Polypharmacy and Decreased Cognitive Abilities in Elderly Patients

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Goal: To estimate the prevalence of polypharmacy and polypharmacy effect on decline in cognitive abilities of randomly selected group of people over 65. Methodology: A preliminary pilot study was based on the results of other researchers. 54 patients over 65 were randomly interviewed. Polypharmacy was defined as using ≥3 drugs. “A short portable mental status questionnaire” was used in estimating decline of cognitive abilities.

Results: According to the study results it was concluded that prevalence of polypharmacy by the elderly is significant—48.1%. Most present drugs are the ones treating cardiovascular disease, anti diabetic, anti-inflammatory drugs, long acting benzodiazepines, antihistamines. Of the total respondents 33.3% of them live alone and do not have adequate supervision. We have found that poly pharmacy resulted in decline of cognitive abilities in 23 of 54 patients tested in rapid mental status check. Conclusion: It is necessary to conduct future research on this issue. Key words: poly pharmacy, elderly patients, decreased cognitive abilities.

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1. INTRODUCTION

Today there is a higher prevalence of symptomatic treatment than the causative, and the clinical signs are atypical, so poly therapy or polypharmacy is inevitable. Unfortunately, very often atypical symptoms that are complaints of geriatric patients are signs of adverse reactions to medications. Polypharmacy in patients is almost a regular occurrence, adherence to guidelines on pharmacotherapy in difficult, often using complicated schemes, drug dosing intervals are different, thus further increasing the risk of inefficiencies and different side effects (1). In aging organism certain bodily functions are reduced. Therefore, a therapy that was preventative and rational can be obsolete in geriatric patients (>65 years) (2). Elderly patients are often inadequately treated even with the condition that they have the correct diagnosis. Predisposing factors are psychological changes associated with aging, and multiple pathological conditions requiring complex drug therapy (3). Geriatric patients generally have a number of different diseases and symptoms. They have prescribed different medications sometimes even for the natural signs of aging. That is the reason that the symptoms and the disease eventually do not respond to treatment. For example, edema due to cardiovascular disease may not require medication if a person loses weight or is not subject to the same physical effort as before (4, 5).

Polypharmacy (lat. polypragmasia) is the administration of multiple medications together (2, 6, 7, 8, 9). The aging process affects the systemic effect of drugs in humans: slows down the absorption, metabolism and elimination of drugs which can delay the beginning of effective action. Due to the decline of renal function there is reduced elimination, and increased accumulation and toxicity of the drug especially after taking repeated doses (4). There are more and more new drugs and the spread of unapproved indications. It’s getting harder to know the toxicology of the drug and/or drug-drug interactions (6).

Consumption of drugs in older patients is proportionally higher according to their proportion in the population. In Sweden on the total population, the prevalence of elderly persons was 8%, and they use 25% of all prescribed drugs (7, 8, 9). It turned out that 90% of the elderly take at least one drug. Outpatients taking the average of three drugs, and residents of homes for the elderly even eighth most commonly prescribed drugs for senior gastrointestinal diseases, cardiovascular diseases, analgesics, anti-rheumatic and anti-depressants. The use of these drugs increases with age (9, 10). There was a statistically significant relationship between the number of drugs used by the women and increased risk of side effects.
Approximately 10-14% of geriatric patients are hospitalized because of adverse reactions (11). Sometimes there is classic oversight so unrecognized side effects impute disease and prescribe a new drug. Because of unnecessary new therapies patients are exposed to the risk of new side effects. Sometimes it is unfortunate that the patient suffers from side effects for months, which gradually leads to functional disability (12). It is similar with drug interactions. The number of interactions increases with the number of drugs (13, 14).

Two of the common mental status changes in geriatric patients are dementia or cognitive decline and depression. Today it is estimated that more and more different types of neuropsychiatric disorders exist among the elderly. Changes in mental status may have long-lasting effect on elderly patients and their families (15). The term dementia, namely dementia syndrome denotes a complex disorder of different cognitive activities to reflect changes in the normal function of the human brain. Dementia is characterized by deterioration of previously acquired mental functions, which lead to reduction of or inability to perform daily activities. This is one of the most serious disorders that affect people of third age (16). It is characterized by weakening of memory and reducing the functionality usually in two or more areas of cognition. There may be various changes in behavior, indifference, inaction, or irritability. Mood swings are often present, sometimes as apathy or depression or inappropriately elevated mood. It should be said that the emergence of mild forgetfulness do not automatically mean dementia. Forgetfulness is not always a sign of illness, so if it over 6 months does not worsen is not on the initial degree of dementia (16, 17). Lack of cognitive function due to dementia is important to the extent that affects the physical and social function of the patient and its relations with others (18).

Elderly people often suffer from depression, and that their environment does not notice because they do not connect their symptoms with a mental illness. Most often complain of physical problems such as problems with digestion, headaches, joint pain, muscle and back pain. Detailed examination and questions about sleep disturbance, loss of appetite, concentration, memory, and to a lesser extent due to previous activity is detected by reduced motivation and depression. Depression is more common in the elderly with a prevalence of 20%. There is greater number of complications including inability to care for themselves and their own health. More common is the development of psychotic symptoms and the number of completed suicides (15).

The effect of any medication on the patient’s electrolyte profile may contribute to changes in mental status (19-21). Elderly patients are more susceptible to common therapeutic concentrations of benzodiazepines. Barbiturates, phenytoin, and benzodiazepines are the cause of deterioration of some basic human abilities: concentration, mental energy, mood and memory. For benzodiazepines was confirmed causality of anterograde amnesia (22). After cimetidine was first used in the treatment of peptic ulcer treatment have been published reports about the effects of a drug to change the cognitive status when the drug is used in large doses (23). It was confirmed that the adverse reaction of beta-blockers is mental depression, and barbiturates can cause confusion and decrease cognitive abilities (21, 22, 23) (Table 1). Ever since the introduction of reserpine in 1950 it was clear that it empty the depot of catecholamine and serotonin and can cause depression (4,19).

This study was undertaken as a research of this complex public health problem of polypharmacy that can if preventive actions are not taken, to significantly reduce the quality of life of geriatric patients and their families. Polypharmacy can be a major cause of irreparable damage and lead to diminishing functional ability and independence of elderly patients. This is because the polypharmacy resulting in decline of cognitive ability and depression. A special task of this study was to assess the current situation.

2. METHODS

Randomly were interviewed 54 patients-respondents, age >65 years, of both sexes in the family medicine clinic “Potok” in the Primary Health Care Center Zenica in the period from April 1st 2010 until May 1st 2010. The subjects are regularly treated in the above clinic and were using a different number and types of medications. Factor in the selection and comparability among the respondents was polypharmacy. Polypharmacy (lat.polypragmasia) is the administration of multiple medications together. It means unjustified, often found prescription drugs more safely without present indications and the likelihood that the patient with often have unwanted and toxic effects in the interaction of these drugs (1). It is estimated that older patients were subjected to polypharmacy to a greater extent than necessary, so we wanted to verify this hypothesis (2).

Design and research instruments

In the design of the research task was to create and record lists of the most commonly used drugs from 1-10 for each patient, record their preparations, body mass index-BMI, dose of drugs used and the signature of the used drugs. In the design of the research is used a survey that contained additional questions about living conditions (alone or in a family environment), on the use of vitamins and other products for self medication, alcohol consumption, smoking, morbidity, disease history and content of everyday activities. The sample was distributed to collect relevant data on polypharmacy (the use of ≥ 3 drugs in tested population), treatment and other relevant factors of importance for the study of medical records in family medicine teams. Finally made are two groups (those who use less than three drugs and a group of patients with three or more regularly used drugs) in both groups was carried out Short Portable Mental Status Questionnaire. The Short Portable Mental Status Questionnaire-SPMSQ for the assessment of the reduction of mental capacity in elderly patients (25). The questionnaire was completed by a health worker team selected doctor, and does not require the patient to fill out the questionnaire so it can be applied to patients with physical defects or for patients of limited mobility. Data on population and mental disorders in geriatric patients have been used by the projections of the Federal
Bureau of Statistics of B&H. Registering of the disease was made according to the tenth revision of International Classification of Diseases, Injuries and Causes of Death (ICD-10). Statistical analysis is done by the standard tests of descriptive statistics with measures of central tendency and dispersion. Quantitative variables are tested by Student t-test if they were normally distributed or Mann-Whitney-test if they were distributed asymmetrically. Qualitative variables are tested by chi-square test with continuity correction. All tests were leveled with the level of statistical significance of 95% (p<0.05).

### 3. RESULTS
The population of B&H is an older society, which is confirmed by the demographics of increasing the participation of elderly in total population since 1961 until 2003 (3.5%, 15.4%). Participation of elderly in the total population was 15.4% (Table 2). Leading mental disorders of the elderly people in the FB&H are shown in Table 3. The most common disorders are depression and neurotic disorders, stress related (39%), affective disorders (27%), dementia (5%) and others. In the sample of randomly selected 54 patients who regularly come into the family medicine clinic for check-ups, age >65 years (according to their regular therapy), and possibly as patients with some new problems, there were 36 female and 18 male patients (Table 4). There was a statistically significant difference in participation of women compared to men (P=0.001). Within polypharmacy (with three or more drugs used) were 26 patients, of which with 3 regularly taken drugs were 17 patients, and 9 were using more than 3 drugs (Table 5). Of the total number of patients who received polypharmacy 19 of them used 2 drugs, five were using 1 medication and only 4 patients were not generally used any regularly used therapy.

From the most commonly used drugs were drugs for treatment of cardiovascular diseases, antiabetic, long-acting benzodiazepines, anti-inflammatory drugs (results not shown but are comparable with Table 1). Out of the total number of respondents 36 living in the family environment (house or flat), and 18 of them living alone (Table 6).

After analysis of results from Short Portable Mental Status Questionnaire, we found a significant decline in cognitive abilities in patients with polypharmacy. Decline in cognitive abilities is observed in 23 of 54 patients. In tested group median functional dementia scale was 30 with interquartile ranging from 26 to 40, while in the control group was 28 with interquartile range of 24 to 37. This difference was not statistically significant (Mann-Whitney test, Z=1.67, p=0.010) between groups.

### 4. DISCUSSION
In the treatment of elderly patients should seek the correct diagnosis, from which is derived a rational pharmacotherapy based on the guaranteed minimum number of effective drugs with known side effects. Many of the diseases from which suffer patients of so called elderly age cannot be treated with medication. The same dose may have due to individual characteristics different effects in different patients. Inter or even intra individual variations are often much more pronounced. Doctors must be aware of the origin of these variations to prescribe safe and effective medicines. Variations can be caused by different concentrations of the drug at...
the site of action or different responses to the same drug concentration. The first type of variations is pharmacokinetic, which arise due to differences in resorption, distribution, metabolism and excretion. The second type is the pharmacodynamic (1, 2, 3, 4). Important factors responsible for variations in the effects of the drug were: ethnic origin, age, pregnancy, genetic factors, idiosyncrasy reactions, disease and interactions between drugs (4, 22, 26). The main reason that age influences the effect of the drug is the fact that the elimination of the drug is less effective in newborns and the elderly, and drug causes long-lasting and powerful effect in these age groups (14). Some pathological factors such as hypothyroidism, which is common in older people, also change the effect of the drug. The composition of body fluids vary with age, adipose tissue is in a higher percentage of body mass, and all this leads to changes in the volume of drug distribution. The elderly take more medications than younger people, so the potential for drug taking is greater (23).

In the Federation of B&H since 1992 until 2008 the structure of the population has greatly changed because of war casualties in these areas. Killed was 250 000 people, 17 000 are missing and 2.2 million people were running from their homes. However, older adults showed an increasing trend (27).

Irrational and inappropiarte is the provision of more therapeutic agents for which there is no evidence of the usefulness of the treatment. Rational drug therapy reduces the number of unwanted interactions, but the public pressure in terms of poly therapy, polypharmacy in fact, is stronger. It is not easy to resist therapeutic evangelism, which often comes from non-critical circle of experts. Using more than three drugs pose a significant risk factor for the occurrence of adverse reactions in elderly people. To assess that risk a family doctor (family doctor and nurse) must pay special attention to drugs that a patient is taking. Should always be carefully evaluated, which drugs are introduced in the last 4 weeks. Often we forget to ask for drugs that are used without prescription or herbal remedies that can also cause adverse reactions: sedatives, hypnotics, anxiolytics, especially long-acting benzodiazepines—diazepam (24).

As there is no justification to treat every symptom of disease, so there is no justification, for example, at the same time to prescribe two drugs from the same group. Older people usually take 4-5 medications daily. Sometimes it comes to more than 6 different drugs during the day, so the range is 3-12 drugs (3). It is necessary in the elderly to seek the simplest possible application of medicines, because some conditions can have completely non-specific symptoms. In particular, the patience is necessary to communicate with patients, especially in older people who have a fear that they will not understand and remember the most important (4). Nearly three quarters of elderly people take on their own initiative medications that are not prescribed (5). Average number of prescribed drugs per person increased from 67% in middle-aged persons to 12.8% in those aged 65 and over (11). As a rule, older people are more sensitive to the application of conventional doses of drugs used in middle age, but among them also unwanted drug reactions (side effects) and drug poisoning is more frequent (4, 28).

5. CONCLUSION
Health status, health needs and functioning of the elderly population varies considerably in relation to other population groups. To estimate the risk of adverse reactions that are harmful to mental health by family practitioners (doctors and nurses) need to pay special attention to drugs that a patient is taking. Always be careful to evaluate the drug included in treatment during the last four weeks. Often we forget to ask for drugs that are used without prescription or herbal remedies that can also cause adverse reactions: sedatives, hypnotics, anxiolytics especially long-acting benzodiazepines—diazepam (24). Overall, the treatment of older patients is complex and rating of pharmacotherapy was not an easy task. For successful drug therapies, the key question is in individual approach to every geriatric patient. To successfully accomplish the task, doctor prescribing the medication must be well acquainted with all the beneficial and harmful effects of each drug (7-8). General Geriatric Questionnaire for future research should include assessment of polypharmacy severity, rapid questionnaire to assess cognitive abilities decline, symptoms and signs of geriatric depression, BMI records, and questions about confounding variables, smoking, alcohol and self-medication.

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