drinking alcohol – risky alcohol consumption (RAC). The second domain (items 4–6, max subscore possible of 12 pts) covers symptoms of alcohol dependence (SAD), while the third part (items 7–10, max subscore of 16 pts, domain 3) is devoted to identifying alcohol-related harm (ARH) – physical and mental problems related to drinking. It has been classically assumed that participants with overall AUDIT scores of 1–7 pts are at low risk of alcohol addiction, 8–15 pts at medium risk, 16–19 pts denotes high risk while alcohol addiction is very likely for those with ≥20 pts.

As a part of the assessment of the subjects, in addition to the questionnaire, measurements of systolic (SBP) and diastolic (DBP) blood pressure after a min. 5-minute rest in the sitting position, body weight, and height (using validated equipment) were also performed. Taking into account the age of the study participants, SBP <140 mm Hg and DBP <90 mm Hg were considered normal blood pressure. Based on the measurements of weight and height, the body mass index (BMI) was calculated according to the generally used formula. We categorized the BMI values in the following way:

– underweight: BMI <18.5,

– normal weight: ≥18.5 and <25,

– overweight: ≥25 and <30,

– obesity: ≥30.

Measurements of anthropometric parameters and blood pressure in the study group were performed by the participants themselves. It was recognized that the assessment of the potential impact of the pandemic on these parameters may also be important. The internal consistency of AUDIT questionnaire in the study groups was acceptable. For the first group, Cronbach's α was 0.75 with bootstrapped 95% confidence interval (95% BCI) 0.72–0.79. The second and third groups also had acceptable internal consistency with α values of 0.77 (95% BCI: 0.68–0.82) and 0.80 (95% BCI: 0.76–83), respectively.

Ethics

The protocol of the POLLEK study was approved by the Bioethics Committee of the Medical University of Silesia in Katowice (approval number KNW/0022/KB/217/19; date: November 8, 2019).

Statistical analysis

Categorical variables were described with numbers and percentages, while the median (Me) and interquartile

ranges (IQR) were given for continuous variables. Due to the non-normal distribution of quantitative variables in the Shapiro-Wilk test, the differences were checked with nonparametric tests (χ^2/Fisher exact and Mann-Whitney U tests). The internal consistency of AUDIT questionnaire was measured with Cronbach's α for each group separately, with the same methodology and way of interpretation as described previously [12]. The authors described sociodemographic characteristics and the prevalence of hazardous drinking as Me and IQR of AUDIT. All statistical analyses were conducted using R 4.1.0 software. The level of significance was defined at a p-value criterion <0.05.

RESULTS

The study group included 3 separate groups of medical students (recruited in the following academic years: 2019–2020, 2020–2021, and 2021–2022) with a total number of 899 students. Generally, no significant intergroup differences were found in the distribution of the analyzed variables with some exceptions described below.

As presented in Table 1, students surveyed during the lockdown lived in their family homes significantly (p = 0.004) more often and assessed their health better (p = 0.02). The same regularity was found when comparing the period 2020–2021 with 2021–2022 (understandable return to dormitories in the post-lockdown period). Subjects surveyed during the lockdown period declared drinking a smaller number of alcoholic beverages compared to pre-pandemic (p = 0.02) and post-lockdown (p = 0.03) groups and more often had higher values of arterial blood pressure (compared to post-lockdown period, p = 0.005). Moreover, there were no significant differences in the consumption of alcohol, place of residence, and self-declared health status between the respondents before the COVID-19 pandemic and after the lockdown.

The median AUDIT score of students tested during the lockdown period was statistically significantly lower (p = 0.048)

compared to the group surveyed before the pandemic (5 vs. 6, respectively). There were no significant differences in the AUDIT results between other periods (Table 1). Taking into account the size of the groups, some differences found by borderline (close to 0.05) p values should be approached with caution.

During the post-lockdown period (2021–2022) there were significantly fewer (p = 0.04) students with normal BMI values. Hypertension (HA) was significantly more prevalent (p = 0.005) among the lockdown group compared to post-lockdown, with no statistically significant differences in the frequency of HA in comparison to other periods. At the same time, the group surveyed during the lockdown significantly more often reported good health, compared to the other groups (p = 0.02 group 2 vs. 1; p = 0.005 group 2 vs 3). There were no differences in the prevalence of chronic diseases (p = 0.99).

In the first and second periods of the study, the odds ratio of hypertension diagnosis were 2.40 and 4.71-fold higher, respectively, among hazardous alcohol drinkers, without statistically significant differences in the third (post-lockdown) period (Table 2).

DISCUSSION

The authors' analysis of the available literature revealed that single pattern of change in drinking habits induced by the COVID-19 pandemic is nonexistent. Although results of presented study indicate a reduction in alcohol consumption by medical students during the lockdown, reports from other countries include both concurring and opposing opinions. At the beginning of the COVID-19 pandemic, a large international online study was conducted in 8 European countries which involved 31 921 participants. They were recruited using mainly social media, mailing lists, and press releases. The study identified the importance of the initial level of alcohol consumption as a factor influencing the change of habits in this regard. The most noticeable increase in consumption was reported

Table 1. The comparison of the 3 study cohorts of first year medical students from Medical University of Silesia in Katowice, Poland, recruited in 3 different academic years (2019–2020, 2020–2021 and 2021–2022) in terms of selected quantitative and qualitative variables

Variable	Participants (N = 899)			p*		
	T1 (N = 355)	T2 (N = 111)	T3 (N = 433)	T1:T2	T2:T3	T1:T3
Age (Me (IQR))	19 (19–20)	19 (19–20)	20 (19–20)	0.86	0.35	0.28
AUDIT score (Me (IQR))	6 (3–9)	5 (2–8)	5 (3–8)	0.048	0.16	0.32
domain						
1 (risky alcohol consumption)	4 (2–5)	3 (2–5)	4 (2–6)	0.13	0.11	0.89
2 (symptoms of alcohol dependence)	0 (0–1)	0 (0–1)	0 (0–1)	0.02	0.39	0.03
3 (alcohol-related harm)	1 (0–2)	0 (0–2)	1 (0–2)	0.27	0.81	0.18
Gender [n (%)]						
female	214 (60.3)	70 (63.1)	292 (67.4)	0.68	0.45	0.044
male	141 (39.7)	41 (36.9)	141 (32.6)			
Place of residence during studies [n (%)]						
family home	84 (23.7)	37 (33.3)	126 (29.1)	0.004	0.01	0.2
dormitory	45 (12.7)	3 (2.7)	53 (12.2)			
flat/room rented or own	226 (63.7)	71 (64.0)	254 (58.7)			
Smoking (any type of cigarette) [n (%)]						
yes	285 (80.3)	85 (76.6)	332 (76.7)	0.354	0.99	0.16
no	66 (18.6)	26 (23.4)	100 (23.1)			
missing data	4 (1.1)	–	1 (0.2)			
Dietary habits [n (%)]						
good	67 (18.9)	17 (15.3)	68 (15.7)	0.46	0.99	0.27
bad	285 (80.3)	94 (84.7)	363 (83.8)			
missing data	3 (0.8)	–	2 (0.5)			
Hypertension [n (%)]						
no	327 (92.1)	97 (87.4)	405 (93.5)	0.13	0.005	0.16
yes	26 (7.3)	14 (12.6)	20 (4.6)			
missing data	2 (0.6)	–	8 (1.8)			
Body mass index [n (%)]						
<18.5	33 (9.3)	6 (5.4)	55 (12.7)	0.09	0.047	0.29
18.5–24.9	262 (73.8)	93 (83.8)	313 (72.3)			
25–29.9	45 (12.7)	12 (10.8)	48 (11.1)			
≥30	12 (3.4)	0 (0)	9 (2.1)			
missing data	3 (0.8)	–	8 (1.8)			
Diagnosis of chronic disease(s) [n (%)]						
yes	84 (23.7)	26 (23.4)	103 (23.8)	0.99	0.99	0.99
no	267 (75.2)	85 (76.6)	328 (75.8)			
missing data	4 (1.1)	–	2 (0.5)			

Table 1. The comparison of the 3 study cohorts of first year medical students from Medical University of Silesia in Katowice, Poland, recruited in 3 different academic years (2019–2020, 2020–2021 and 2021–2022) in terms of selected quantitative and qualitative variables – cont.

Variable	Participants (N = 899)			p*		
	T1 (N = 355)	T2 (N = 111)	T3 (N = 433)	T1:T2	T2:T3	T1:T3
Self-assessment of current health status [n (%)]						
very poor	4 (1.1)	0 (0.0)	4 (0.9)	0.02	0.005	0.9
poor	29 (8.2)	5 (4.5)	35 (8.1)			
average	110 (31.0)	21 (18.9)	140 (32.3)			
good	168 (47.3)	72 (64.9)	196 (45.3)			
very good	44 (12.4)	13 (11.7)	57 (13.2)			
missing data	–	–	1 (0.2)			
Alcohol drinks on a typical day when subject is drinking [n (%)]						
1–2	129 (36.3)	59 (53.2)	158 (36.5)	0.02	0.03	0.9
3–4	96 (27.0)	18 (16.2)	112 (25.9)			
5–6	53 (14.9)	14 (12.6)	63 (14.5)			
7–9	36 (10.1)	15 (13.5)	44 (10.2)			
≥10	26 (7.3)	5 (4.5)	31 (7.2)			
missing data	15 (4.2)	–	25 (5.8)			

IQR – interquartile range.
T1 – pre-pandemic period (2019–2020); T2 – lockdown period (2020–2021); T3 – post-lockdown period (2021–2022).
p – χ^2 test for qualitative variables, Mann-Whitney U test for quantitative variables.

for participants initially (pre-pandemic levels) classified as drinkers >90th percentile compared to people drinking less, with little absolute changes in drinking habits [13].

In a small cross-sectional online survey involving 76 Finnish medical students, the overall reduction in alcohol consumption was 12 g/week and it concerned mainly women as well as those with higher initial intake. The majority of university students in Germany (62.2%) declared no change in the number of drinks, while 19.4% drank less and only 18.4% reported drinking more. In this group, a reduction in binge drinking was observed in 24.4% of participants, 70.2% declared no change, and only 5.4% got drunk more often [14]. Lower alcohol consumption was also noted among medical students in Serbia [15], Brazil [16], and in another German study involving students from many faculties [3] which was conducted online in the period of

July–August 2020. However, a second survey conducted later at the same University initially showed an increase in alcohol and drug consumption as well as depressive symptoms. Interestingly, when participants who had taken part in the first survey had been excluded, there were no differences between both surveys in alcohol consumption measured with AUDIT-C [17]. On the contrary, in the Canadian study conducted in June 2020, an increase in alcohol consumption by 20% was found [4]. Another study, involving medical students and newly graduated doctors in Brazil, compared alcohol intake at the beginning of the pandemic (first half of April 2020) and 6 months later. There was a statistically significant increase in drinking among participants (from 54.3% to 72.4%, p = 0.0004) as well as newly graduated doctors (from 50% to 85%, p = 0.04). The use of illicit drugs has doubled (an increase from 5.4%

Table 2. Hypertension among hazardous drinkers compared to non-hazardous drinkers in 3 study periods of first year medical students from Medical University of Silesia in Katowice, Poland, recruited in 3 different academic years (2019–2020, 2020–2021 and 2021–2022)

Variable	Hypertension [n (%)]			OR	95% CI
	yes	no	missing data		
2019–2020					
hazardous drinker	13 (11.3)	102 (88.7)	0 (0)	2.40	1.03–5.69
no hazardous drinker	11 (5.0)	208 (94.1)	2 (0.9)	1.00	ref.
2020–2021					
hazardous drinker	8 (27.6)	21 (72.4)	0 (0)	4.71	1.45–16.16
no hazardous drinker	6 (7.3)	76 (92.7)	0 (0)	1.00	ref.
2021–2022					
hazardous drinker	7 (5.5)	120 (93.8)	1 (0.8)	1.38	0.49–3.63
no hazardous drinker	11 (4.0)	258 (93.5)	7 (2.5)	1.00	ref.

Subjects with missing any AUDIT data were removed from the analysis.

to 11.2%, p = 0.04) [5]. It is also worth mentioning that more than a half (52%) of Polish physicians quarantined or isolated for COVID-19 who had been surveyed in the study called ALCOVID survey declared the increase in alcohol consumption [18].

From November to December 2020 (the second wave of the pandemic), an online study evaluating mental health was conducted in Poland [19]. About 46% of the respondents declared that their alcohol consumption had not changed compared to the state before the pandemic, 18% declared lower consumption, while higher consumption concerned only less than 10%. The significant limitations of the quoted study are biased selection (snowball recruitment which does not allow the results to be generalized) and recall bias. These results are mainly in line with the "Pandemic against LifeStyle" (PaLS) project, in which about half of the respondents (47.2%) were medical students [20]. In this study, 43% of students declared no change in alcohol consumption, while nearly every fourth student reported an increase (23.4%) or decrease (28.5%), respectively. Moreover, medical university students were

reported not to have a higher tendency to drink alcohol. Similar conclusions are provided by a study on another group of 980 Polish students, 31% of whom attended medical school. In the entire study group, almost half of the subjects (43%) declared a reduction in alcohol consumption after the outbreak of the pandemic, while only 18% reported drinking more [21].

Nevertheless, the results of studies carried out in the later stages of the pandemic seem different. According to the online survey conducted January–February 2021, 28.6% of medical students in Poland declared an increase in the consumption of alcohol, cigarettes, or other stimulants. Unfortunately, the authors did not publish any data on the percentage of students among whom these habits decreased or did not change. Kosendiak et al. conducted a 3-staged study in a group of 2920 students at Wroclaw Medical University in Poland. The first part started in March 2020 (the beginning of the pandemic), the second 6 months later, and the third 1 year later (March 2021). This is another study that demonstrated the negative impact of the COVID-19 pandemic, translating into an

increase in smoking and alcohol consumption, while simultaneously reducing physical activity [22].

Social distancing appears to be a major explanation for lower alcohol consumption among students following the outbreak of the COVID-19 pandemic [1,2]. The results of presented study provide another argument for the validity of this thesis. It can be assumed that in the case of young people, the model of party drinking is domineering, therefore the frequency of alcohol consumption turned out to be lower. This is also explained by a different structure of residence – for understandable reasons, students lived in dormitories significantly less often during the pandemic. Another explanation, but rather for other countries, is that restrictions on the sale of alcohol can lead to lower consumption and better adherence to social distancing during the lockdown period [2]. Prohibition, limiting social contacts and change of residence may have played an important role in reducing alcohol consumption during the pandemic. It is obvious that limiting social contacts cannot be considered a protective factor in terms of alcohol consumption.

On the other hand, the literature discusses the issue of social consent to the use of alcohol to reduce stress by more affluent and better-educated people [5]. According to Salerno et al. [23], the problem of increased alcohol consumption since the onset of the COVID-19 pandemic affected also sexual and gender-minority university students. Authors reported that in this period about 32% of them had increased alcohol intake, which was also linked with higher distress.

Presented study has had some obvious limitations. First is the use of AUDIT tool. Subjects may not have provided accurate data on their drinking due to the social desirability bias (associated with the social stigma of heavy alcohol intake) and the recall bias. Unfortunately, due to the outbreak of the COVID-19 pandemic, the authors were not able to gather control data from the first group. Two factors played a significant role in reducing alcoholic beverages consumption during the pandemic. Therefore,

the authors decided to make an indirect comparison of the individual groups included in the study in the subsequent years. Additionally, the transition to remote learning mode forced the survey with the participation of the second group to be conducted only in a remote form. As a result, these circumstances had a major impact on the low percentage of participation in this group. Different circumstances of conducting the study with the participation of the second group result in limitations in comparing it with groups 1 and 3.

However, as the assessment of group 2 is crucial for understanding the impact of the lockdown (even not the pandemic itself) on alcohol consumption habits, these results have been left in the main part of the paper (however possible limitations should be taken into account). During the lockdown, with no face-to-face classes, it was not possible to measure blood pressure in any other way than using the values declared by students, derived from self-examination at home. Medical students during their first-year classes are taught the technique of measuring blood pressure. The different methods of measurement (during classes in groups 1 and 3 and self-examination in group 2) are amongst week points of the study, but considering the exceptional circumstances of the pandemic, let consider it a justified deviation and the only possible one under these conditions. In addition, previous analyses indicated the equivalence of the use of paper and electronic questionnaires in the target population of POLLEK study.

Given the source population of medical students, the results obtained cannot (yet) be generalized to the professional population of physicians. On the other hand, high participation rates in the first and third groups are an undoubted strength of the study. Another strong point of this study is the simultaneous presentation of the hypertension frequency and alcohol intake among medical students during the COVID-19 pandemic. According to the authors' knowledge, those data have

not been available in Poland yet. Obtained results suggest that the frequency of hypertension was the highest among the lockdown group (12.6%) compared to the pre-pandemic (7.3%) and post-lockdown period (4.6%). This translates into a higher odds ratio of probability of hypertension among hazardous alcohol drinkers in the first and second study periods, without statistically significant differences in the third (post-lockdown) period. It may indicate the existence of some relationship between alcohol abuse and the risk of hypertension, although further research in this direction would be necessary (involving other important factors like time relationships between variables, which have not been included in the study). One of the previous Polish studies confirmed the lowest resilience to distress among first-year medical students, which had resulted in higher usage of stimulants like alcohol during the COVID-19 pandemic [24]. The authors recommend mental health support of vulnerable students in current and future challenges. Moreover, the newly published position of experts suggests the need for immediate action to address suboptimal hypertension care, including the improvement of disease recognition [25]. Presented results have confirmed that both of those recommendations are also important for the freshmen of medical studies

CONCLUSIONS
Lockdown due to COVID-19 pandemic might be associated with a decrease in alcohol intake among medical students. This may be due to a different place of residence of students, a family home rather than a dormitory. It should be concluded that the debate on this topic seems to be still open. There is still no clear answer regarding the impact of the pandemic on alcohol consumption among medical students. There is a need for long-term, representative studies in various groups (including the population of medical professionals) analyzing trends in alcohol consumption with, inter alia, to psychological and economic aspects.

Author contributions
Research concept: Maksymilian Gajda, Szymon Szemik, Małgorzata Kowalska
Research methodology: Maksymilian Gajda, Szymon Szemik, Małgorzata Kowalska
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Statistical analysis: Maksymilian Gajda
Interpretation of results: Maksymilian Gajda, Szymon Szemik, Małgorzata Kowalska
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