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CLINICAL STUDY

The use of antiplatelet medication in hospitalised elderly patients

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ABSTRACT

BACKGROUND: The use of antiplatelet agents is strongly recommended for the secondary prevention of ischemic events such as myocardial infarction, stroke/transient ischemic attack (TIA).

OBJECTIVES: The aim of our study was to analyse the use of antiplatelet medication in patients after myocardial infarction, stroke/TIA, and patients with both conditions and to identify patient-related characteristics, which determine the use of such drugs in elderly patients.

METHODS: Study sample (n = 372) was derived from 2,157 patients admitted to long-term care departments of three municipal hospitals. The study included patients aged ≥65 years after myocardial infarction, stroke/TIA or both.

RESULTS: Antiplatelet medications were prescribed in 54.8 % and 68.5 % of patients at hospital admission and discharge, respectively. Hospitalisation led to a significant increase in the use of antiplatelet medication in patients after myocardial infarction and in those with the combination of both events. However, in patients after only stroke/TIA, we did not find any significant difference comparing the use of antiplatelet medication at the time of hospital admission and discharge, respectively.

CONCLUSION: Our study revealed that physicians are more aware of the benefits of antiplatelet medication in elderly patients after myocardial infarction or those after both myocardial infarction and stroke/TIA in comparison with patients after only stroke/TIA *(Tab. 3, Ref. 32)*. Text in PDF *www.elis.sk.*

KEY WORDS: myocardial infarction, cerebrovascular, stroke, transient ischemic attack, bleeding risk, thrombotic event.

Introduction

Nowadays, cardiovascular diseases represent the leading cause of mortality in Europe, contributing to almost 47 % of all deaths in Europe. Coronary heart disease and stroke are responsible for 21 % and 12 % of all deaths, respectively. Up to 82 % of deaths caused by coronary heart disease and 86 % of all strokes occur in people aged 65 years or older (1). In Slovakia, cardiovascular diseases represented the cause of mortality in 29 % of younger adults (aged < 65 years) in 2011, whereas in elderly population (aged ≥ 65 years) cardiovascular diseases contributed to 62 % of all-cause mortality over the same period (2).

Both myocardial infarction and stroke are associated with the risk of recurrence of thrombotic events. In patients after an acute coronary syndrome, the risk of reinfarction is estimated at 7 % during the next three years. The risk of stroke in patients after myocardial infarction reaches 2 % (3). After ischemic stroke, the risk of recurrence is estimated at 11% during the first year, and 26 % during the first 5 years (4). After a transient ischemic attack (TIA), the risk of stroke varies from 3 % to 19 % within following 90 days (5). For the reasons mentioned above, the use of antithrombotic agents is strongly recommended for the secondary prevention according to guidelines for treatment of such conditions (6, 7).

Despite underrepresentation of elderly patients in clinical trials, there is a sufficient evidence of the benefit of the use of antiplatelet medication in elderly patients after myocardial infarction, stroke or TIA (8). Since older patients are at increased risk of mortality, they could have a greater absolute benefit from guideline-recommended therapies (9, 10). Nevertheless, the underuse of beneficial cardiovascular medication, such as antiplatelet agents, in elderly patients has been described in several studies (11–15). Underuse of antiplatelet medication in patients with established atherosclerotic disease of coronary or cerebral arteries is listed also in START criteria (Screening Tool to Alert Doctors to the Right Treatment)

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(16, 17). These criteria summarise clinical situations, in which the absence of the use of beneficial medication represents a common issue. The increased perception of the risk of bleeding by prescribing physicians has been considered as the reason for the underuse of antiplatelet drugs (18). The absence of the administration of such beneficial medication is accompanied by an increased risk of thrombotic events (e.g. myocardial infarction, stroke). These events are associated with an increased morbidity and mortality and, moreover, they may lead to disability with a serious negative consequences for the quality of life.

The aims of our study were: a) to analyse the use of antiplatelet medication in patients with a history of myocardial infarction, stroke/TIA, and patients with both conditions; b) to evaluate the influence of hospitalisation on the use of such medications by comparing their prescription at the time of hospital admission and discharge, respectively; c) to identify patient-related characteristics, which determine the use of antiplatelet drugs. Studies, which evaluated the underuse of antiplatelet medication were focused mostly on a sole medical condition (myocardial infarction or stroke) (14, 15, 19). To our knowledge, there is no similar study, which evaluates and compares the effect of hospitalisation on the use of antiplatelet medication among patients after different thrombotic events, such as myocardial infarction or stroke/TIA or both.

Methods

The study sample (n = 372) was derived from 2,157 patients admitted to long-term care departments of three Slovak municipal hospitals (Malacky, Nitra, Ilava) between January 1, 2008 and December 31, 2009. The same source was used also in the previous evaluation (20). The study included only patients aged ≥ 65 years, those with history of cerebrovascular ischemic event (stroke or TIA), myocardial infarction or both. Patients with contraindications for antiplatelet therapy–with haemorrhagic conditions (e.g. haemorrhagic stroke or haemorrhagic peptic ulcer) were excluded from the study. Patients with an acute stroke or acute myocardial infarction or atrial fibrillation, those who died during hospitalisation, and patients with an incomplete documentation for our analysis were not included in the study. Of 2,157 patients hospitalised during the study period, 372 patients met the criteria described above and formed the study sample for our evaluation.

Demographic characteristics (age, gender), data on social status (living alone or with somebody else), immobilisation and comorbid conditions were recorded for each patient. Comorbid conditions were documented in line with the 10th Edition of the International Classification of Diseases (21). The drugs prescribed were abstracted from hospital charts. The following antiplatelet medications were recorded in our study population: aspirin, ticlopidine, clopidogrel, combination of aspirin with dipyridamole. The use of anticoagulation therapy was also registered (warfarin, heparin or low molecular weight heparins) where such medication was administered. The administration of antiplatelet and/or anticoagulation medications was evaluated separately at the time of hospital admission and discharge, respectively.

Data for our study were excerpted from patient's medical records. The rules of personal data confidentiality as well as all ethical and legal principles were fully respected.

Evaluation of the use of antiplatelet medications

For the analysis of the influence of hospitalisation on the use of antiplatelet medications, the study sample was divided into three groups: a) patients with history of myocardial infarction; b) patients with history of stroke/TIA; c) patients with history of both conditions: myocardial infarction and stroke/TIA. To determine the effect of hospitalisation, we compared the use of antiplatelet medication separately in three groups mentioned above at the time of hospital admission and discharge, respectively.

In order to evaluate the influence of patient-related characteristics on the use of antiplatelet medication, we divided the study sample into two groups. Patients taking at least one antiplatelet drug created the group of antiplatelet medication users, and those without any antiplatelet agent formed the group of antiplatelet medication non-users. We compared the presence of selected factors (demographic characteristics, living alone, immobilisation, comorbid conditions and the use of anticoagulation therapy) between the groups of antiplatelet medication users and non-users. These analyses were performed separately at the time of hospital admission and discharge, respectively.

Statistical analysis

Categorical variables were characterised by frequencies and percentages. Continuous variables were expressed as the means ± standard deviations.

To compare continuous variables between the two groups, the Mann-Whitney U test was applied. The reason for the use of this non-parametric test was the non-Gaussian distribution of evaluated variables. The normality of distribution was tested using the Kolmogorov-Smirnov test. The use of antiplatelet medications at the time of hospital admission and discharge was compared by the McNemar test. The distribution of categorical variables between the groups of antiplatelet medication users and non-users was evaluated using the χ^2 test.

In order to identify the most important characteristics of the use of antiplatelet medication, the binary logistic regression model was applied. The odds ratios and 95 % confidence intervals of odds ratios were determined for patient-related characteristics of antiplatelet medication users.

All statistical tests were carried out at a significance level of $\alpha = 0.05$. The statistical software used was SPSS for Windows, version 20 (IBM SPSS Inc., Chicago, IL, USA).

Results

The mean age of patients of the evaluated group (n=372) was 77.5±6.5 years. Women (n=210; 56.5 %) were prevailing over men (n=162; 43.5 %). We did not find any significant difference in the age between men and women (77.4±6.8 vs 77.7±6.3 years; p=0.839 according to the Mann-Whitney U test).

Although the prescription of antiplatelet medication was fully

Tab. 1. Comparison of the use of antiplatelet medications at hospital admission and discharge among patients after myocardial infarction, stroke/TIA and combination of both.

Thrombotic event	At admission		At discharge		p
	Antiplatelet medication non-users	Antiplatelet medication users	Antiplatelet medication non-users	Antiplatelet medication users	
Myocardial infarction (n=107)	55 (51.4)	52 (48.6)	29 (27.1)	78 (72.9)	**<0.001**
Stroke (n=207)	99 (47.8)	108 (52.2)	83 (40.1)	124 (59.9)	0.061
Myocardial infarction and stroke (n=58)	14 (24.1)	44 (75.9)	5 (8.6)	53 (91.4)	**0.004**

Values represent the frequency, the percentages are provided in brackets (% of n).
p–statistical significance according to the McNemar test. In case of statistical significance, the values are expressed in bold.

Tab. 2. The univariate analysis of the influence of patient-related characteristics on the use of antiplatelet medication.

Factor	At admission			At discharge		
	Antiplatelet medication non-users (n=168)	Antiplatelet medication users (n=204)	p	Antiplatelet medication non-users (n=117)	Antiplatelet medication users (n=255)	p
Socio-demographic and clinical characteristics						
Age ≥75 years	110 (65.5)	133 (65.2)	0.955	80 (68.4)	163 (63.9)	0.402
Age ≥85 years	33 (19.6)	23 (11.3)	**0.025**	23 (19.7)	33 (12.9)	0.093
Female sex	95 (56.5)	115 (56.4)	0.973	66 (56.4)	144 (56.5)	0.991
Living alone	25 (14.9)	34 (16.7)	0.639	18 (15.4)	41 (16.1)	0.865
Immobilisation	37 (22.0)	57 (27.9)	0.191	36 (30.8)	58 (22.7)	0.098
Anticoagulation therapy	38 (22.6)	9 (4.4)	**<0.001**	58 (49.6)	25 (9.8)	**<0.001**
Comorbid conditions						
Arterial hypertension	154 (91.7)	178 (87.3)	0.172	99 (84.6)	233 (91.4)	0.051
Heart failure	52 (31.0)	89 (43.6)	**0.012**	51 (43.6)	90 (35.3)	0.126
Diabetes mellitus	71 (42.3)	111 (54.4)	**0.020**	59 (50.4)	123 (48.2)	0.695
Anaemia	39 (23.2)	35 (17.2)	0.145	27 (23.1)	47 (18.4)	0.297
Chronic renal insufficiency	83 (49.4)	115 (56.4)	0.180	71 (60.7)	127 (49.8)	0.051
Depression	14 (8.3)	36 (17.6)	**0.009**	20 (17.1)	30 (11.8)	0.162
Dementia	23 (13.7)	41 (20.1)	0.103	26 (22.2)	38 (14.9)	0.082

Values represent the frequency, the percentages are provided in brackets (% of n). p–statistical significance according to the χ^2 test. In case of statistical significance, the values are expressed in bold.

indicated in all patients of the study sample, antiplatelet drugs were prescribed only in 204 (54.8 %) and 255 (68.5 %) patients at hospital admission and discharge, respectively. Hospitalisation led to a significant increase in the use of antiplatelet medication ($p < 0.001$ according to the McNemar test). The comparison of the use of antiplatelet medication at the time of hospital admission and discharge stratified by comorbidities of interest (myocardial infarction, stroke/TIA, and a combination of both conditions) is shown in Table 1.

The results of the univariate analysis of the influence of patient-related characteristics on the use of antiplatelet medication are summarised in Table 2. The most important characteristics of antiplatelet medication users were identified in multivariate analysis using the binary logistic regression model (Tab. 3).

Discussion

The most important findings of our study could be summarised in the following points:

Firstly, an overall underuse of antiplatelet medication was found in our study group of elderly patients. Despite the fact that our study included only patients without contraindications for antiplatelet medication use, such drugs were prescribed only in 54.8 % and 68.5 % of patients at hospital admission and discharge, respectively. Secondly, hospitalisation led to a significant increase in the use of such medication. This result could be considered as a positive effect of the re-evaluation of medication in elderly patients by hospital physicians. Thirdly, the differences in the increase of the use of antiplatelet medication among evaluated groups with comorbid conditions of interest (myocardial infarction, stroke/TIA, or both) represent the most important finding of our study. Hospitalisation led to a significant increase in the use of antiplatelet medication in patients after myocardial infarction and in those with the combination of both events (myocardial infarction and stroke/TIA). However, in patients with a history of only cerebrovascular ischemic events (stroke/TIA), we did not find any significant difference comparing the use of antiplatelet medication at the time of hospital admission and discharge, respectively. Fourthly, following comorbid conditions, as factors increasing the patient's probability of the prescription of antiplatelet medication appeared: heart failure, diabetes mellitus and depression at hospital admission and arterial hypertension at hospital discharge. On the other hand, age ≥ 85 years and the concomitant use of anticoagulation therapy (warfarin, heparin or low molecular weight heparins) represented factors associated with a decreased probability of the patient being prescribed antiplatelet drugs both at hospital admission and discharge, respectively.

Tab. 3. The multivariate analysis of the influence of patient-related characteristics on the use of antiplatelet medication.

Factor	At admission			At discharge		
	OR	95% CI	p	OR	95% CI	p
Socio-demographic and clinical characteristics						
Age ≥75 years	1.42	0.83–2.43	0.198	1.64	0.89–3.04	0.114
Age ≥85 years	0.36	0.18–0.73	**0.005**	0.47	0.23–0.97	**0.041**
Female sex	0.70	0.44–1.13	0.150	0.74	0.42–1.28	0.276
Living alone	1.18	0.62–2.25	0.609	1.75	0.81–3.75	0.153
Immobilisation	1.74	0.98–3.10	0.058	0.75	0.41–1.39	0.366
Anticoagulation therapy	0.10	0.04–0.25	**<0.001**	0.08	0.04–0.16	**<0.001**
Comorbid conditions						
Arterial hypertension	0.57	0.25–1.31	0.186	2.74	1.26–5.98	**0.011**
Heart failure	2.46	1.49–4.07	**<0.001**	0.91	0.54–1.54	0.725
Diabetes mellitus	1.91	1.19–3.07	**0.007**	1.16	0.68–1.97	0.588
Anaemia	0.72	0.38–1.34	0.298	1.11	0.58–2.13	0.747
Chronic renal insufficiency	1.39	0.84–2.31	0.202	0.61	0.34–1.10	0.100
Depression	2.09	1.02–4.31	**0.044**	0.91	0.43–1.93	0.799
Dementia	1.55	0.81–2.95	0.187	0.75	0.39–1.45	0.391

OR–odds ratio; CI–confidence interval; p–statistical significance in the logistic regression. In case of statistical significance, the values are expressed in bold.

Similarly to our study, Maggioni et al (14) reported an overall underuse of antiplatelet medication in a large sample of 7,082 patients (mean age 72 ± 13 years) hospitalised for an acute coronary syndrome. Of the patients discharged alive, 65.8 % were treated with an antiplatelet drug. In contrast to our results, Vermeer and Bajorek (22) reported good adherence to evidence-based guidelines for secondary prevention of acute coronary syndrome. In the group of their study, as many as 96 % of eligible patients received antithrombotics comprising at least aspirin. Also Lee et al (12) reported the 99 % rate of antiplatelet medication prescription in patients with acute myocardial infarction (n = 9 294).

In line with the results of our study, Volpato et al (23) found a considerably high rate (more than 40 %) of patients with acute ischemic stroke or TIA without prescription of antithrombotic therapy at hospital discharge. In a cross-sectional survey carried out by Filippi et al (11), in family practice more than one quarter of patients with a history of stroke or TIA were not treated with antithrombotic agents.

In our study group, advanced age of ≥ 85 years has negatively influenced the prescription of antiplatelet medication at hospital admission and discharge, respectively. This result could be explained by an increased perception of the risk of bleeding by prescribing physicians. In the analyses of Yan et al (24) and Lee et al (12), beneficial cardiovascular therapy, including antiplatelet medication, β-blockers, angiotensin-converting enzyme inhibitors and lipid modifying therapy were evaluated in patients with acute coronary syndromes. Similarly to our results, advanced age appeared as a negative predictor of the use of beneficial therapy in both studies. Pereira et al (15) reported a decreased likelihood of patients aged ≥ 80 years after myocardial infarction with ST-segment elevation to be prescribed aspirin or the combination of aspirin with clopidogrel at hospital discharge. In contrast to our results, age ≥ 65 years was correlated positively with the prescription of antiplatelet/anticoagulant drugs in the study of Filippi et al (11) who evaluated the secondary prevention in Italian stroke patients. Also Asberg et al (19) found increased odds for the prescription of antiplatelet medication in the oldest patients after ischemic stroke (≥ 85 years) in comparison with the youngest participants of their study (18 to 64 years of age).

Chronic heart failure seemed to be a factor increasing the probability of patients in our study sample to be prescribed antiplatelet therapy at hospital admission. This result may be considered positively as patients with heart failure are at increased risk of thrombotic events (25). In contrast to our study, patients with signs of chronic heart failure were less likely to receive aspirin and lipid-lowering agents in the study of Roe et al (26).

Diabetes mellitus was shown as a factor increasing the likelihood of a patient to be prescribed antiplatelet agents at hospital admission in our study sample. In line with our study, Filippi et al (11) reported diabetes mellitus as a factor positively influencing the prescription of such medications in patients with diagnosis of stroke or TIA.

Patients suffering from depression had an increased chance of being prescribed antiplatelet medication at hospital admission. This result could be associated with the common occurrence of depression among patients after stroke or those with coronary heart disease (27, 28).

In our study, arterial hypertension increased the probability of a patient to be prescribed antiplatelet medication at hospital discharge. Arterial hypertension represents one of the most important risk factors of stroke or myocardial infarction (25, 29, 30).

In our study, anticoagulation therapy seemed to be an important factor decreasing the probability of antiplatelet medication prescription both at hospital admission and discharge. This result reflects the increased physicians' awareness of the bleeding risk of such combination. The combination of aspirin with warfarin is associated with a 2-fold increased risk for serious bleeding complications. Combination of warfarin and aspirin should be used cautiously after careful consideration of both risk factors for thrombosis and risk factors for bleeding. The use of such combination is reasonable to consider e.g. in patients after acute myocardial infarction with chronic atrial fibrillation or venous thromboembolism (31, 32). However, patients with atrial fibrillation were not included in our study sample.

Several studies evaluated the use of antiplatelet medication in elderly patients (14, 15, 19). Most of these studies were focused solely on patients with a condition of stroke or myocardial infarction. The contribution of our study lies in the comparison of the effect of hospitalisation on the use of antiplatelet medication among patients after stroke or myocardial infarction or both. The retrospective design of our study provides limited opportunities to analyse the reasons for non-prescription of antiplatelet medications other than contraindications for their use (e.g. patient's individual intolerance or non-compliance). Despite these limitations, our study suggested certain differences in the awareness of physicians regarding the benefits of antiplatelet medication use among evaluated groups. It seems that physicians are more aware of benefits of such treatment in patients after myocardial infarction or those after both myocardial infarction and stroke in comparison with patients after only a cerebrovascular ischemic event (stroke/TIA).

Conclusions

Our study revealed an overall underuse of antiplatelet medication in patients with history of myocardial infarction and/or stroke/TIA, in whom such medication is fully indicated. The increase of the use of antiplatelet drugs during hospitalisation reflects the positive effect of the re-evaluation of pharmacological treatment by hospital physicians. The differences in the increase of the prescription of antiplatelet drugs among groups of patients after myocardial infarction or stroke/TIA or both indicate the necessity to pay special attention to the benefits of such medications in patients following stroke during the courses of continual medical education.

Learning points

- Overall underuse of antiplatelet medication was found in our study group of elderly patients.
- Hospitalisation led to a significant increase in the use of antiplatelet medication in patients after myocardial infarction and in those with the combination of both events (myocardial infarction and stroke/TIA).
- In patients after only stroke/TIA, we did not find any significant difference comparing the use of antiplatelet medication at the time of hospital admission and discharge, respectively.

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