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Most common cardiovascular diseases of the elderly – A review article

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REVIEW ARTICLE



ABSTRACT

Number of people over 65 years is continuously increasing and represents an ever growing proportion of population even in Hungary. Medical treatment of the elderly implies a massive burden for the healthcare system. Special knowledge is required to provide an appropriate medical care for the elderly. During the ageing process, several changes accumulate in the body and several chronic diseases develop. Function of parenchymal organs is impaired, healing process is slower, clinical manifestations of diseases are not so prominent, the diagnosis is often difficult to establish. Moreover, treatment possibilities also differ, because pharmacokinetics and pharmacodynamics of drugs are different from that of young patients. Communication with older patients is also cumbersome, participation of a relative or caregiver at consultation can be useful. Cardiovascular diseases remain the leading cause of death of adults over the age of 65. Among these diseases congestive heart failure, coronary artery diseases, hypertension, atrial fibrillation have the greatest significance.

KEYWORDS

elderly, ageing, geriatric, multimorbidity, polypharmacy, cardiovascular diseases

INTRODUCTION

Epidemiology of the elderly

Proportion of people aged 65 and over was 20.6% in the EU population in 2020 and it is expected to reach 40.6% by 2050. This rate in Hungary was 19.9% in 2020 and is proposed to be even 30% by 2050 [1]. In the EU, at age 65 men and women expect to live 17.9 and 20.1 years respectively.

Healthy life years at the age of 65 are expected to be 9.4 years both in case of men and women. [2]. Because of the increased life expectancy, the main goal of geriatrics is not only to increase the number of healthy life years, but also to improve the quality of life of these years.

Older people require more frequent medical care and are more often admitted to outpatient surgery or sent to hospital. The proportion of the elderly among participants of the healthcare system is very high. People over 65 years represent approximately 40% of hospital discharged patients. The main determinants of healthcare costs are not only age, but comorbidities and proximity to death, especially the last 12 months of life, as well [3]. Improving the well-being of older people is therefore not only a humanitarian issue but an economic necessity as well.

Classification of the old population

With an increasing lifespan, people live decades over 65. A better classification for the elderly is based upon functionality rather than age years alone. According to this, we can confine “young-old” “old”, and “old-old” elderly. While the “young-old” are people who are active

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and healthy, the “old-old” are people who have chronic illnesses, are frail, and manifest clinical symptoms of diseases [4]. It is worthy to emphasise that the elderly is not a homogenous population, and treatment schedules and predictable prognoses may be quite different for the patients.

Main clinical characteristics of disease manifestation in the elderly

The main characteristic feature of patients over 65 is multimorbidity. It means that two or more chronic diseases are present at the same time. Eighty percent of 65+ people have at least one chronic condition and 68% have two or more chronic illnesses [5]. These diseases can influence each other, one can worsen the other, and the applied therapy for each illness can also have an effect. The fine-tuning of balance of an old individual can easily be damaged. They can more easily be victim of stress (frailty). Because of multimorbidity, geriatric care should be highly complex, and a holistic approach is required.

Clinical appearance of illness in patients with advanced age is typically more smouldering than in case of younger patients. The onset of symptoms is not so pronounced, fever and pain are less prominent. Asymptomatic disease manifestation or presenting disease with only a few symptoms are also characteristic. Peptic ulcer may be symptomless; hyperthyroidism may manifest only with atrial fibrillation, which can remain unrecognised. These things make it more difficult to establish an appropriate diagnosis in time.

Because of their decreased pain sensation, which is an important self-protecting mechanism, it is also harder to determine the severity of a disease in elderly patients.

On the other hand, the healing process is much slower in older adults. Thus, the time for hospitalisation is longer than in case of younger patients.

Treatment specificity of the elderly

Older patients with multiple chronic diseases usually take several drugs. Polypharmacy means that the patient takes five or more drugs. The more the drugs, the higher the probability for drug-drug interactions. Renal impairment is also common, which may cause intoxication mainly in case of drugs with narrow therapeutic range. For the elderly, treatment plans should be constructed with small steps of dose modifications and with thorough observation of the patient. The treating process should be based on a holistic approach and should be carried out by a multi-professional team.

Family members. Because of the common cognitive impairment in older ages, as well as hearing loss and psychomotor retardation, the presence of a family member during medical consultation is highly important. A relative can help not only in the better understanding of the medical information but can give an emotional security to the patient. It is important because in case of frail patients all types of stress - including the medical examination itself - can be greatly harmful.

Education of the relatives or caregivers about the potential side effects of drugs, the symptoms of diseases, and the proper administration of drugs is important.

Most common diseases of geriatric patients

Most common chronic diseases include cardiovascular problems, diabetes, chronic obstructive pulmonary diseases (COPD), cancer, chronic renal failure, dementia, depression, osteoporosis, and osteoarthritis. A common feature of these illnesses is that their prevalence is increasing with age. The ten most common diseases and their frequency among the 65+ population is listed based on data from the National Council on Aging [5]: hypertension (high blood pressure) 58%, high cholesterol 47%, arthritis 31%, ischaemic/coronary heart disease 29%, diabetes 27%, chronic kidney disease 18%, heart failure 14%, depression 14%, Alzheimer's disease and dementia 11%, chronic obstructive pulmonary disease 11%.

Developments in Health Sciences (DHS) intends to launch a series of articles about the most common medical illnesses of geriatric patients; among these the present article is the first one dealing especially with cardiovascular diseases.

CARDIOVASCULAR DISEASES OF THE ELDERLY

The most common cardiovascular diseases of the elderly

Frequency of cardiovascular diseases is increasing with age. Prevalence rate of hypertension, congestive heart failure (CHF), coronary artery disease (CAD), arrhythmias, especially atrial fibrillation, peripheral arterial disease, valvular heart disease, and stroke is around 40% in people aged 40–59 years and 79–86% in patients aged 80+. Cardiovascular diseases (CVD) is still the leading cause of death of people over age 65. CVD are also responsible for 82% of all deaths in patients aged 65+ years [6].

Age-related features of cardiovascular diseases

Age related structural changes include increased left ventricular wall thickness, attributed to hypertrophy of myocytes with a progressive loss of myocyte numbers; increased fibrosis and calcification of the valves, and also the loss of cells in the sinoatrial node [7]. There are functional changes as well, such as changes in maximal heart rate, end-systolic volume, end-diastolic volume, contractility, prolonged systolic contraction, prolonged diastolic relaxation, and sympathetic signalling. Due to these functional alterations, compensatory responses impair [8].

Cardiac injury repair becomes increasingly defective with age, resulting in abnormal remodelling and also dysfunction [8].

Symptoms should refer to cardiovascular diseases

Patients experiencing exertional dyspnoea, progressive fatigue, palpitation or very slow heartbeat, dizziness, collapse,



and falling should be referred to cardiovascular examinations. Older people may often feel only uncertain discomfort around the chest. Particularly, the subgroup of patients with diabetes can present without or only with a mild pain in case of coronary artery ischaemia (it is called silent angina), which can thus remain unrecognised. Therefore, those patients with diabetes and CAD should be regularly screened for disease progression to detect the problem in time.

A special emphasis should be put on falls and syncope of older patients as a symptom of CVD.

Fatigue or exertional dyspnoea should not be overlooked either, because older people live a more sedentary life with less walking.

Coronary artery disease (CAD). Of those people who die because of CAD, about 80% belong to the 65+ population. CAD is present in 50% of elderly women and 70%–80% of men [9].

Traditional risk factors are hypertension, smoking, dyslipidaemia, diabetes mellitus, obesity, and sedentary lifestyle whose harmful effects accumulate over a lifetime [10].

Characteristic features of older patients with CAD are a more extensive coronary atherosclerosis than of younger adults, higher prevalence of multi-vessel disease, and the obstruction of the left main coronary artery [10].

Symptomless manifestation or disease with discreet symptoms is relatively common (60% in those 85 years or older), but the clinical consequences of a silent event are just the same as of a coronary heart event with alarming symptoms. A pitfall of silent ischaemia may be that preventive measures could not be applied in time. Prevention is of utmost importance because prognosis of myocardial infarction in the elderly is associated with poor prognosis. Dyspnoea is a very common presenting symptom, both for acute coronary syndromes and chronic CAD.

ECG is not informative in most of the cases, due to other common abnormalities (left ventricular hypertrophy, pace rhythm). Exercise testing is a standard method for diagnosing patients with coronary artery disease (CAD), but in case of older patients it is usually not possible to carry out, instead, nuclear and echo testing with pharmacological agents is used. Coronary arteriography is a safe and routine examination recommended for patients with advanced age as well.

Cardiac CT is a useful method for its negative predictive value in ruling out CAD.

The proportion of patients aged 70+ years dying within one year following a first myocardial infarction is much higher than that of aged 40–69 years [9]. Invasive interventions such as coronarography may offer better outcomes and may lower mortality, compared to medication in a subgroup of patients with old age. Standard of care for patients with myocardial infarction with ST elevation (STEMI), remains mechanical revascularisation with percutaneous coronary intervention (PCI) within 90 min. Thrombolysis is associated with an increased bleeding risk at elderly age.

Supporting the use of drug eluting stents (DES) vs. bare metal stents (BMS) for older CAD patients is not obvious.

Though DES can offer a more durable effect than BMS, bleeding risk is much higher.

Measures to improve mobilisation and avoid polypharmacy are important for older patients.

Hypertension. Elevated arterial blood pressure (BP) is significantly related to cardiovascular and all-cause mortality. Prevalence rate for the 60+ population is estimated to be over 60% [11]. People over the age of 65 years account for 70% of all adult hypertension in developed countries [12].

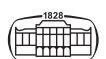
The most common form of hypertension in the elderly is isolated systolic hypertension (ISH). ISH is defined as systolic blood pressure (BP) ≥ 140 mm Hg and diastolic BP < 90 mm Hg and also an increase of pulse pressure (abnormal value is above 53 mm Hg) [13]. The most important factor in developing ISH is the increasing stiffness of the arterial wall in the elderly due to atherosclerosis which is inherent in the elderly [14].

It is very important to reach a target value of BP to avoid the hypertension-associated morbidities even in case of older people, though recommendations previously were more permissive. First line treatment of ISH include the thiazide-like diuretics (indapamide, chlorthalidone) and dihydropyridine type calcium channel blockers. Angiotensin-converting enzyme inhibitors or angiotensin receptor blockers are also recommended [15]. Combination of two or three antihypertensive drugs is often necessary to reach the desired BP goals. When the antihypertensive medication is designed, we should keep in mind the co-morbidities, tolerability of the patient, and also the clinical response. Management strategies should always be created on an individual basis.

On the other hand, overtreatment of hypertension may also cause serious problems in the elderly. Aggressive lowering of BP may be harmful in elderly patients due to the risk of target organ hypoperfusion. Hypotension may be connected with dizziness, falls, confusion, unconsciousness, or acute coronary heart syndrome. Though the SPRINT study demonstrated a better outcome for patients with more aggressive treatment mainly due to reduction of heart failure and cardiovascular death [16], lowering BP under 120 mm Hg is quite dangerous for the geriatric population and according to our experience it should not be recommended as a routine way of treatment.

Orthostatic hypotension is characterised by BP decreasing with at least 20 mmHg in standing from a lying position. It is more common in older adults, with a prevalence of as much as 24% of patients over age 65 [17]. The main causes are regulation disturbances of the ageing autonomic nervous system with an impaired baroreceptor sensitivity, severe volume depletion, and adverse effects of medications such as certain antihypertensive drugs (diuretics, calcium channel blockers), vasodilators like nitrates, and also antidepressants, antipsychotics, opiates, and alcohol. In the background of falls and collapses orthostatic hypotension should be explored and BP should be set to a safe level.

The other common phenomenon with low BP among geriatric patients is the postprandial hypotension (PPH). It is



characterised by >20 mmHg systolic fall of BP by 15–90 min after meal [18]. It occurs in up to one third of older people, mainly in those who are frail. Diabetes and diseases with an impairment of autonomic nervous system such as Parkinson's disease predispose patients to PPH. Symptoms include dizziness, light-headedness, faintness, and falls. It is an under-recognised cause of syncope of the geriatric patients. For those with serious symptoms, lifestyle modifications such as increased water intake before eating, lying down after meals, eating small, low-carbohydrate containing meals more frequently, and taking smaller dose of the antihypertensive drugs are recommended. Taking caffeine can also be helpful [19].

Heart failure. Incidence of congestive heart failure (CHF) continues to rise with increasing age. Only 17% of people with heart failure are less than 65 years of age [20]. The real prevalence of CHF is not known, probably due to a lack of diagnosis, as the reduced activity of old people is often attributed to “normal ageing” and is not considered to be a disease.

There are two main types of CHF: systolic and diastolic dysfunction, also referred to as heart failure with reduced or preserved ejection fraction (HFrEF and HFpEF). Quality of life and prognosis is similar in patients with either type of CHF. Rate of the elderly is higher in the HFpEF group. Hypertension is a leading cause of HFpEF and atrial fibrillation occurs more often in HFpEF than in the case of HFrEF.

Though signs and symptoms of CHF are similar in young and elderly people, unremarkable manifestation is more common in the elderly.

Diastolic heart failure is the primary haemodynamic dysfunction in the elderly. It is also called heart failure with preserved ejection fraction (HFpEF). Among patients over 80 years of age with clinically defined heart failure, up to 70% have preserved systolic function [21]. It is important to be aware of this high prevalence of diastolic dysfunction as it has implications for treatment.

Prolonged relaxation, diminished contraction velocity, decreased β -adrenergic response, and increased myocardial stiffness are prominent features of the senescent cardiomyocytes. This results in an impairment of the left ventricular diastolic function, which in turn contributes to the increased incidence of CHF and atrial fibrillation in the elderly [22].

HFpEF is now understood as a systemic syndrome, involving multiple organ systems, likely triggered by inflammation, and with an important contribution of ageing, lifestyle factors, genetic predisposition, and multiple comorbidities. All of the abovementioned factors are typical of a geriatric syndrome. HFpEF is commonly associated with other cardiovascular co-morbidities, such as hypertension and diabetes [23].

The clinical presentation of systolic and diastolic dysfunctions differs; patients with CHF caused by systolic dysfunction present with gradual worsening of daytime symptoms and paroxysmal nocturnal dyspnoea, whereas

those with diastolic dysfunction may present with a more abrupt onset of symptoms.

Diagnosis of diastolic dysfunction or HFpEF is often challenging in the elderly. The main symptom is dyspnoea provoked by physical activity. However, this symptom can appear in the course of a number of other conditions, even not cardiologic problems.

It is also hard to apply an effective medication for treating HFpEF. Aldosterone antagonist, ACE inhibitors, beta blockers, and angiotensin II receptor antagonists, which are effective for HFrEF, were failed to provide benefit in long term outcomes for patients with HFpEF [24]. At the moment there is no specific evidence-based therapy for treating HFpEF. New drugs that target the underlying inflammation, oxidative stress, and ageing-related dysfunctions may prove to be particularly effective for HFpEF. Prophylaxis may also have significance. Screening for and eliminating risk factors (such as obesity, smoking, and atrial fibrillation that predict new onset HFpEF rather than HFrEF years before symptomatic CHF develops) is useful.

Common geriatric conditions such as poor mobility, multiple disabilities, malnutrition, and cognitive impairment significantly affect the course of CHF, its management, and its prognosis in the elderly [25].

Frailty syndrome is defined as a state of reduced ability to recover from stress resulting from an age-related decline in reserves [26]. There is a higher prevalence of CHF among frailty patients and frailty syndrome significantly worsens the prognosis of CHF. Assessment of frailty is important to reduce the progression of CHF [27].

Atrial fibrillation. Atrial fibrillation (AF) is the most frequent type of arrhythmia affecting the general population and also the geriatric patients. The number of patients with AF is increasing and is expected to double by 2050 [28].

The prevalence of AF is increasing with age: while in those of under 49 years prevalence is ranged from 0.12 to 0.16%, in those aged 60–70 years it is 3.7–4.2% and beyond the age of 80 years, prevalence can be as high as 10–17% [29].

AF was found to be strongly predictive of future cardiac morbidity and mortality among older adults, even if asymptomatic.

The clinical significance of AF is its association with an elevated risk of ischaemic stroke. It has been documented that there is a 5-fold increase of risk of ischaemic stroke among AF patients [30].

The most prominent independent risk factors for the development of AF are age, hypertension, congestive heart failure, diabetes mellitus, coronary artery disease, and valvular disease; all of them have a greater prevalence in the geriatric population [8]. Anticoagulant therapy is crucial for reducing the risk of stroke for AF patients.

The main challenge is to find the very fine line between preventing stroke and not causing fatal bleeding when recommending oral anticoagulant therapy. Unfortunately, scoring systems for bleeding risk (HAS-BLED score) and thrombotic risk (CHADS2 or CHADS2-VASc score) of AF



patients contains very similar parameters. Hypertension, age ≥ 65 years, and previous stroke are common elements of both scoring systems. Meaning that those patients with elevated thrombotic risk, are often considered having elevated bleeding risk as well.

Although it is important to take all the factors, pro and cons, thoroughly under consideration, bleeding risk is generally over-estimated. Though age is an independent risk factor of AF, advanced age per se is not a contraindication for anticoagulant therapy. Indeed, CHADS2 scoring system involves increased age as a risk factor for ischaemic stroke. Frequent falls, lack of patient's compliance, previous peptic ulcer, or uncontrolled hypertension may be in the other pan of the scale. For those patients with paroxysmal AF with frequent alterations of the rhythm, anticoagulant treatment is particularly important.

Decision making should always be individualised, thoroughly thought about, and reassessed from time to time whether the risk of bleeding increased due to NSAID abuse, or it became dangerous to be anticoagulated because of frequent falls or the non-compliance of the patients. The focus is on the repeated assessment, therefore long-term care of these patients is highly important.

For those patients with contraindication of anticoagulant therapy, influencing the so-called “modifiable risk factors” such as body mass index (BMI), diabetes, obstructive sleep apnoea, and hypertension is substantial.

Types of anticoagulant therapy. Low molecular weight heparin (LMWH) is safe for the elderly. For those with impaired renal function, dose reduction may be necessary. Direct oral anticoagulants (DOACs) are not advised for patients with very high or very low BMI, neither for very old patients, nor for those with impaired renal function. Old people have brittle fluid balance, thus gastrointestinal infection or infection with fever can cause severe dehydration concomitant intoxication with DOACs. Patients with valvular AF should also be treated with other types of anticoagulants. Vitamin K antagonists, though their use is rather inconvenient, are effective and safe anticoagulants.

Screening for risk factors of cardiovascular diseases

Diabetes, obesity, hypertension, elevated level of total cholesterol, and low-density lipoprotein-cholesterol level are important risk factors for CVD.

Measures for prevention

Strategies for CVD prevention should start in childhood or in adolescence. These include prevention of the development of risk factors such as diabetes, obesity, and hypertension. Behaviour pattern of children and adolescents should be influenced in a positive direction. Smoking, sedentary lifestyle, and eating junk food should be avoided [31]. Regular dental care is also recommended. The accurate treatment of hypertension, AF, coronary artery disease, diabetes and atherosclerosis is a potent way of secondary prophylaxis. There is evidence that lipid-lowering treatment substantially

decreases the incidence of coronary heart disease in persons with dyslipidaemia [32].

Authors' contribution: KG wrote the manuscript, DM, AV, and ÁSz collected literature data and took part in the correction of the manuscript.

Ethical approval: This review was conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards.

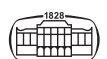
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ABBREVIATIONS

AF	(atrial fibrillation)
BMI	(body mass index)
BMS	(bare metal stents)
BP	(blood pressure)
CAD	(coronary artery disease)
CHF	(congestive heart failure)
COPD	(chronic obstructive pulmonary diseases)
CVD	(cardiovascular diseases)
DES	(drug eluting stents)
DOACs	(direct oral anticoagulants)
HFpEF	(heart failure with preserved ejection fraction)
HFrEF	(heart failure with reduced ejection fraction)
ISH	(isolated systolic hypertension)
LMWH	(low molecular weight heparin)
NSAID	(non-steroidal anti-inflammatory drugs)
PCI	(percutaneous coronary intervention)
PPH	(postprandial hypotension)
STEMI	(myocardial infarction with ST elevation)

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