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VERSITA

ACTA FACULTATIS PHARMACEUTICAE UNIVERSITATIS COMENIANAE

ANALYSIS OF INDIVIDUALLY PREPARED MEDICINES PRESCRIPTION IN COMMUNITY PHARMACY

ANALÝZA PRESKRIPCIE INDIVIDUÁLNE PRIPRAVOVANÝCH LIEKOV VO VEREJNEJ LEKÁRNI

Original research article

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Abstract Our study deals with the analysis of prescription of individually prepared medicines (IPMs) in selected community pharmacies in Slovakia and Greece during the year 2011. Throughout the given period, the total sum of processed medical prescriptions in selected Slovak pharmacies was 50,992, while in Greece it was 45,862 prescriptions. Out of the total sum of prescriptions, we selected those with prescribed IPMs. In our study, we further analysed the representation of individual age groups and both genders in prescriptions of the IPMs. Next, we examined the frequency of IPM prescriptions based on specialisation of the prescribing physicians and the most frequent diagnoses for which the IPMs were prescribed. Further, we classified the prescribed IPMs into specific groups according to their drug forms. In our study, we also described the representation of individual drug forms (oral, cutaneous and for specific use) and representation of prepared or adjusted IPMs. The relevance of this topic is supported by marked decrease of rate of preparing of IPMs in the last decades as well as by necessity to preserve it for reasons such as certain diagnoses, technological and economic aspects and differences among age groups require distinctive specification of the prepared medicines.

Slovak abstract Práca sa zaoberá analýzou preskripcie individuálne pripravovaných liekov (IPL) vo vybraných verejných lekárňach na Slovensku a v Grécku počas kalendárneho roka 2011. V sledovaných lekárňach bolo na Slovensku za daný rok spracovaných celkovo 50 992 lekárskych predpisov, kým v Grécku to bolo 45862 predpisov. Z nich boli následne vyselektované súbory lekárskych predpisov s predpísanými IPL a ďalej analyzované vzhľadom na vek a pohlavie pacientov. Štúdia ďalej pozoruje frekvenciu predpisovania IPL vzhľadom na odbornosť preskribujúceho lekára a diagnózy, na ktoré boli IPL predpisované. Taktiež sleduje zastúpenie jednotlivých liekových foriem (perorálnych, kutánnych a na špecifikované použitie) a zastúpenie pripravovaných či adjustovaných IPL. Aktuálnosť problematiky danej štúdie spočíva v prudkom poklese prípravy individuálne pripravovaných liekov (IPL) v posledných desaťročiach a v potrebe jej zachovania kvôli diagnózam, ekonomickým a technologickým aspektom, a vekovým diferenciám, ktoré si vyžadujú špecifický prístup k pripravovanému lieku.

Keywords *individually prepared medicines – medical prescription – prescription of IPM – community pharmacy – Slovakia – Greece*

Kľúčové slová: *individuálne pripravované lieky – lekársky predpis – preskripcia IPL – verejná lekáreň – Slovensko – Grécko*

INTRODUCTION

Preparation of individually prepared medicines (IPMs) represents an inseparable part of pharmaceutical care provided in a community pharmacy. Out of the total amount of medicines dispensed from a pharmacy, IPMs correspond to only a marginal part. However, they still keep their importance. IPMs (also known as "magistraliter") are prepared in a pharmacy according to medical prescriptions, while they should comply with applicable pharmacopoeia requirements (Fekárová & Biala, 2004, Fulmeková et al, 2004, Kmeťová, 2008).

Individual preparing of medicines enables preparation of the medicines and therapeutic combinations which cannot be manufactured industrially either because of their low stability or not profitable production costs. What is even more important is that prescribing of IPMs allows the physician to individualise the therapy in terms of selection of medicines or their combination, respecting their specific interactions, and dosages adjusted to the status of the patient (Giam & McLachlan, 2008). Furthermore, the preparation of individual medicines

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is less expensive; the physician can prescribe the amount of medicine that is efficiently necessary for the selected therapy, which also makes this treatment more cost-effective (Hrková et al, 1993, Solich & Dofková, 1974A, 1974B, 1974C).
The process of preparation of IPMs in a pharmacy has always included attributes of a special relationship among all – physician, pharmacist and patient. It represents more pronounced relationship among all present parties with all positive and negative consequences (Giam et al, 2011).
Prescribing IPMs may have significantly positive psychological influence in some patients who show markedly increased compliance to the pharmacotherapy if they know that it has been prescribed specially for them (Fürtig et al, 1986, Lehocká et al, 2012).

METHODS

In our study, we aimed to describe the basic characteristics of prescribing and preparing IPMs in a community pharmacy, its differentiation according to the most frequent diagnoses and forms of medicines. In this study, we also stress the importance and irreplaceable role of IPM prescribing in the therapeutic practice. Data sources for our study were the medical prescriptions dispensed in five selected community pharmacies in different regions of Slovakia and in five pharmacies in Greece situated near hospitals and healthcare facilities. The collection of medical prescriptions was analysed according to gender and age of patients, specialisations of prescribing physicians, diagnoses, drug forms and compositions of IPMs. In our analysis, we also took into account whether the prescribed IPMs were prepared or adjusted. Part of the results has already been published (Lehocká et al, 2012).

RESULTS AND DISCUSSION

Analysis of the set of medical prescriptions from the selected community pharmacies in Slovakia and Greece during 2011 revealed that, out of the total amount of medical prescriptions in Slovakia, the prescriptions of mass-produced medicines (MPM) represented in average 98.2%, whereas the prescriptions of IPMs amounted to 1.8%. Throughout the year, the proportion of MPMs and IPMs in medical prescriptions remained stable. In Greece, the prescriptions of MPMs represented 93.7%, and prescriptions of IPMs 6.3%. However, IPMs were prescribed more during the winter than in the summer. This was mostly due to IPMs prescribed for skin application (for instance, acne). During the summer, the skin is more sensitive due to ultraviolet radiation from the sun. Taking into account other countries, in the United States, it has been estimated that approximately 1% of prescriptions are compounded, representing nearly 30 million prescriptions annually (Committee on Health Education, Labor, and Pensions, 2003). Studies in 2004 and 2006 found that approximately 10% of Australian pharmacies offered specialised compounding service (Giam et al, 2010).
Results of the analysis show the decreasing trend in prescription of IPMs in Slovakian pharmacies, as well as the proportion of MPMs and IPMs in overall amount of medical prescriptions in Slovakia and Greece in 2011 (Fig. 1). These results are supported by similar analyses from the past. Solich and Dofkova reported in a survey that in 1974 IPMs made up 10%–20% of all prescriptions, and in 1986 they represented only 8%–10% (Solich & Dofková, 1974A, 1974B, 1974C, Fürtig et al, 1986). After 1990, the amount of IPMs decreased even more to 6% and in 2004 the authors of the study "Survey of preparing of individually prepared medicines in community pharmacies in Slovakia" report only 3.6% of prescriptions of IPMs (Fig. 2) (Fekárová & Biala, 2004).
Analysing the whole group of prescriptions of IPMs according to gender, we found that overall proportion of both genders is quite equal in Slovakia with 50.6% of IPMs prescribed to women and 49.4% to men. In Greece, IPMs were prescribed to women more often than to men, 71.2%, vs. 28.8%, respectively.
Figure 3 documents the results of age structure analysis in the studied group of patients in both Slovakia and Greece.

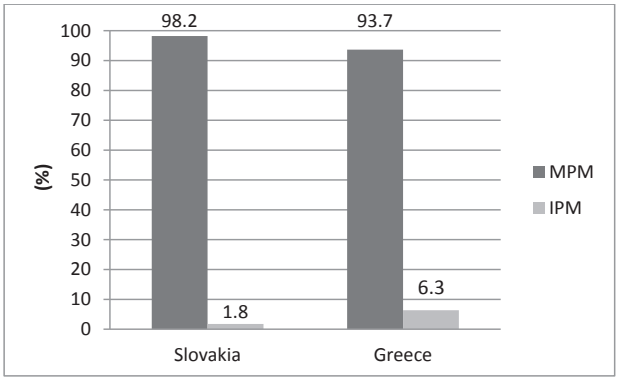

Fig. 1. Proportion of MPMs and IPMs on overall amount of medical prescriptions

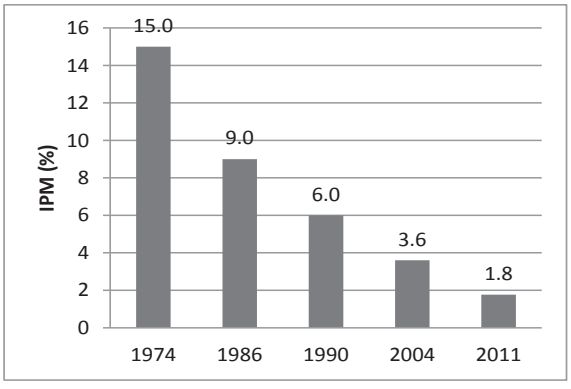

Fig. 2. Development of percentage of IPMs from total amount of prescriptions

The analysis shows that the greatest number of prescriptions in both countries was prescribed to patients above 18 years of age, 74.7% in Slovakia and 67.2% in Greece. As far as paediatric patients are concerned, IPMs were prescribed more frequently to children in age group 0–<6 years (15.4%) than to children in age group 6–18 years (9.9%) in Slovakia. Opposite results were obtained from Greece, where more IPMs were prescribed to children in age group 6–18 years (22.0%) than to children in age group 0–<6 years (10.8%). This fact shows clearly the need for individualisation of therapy, which is enabled by IPMs, mostly in paediatric age groups. Also in one Australian study it is shown that out of all products with approved paediatric indications, around 24% were not available in a form suitable for administration to children. This can be solved by preparing IPMs for these cases (Tan et al, 2003). In this study, we analysed the specialisation of physicians who prescribed IPMs. Results show great quantitative differences among the prescribing physicians. Leading by far were dermatologists with 39.3% in Slovakia and 66.7% in Greece. The second group of physicians in Slovakia were GPs (general practitioners) with 16.3%; the third were paediatricians with 14.9%. The last group prescribing IPMs were "other" with 5.4% which comprises specialisations e.g. internists, cardiologists, angiologists. Unlike in Slovakia, Greek's second most frequently prescribing group of physicians were paediatricians with 11.2%, and the third place was taken by otorhinolaryngologists (ORL), who were the fourth group in Slovakia (Table 1).

Table 1. Proportion of IPM prescription according to specialization of physician

	% IPM	
Specialisation	Slovakia	Greece
Dermatologist	39.3	66.7
GP	16.3	1.2
Pediatrician	14.9	11.2
ORL	13.4	11.0
Gynaecologist	9.5	2.8
Ophtalmologist	1.2	5.3
Others	5.4	1.8
Total:	100.0	100.0

The obtained results are in correlation with therapeutic procedures within the individual specialisations of physicians. While the assortment of MPMs in cardiovascular diseases is quite broad (with exception for MPMs for paediatric patients suffering from atypical diagnoses for their age), in dermatological diseases there is much wider space for individual approaches to therapy through IPMs or preparing of IPM with use of MPM. Table 2 shows the most frequent diagnoses for which were IPMs prescribed. The most frequent diagnosis in Slovakia was dermatitis (70.1%), followed by acne (18.2%). In Greece, most prescriptions were for acne (66.7%), allergy was the second with 17.3% and dermatitis was the third most frequent diagnosis with 12.5%.

Table 2. Proportion of IPM prescription in most frequent diagnoses

	% IPM	
Diagnosis	Slovakia	Greece
Dermatitis	70.1	12.5
Acne	18.2	66.7
Allergy	0.9	17.3
Others	10.8	3.5
Total:	100.0	100.0

Figure 4 shows the representation of IPMs according to classification based on the way of administration (oral, cutaneous and for specific use) and the subsequent classification into concrete drug forms. In both countries, drug forms for cutaneous use were prescribed most often, 70.5% in Slovakia and 75.0% in Greece, while the prescriptions in both countries similarly used ointments, creams and pastes. With the exception of cutaneous drug forms, oral preparations in Slovakia are prepared more often (22.8%) than drug forms for specific use (6.7%), whereas drugs for oral administration were represented mostly by adjusted pills and prepared capsules. IPMs for specific use comprised nose drops used in the most cases. On the other hand, in Greece, drugs for specific use were prepared most often with 16.7% than oral drugs with 8.3% rate of prescription, while regarding the drug forms the most frequent were nose and ear drops for specific use and capsules for oral use.

In the last years, we witness not only decreasing of number of prescriptions of IPMs, but changes have been documented in the assortment of prescribed IPMs both adjusted and prepared not only in Slovakia, but also in Greece. A few years ago, one of the most frequently prescribed IPMs were calcii carbonici pills, which were prescribed for patients with chronic renal failure, and cremor aluminii acetico-tartarici indicated for oedemas in posttraumatic cases or patients after allergic reaction. The irreplaceable place among adjusted IPMs belonged to magnesii lactici pills, which were prescribed for hypertension and cramps during pregnancy. Another example is liquid powder (suspensio zinci oxydati) prescribed mostly for paediatric patients for diagnoses like hives (urticaria), chickenpox and skin reactions after insect bites. Until recently, some of the most frequently prepared IPMs were Solutio Jarisch used for soothing of irritated skin in various dermatological diagnoses or allergic reactions, antimycotic Solutio Castellani or disinfectant of oral cavity Solutio Gentiani. All of the above mentioned IPMs were prescribed mainly by GPs and paediatricians. Prescription of these occurs still today; however, preparation of some of them was replaced by mass-produced equivalents (Lehocká et al, 2012).

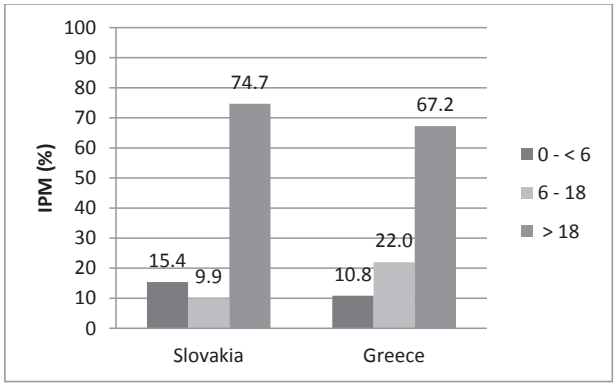

Fig. 3. Proportion of IPMs according to age of patients

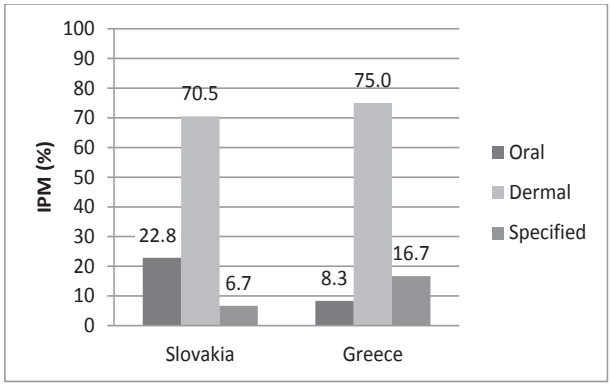

Fig. 4. Proportion of IPMs according to way of administration

Even though many of the IPMs, which were until recently prepared in a pharmacy, were replaced by MPMs, IPMs retained their important place in a pharmacy. Their assortment is rather wide and covers wide scale of various drug forms and active substances for numerous types of diagnoses. It includes for example combinations of dilutions of mass-produced glucocorticoid ointments with various ointment bases, which are used in therapeutic practice because of shortage of mass-produced glucocorticoids with desired concentration, or the need for using other ointment base, which makes this individualised approach a benefit for the patient.

Table 3 shows some examples of current IPMs in Slovakia and Greece, among which are nasal ointment, salinic gargle or migraine suppository, for example.

CONCLUSION

This analysis confirms the decreasing tendency in prescription rates of IPMs on one side, while on the other it emphasises its irreplaceable role in patients' therapy, predominantly in cases and diagnoses which, from various reasons, require such individual approach. Absolute absence of preparing IPMs in the current situation of constantly growing numbers of allergies and diseases occurring in unusual situations and age of the patients would make it impossible to manage their treatment on sufficiently individual basis. It is therefore necessary not only to keep, but also to develop, this ultimately specific patient's care, using yet more sophisticated and modern equipment and knowledge of pharmacists skilled in preparing of IPMs (Giam et al, 2011).

Table 3. Examples of current IPMs in Slovakia and in Greece (all the measures are in g, as is common at the prescription)

a.) Slovakia

Prescription 1:		**Prescription 2:**		**Prescription 3:**	
(Dg- Allergic dermatitis)		(Dg- Acute sinusitis)		(Dg- Gastritis):	
Acidi salicylici		Ol. Eucalypti	0.4	Bismuthi nitrici bas.	0.12
Ol. ricini	áa 2.0	Ol. Vaselini	2.0	Bensocaini	0.01
Ung. Emolientis	ad 100.0	Vas. Albi	ad 20.0	Natr. Hydrogencarb.	0.2
M.f ung.		M.f ung.		M.f cps.	
D.S.: Apply to skin		D.S. Nasal Ointment		D.S. 4x1 cps.	
Prescription 4:		**Prescription 5:**			
(Dg- Acute tonsillitis)		(Dg- Migraine)			
N atrii benzoici		Ergotamini tartarici	0.001		
Natrii bicarbonici	áa 30.0	Diazepam	0.005		
Natrii chlorati	6.0	Phenobarbitali	0.02		
Ol. Menth. Piper.	0.08	Cofleini	0.1		
M.f plv.		Aminophenazoni	0.2		
D.S. Salinic gargle		Ol. Cacao q.s. ut m.s. supp.			
		M.f supp.			
		D.S. 1 supp. during migraine			

Table 3. Examples of current IPMs in Slovakia and in Greece (cont.)

b.) Greece

Prescription 1:		**Prescription 2:**		**Prescription 3:**	
(Dg- Acne, Scabies)		(Dg - Psoriasis)		(Dg - Dermatitis)	
Sulphuris praec.	5.0	Acidi salicylici	20.0	Acidi salicylici	1.0
Ung. Simplicis	45.0	Cerae lanae hydr.	60.0	Ureae	15.0
Ung. Sulphuri	50.0	Clobetazol ung.0.05%	100.0	Aq. Dest.	15.0
M.fung.		Vaselini flavi	120.0	Clobetazol ung.0.05%	50.0
D.S. Apply to skin		M.f ung.		Encerini	25.0
		D.S. Apply to skin		M.fung.	
				D.S. Apply to skin	
Prescription 4:		**Prescription 5:**			
(Dg - Sinusitis)		(Dg - Sinusitis)			
Acidi borici	3.0	Ephedrini hydrochl.	0.20		
Paralini liq.	30.0	Natrii chlorati	0.12		
Cerae lanae hydr.	30.0	Aqua destil.	20.0		
Ol. eucalypti	4 gtts	M.f gtt.			
M. f ung.		D.S. Nasal drops			
D.S. Nasal ointment					

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