Hypertension control in the Tunisian elderly

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Abstract

Background: Hypertension is a major public health problem. Despite therapeutic progress, blood pressure control remains insufficient particularly in the elderly. The aim of our study was to identify the factors associated with poor blood pressure control in the elderly in Tunisia.

Material and methods: We conducted a descriptive study including 101 Tunisian treated hypertensive patients, aged 65 years and over, followed on an outpatient basis between November and December 2019.

Results: Median age was 73 and sex ratio was 0.57. The major cardiovascular risk factor was diabetes in 60.4% of cases, followed by dyslipidaemia (48.5%) and smoking (40.6%). About 33% of the hypertensive patients realized regular physical activity and 31% had a high-sodium diet. Our patients were completely dependent in 4% of cases and among those aged 80 and over, 68.2% were frail. The prevalence of poor blood pressure control was 59%. Adherence to treatment was satisfactory in 75.2% of cases. In multivariate analysis, the factors associated with poor blood pressure control were: non-compliance with treatment [odds ratio (OR) = 0.19; p = 0.013], frailty (OR = 7.194; p = 0.004), the number of antihypertensive tablets (OR = 0.382; p = 0.008), non-use of thiazide diuretics (OR = 25.903; p = 0.001) and the patient's lack of knowledge of antihypertensive treatment (OR = 0.56; p = 0.008).

Conclusion: Detection of the risk of non-compliance, the use of combined treatments screening for frailty and informing the patient about his/her treatment are necessary to improve blood pressure control in our Tunisian context.

Key words: hypertension; aged; therapeutic adherence; blood pressure control

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Introduction

Hypertension (HTN) is a major cardiovascular risk factor and is associated with significant morbidity, severe disabilities and nearly 10 million premature deaths [1].

The prevalence of HTN differs from 30 to 45% in the general population. This prevalence increases with age and is higher than 60% for people over 60 years [2].

Several studies have shown the importance of blood pressure (BP) control in reducing the risk of cardiovascular events [3]. But despite the new therapeutic classes, fixed dose combinations and the updated guidelines on the management of HTN, only 30% of patients reach their target BP in Europe and the rate of BP control decreases with age [4].

In fact, BP control is more difficult in the elderly because of drug iatrogenia and the frailty of this population.

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In Tunisia, the prevalence of HTN was estimated to 30.6% in 2012 and 50.5% by the ATERA SURVEY between 2016 and 2019 [5]. Indeed optimal BP control was reached in 24.1% of treated hypertensive of all ages [6].

The aim of our work was to study the prevalence of BP control and the factors associated with its poor control in hypertensive elderly patients followed at the outpatient cardiology clinic at Habib Thameur Hospital in Tunis and the hospital Mahmoud Materi of Ariana.

Material and methods

We conducted a descriptive cross-sectional prospective collection study within the Cardiology consultation of Habib Thameur Hospital and Mahmoud Materi Hospital, between 11/11/2019 and 31/12/2019.

Elderly was defined by the World Health Organization (WHO) as any person whose age is 65 years or older [10]12,1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} , so the study included patients aged 65 and over, diagnosed with an essential HTN under drug treatment, followed-up at the cardiology outpatient consultation for at least 06 months. The patient was included randomly. An oral informed consent of the patient for participation in the study was taken. The level of oral comprehension (of the patient or his/her companion) enabling the semi-structured interview to be conducted was checked before the inclusion.

The non-consensual patients, those with secondary HTN or a psychiatric pathology which may hinder interrogation or a low level of understanding or cognitive impairments that may interfere with oral maintenance, were not included.

Questionnaires used

All the questionnaires were submitted during a semi-structured interview, by the same interviewer, and after translating the questions into Tunisian dialect. The respondent's consent to participate in the survey was requested orally. Anonymity has been ensured.

We collected:

- sociodemographic data (Age, gender, educational level, socioeconomic condition);
- clinical data (HTN history, HTN monitoring and adherence to treatment).

  Evaluation of drug adherence: the drug adherence score was evaluated by a visual scale of adherence EvalObs antihypertensive treatments [7]. The patient reports the number of times they have taken the antihypertensive treatment in the past 15 days. Therapeutic adherence was considered to be:

  a) unsatisfactory when the treatment was taken for less than 11 days out of 15,

  b) satisfactory when the treatment was taken for 11 days or more.

  Evaluation of the risk of therapeutic non-adherence: the EvalObs Pro application is a tool that has been developed to assess the risk of non-compliance of the treated hypertensive patient. This calculator allows, through 10 questions relating to the patient's personal characteristics and state of health, to stratify the risk of non-compliance as: low, intermediate or high [8].

  Assessment of causes of therapeutic non-adherence: The compliance questionnaire is used to help health professionals or the patient in self-assessment, to understand the reasons of poor compliance and to suggest solutions to improve it [8]. We asked all the patients the eight questions from the Que-obs application [8];
- risk factors associated (sedentary lifestyle, diabetes, smoking).

  Diet: Salt consumption was assessed by the quantity of bread and its salt content, the use of olives, pickles and the amount of salt in raw and cooked dishes. WHO recommends a salt intake of less than 5 g per day for all subjects whether or not they are hypertensive [16]. Therefore we considered any patient consuming more than 5 g per day as having a high salt diet.

  We assessed the patient knowledge of HTN (target blood pressure and complications of HTN) and treatment.

  Assessment of the patient's knowledge of high BP: we evaluated it during a semi-structured interview. The patient's knowledge of the pathology and its source of information, of the BP target of the treated patient, of cardiovascular complications of untreated HTN, of the hygieno-dietary measures associated with the treatment, of the treatment, its dosage and its dosing schedules and the benefit of treatment perceived by the patient.

Clinical data

BP measurement

Blood pressure was measured while sitting upright after resting for 5 min with a classic sphygmomanometer (Spengler, Vaquez Laubry Classic). Ortho-

static hypotension was also investigated three minutes after moving to the standing position.

HTN was defined as systolic blood pressure (SBP) ≥ 140 mm Hg and/or diastolic blood pressure (DBP) ≥ 90 mm Hg measured at two successive visits to the physician's office [9].

Target BP was defined by a SBP between 130–139 mm Hg (if well tolerated) and a DBP between 70–79 mm Hg in patients aged 65 to 79 years according to the 2018 European Society of Cardiology guidelines [9]. BP was measured in the office, by a suitable BP monitor, in a sitting position after a few minutes of rest. BP was taken to both arms.

For patients over 80 years old (yo), target BP value was set after the frailty assessment [11]:

- in healthy patients aged 80+ years, target for BP was a SBP between 130 and 139 mm Hg and a DBP between 70 and 79 mm Hg;
- targets for patients over 80 years of age and frail may be less stringent;
- orthostatic hypotension has been systematically investigated and was defined as a decrease in SBP of at least 20 mm Hg and/or PAD of at least 10 mm Hg occurring within three minutes after moving to the standing position [12].

Autonomy

Autonomy was assessed by the KATZ index that objectively measures the degree of autonomy in the basic activities of daily life: body care, clothing, toileting, transfer, continence and nutrition. A total score of less than three defines a highly dependent elderly subject [13].

Frailty

Frailty is a geriatric syndrome defined as the inability to respond appropriately to medical, psychological or social stress. We used the test proposed by Fried to screen the frail elderly [14]. Due to the unavailability of the dynamometer to measure the muscle strength of the wrist, we used the chair lift test to assess the muscle strength of the lower limbs [15].

Statistical analysis

Data entrance and analysis was performed using SPSS software version 22.00. Simple frequencies and relative frequencies (percentages) were calculated for qualitative variables and the means and standard deviations and extents (extreme values: minimum and maximum) for the quantitative variables.

To compare qualitative variables between two or more groups, we used the Pearson Chi2 test or the exact Fisher test for numbers below 5. For comparisons of quantitative variables, we used the t-test of Student and the analysis of variance (ANOVA) for the comparison of averages in normal distribution and testing of Mann-Whitney and Kruskal-Wallis in non-Gaussian distribution.

We conducted a logistic regression by the step-by-step method to identify the independent factors associated with BP control.

A p-value of < 0.05 was considered statistically significant.

Results

General characteristics of the population

The study included 101 patients. The median age of our patients was 73 yo (extremes 65–90 yo). Seventy-eight per cent of our patients were between the ages of 65 and 79 years and 21.8% were over the age of 80 years. The sex ratio was 0.57 (36.6% men and 63.4% women). All patients had social security and 45.5% had a retirement pension. Sixty per cent of patients were illiterate and 18.8% had a primary education level. Eighty-four per cent of patients lived in urban settings, 57% lived with their families, 2.7% with their spouse and 10.9% alone.

Medical history

The predominant cardiovascular risk factor was diabetes in 60.4% of cases, followed by dyslipidaemia in 48.5% and smoking in 40.6%. Thirty-six per cent of the patients had a history of acute coronary syndrome, 12.9% of ischaemic stroke and 19.8% of atrial fibrillation.

Lifestyle

Ninety-nine per cent of our patients did not consume alcohol, 32.7% had regular physical activity and 31% had a high-salt diet. Ninety-two percent of our patients were independent (n = 93), 4% had partial autonomy and 4% had a complete dependence. Among our patients aged 80 and over (n = 22), 68.2% were frail (n = 15).

Hypertension

Time since diagnosis of HTN was 15 ± 8 years with extremes ranging from 1 to 40 years: 11.9% < 5 years, 23.8% between five and ten years and 64.4% > 10 years.

The follow-up was regular in 98% of cases, with an average number of visits per year of 2.6 ± 1.2 and extremes ranging from 1 to 5 visits per year.

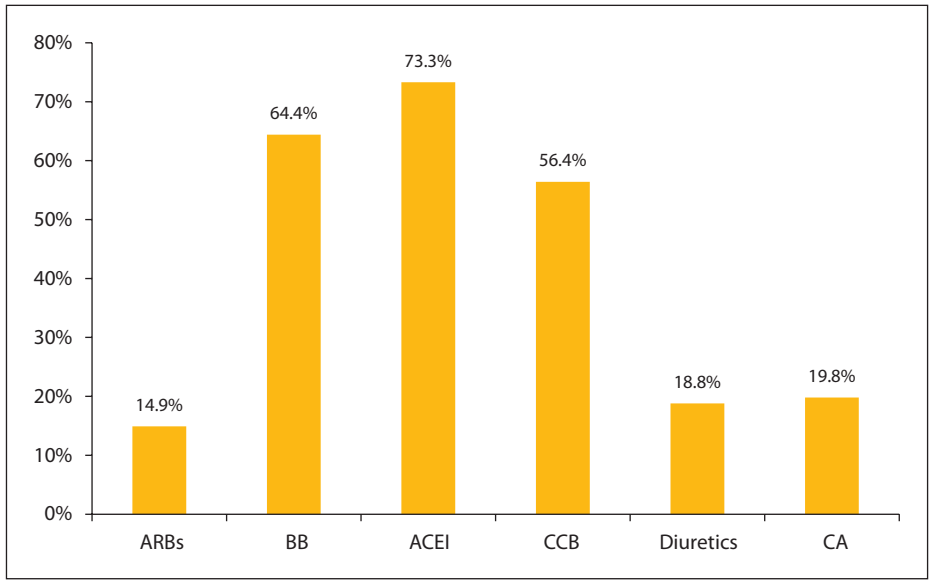

Figure 1. Use of different therapeutic classes. ARBs — angiotensin II receptor blockers; BB — beta-blockers; ACEI — angiotensin-converting enzyme inhibitors; CCB — calcium channel blockers; CA — central agonist

More than one anti-HTN drug was needed in 87.1% of cases. Dual therapy was prescribed in 49.5% of cases.

In 72.3% of cases, prescribed antihypertensive drugs were those from hospital nomenclature. A combined treatment was prescribed in 10.9% of cases.

The angiotensin-converting enzyme inhibitors were the most prescribed molecules (Fig. 1).

Fifty-nine percent of patients did not reach target BP and 1% of patients had orthostatic-hypotension.

Average SBP was 145.94 ± 20.6 mm Hg on the left arm and 143.76 mm ± 23.79 Hg on the right (extremes 110–220 mm Hg).

Average DBP was 83.76 ± 9.58 mm Hg on the left arm and 83.3 ± 9.75 mm Hg on the right (extremes 50–120 mm Hg).

Patients monitored their BP in 64.4% of cases in an outpatient setting.

Average number of antihypertensive tablets was of 4.3 ± 2.2 tablets per day (extremes 1–11 tablets per day).

Average number of total tablets per patient was 8 ± 3 (extremes ranging 1–19 tablets per day).

Eighty-nine per cent of patients were taking five or more tablets per day. In 90.1% of cases the patients took the treatment by themselves. The patient's treatment was given by the descendant in 7.9% of cases and by the spouse in 2% of cases.

Three per cent of patients used a pill box.

Adherence to treatment and knowledge of high BP

Therapeutic adherence was satisfactory in 75.2% of cases (n = 76).

The EvalObs Pro application detected a high risk of therapeutic non-adherence to antihypertensive treatment in 33.7% of cases (Fig. 2).

The reasons of therapeutic non-adherence to treatment were derived from the Que-obs application (Tab. 1).

Twelve percent of the patients said they received information about HTN and the physician was the source of information in 6.9% of cases.

Forty-five per cent of patients were unaware of their BP target and 65% were unable to mention at least two hygieno-dietary measures to be implemented as part of BP control treatment.

Nineteen per cent had a good knowledge about their antihypertensive medication, 4% a partial knowledge and 30.7% no knowledge about their medication. Despite that 46.5% of the patients did not know their antihypertensive medication they always had their prescription paper with them when they went to the physician.

Eighty-nine per cent were aware of the dosage and plan for taking their medication.

Factors associated with poor BP control

General characteristics associated with poor BP control were analysed (Tab. 2).

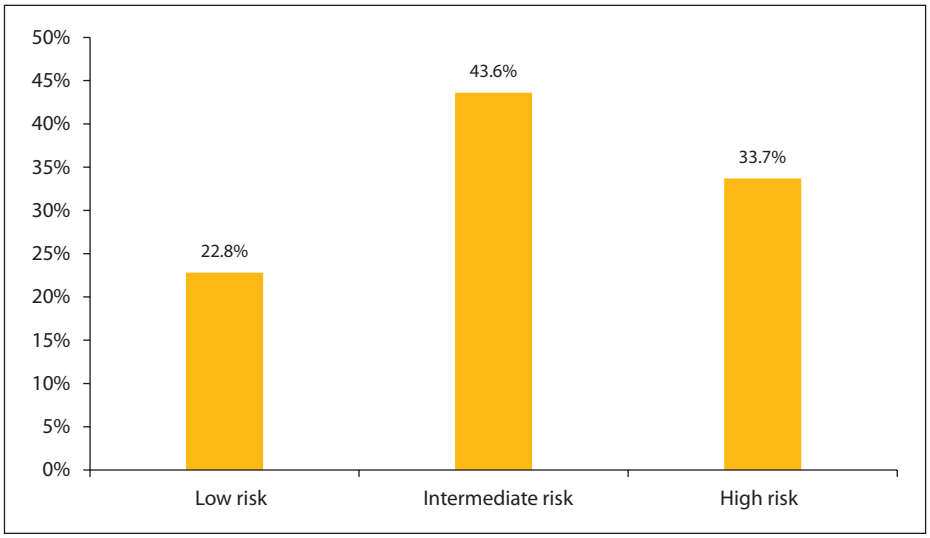

Figure 2. The risk of therapeutic non-adherence

Table 1. The causes of therapeutic non-adherence to treatment

		N	Percentage (%)
Did you forget to take your medication this morning?	Yes	51	50.5
	No	50	49.5
Since the last consultation, have you been out of treatment?	Yes	33	32.7
	No	68	67.3
Have you ever taken your treatment late compared to the usual time?	Yes	34	33.7
	No	67	66.3
Have you ever not taken your treatment because some days, your memory fails you?	Yes	17	16.8
	No	84	83.2
Have you ever not taken your treatment because some days you feel that your treatment is doing you more harm than good?	Yes	7	6.9
	No	94	93.1
Do you think you have too many pills to take?	Yes	41	40.6
	No	60	59.4
When you are on the move, do you ever fail to take your medication?	Yes	4	4
	No	97	96
Are you still undecided for regular treatment for your chronic disease?	Yes	7	6.9
	No	94	93.1

Hypertension

All the variables analysed are summarized in Tables 3 and 4.

Adherence to treatment and knowledge

All the variables analysed are summarized in Table 5.

In multivariate analysis, the factors independently related to poor control of BP were:

- poor adherence to treatment: adjusted OR = 0.19, 95% confidence interval (CI): 0.051–0.704; p = 0.013;
- lack of awareness of the patient's antihypertensive treatment: adjusted OR = 0.56; 95% CI: 0.364–0.861; p = 0.008;
- the number of antihypertensive tablets adjusted OR = 0.382; 95% CI: 0.188–0.774; p = 0.008;
- absence of thiazide diuretics: adjusted OR = 25.903; 95% CI: 4.121–162.816; p = 0.001;
- frailty: adjusted OR = 7.194; 95% CI: 1.905–27.164; p = 0.004.

Table 2. General characteristics associated with poor blood pressure (BP) control

N		Good BP control (n = 41)		Poor BP control (n = 60)		p
		Percentage	N	Percentage (%)		
Gender	Women	27	42.2	37	57.8	0.66
	Men	14	37.8	23	62.2	
Range of ages	65–79	31	31.2	48	60.8	0.6
	80 and over	10	45.4	12	54.6	
The retirement pension	Yes	16	34.8	30	65.2	0.27
	No	25	45.4	30	54.6	
Education level	Illiterate	24	39,3	37	60.7	0.61

Table 3. Factors associated with poor blood pressure (BP) control

		Good BP control (n = 41)		Poor BP control (n = 60)		p
		N	Percentage (%)	N	Percentage (%)	
History of hypertension	< 5 years	6	50	6	50	0.38
	Between 5 and 10 years	7	29.2	17	70.8	
	10 years and over	28	43.1	37	56.9	
History of cardiovascular disease	Yes	26	40	39	60	0.87
	No	15	41.6	21	58.4	
Tobacco	Yes	12	26.2	31	73.8	0.15
	No	29	48.4	29	51.6	
Physical activity	Yes	13	39.4	20	60.6	0.86
	No	28	41.2	40	58.8	
Diet rich in salt	Yes	9	29	22	71	0.02
	No	32	45.7	38	54.3	
Frailty	Yes	10	66.7	5	33.3	0.02
Autonomy	Complete autonomy	38	40.9	55	59.1	0.758
	Complete dependence	2	50	2	50	
	Partial autonomy	1	25	3	75	
Medical follow-up	Regular	41	41.4	58	58.6	0.238
	Irregular	0	0	2	100	
Outpatient BP	Yes	25	38.5	40	61.5	0.558
	No	16	44.4	20	55.6	
Hospital Nomenclature drugs	Yes	73	34.2	48	65.8	0.03
	No	28	57.2	12	42.8	
Fixed associations drugs	Yes	11	72.7	3	27.3	0.04
	No	90	36.7	57	63.3	
Thiazide diuretics	Yes	12	70.6	5	29.4	0.006
	No	29	34.5	55	65.5	

Table 4. Factors associated with poor blood pressure (BP) control

	Good BP control (n = 41)		Poor BP control (n = 60)		p
	Average	Standard deviation	Average	Standard deviation	
Frequency of consultations per year	2.45	1.185	2.83	1.263	0.12
The number of anti-hypertensive classes	2.53	0.929	2.27	0.949	0.16
The number of anti-hypertensive tablets	4.73	2.299	3.71	2.159	0.02
Number of tablets taken for chronic diseases	8.52	3.122	7.22	2.725	0.03

Table 5. Factors associated with poor blood pressure (BP) control

N		Good BP control (n = 41)		Poor BP control (n = 60)		p
		Percentage (%)	N	Percentage (%)		
Adherence to treatment	Satisfactory	36	47.4	40	52.6	0.006
	Unsatisfactory	4	16.7	20	83.3	
The risk of non-adherence	Low risk	11	47.8	12	52.2	0.63
	Intermediate risk	18	40.9	26	59.1	
	High risk	12	35.3	22	64.7	
Patient has information about hypertension	Yes	6	50	6	50	0.48
	No	35	39.7	54	60.7	
Patient knows optimal BP	Yes	24	42.9	32	57.1	0.6
	No	17	37.8	28	62.2	
The patient is able to mention two hygieno-dietary measures	Yes	14	40	21	60	0.92
	No	27	40.9	39	59.1	
Knowledge of treatment	Good knowledge	12	63.2	7	36.8	0.03
	Intermediate knowledge	3	75	1	25	
	No knowledge	8	25.8	23	74.2	
	No knowledge but has always his/her prescription with him/her	18	38.3	29	61.7	
The patient is aware of the dosage regimens and the plan of medication	Yes	38	42.7	51	57.3	0.24
	No	3	25	9	75	

Discussion

BP management in the elderly is difficult due to drug iatrogenia and the relative frailty of older subjects.

The aim of our work was to study the prevalence of BP control and the factors associated with poor BP control in hypertensive elderly Tunisian patients.

Prevalence of BP control

The prevalence of BP control improved worldwide despite the very large disparity between high-income and middle- and low-income countries [17].

In our study, the prevalence rate of poor BP control was comparable to other studies in Europe.

A Lithuanian study dating from 2010 showed that 54% of older subjects had poor BP control and 50% of subjects over 60 yo did not reach the target BP in the Nancy Preventive Medicine Centre in 2003 [18, 19].

In 2015, in the French Flash study target BP was reached in 56.6% of the hypertensive patients aged of 65 and 74 yo *vs.* 49.1% of the population aged 80 and over [20].

All these studies used office BP measurements except for the Flash study, which was based on self-measuring BP at home.

An Indonesian study conducted in 2017 found a prevalence of BP control close to that of our study (52.6%). The elderly was defined in this study as being over 60 yo [21].

However, our prevalence rate is better than other studies in Africa or Asia: 83% of Burkinabe subjects aged 60 and over did not have a controlled HTN and 77% of Algerian subjects aged 65 and over, had poor BP control [22, 23].

Factors related to poor BP control

Drug adherence

The prevalence of poor adherence to treatment in our work was lower compared to the study of Lefort et al. that included 2370 hypertensive subjects of 55 yo and more (23.8 *vs.* 37.6%) [24]. This difference may be due to the fact that Lefort et al. used the Girerd's questionnaire to evaluate adherence to treatment and the inclusion of patients age of more than 55 yo.

Prevalence of poor adherence to treatment in our study was similar to those found in Cameroon and Algeria (25.7% and 24.5%) [25, 26]. These studies used the Girerd's and the Morisky's questionnaire.

Knowledge of the antihypertensive treatment

In our study, although 89% of patients were aware of the dosage and time taken of their anti-hyperten-

sive medication; only 18.8% had a good knowledge of their antihypertensive treatment.

In 1995, in Chile, 422 elderly subjects who had been consulted in basic health centres were asked about their knowledge of their treatments: only 24.9% had a good knowledge of their treatments [27]. Comparatively, a lower rate of 17.5% was found in Portugal, where patients were asked in the pharmacy about their knowledge of their therapies [28].

In France, a study conducted in ambulatory geriatric care showed that the knowledge of treatment by the frail elderly was low [29]. Indeed, only two of the 30 patients interviewed had a perfect knowledge of their treatment. Knowledge of the dosage was the lowest followed by knowledge of the name of the drugs.

Knowledge of treatment is an important step in therapeutic adhesion. Limited knowledge of HTN and its risks is a barrier to BP control [30].

As a result, the 2018 European guidelines underlined the value of detecting poor adherence to drug treatments [5].

Antihypertensive treatment

In our study, a significant correlation was found between the number of antihypertensive tablets taken by the patient, the number of total tablets for all chronic diseases and BP control. The more the number of tablets was reduced, the more control of BP was optimal.

A literature review, based on the example of HTN treatment, found that the low number of daily doses of anti-hypertensive treatment improved therapeutic adhesion and therefore reaching the target BP [31].

Our study showed that the use of a combined treatment allowed better BP control. Therefore the ESC guidelines advocate the prescription of a combined treatment in one pill [9].

The elderly person usually has several chronic pathologies requiring different medications with the resulting therapeutic adhesion problems. Combined treatment improves therapeutic adhesion especially in the elderly [32]myocardial infarction, and heart failure. Although the choice of initial drug therapy exerts some effect on long-term outcomes, it is evident that BP reduction per se is the primary determinant of CV risk reduction. Available data suggest that at least 75% of patients will require combination therapy to achieve contemporary BP targets, and increasing emphasis is being placed on the practical tasks involved in consistently achieving and maintaining goal BP in clinical practice. It is within this context that the American Society of Hypertension presents this Position Paper on Combination Therapy for Hypertension. It will address the scientific basis of combination therapy, present the pharmacologic rationale for choosing specific drug combinations, and review patient selection criteria for initial and secondary use. The advantages and disadvantages of single pill (fixed and therefore significantly improves BP control.

A Canadian study, with primary-care physicians showed that a simplified treatment regimen starting with combined dual therapy significantly improved BP control [33].

A recent American study, in the black and low socio-economic population found that the use of combined treatments, the "polypill" of antihypertensives and statins, resulted in a statistically significant reduction in BP and improvement in cardiovascular protection [34].

Thiazide diuretics are recommended as a first-line therapy in the elderly subject without any contraindications [35]. Our study showed that the use of thiazide diuretics allowed better control of BP.

Frailty

Frailty rate in our study was high compared to the Zulfiqar et al.'s study which found, using the same screening method, a rate of frailty of 17% [36]. The authors screened 70 patients aged 65 and over, while we evaluated the frailty only for the patients over 80 yo.

Another study found a 47.2% frailty rate among those over 65 years and a 65.2% frailty rate among those over 79 years, which was comparable to our results [37].

HTN was found to be a risk factor for frailty in the elderly [38]. A Korean study, including 4557 subjects aged 65 years and older, showed that the proportion of patients with target BP 150/90 in older subjects was significantly lower in frail subjects, and that frail hypertensive and treated elderly subjects had weakly achieved their target SBP, as well as the target DBP [39]. In multivariate analysis, frailty was identified as a predictor of poor BP control (OR = 2.04; CI = 1.234–3.384; p = 0.001).

This low rate of BP control in frail subjects may be due to difficulty in drug adherence due to the importance of side effects in this group of patients. In fact, HTN in the elderly generally concerns the SBP and therefore, the decrease in DBP caused by the treatments could be responsible for cardiovascular complications [40].

Conclusion

The control of blood pressure in the Tunisian elderly remains insufficient. Wider implementation of well-evidenced in other countries single pill combination along with health education may help to improve BP control in our Tunisian elders.

Conflicts of interest

We declare that we have no conflict of interest.

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