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# COMPETENCE OF THE STUDENTS FROM THE MEDICAL UNIVERSITY OF VARNA FOR PRESCRIBING A RATIONAL PHARMACOTHERAPY

**A. Belcheva**

*Department of Preclinical and Clinical Pharmacology and Biochemistry, Prof. Paraskev Stoyanov Medical University of Varna*

## ABSTRACT

**The skills of the students from the Medical University of Varna for choosing and prescribing of a rational pharmacotherapy were tested. This took place within the framework of a comparative study of the competence in the therapeutic skills of final year medical students from 19 Universities of 10 European countries. From the Bulgarian Medical Universities those of Varna and Sofia were included in the study. The number of students who took part in the study was 1234, from which 37 were from Varna and 109 -from Sofia. Within 30 minutes the students had to determine a non-medical and/or medical treatment (prescription) for four written patient cases. Four diseases from the general practice were included (essential hypertension, acute bronchitis, gastroenteritis and osteo-arthritis). They were presented by four patient cases with an increasing degree of complexity. The skills were scored according to the 5 World Health Organization (WHO) prescribing indicators of therapeutic competence: 1) the number of drugs per prescription; 2) the number of generic names; 3) the number of non-antibiotics; 4) the number of non-drug treatments; 5) the number of completeness of the prescriptions. The scores of the test forms were descriptively analyzed. The skills of the Varna students are similar to the average European students' skills: indicator (1) - 1.4 drugs for Europe and 1.8 - for Varna; indicator (2) - 73.7% and 80.8%, respectively; indicator (3) - 82.7% and 80.5%; indicator (4) - 16.1 and 6.6; indicator (5) - 64% and 78.1%. There is not a significant difference in the competence of Varna and Sofia students. The students from the University of Varna use more often generic names in comparison with the students from the University of Sofia (80.8% vs. 73.2%) and more often prefer the non-drug treatment (6.6% vs. 5.2%). This similarity might be due to the problem-based teaching that is carried out in both departments.**

**Key words**: testing of students, skills for prescribing, pharmacotherapy

## INTRODUCTION

The competence in the therapeutic skills of 1234 final year medical students from 19 Universities of 10 European countries were tested between January and April 2000. The investigations show that medical errors due to poor prescribing are common for many countries (1,4). Supposed explanations for this behavior are restrained to factors that influence the prescribing behavior of doctors after graduation, such as recruitment by the pharmaceutical industry, demanding patients and time pressure in daily practice (5). Recently it has been shown in the Netherlands that final year students from all 8 medical faculties did not meet the required therapeutic objectives regarding choosing and prescribing drugs (6). Therefore, there is reason to doubt the assumption that the competence in therapeutics of graduates is adequate, possibly due to insufficient therapeutic teaching. The aim of the present study was to determine the level of competence in choosing and prescribing drugs and to seek a relation between therapeutic competence and therapeutic teaching.

In the present work the therapeutic competence of the Bulgarian medical students (from the Medical Universities of Varna and Sofia) is compared with that of other European students. The skills of the students from the University of Varna for prescribing a rational pharmacotherapy are analyzed.

## MATERIALS AND METHODS

*Populations*

The level of competence of 1234 final year medical students was determined. Students from Belgium, Greece, Estonia, Spain, Italy, Norway, United Kingdom, The Netherlands, Croatia and Bulgaria were included in the study. Bulgarian students were from the Medical University of Sofia

**Address for correspondence:**
*A. Belcheva, Dept. of Preclinical and Clinical Pharmacology and Biochemistry, Prof. P. Stoyanov Medical University of Varna, 55 Marin Drinov St, BG-9002 Varna, BULGARIA*
*E-mail: belcheva@asclep.muvar.acad.bg*

) students) and from the Medical University of Varna students).

*ign of the study*

students had to: 1) determine the drug and/or non-drug ment for 4 written patient cases within 30 minutes and rite a prescription in case they chose a drug treatment; ll out a questionnaire regarding the received therapeutic ning.

*ing and analysis*

test forms were scored according to the 5 (WHO) pre-ing-indicators of
peutic competence (2):
verage number of drugs per prescription;
ercentage of drugs prescribed with generic names;
ercentage of non-antibiotics;
ercentage of non-drug treatments;
ercentage of complete prescriptions.
t from these indicators the total number of generic s prescribed for the four cases was determined.

*rials*

diseases from the general practice are included: essen-ypertension, acute bronchitis, gastroenteritis and -arthritis. Each of the diseases was presented by 4 with increasing complexity. Thus 16 different written t cases were developed. A total number of 24 combi-ns were randomly divided in the test-packages over pulation of the students of each university.

*g and analysis*

cores of the test forms and the answers of the ques-ire were descriptively analyzed. These scores were l by two kinds of analysis. The scores regarding the ng methods were compared per prescribing indicators nparison of means (95% interval). The other teach-ects of the questionnaire were related to the prescrib-dicators by means of Kendall's Tau-B test.

## RESULTS AND DICUSSION

*number of drugs per prescription*

ean number of drugs per prescription for all Euro-tudents was 1.4 (1.1 - 1.7). The same is the mean r prescribed by the Bulgaria students - 1.4 (1 - 2.8). udents from the Medical University of Varna pre-l a higher mean number of drugs per prescription - 4 -2.6) in comparison with the medical students from 1.3 (0.3-1.6) (Fig. 1).

*tage of drugs prescribed with generic names*

rcentage of drugs prescribed with generic names by ents from Europe was 73.7 (42.8 - 95.7). This per-: was higher for the students from Varna - 80.8 (46 - d for the students from Sofia this percentage was 5 -100) (Fig. 2). From the other European countries the highest was the percentage for the students from Estonia - 95.0 (50 - 100), followed by Norway - 93.3 (0 -100), and the lowest was the percentage for Greek students - 24.8 (0 - 100).

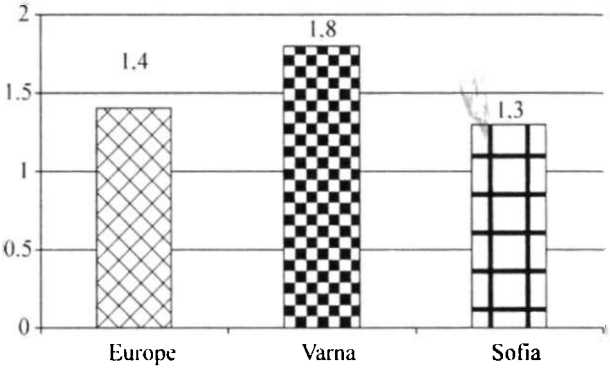



*Fig. 1. Mean number of drugs per prescription*

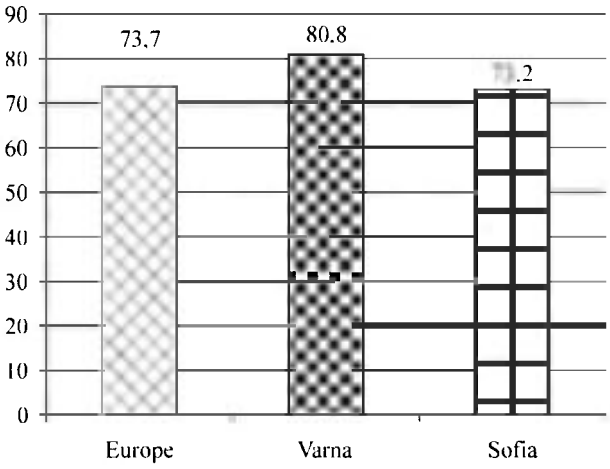



*Fig. 2. Percentage of drugs prescribed by using generic names*

*Percentage of non-antibiotics*

The non-antibiotic treatment was prescribed by all students in 83.7% (78.4 -90.6) of the cases. For Varna this percentage was 80.5 (50 -100) and was very similar to that for Sofia - 80.4 (25 - 100) (Fig. 3). The highest was this percentage for the students from Belgium - 90.6 (60 - 100), and the lowest for the students from Italy - 78.4 (25 - 100).

Percentage of non-drug treatments

The non-drug treatment was prescribed by all students in 16.1% (5.5 - 30.1) of the cases. For Bulgarian students this percentage was considerably lower in comparison with the students from other countries - 5.5% (0 - 33). This percentage was higher for the students from Varna than from Sofia - 6.6 5 (0 - 25) and 5.2% (0 - 33), respectively (Fig. 4). The

non-drug treatment was most frequently prescribed by the students from Norway - 30.2% (0 - 67).

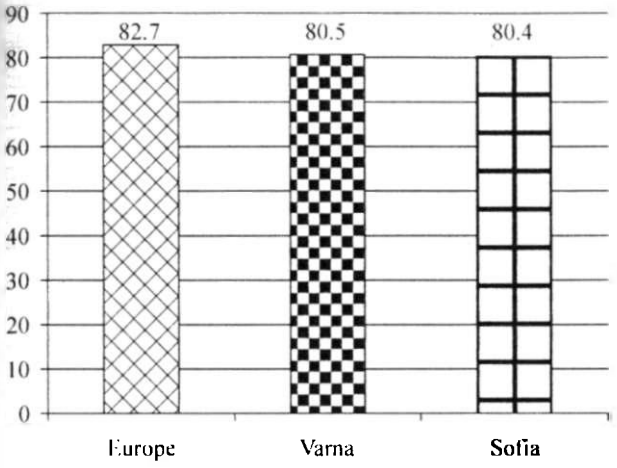



*Fig. 3. Percentage of prescribed non-antibiotic drugs*

*Percentage of complete prescriptions*

The percentage of complete prescriptions was 64.0 (36.2 - 94.6). Bulgarian students wrote the prescriptions more completely - Medical University of Varna - 78.1% (40 - 90) and Medical University of Sofia - 78.9% (32 - 100). Most completely wrote the prescriptions the students from Estonia - 94.9% (68 - 100), and less completely – the students from Spain - 36. 2% (46 - 95).

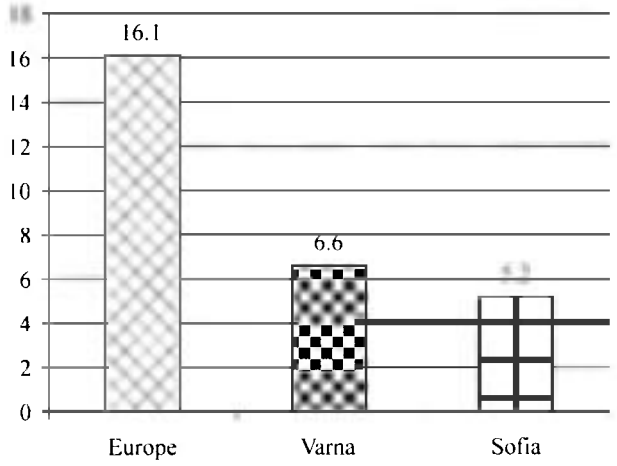



*Fig. 4. Percentage of prescribed non-drug treatment*

*Total number of prescribed generic drugs*

The students prescribed a total number of 247 generic drugs from 59 different groups. Bulgarian students prescribed 91 drugs. For the students from Varna their number was 46. Only the students from Spain included more drugs in their prescriptions - 121, while the students from Norway prescribed 25 drugs and the students from Estonia - 41. The greater number of prescribed generic drugs is regarded as an index of lower competence. The large range in numbers of generic drugs prescribed can be interpreted by comparing it with recommendations in the Oxford Formulary (3). For the four different clinical indications included in the study, the Oxford Formulary recommends 20 different generic drugs.

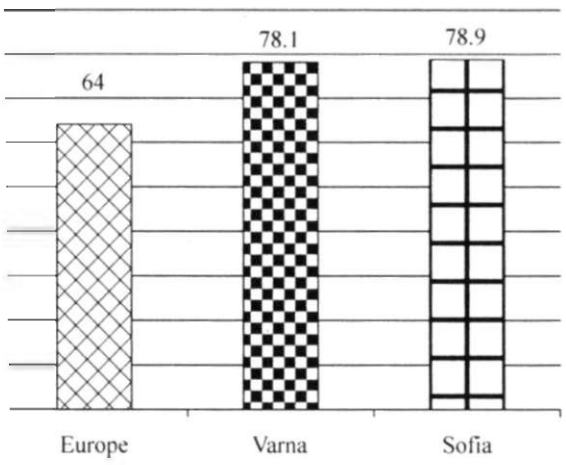
The generic drugs prescribed by the medical students from Varna and the frequency of their prescribing are given in Table 1.

*Table 1. Frequency of generic drug prescription in the Medical University of Varna*

| Generic name | Frequency of prescription |
|---|---|
| paracetamol | 32 |
| enalapril | 18 |
| amoxicilline | 13 |
| meloxicam | 11 |
| acidum acetylsalicylicum | 9 |
| bromhexine | 8 |
| ferrosulfat, hydrochlorothiazide | 7 |
| diclofenac, gentamicine, indapamide, salbutamol | 6 |
| clavulanic acid, digoxine, furosemide, metoclopramide, piroxicam, ranitidine, sulfaguanidine, tenoxicam | 5 |
| benzylpenicilline, nifedipine | 4 |
| ampicilline, atenolol, ethametazon, cefalexine, ceftriaxon, erythromycine, penicilline, propranolol, tropisetron | 3 |
| aminophenazon, ammophilline, beclometason, cefuroxim, chlortalidon, co-trimoxazol, indofosmide, indometacine, ketoprofen, verapamil, scopolamine butyl bromide | 2 |
| calcitonine, cefalotine, chlorquinaldol, acidum folicum, ibuprofen, lincomycine, loperamide, nimesulide, omeprazol, perindopril tilidine, triamteren | 1 |

*The teaching curriculum*

The data for the received training in basic pharmacology, clinical pharmacology and pharmacotherapy, as well as the self-assessment of the students for their knowledge and skills are presented in Table 2. The students from the Medical Universities of Varna and Sofia judged their therapeutic knowledge as "good", while the self-assessment of the students from other countries was more frequently "average".




*5. Percentage of prescribed prescriptions in their ›leteness*

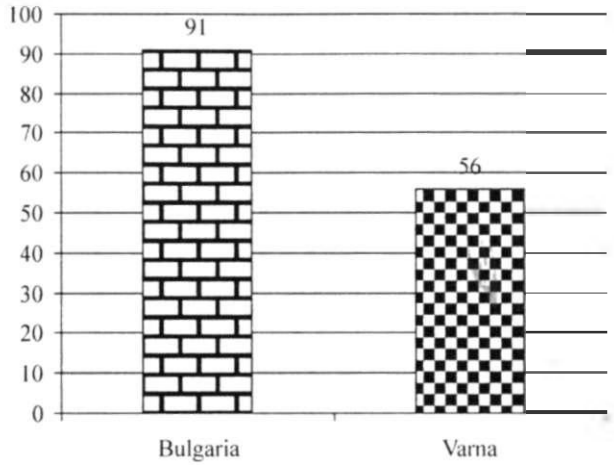



*Fig. 6. Total number of prescribed generic drugs*

*› 2. Manner of therapeutic training*

| Therapeutic training | Europe | Varna | Sofia |
|---|---|---|---|
| Preclinical pharmacology | | | |
| Number of hours | 10-50 | 150 | 165 |
| Year of pharmacology teaching | 3 | 3 | 3 |
| Self-assessment of knowledge/skills | mean | good | good |
| Clinical pharmacology | | | |
| Number of hours | 10-50 | 30 | 60 |
| Self-assessment of knowledge/skills | 5-6 | 5 | 5 |
| Year of teaching | mean | good | good |
| Pharmacotherapy | | | |
| Number of hours | 10-50 | no | 10-50 |
| Year of teaching | 5-6 | no | 5 |
| Self-assessment of knowledge/skills | mean | no | good |
| Number of prescriptions made out | | | |
| To simulated patients | 0-25 | 25-100 | 0-25 |
| To real patients under supervision | 0-25 | 0-25 | 0-25 |
| To real patients without supervision | 0-25 | 0-25 | 0-25 |
| Drug reference books/lists | | | |
| WHO list of 'Basic Drugs' | do not know | know | know |
| National list of 'Basic Drugs' | do not know | know | know |
| Local/national prescription list | know | do not know | know |
| Local drug compendium | possess | know | know |

The students from Varna unlike the students from other countries did not point out training in pharmacotherapy. That is because the subject that is taught in the Medical University of Varna is "clinical pharmacology" while in the other countries the subject is "clinical pharmacology and pharmacotherapy".

Several conclusions might be drawn from the study: 1) the number of teaching hours does not correlate with the students' competence; 2) the knowledge and use of a greater number of drug compendia leads to a higher level of competence, while the higher knowledge about drug formularies leads to a less non-drug treatment prescribing; 3) the greater number of written prescriptions during training increases the level of competence measured by 2 from 5 indicators (1st indicator); 4) the earlier beginning of teaching leads to a higher competence measured by 3 from 5 indicators (1st, 2nd, 5th); 5) the self-assessment of the students for their competence does not coincide with the established by the study level of competence; 6) the prescribing of a greater number of generic drugs is an indicator of lower competence.

## CONCLUSIONS

1. The very high number of different drugs prescribed and the huge differences between countries indicate that a large number of European final year medical students have insufficient competence in therapeutic skills.
2. The therapeutic skills of Bulgarian medical students and the teaching they receive are similar to those of European ones.
3. There are no differences in the therapeutic skills to prescribe a rational pharmacotherapy between the students from Varna and Sofia probably because of the problem-based teaching, which is carried out in the Department of Preclinical and Clinical Pharmacology in the Medical University of Varna and the Department of Clinical Pharmacology and Therapy in the Medical University of Sofia.

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