Relation of Polypharmacy to Systemic and Oral Health Related Factors

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To assess polypharmacy (i.e., multiple medication use, as synthetic chemical products) and its relationship to general, systemic health and oral health factors in adults over 50 years old. A cross-sectional study was conducted on a convenience sample of adult patients recruited from two medical centers from Bucharest, i.e. from the Clinic of Dental Prosthetics, Carol Davila University of Medicine and Pharmacy, and from Saint Luca Hospital for Chronic Diseases. Study sample included 126 patients, that used a mean of 5.2 drugs. Almost half of patients (43.65%) used more than five prescribed medications. There was a tendency to use a greater number of medications in the case of patients that were hospitalized at Saint Luca Hospital, were less educated, had a lower income, had a greater number of comorbidities, had untreated edentulism in both jaws, were unfrequently wearing removable prosthesis and were using denture adhesives. Both positive and negative effects of polypharmacy should be considered in mutimorbidity patients when establishing prescription medications, along with general and oral factors that may influence treatment conduct and outcome.

Keywords:medication, drug, ageing, edentulism, dental prosthesis

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Aging often associates comorbidities that require multiple medications. Nowadays beside the trend of aging population, a trend of increasing prescription drug use and polypharmacy can also be observed [1]. Polypharmacy due to multimorbidity is most common in older population, and should be considered by all healthcare providers. Polypharmacy may results in drug-drug interactions with side effects that may contribute to further deterioration of health status, may result in medication nonadherence, leading to higher health care costs [2]. Thereforealthough polypharmacy can be clinically justified, it can also be sometimes inappropriate, it being seen as an issue that requires in-depth knowledge in order to define the best parameters of managing it [3]. This is a phenomenon in which both physicians and patients pay an important role, needing to be analyzed in a wider context, including not only health related factors, but also behavioral, social, cultural and geographical ones [17-21].

The aim of this study was to assess polypharmacy (i.e., multiple medication use), and its relationship to general, systemic health and oral health factors in adults over 50 years old.

Experimental part

Method

A cross-sectional study was conducted on a convenience sample of adult patients. Participants were recruited from two medical centers from Bucharest, from the Clinic of Dental Prosthetics of the Carol Davila University of Medicine and Pharmacy, and from the Saint Luca Hospital for Chronic Diseases. Only adults over 50 years of age, without severe cognitive impairment,were included. Patients were included after giving an informed consent to attend this study.

Main study variables were patients general characteristics (sex, age, education, income), general health status assessed by the number of comorbidities, medication used assessed by the number of drugs taken, and some features of oral status (presence of complete edentulism in one or both jaws, prosthetic treatment, wearing of removable prosthesis, and use of denture adhesives). Data was collected by interviews, examination of medical records and clinical oral examination.

Data analysis was conducted after assessing the normality of the distribution of the variables, which lead to the usage of nonparametric tests. For the comparison of two independent groups the Mann Whitney test was used, for the comparison of more than two independent groups the Kruskal-Wallis test was used, and for correlations the Spearman test was used. Statistical significance was considered at ap-value <0.05. The data were analyzed with SPSS Statistics software.

Results and discussions

Study sample included 126 patients, from which 51 patients form the Clinic of Dental Prosthetics of the Carol Davila University of Medicine and Pharmacy, and 75 hospitalized patients from Saint Luca Hospital for Chronic Diseases.

The included patients, at the time of data collection, used a mean of 5.2 drugs, with a minimum of 0 drugs, and a maximum of 15 drugs. The majority of patients used multiple medications, and 43,65% used more than five prescribed medications (table 1).

No of drugs used	Frequency	Percent
<1	7	5.6
2	10	7.9
3	12	9.5
4	20	15.9
5	22	17.5
6	20	15.9
7	15	11.9
8	9	7.1
> 9	11	8.7

Table 1
NUMBER OF MEDICATIONS USED IN THE STUDY SAMPLE

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All authors have an equal contributions as the first author

Variable		No of drugs used (mean)	p
sex	male	5.33	0.692
	female	4.93	
age	50-60 years	4.11	0.265
	61-70 years	5.11	
	71-80 years	5.49	
	81-90 years	5.56	
recruited	Hospital for Chronic Diseases	6.11	<0.001*
	Clinic of Dental Prosthetics	3.86	
education	primary/middle school(I-VIII)	6.04	0.003*
	high school diploma	4.70	
	bachelor's degree	4.09	
income	< 500 RON	5.87	0.013*
	500-1500 RON	4.59	
	>1500 RON	4.17	

Table 2
NUMBER OF MEDICATIONS USED ACCORDING TO GENERAL CHARACTERISTICS

Table 3
NUMBER OF MEDICATIONS USED ACCORDING TO NUMBER OF COMORBIDITIES

No of comorbidities	No of drugs used (mean)	p
<1	0.67	<0.001*
2	2.64	
3	3.68	
4	5.37	
5	6.11	
6	6.75	
>7	8.67	

Analyzing the relationship between polypharmacy and general characteristics, there was noticed the tendency to use a greater number of medications by patients that were hospitalized at Saint Luca Hospital for Chronic Diseases, were less educated and had a lower income (table 2).

Analyzing the relationship between polypharmacy and systemic status, a strong relationship was noted between the number of comorbidities and number of drugs used, as by conducting a subgroup analysis (table 3) or correlation analysis ($r=0.764$; $p<0.001$*).

Analyzing the relationship between polypharmacy and oral status, there was a tendency to use a greater number of medications by patients with untreated edentulism in both jaws, who were unfrequently wearing the removable prostheses and who were using denture adhesives (table 4).

This study's main results suggest that polypharmacy is frequently encountered in adult patients over 50 years old. We observed a trend to use a greater number of medications by patients recruited from Saint Luca Hospital for Chronic Diseases, were less educated, had a lower income, a greater number of comorbidities, untreated edentulism in both jaws, wereunfrequently wearingthe removable prostheses and used denture adhesives.

Especially in the elderly, multimorbidity defined by coexistence of multiple chronic conditions, is frequently encountered and often relates to polypharmacy [4]. In this context polypharmacy is completely justifiable from a medical point of view, but raises concerns for physicians especially, such as unwanted side effects and drug-drug interactions, with possible negative impact on health and treatment outcome. For example, in patients with multimorbidity and polypharmacy the dentist should consider the higher risk of occurrence of xerostomia and hyposialia, a common side effect associated with many pharmacological drug classes [5]. These changes may be a risk factor for some oral conditions as denture stomatitis and oral candidiasis, with a negative effect on the patient's comfort and quality of life, and may influence treatment outcome [6,7]. Therefore an accurate evaluation of medications used should be considered during initial evaluation.

By this study results, polypharmacy is frequently encountered and relates strongly to the number of comorbidities, but also to other factors. These results are partially in accordance with other research. The differences that are noted are linked to several factors, e.g., different geographic origin of study sample, different characteristics of study sample such as age distribution, different interpretation of polypharmacy *(i.e.* it is defined as the use of multiple medications, but there is no consensus on the cut-off value), other determinants of polypharmacy considered.

Among previous studies, polypharmacy registers a different frequency. Polypharmacy defined by the regular use of five or more drugs was encountered with a frequency of 11.8% in adults aged 40-81 years old in the population of Lausanne, Switzerland [8]. A recent study on the US population stated that half of the patients taking prescription drugs are exposed to two or more drugs, and 5% are exposed to 8 or more [9]. Another study on the US population revealed that among adults above 65 years old 40.6% used multiple drugs and 35.6% had polypharmacy (defined as use of more than five medications), of which about 57% had contraindicated drug combinations [10]. Our results are partially similar, with regards to confirming the increasing frequency of polypharmacy.

Variable		No of drugs used (mean)	p
edentulism	complete edentulism in both jaws	4.87	0.084
	complete edentulism in one jaw	4.75	
	dentate in both jaws	5.66	
prosthetic status	without prosthetic rehabilitation in both jaws	6.13	0.003*
	without prosthetic rehabilitation in one jaw	3.75	
	with prosthetic rehabilitation	4.81	
removable prostheses use	always	4.21	0.033*
	socially	5.46	
	never	6.00	
denture adhesives	yes	5.47	0.029*
	no	4.07	
	do not know what represents	3.00	

Table 4
NUMBER OF MEDICATIONS USED ACCORDING TO GENERAL CHARACTERISTICS

In previous research, advanced age was usually found to be associated with an increased frequency of polypharmacy [8]. This tendency was also noted in this research but did not reach statistical significance, one contributing factor being the relatively small sample size.

Similar to other research [8], this study's results suggest that polypharmacy is more frequent in individuals with lower education. One explanation may be that less educated persons expect more positive results from medication, without balancing with the negative side effect they bring and drug-to-drug interactions [11]. The effect of education is perceived as controversial. Even so its impact most probably exists, as generally influencing health status and treatment accessibility. Other studies found different relationships between the two [10,12,13].

As there is a clearly accepted relationship between complete edentulism and other coexisting diseases [14], the increased frequency of polypharmacy with completely edentulous patients, especially in those without prosthetic rehabilitation, found in this research comes as no surprise. According to our study, patients that use dental adhesive register a tendency to use more medications, which probably relates to their habit of using and investing more in medications in general.

Poypharmacy in elderly should be carefully analyzed, as previously being stated that nearly half of older adults take one or more medications that are not medically necessary [15]. By some former evidence, non-institutionalized patients are on significantly less drugs, and also it seem the medication is controlled better in some residencies as geriatric clinics,being observed to exert a positive effect on polypharmacy as associating a substantial reduction of prescribed drugs [16]. Even if it is difficult to generalize for all nursing homes for elderly in this regard, it might be a good fact to point-out to the medical staff from these residency the recommendation to reassess medication and if possible to decrease the number of drugs administered, as their patients are old, frequently with multiple systemic diseases and probable frequently register polypharmacy.

Among study limitations the following can be mentioned: the relatively small sample size, the relative small number of systemic and oral factors analyzed that may affect the number of medications used, and in general the difficulty to assess a complexphenomenon as polypharmacy.

Conclusions

Polypharmacy is frequently encountered in adult patients over 50 years of age. We noticed a trend to use a greater number of medications by patients that were recruited from the Hospital for Chronic Diseases, were less educated, had a lower income, a greater number of comorbidities, untreated edentulism in both jaws, wereunfrequently wearing of removable prostheses and used denture adhesives. Both positive and negative effects of polypharmacy should be considered in mutimorbid patients when establishing prescription medications, along with general and oral factors that may influence treatment conduct and outcome.

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