

European university students of pharmacy: survey on the use of pharmaceutical drugs

Stefania Scuri¹, Fabio Petrelli¹, Elisabetta Tanzi², Thi Thu Cúc Nguyễn³, Iolanda Grappasonni¹

¹ School of Medicinal and Health Products Sciences, University of Camerino (Italy); ² Department of Biomedical Sciences for Health, University of Milano (Italy); ³ Department of Pharmaceutical Administration and Economics, University of Hanoi (Vietnam)

Summary. *Background and aim:* In recent years, self-medication is an increasing public health issue, also among the European young people. Only 48% of people throughout the world use prescribed medications, while the remainder admits that they self-medicate with over the counter drugs or leftover prescribed drugs. Also, the risk of antibiotic resistance, throughout the world, has doubled, due to the recourse to these drugs when they are not called for, or to failure to follow their instructions for use. *Methods:* A five-part questionnaire, translated into the national languages and validated, was given to Pharmacy students in Italy, Spain, the Czech Republic and Romania obtain anonymous information about their pharmaceutical drugs use. *Results:* Regarding the use of pharmaceutical drugs, students in Spain and Romania indicated the highest percentages of use. In Italy and Romania, the pharmacist is rarely consulted, while the advice of family members or friends is more frequently requested. In all four countries the problem of taking antibiotics without a medical prescription is significant, and 50% of Romanian students use antibiotics to treat the flu. Another important result is that, in Spain, 38.4% of the respondents admitted to using medicines with alcohol. *Conclusions:* Considering that the drug information leaflet is not read by 50% of young people interviewed, it would be important for public health entities to instruct the population, especially younger age groups such as secondary school students, about the importance of reading this information carefully. The use of mass media in such a preventive medicine campaign could be effective. (www.actabiomedica.it)

Key words: students of pharmacy, pharmaceutical drugs, self-medication

Introduction

The World Health Organization states that “over half of all medicines are incorrectly prescribed, distributed or sold, and half of all patients fail to take medicines correctly.” The problem is that over 50% of nations fail to implement policies to promote the rational use of medicines (1). In the European Union, on average, only 48% of people use prescribed medications in a two week period (2-5).

Self-medication is defined as the purchase of medicines without a prescription to treat self-diagnosed illnesses or symptoms, the extension of phar-

maceutical drugs use beyond the period indicated by the physician, the re-use of old prescriptions to purchase medicines, or the sharing of medicines among relatives and friends. Political, economic and cultural factors have contributed to the steady increase in self-medication over the years, such that it is becoming one of the main problems of public health (6).

Self-medication mainly serves to deal with health problems that are not particularly serious or important, such as light discomfort or pain, colds or headaches, while it is not associated with the treatment of more severe illnesses such as hypertension. Thus self-medication is commonly indicated as treatment of transi-

tory illnesses or health problems that are not serious or significant (7). The most common and dangerous example of this behavior is the inappropriate use of antibiotics to cure infective diseases that are not serious, because this contributes to the spread of antibiotic resistant pathogens (8-10). Many studies regarding drugs use by young people point to a significant increase in the use of physician prescribed drugs but also in the use and abuse of drugs that have not been prescribed (11).

In the last ten years, the self-medication with antibiotics in young people has doubled, due to the recourse to antibiotics when they are not called for, or failure to follow the instructions for their use (1, 2). In fact, even among university students preparing for healthcare professions, there are high levels of self-medication with antibiotics to treat illnesses that would resolve spontaneously, and also of storing up supplies of antibiotics (12).

Another worrisome trend among people of this age group is the rise in the use of antidepressants (13). In the last five years in the United States (U.S.), antidepressant use has increased 100% in the entire population, while in recent years Holland has seen a 150% increase of the use of antidepressants by adults and young people. Many take them simply because they feel a bit down or because they are experiencing disappointments at school, with friends or with love interests.

There have been rare cases of increases in suicidal thoughts among adolescents who take antidepressants. Antidepressants have many other negative side effects, such as weight gain, altered blood lipid levels, and risk of diabetes (14, 15). Self-medication with antidepressants is thus a serious cause of concern. Another category of drugs misused by young people is amphetamines. American studies have shown that at universities, undergraduate use of amphetamines without a prescription every month ranges between 2% and 8%, while over the course of a year it can reach 16%. Even more worrisome is the habit of taking stimulants together with alcohol or other drugs (16, 17).

While the development of new drugs has permitted the treatment of many diseases, this does not mean that drugs should be considered a cure-all for every problem and consequently used inappropriately. In

fact, the incorrect use of drugs and the medication errors (MEs) are cause of adverse drug reactions (ADR), the frequency of which is on the rise (18).

Therefore, in the light of these considerations, and given that many studies on the spread of self-medication have focused on university student populations, but without specifying their program of studies, or focusing on medical school students, we felt it would be particularly interesting and novel to explore.

Materials and Methods

A questionnaire was formulated to obtain anonymous information from Pharmacy students in Italy, Spain, Czech Republic and Romania about their use of medicines, their knowledge about them and their attitudes to them. The four nations were chosen on the basis of different social and cultural criteria. Romania and the Czech Republic were selected because they had only recently joined the European Union and have traditions and cultural backgrounds related to a national Communist system. Italy and Spain, founding nations of the European Union, have for some time now experienced an economic boom that has promoted a more consumerist lifestyle. The questionnaire was translated into the national languages and initially administered to a selected sample of university students in the four nations, in order to validate its design. Later, trained operators were sent to the four nations to conduct interviews in which they asked participants the questions in the questionnaire, and then noted the answers on the questionnaire forms. The interviews were conducted from 2015 until 2017 in the context of a broader two-part study, the first part concerned with lifestyles of high school students (19-21), and the second regarding the use and abuse of medicines among university students of Pharmacy. This paper analyzes the second part. Before the questionnaires were filled out, the operators informed the students about the purpose of the study, stressing the importance and usefulness of the data that would be acquired. Each student was asked to fill in and sign an informed consent form in accordance with the latest version of the Declaration of Helsinki. The questionnaire had five sections: questions to characterize the sample of Pharmacy students, questions to

understand how students take certain classes of drugs, questions to identify the people from whom students receive advice about medicine, and questions to learn about use, abuse and correct habits regarding preliminary reading of the information leaflet contained with the drug package. The data collected was input and processed using Access and Microsoft Excel. Statistical analysis was performed with X-Lstat software (22). Descriptive statistics were used to analyze the distribution of variables. Qualitative data were described using frequencies and percentages. The Chi-square analysis and the Odds Ratio (OR) to evaluate the association between pharmaceutical products use, doctor advice and self-administration has been applied. The level of statistical significance was set at $p < 0.01$ with a confidence interval of 99%.

Results

A total of 4275 questionnaire across the universities of four countries were distributed, and 4099 pharmacy students completed all items of the questionnaire with a response rate of 95.8%, and a rate of refuse of 4.1%. The sample was composed principally by females, and the average age is 21.9 ± 2.2 (Table 1).

Czech Republic

As can be seen in Figure 1, in response to the question "Have you used pharmaceutical products in the last 12 months?" 69.6% of Pharmacy students responded affirmatively, indicating mainly analgesics and antipyretics (80%) for headache (76.5%), toothache (5.8%) and other sources of pain (16.2%) (Figure 2).

Antibiotics were taken by 41.3% to treat infective diseases, and 2.1% of respondents indicated that they had taken drugs to alleviate anxiety. None, instead, had taken stimulants. In response to the question "Who gives you advice on pharmaceutical products?", 67.9% indicated physicians or pharmacists, and 32.1% indicated family members, friends, or self-medication. Specifically, regarding antibiotics, in response to the question "Do you use medicines only on advice of a doctor or a pharmacist?", the Czech Republic students gave one of the highest percentages of those who admitted using them without a prescription (32.2%). Regarding the correct use of antibiotics, a good percentage of students in the Czech Republic (81%) knew that antibiotics are used to treat bacterial infections, while the others thought erroneously that they are useful against viral infections and the flu. In response to the question "When do you stop taking antibiotics?" 80.7% gave the correct option, "at the point indicated by the doctor" while the others responded incorrectly (4.6%). In addition, if the same symptoms recur after some time, before taking the drugs used previously, 71.4% consult their doctor, 18.4% ask the pharmacist, and the rest consult a family member or friend, look up the information on internet, or do not seek any information at all.

Regarding the lack of awareness that drugs can cause poisoning if taken in incorrect ways or quantities, when asked: "Do you think that using medicines is: mostly beneficial, doesn't harm health much, mostly harmful and little beneficial, and sometimes beneficial but sometimes harmful", 69.4% declared that the medicines could be harmful and cause poisoning; 6.2% answered no, and 24.4% declared they did not know. Furthermore, to the question "Have you ever taken medicine to-

Table 1. Characteristics of the sample

	Italy		Romania		Czech Republic		Spain	
	n°	%	n°	%	n°	%	n°	%
<i>Gender</i>								
Males	843	49.6	498	28.8	149	38.7	210	45.4
Females	723	42.5	1202	69.6	236	61.3	238	51.4
No answer	134	7.9	27	1.6	/	/	15	3.2
Tot.	1700	100	1727	100	385	100	463	100
<i>Age (mean±SD)</i>	22.0±2.4		22.7±2.5		21.5±2.4		22.7±1.5	

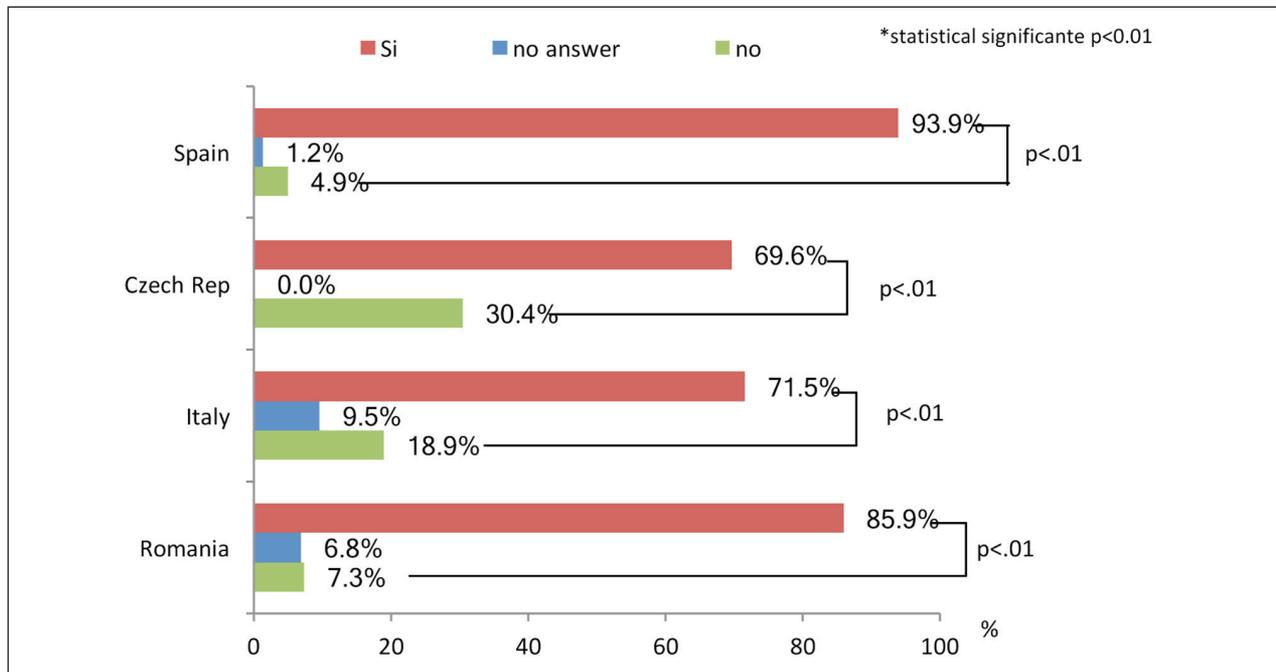


Figure 1. Have you used pharmaceutical products in the last 12 months?

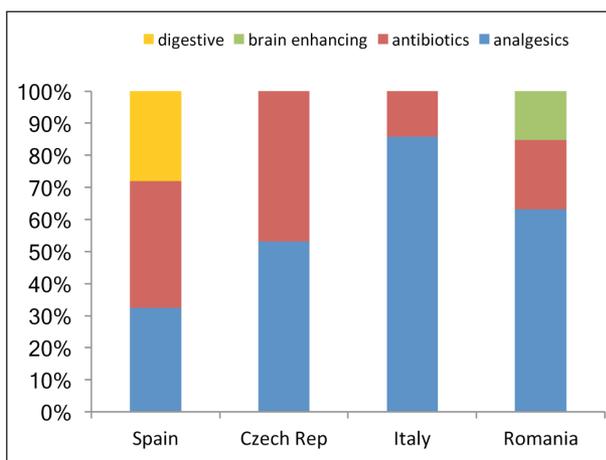


Figure 2. The pharmaceutical products most widely used by students

gether with alcohol?" 38.2% admitted taking medicine and drinking alcohol together (Figure 3). The instructions reported on the leaflet are clear only for 65.9% of students.

Romania

Romania gave the highest percentage (85.9%) of pharmacy student respondents with affirmative an-

swers to the question about the use of pharmaceutical products in the last 12 months (Figure 1). Fully 68.6% of these Romanians answered the question "Who gives you advice on pharmaceutical products?", by indicating their doctor, specialists or pharmacists, and 31.4% reported family member, friends and self-administration, while only 36.4% of these students declared that the instructions in the leaflets are clear. Regarding the kind of medicines used, the greatest frequency was for analgesics (77.4% reported having taken these drugs occasionally), followed by those used for infections (26.5%), memory enhancers (18.6%) and for problems of anxiety (Figure 2). Regarding the consumption of prescribed antibiotics, 71.6% answered yes, whereas 28.3% responded no or not always. Over half of Romanian students, in response to the question "For what purposes are antibiotics taken?" indicated treatment of flu, while the remainder stated treatment of colds, viral and bacterial infections. Regarding the number of days antibiotics should be taken, 52.8% of the Romanian students follow their physician's indications, while 34.3% take them until symptoms disappear, and about 6.4% stop treatment when the fever passes; only 5.4% follow the instructions that come with the package, while 0.9% did not respond. Considering the answers to the ques-

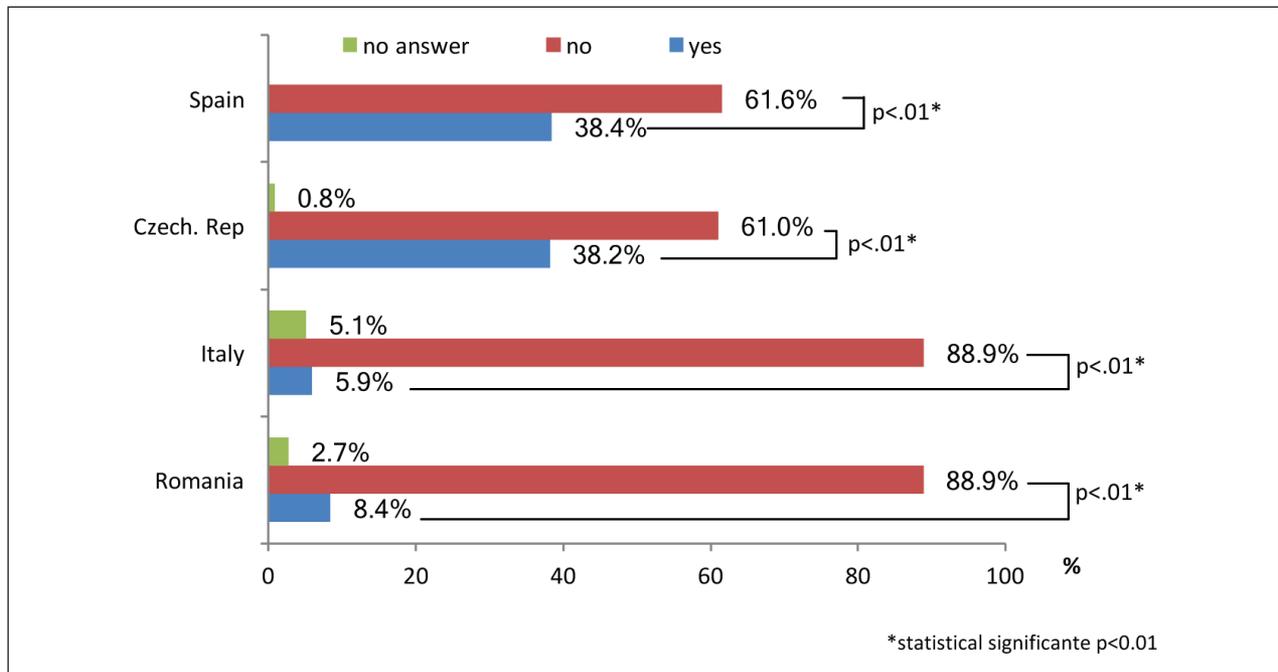


Figure 3. “Have you ever taken medicine together with alcohol?”

tion: “*Have you ever taken medicine together with alcohol?*” (Figure 3), one sees that the students in Romania were quite aware of the dangers of this behavior (88.9% indicated no as their answer). To the choice: “*Do you think that using medicines is: mostly beneficial, doesn't harm health much, mostly harmful and little beneficial, and sometimes beneficial but sometimes harmful*” 65.3% choose yes whereas 30% responded “I do not know”.

Italy

64.5% of Italian pharmacy students declared they had used pharmaceutical products in the last 12 months (Figure 1). In Italy, the use of analgesics is occasional (46.2%) and the main pathologies for which medicines were taken were infections (39.1%), asthma, often associated with allergies, (4.6%), bronchitis (9.7%), headache (61.3%), anxiety (7.7%), associated with sleep disturbances, irritability (5.1%) and memory problems (4.9%) (Figure 2). In Italy, 26.6% admitted using antibiotics for viral infections in general, 10.3% for colds, 40.1% for the flu, while the rest did not respond. Among those who do not avail themselves of the advice of a physician, 29.1% believed that antibiotics cure viral infections, 13.4% deemed them useful

for colds, 40.1% thought they cure flu, and the rest did not respond. Fully 74.3% end the treatment according to the doctor's instructions, 25.7% end the treatment when the symptoms disappear, and 85.1% trust themselves to their doctor's opinion even when the same symptoms recur. In Italy, pharmacists are consulted rarely (8.9%) about instructions for drugs use. In fact, a higher percentage (33.2%) of respondents treat themselves without any advice. 60.35% of Italian students responded that drugs can cause poisoning, while 23.5% did not know this fact. In response to the question “*Have you ever taken medicine together with alcohol?*” the students in Italy were quite aware of the dangers of this behavior, because only 5.9% admitted they had taken medicine and consumed alcohol contemporaneously (Figure 3). Regarding the clarity of the information provided in the instructions leaflet, 67.23% of the students reported that they found the instructions unclear, and only 11.5% said they were able to understand them.

Spain

Among the Spanish students, 54.8% indicated that they had used drugs in the previous 12 months,

with very limited use of sedatives or medications for hypertension, diabetes, or asthma, but greater use, albeit for short periods, of anti-flu medications, antibiotics, antivirals and analgesics. Drugs for problems of anxiety were taken by 30.7%, and memory enhancers were used by 27.4% (Figure 1). In response to the question: “*Who gives you advice on pharmaceutical products?*”, the percentages showed that a specialist physician (42.3%) is consulted as often as the family doctor (47.1%), but a significant percentage of respondents (32.4%) admitted using drugs on the advice of family members. Spain had the greatest percentages of subjects who admitted to taking antibiotics without a prescription: 35.7% of the students admitted to this dangerous habit, while only 30.9% reported that they use antibiotics prescribed by their physician. Regarding the potential of drugs to cause poisoning, 58.1% of the Spanish students said they did not know whether this was true. Similar lack of knowledge emerged in the 34.7% of students who believed that antibiotics are useful for treating gastrointestinal disturbances, and the 32.4% who believed they are effective in combating the flu, while the rest of the students indicated that they are to be used for viral infections and colds. This confirms that the Spanish students, like the Italians, frequently use antibiotics for a simple cold or flu. In this way, antibiotics become ineffective for more important illnesses. Among Spanish students, 57% thought it is useful to stop taking antibiotics at the point indicated by the doctor, 21.2% at the disappearance of symptoms, 11.8% at the point indicated on the packaging, 8.7% when the fever passes, and 1.3% a few days after the first dose. Most students knew how to use antibiotics for the correct number of days, and similarly, 70.6% felt it is indispensable to consult the doctor should the medicine fail to have effect. To the choice: “*Do you think that using medicines is: mostly beneficial, doesn't harm health much, mostly harmful and little beneficial, and sometimes beneficial but sometimes harmful*”, the data for Spain was the most worrisome, as almost 60% of students did not know how to answer the question, and 20% even said no. Looking at figure 2, one sees that in response to the question “*Have you ever taken medicine together with alcohol?*” 4 out of 10 students in Spain admitted taking medicine and drinking alcohol together (Figure 3).

Statistical Analysis

Looking at the results country by country provides some interesting comparisons. Among the Spanish respondents who indicated that they had taken drugs in the last 12 months, there was a significantly higher percentage who self-medicate or take medicines on the advice of friends or family (45.3%) than for those who consult a pharmacist before taking a drug (24%) ($\chi^2=7.92$, $p<0.01$, $OR=3.75$), while there was not a significant difference between those who confer with a family physician or specialist and those who take advice from family or friends, or self-medicate.

In comparison, among the Italian respondents there was not a statistically significant difference between the percentage of those who confer with a family physician and the percentage of those who seek no advice from healthcare professionals. In contrast, the Italians showed a statistically significant higher percentage of young people who get advice from family and friends rather than a specialist ($\chi^2=7.77$, $p<0.01$, $OR=2.63$), and this difference is even higher compared to those who consult a pharmacist ($\chi^2=15.84$, $p<0.01$, $OR=4.60$).

Also for the Czech Republic, there was a statistically significant higher percentage of students who do not seek advice from a pharmacist, but prefer to ask advice from other figures ($\chi^2=10.56$, $p<0.01$, $OR=3.44$), while there was not a statistically significant difference in the percentages of those who ask advice from family physicians/specialists and those who consult with other figures.

Regarding Romania, the percentages of students who self-mediate compared to those who consult a family physician or specialist did not differ significantly. Once again, the figure of the pharmacist emerges less frequently as a source of advice than do family members, friends, or simple self-medication ($\chi^2=10.22$, $p<0.01$, $OR=3.12$).

Considering all four countries, the drugs most often taken as self-medication were antibiotics; this was particularly evident in Spain (Table 2).

As can be seen in Table 2, for Spain there is a significant Odds Ratio, while for the other countries, even though there is statistical significance (except for the Czech Republic), the Odds Ratio values do not

Table 2. Association between the prescription or nonprescription antibiotic use by the pharmacy students surveyed

Variables	Prescription %	Non prescription %	OR (99%)	P-value
Czech republic Antibiotic use	67.8	32.1	0.65 (0.325-1.29)	0.288
Italy Antibiotic use	74.3	23.6	0.38 (0.21-0.69)	0.002
Romania Antibiotic use	71.6	26.5	0.40 (0.22-0.72)	0.004
Spain Antibiotic use	30.9	68	4.40* (2.36-8.19)	<0.001

*Statistical significance: $p < 0.01$ and 99% confidence interval

express a significant association between taking antibiotics and absence of a prescription. Statistical analysis of antibiotic use without prescription shows a greater risk of inappropriate exposure, and thus a possible future interaction between this type of behavior and the emergence of antibiotic resistance.

Discussion and Conclusions

Inappropriate use of drugs and the habit of self-medication, in particular that of antibiotics, are increasingly widespread practices even among university students, as noted before (6, 8-10). This study focused on a well-defined sample, pharmacy students, whom one would think would be especially attentive and sensitive to this issue. However, the percentage of students who take antibiotics without consulting a physician to verify the real need for them is truly striking. This dangerous habit is quite common among the Spanish and Czech students, but also present among the Italian and Romanian ones, though in lower percentages. This may not be inherently dangerous, but may become so when the person does not know how the drug should be used, for example, when antibiotics are used to treat viral infections or the flu (23-26).

Fully 45% of the students reported that they themselves choose when to stop taking antibiotics, which often makes the treatment ineffective, or worse, enables certain pathogenic microorganisms to develop resistance to these drugs.

Our findings highlighted that in the four countries the pharmaceutical products most widely used by the students are analgesics and antibiotics. Of concern is the percentage of subjects who get advice on medicine use from family members rather than from healthcare professionals, and in particular from pharmacist. These results are in accordance with the literature (27). In Italy and Romania, students indicated that they are more likely to treat themselves without any advice than to consult a pharmacist. These findings confirm the WHO statements about the health risks of the incorrect use of medicines, especially resistance to antibiotics that can result from wrongheaded use of these drugs, and are in accordance with other researches (1-3, 28, 29).

The same superficiality is seen concerning mind-acting drugs. Most students indicated that they knew the dangers of these products, but the answers of students in Spain and Romania in particular to the question about the dangers of tranquillizers and soporifics indicated that they were ill-informed, perhaps not perceiving them as part of this class of drugs. This result is in line with the WHO statement about the risks related to the abuse of mind-acting drugs (1), and with the results showed about the surfing internet to search medical information (29).

Another incorrect behaviour that emerged from this study was the consumption of alcohol together with the use of medicines, above all in the Czech Republic and Spain (30, 31). Very real dangers can ensue, including nausea and vomiting, headache, somnolence,

fainting, or loss of coordination, even cardiac problems and difficulty breathing. Alcohol can make a drug less effective or useless, or even dangerous or toxic (32, 33).

To our mind, one of the most important preventive actions that should be taken is to inform young people about the proper use of pharmaceutical products, in the hope that they will then use these drugs correctly (34). Simply educating them to read the drug information in the packaging would be an important measure, as our data indicate that almost half the students interviewed do not do so (35-39).

In addition, in order to avoid the use of medicines leftovers from a previous illness or of drugs passed on by family or friends, physicians should write prescriptions for exactly the quantity of drug needed for the patient. Similarly, pharmaceutical firms should produce packages of drugs such that proper doses would not be exceeded or pharmacists should be required to prepare personalized packages with precisely the number of doses prescribed for the patient.

Conflict of interest: None to declare

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Correspondence:
Fabio Petrelli
School of Medicinal and Health Products Sciences,
University of Camerino (Italy),
Via Madonna delle Carceri, 9 - 62032 Camerino (MC), Italy
Tel. +0039 0737402420
E- mail: fabio.petrelli@unicam.it