UNIVERSITY OF MEDICINE AND PHARMACY OF CRAIOVA
Ph.D.SCHOOL

ABSTRACT

PH.D. THESIS

RESEARCHES ON THE PRACTICAL IMPLEMENTATION OF THE CONCEPT "PHARMACEUTICAL CARE" IN A COMMUNITY PHARMACY IN ROMANIA

PHARMACEUTICAL MONITORING OF

THE HYPERTENSIVE PATIENT

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2012

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Abbreviations

FIP International Pharmaceutical Federation

WHO World Health Organization

HRQOL Health Related Quality of Life

PC pharmaceutical care

H hypertension

AP arterial pressure

BP blood pressure

SBP systolic blood pressure

DBP diastolic blood pressure

BMI Body mass index

INTRODUCTION

Pharmacy as a component of the health system is currently in reprofessionalisation. *Pharmaceutical care,* which is a new concept, requires the changes in the pharmacists practice from the orientation towards the pharmaceutical product to the orientation towards the *pharmaceutical care* of the patient.

The concept of *pharmaceutical care* arises from the development in the pharmaceutical activity, particularly within the community pharmacies, with regard to the optimisation of the use of medicines by the patient.

Pharmaceutical care provides the pharmacist with the real opportunity to be a responsible professional in health care [1].

The aim of the study presented in this Ph.D. thesis was to evaluate the effect of the *pharmaceutical care* on the hypertensive patient adherence to the treatment and on the efficiency of the therapeutic results related to the medicine that ultimately lead to the improvement of the patient's life quality.

The Ph.D. thesis containing 204 pages is divided into two parts: a general part – the state of knowledge in the domain of the *pharmaceutical care* (72 pages) and a part with personal research (132 pages), has 25 tables and 55 figures and charts, 341 references.

The theoretical part is divided into 3 chapters.

In the first chapter **„*Pharmaceutical care* - a new philosophy of pharmaceutical practice"** there are included current data on the state of knowledge in the pharmaceutical assistance : therapeutic aspects which justify the *pharmaceutical care*, past and current definitions of the *pharmaceutical care*, philosophy of the pharmaceutical practice in this concept, the role of the community pharmacist in the *pharmaceutical care* versus the traditional role, differences and similarities between the *pharmaceutical care* and the clinical pharmacy, its role in improving the patient's life quality, ethical issues of the *pharmaceutical care*, the current situation of the *pharmaceutical care* in the world and in Europe and its way of development in the future.

The second chapter, entitled „**Hypertension: therapeutic management**" develops problems related to the prevalence of the hypertension, the pharmacoepidemiology of the antihypertensive medication, the prevalence, the treatment and the control of the hypertension in Romania.

The third chapter „***Pharmaceutical care* services of the hypertensive patient"** describes the *pharmaceutical care* services for the hypertensive patient by presenting the pharmacist's intervention modalities in the therapeutic control of the hypertension, especially in the case of the therapeutically uncontrolled forms and in the case of the elderly hypertensive patients. It is evaluated the role of the pharmacist in the management team of the hypertension represented by the physician –pharmacist – nurse –patient. On this occasion it is outlined the new concept of patient – centred *pharmaceutical care.*

The second part of the thesis **Personal research** is structured into 3 chapters. Each of these chapters represents a personal study and they are entitled:

1. **Researches on improving the effectiveness of the antihypertensive treatment through the *pharmaceutical care* in the community pharmacy;**

2. **Researches on improving the hypertensive patient's adherence to the antihypertensive treatment through the *pharmaceutical care*;**

3. Research on the influence of the *pharmaceutical care* on the quality of life of the hypertensive patient.

The studies mentioned above were conducted on a group of 99 hypertensive subjects who received *pharmaceutical care* compared to a control/witness group of 50 hypertensive patients who received only traditional instruction by the pharmacist on the medicines prescribed in the pharmacy. Both groups addressed the same community pharmacy. The results of the research were interpreted and compared to the very recent data from the literature. Having read the references in our country, it seems that this study is the first one in Romania regarding the *pharmaceutical care* of the hypertensive patients.

II.PERSONAL RESEARCH

II.1.Researches on the improvement of the efficacy of the antihypertensive treatment through the *pharmaceutical care* in the community pharmacy

Pharmaceutical care represents an innovative approach, oriented to improve health care and the quality of life for the patients with hypertension. The presence of the pharmacist in the therapeutic management of the patient with hypertension results in a successful control of hypertension [2].

In Romania the cardiovascular diseases represent the leading cause of mortality, with a rate over 35%. Although the benefits of the antihypertensive

medication are clearly established, only 70% of the patients with hypertension are currently treated and only about 40% are adequately controlled [3].

II.1.1. The motivation for the research

In the recent years the fact that the *pharmaceutical care* has passed from the clinics to the ambulatory, has increased the demand for clinical ambulatory pharmaceutical services of good quality. The *pharmaceutical care* was defined as the responsible provision of drug therapy by the pharmacist in order to obtain positive results that improve the health status of the patient [4].

II.1.2. The aim of the research

The aim of the study was to notice and to quantify whether the hypertensive patients who are taking part in the *pharmaceutical care* program have better blood pressure reduction compared to the reduction obtained under treatment of a group not taking part in this program.

II.1.3. The clinical study design

The study was prospective, longitudinal, randomized, controlled and was performed on 2 groups of hypertensive patients addressing the same pharmacy in Piteşti:

- a group of 99 patients with hypertension to whom it has been applied a *pharmaceutical care* program;

- a control group of 50 patients with hypertension to whom the drugs dispensing was done following the usual, traditional pattern with a minimal training of the patient to the pharmacy counter, being offered standard pharmaceutical services.

We have been monitoring the patients in the study group who had hypertension, measuring the BP prior to the beginning of the study and during it, monthly, for 12 months. We have conducted monthly *pharmaceutical care* and whenever the patients in the group returned to the pharmacy. The group of study and the control group have been divided into several subgroups according to:

-gender;

-age;

-level of education;

-co-morbidities;

-number of medicines prescribed;

-non-pharmacological regimes (hyposodium diet).

We have compared at the end of the *pharmaceutical care* period the values of BP compared to those of the control group with the initial values. In the case of the control group the BP values were measured by the pharmacist at the beginning and at the end of the study; for the other period of time the BP monitoring was performed by the family physician.

II.1.3.1. The *pharmaceutical care* program.

The *pharmaceutical care* took place inside the pharmacy in a suitable space outside the counter.

During the first minimal consultation the patients have signed an agreement in order to show their consent to be introduced in the study, according to the international regulations. The pharmacist kept the confidentiality regarding all the socio-demographic data or related to the disease, of the patients.

The blood pressure was measured inside the pharmacy, with an aneroid sphygmomanometer calibrated and checked periodically, with a cuff adjusted to the arm size, as recommended by the European Society of Cardiology.

There were taken into consideration the risk factors, while measuring the blood sugar, the triglycerides, the LDL – cholesterol, the HDL – cholesterol, the BMI (Body mass index).

The *pharmaceutical care* plan has had the following objectives:

- the initial minimal evaluation of the patient's health;
- preparing a written record for each patient with the monthly supervision of the evolution of the hypertension following the values of BP;
- specific education of the patient and conciliation on problems related to hypertension and the adherence to the treatment;
- monitoring the blood pressure and the blood biochemical parameters (glucose, cholesterol, triglycerides);
- a mutual relationship of consult with the family physician.

Each pharmaceutical consultation and training that takes places inside the pharmacy that are performed monthly and discretely in the place specially arranged for the achieving of the *pharmaceutical care* program has lasted 20-30 minutes for each patient. The data on the health or on the events related to the disease or treatment that have occurred recently have been written in the patient's record.

We have discussed with the patients who had comorbidities (diabetes, dyslipidemia, metabolic syndrome) about the importance of monitoring some blood biochemical factors (fasting or pre-prandial glucose, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides). Glucose and cholesterol were initially measures at 6 and 12 months of the study. In the case of the diabetic patients glucose monitoring was performed once a month. The glucose measurement was performed with a meter at the pharmacy for the group with PC and the cholesterol was measured by the family physician.

II.1.3.2. The record of each patient consisted of:

- the socio-demographic data (age, sex, marital status, level of education – elementary school, high school, faculty, habitat - rural or urban, telephone number);
- general health;
- the history of the disease;
- the history of the medication used and the medication used at the moment of the beginning of the study, medication change;
- lifestyle (diet, frequency and quantity of tobacco or alcohol used, the level of activity or inactivity, the frequency or intensity of exercise);
- during the study, there were periodically written in the record the values of the clinical and paraclinical parameters followed, the changes in the lifestyle, the adherence to the medical treatment and the existence of some adverse reactions to medicines;
- patient's identified problems and necessities, related to disease;
- medicines dispensing date for the next month, to check any omissions of doses or dose reduction;
- the interrelation with the family physician;
- the intervention in the patient's training or in the physician's announcement to the problems related to the medication prescribed;
- the values of the blood pressure measured in the pharmacy each month, for a period of 12 months, and at the beginning and at the end of the study the body mass, (BMI);
- the glucose profile of the patient by measuring the fasting or pre-prandial glucose with a glucometer inside the pharmacy, initially, at 6 and 12 months of the study; for the diabetics patients the glucose was measured monthly;

- in relation with the family physician the measurement of the values of the lipid profile of the patient (the triglycerides, the total cholesterol, the LDL – cholesterol, the HDL – cholesterol);

- the monthly assessment of the functional status of the physician related to his mobility, his physical and intellectual activity, the resistance at the physical effort;

- any hospitalisations and their causes.

II.1.3.3. The monthly *pharmaceutical care* of the study group compared to the control group consisted of:

-training about the correctness of the administration of the treatment, the patient's abilities to take the medicines;

-clarifying the problems related to the use, the order of use and the necessity of a continuous administration, without interrupting the medication;

-the possible training of the patient to learn how to control their blood pressure alone at home using their own measuring device;

- the detection of problems relate to adverse effects (the identification of signs and symptoms related to drugs) and the relationship with the family physician;

- the education of the patients on proper storage of drugs at home;

- the encouragement of patients in order to use non-pharmacological methods and some nutritional measures such as the low sodium diet (approx. 2.4 g/day NaCl), diets based on the weight status (diet rich in fruits, vegetables, low-fat, mostly unsaturated, using minimal processed food containing quite a lot of salt), quitting smoking, alcohol and coffee abuse, etc;

- following the salty taste changes induced by some antihypertensives so that the diet with sodium restriction be properly accepted and the sweet taste changes in the case of the diabetics changed in the antidiabetic treatment;

- the implementation of the strategies to increase patients' adherence to drug treatment.

The patient has received a form from the pharmacist in which he/she has written irregularities in the drugs administration. The medication adherence is established by using the facts that the patient has written in the form, whenever he/she took the medication, regularly and daily, according to the therapeutic scheme during a month, if there were days in which the drugs have not been administered, if he/she took all the

prescribed drugs or only a part of them. The pharmacist has registered monthly all the data reported by the patient, related to the treatment adherence in order to quantify this parameter.

II.1.4. Statistical processing

Given the data structure as well as in order to analyse the effect it is suitable the average statistical analysis, we have used Student test (t). Experimental statistical samples distribution normality was checked using Lillieford test, which tests the null hypothesis (that the sample comes from a normal distribution, against the hypothesis that it does not come from a normal distribution). This way we made sure that all statistical samples have a normal distribution and the statistical decision is therefore consistent.

We have calculated the means and the SD of blood pressure values in the first month and in the 12th month and we have processed the data using the Student test (t).

We have calculated the average chart SD of the BP values during the 12 months of pharmaceutical assistance and the variance comparing to the 2 groups (PC versus control), determining the correlation coefficient.

From the statistical analysis of the decrease in blood pressure averages in the 12th month compared to the initial values in the two groups there was a significantly greater decrease in the group with the *pharmaceutical care* compared to the control group ($p<0.05$).

II.1.5. Results

Table no. 1. Demographical and therapeutic aspects of the group with the pharmaceutical care and of the control or witness group .

	Study group (PC)	Control group (M)
Total **Women** **Men**	**99** 50(50.5%) 49 (49.5%)	**50** 25 (50%) 25 (50%)
Secondary school or High school **Higher education**	**60 (60.60%)** W 32 (53.33%) M 28 (46.66%) **39 (39.40%)** W 19 (48.71%) M 20 (51.29%)	**26 (52%)** W14 (53.84%) M 12 (46.16%) **24 (48%)** W 11(45.83%) M 13 (54.16%)
Marital status : married **Unmarried (single, widows/widowers, divorced)**	82 (83,83%) 17(17,17%)	39 (78%) 11 (22%)
Social status **-active** **-retired**	**57** (57.57%) **42** (42.43%)	**27** (54%) **23** (46%)
Age 51-60 years **61-70 years** **71-80 years**	**17** (17.17%) W 7 (41.17%) M 10 (58.82% **59** (59.60%) W 31 (52.54%) M 28 /47.46%) **23** (23.23%) W 11 (47.82%) M 12 (52.17%)	**8** (16%) W 0 (0%) M 8 (100%) **34** (68%) W 22 (64.70%) M 12 (35.30%) **8** (16%) W 3 (37.5%) M 5 (62.5%)
Residence – urban	**100** (100%)	**50** (100%)
Smokers no. (%)	**41** (41.41%)	**18** (36%)
BMI (kg/m2) M±DS	**23**.12±0.35	**23.7**4±0.76
Essential hypertension, without comorbidities	**17** (17.17%) W 14 (82.35%) M 3 (17.65%)	**12** (24%) W 6 (50%) M 6 (50%)
Patients with hypertension and dyslipidemia	**56 (**56.56%) W 22 (39.28%) M 34 (60.72%)	**21** (43.98%) W 9 (42.85%) M 12 (57.14%)
Patients with hypertension and diabetes	**15** (15.15%) W 11 (73.33%) M 4 (26.66%)	**5** (10%) W 2 (40%) M 3 (60%)
Patients with hypertension and metabolic syndrome	**11** (11.11%) W 7 (63.64%) M 4 (36.36%)	**12** (24%) W 7 (58.33%) M 5 (41.66%)
Average number of medicines/patient	**3.11**medicine /patient	**3.**42 medicine/patient

Antihypertensives **Hypocholesteroleminant** **Antidabetics**	**2.24** medicine/patient **0.64** medicine/patient **0.23** medicine/patient	**2.76** medicine/patient **0.64** medicine/patient **0.28** medicine/patient
Number of patients treated with **1 antihypertensive** **2 antihypertensive** **3 antihypertensive** **4 antihypertensive**	 **6** (6.06%): 3 (50%) W, 3 (50%) M **60** (60.60%): 31(51.66%) W, 29 (48.33%) M **30** (30.30%): 16 (53.33%) W, 14 (46.66%) M **3** (3.03%): 1 (33.33%) W 2 (66.66%) M	 **6** (12%): 4 (66.67%) W 2 (33.33%) M **22** (44%): 16 (72.72%) W 6 (27.28%) M **18** (36%): 6 (33.33%) W 12 (66.66%) M **4** (8%): 2 (50%) W, 2 (50%) M
Number of patients treated with	**1AH without any drugs 4 (4.04%)** +Hypolip 2 (2.02%) **2AH without any drugs 16 (16.16%),** + Hypol 33 (33.33%) + AntiD 7 (7.07%) + Hypol+AntiD 6 (6.06%) **3AH without any drugs 3 (3.03%),** + Hypol 20 (20.20%) + AntiD 4 (4.04%) + HypoD+AntiD 4 (4.04%) **4AH without any medicines 0 (0%)** +Hypol 1 (1.01%) +Hypol+AntiD 2 (2.02%)	**1AH without any drugs 3** (6%) +Hypolip.3 (6%) **2AH without any drugs 9 (18%)** +Hypol 8 (16%) +AntiD 3 (6%) +Hypol+AntiD 2 (4%) **3AH without any drugs 4 (8%),** +Hypol 10 (20%) +AntiD 1 (2%) +Hypol+AntiD 3 (6%) **4AH without any drugs 0 (0%)** +Hypol 3 (6%) +Hypol+AntiD 1 (2%)
Number of consultations inside the pharmacy during the study	12	2 (initial and end of the study)

W-women, M-men, AH-antihypertensive; Hypol-Hypolipemiant; antiD – Antidiabetics.

From the analysis of the percentage decrease of the BP in the 12th month compared to the first month it is noticed (Table 2) that in the majority of cases the percentage decrease is more emphasized in the patients with the *pharmaceutical care*

(PC) compared to those with the minimal pharmaceutical assistance (C), an obvious argument in favour of the *pharmaceutical care*.

Table no.2. The percentage decrease of the BP in the 12th month compared to the first month.

(TA1-TA12)/TA1*100	**↓SBP Control (C) %**	**↓SBP PC %**	**↓DBP Control (C)%**	**↓DBP PC%**
TOTAL W+M [%]	13.65	14.47	10.65	11.87
TOTAL W [%]	14.6	14.60	11.79	10.85
TOTAL M [%]	12.69	14.28	9.53	10.69
Secondary school or high school [%]	14.64	14.59	12.06	12.60
Higher education [%]	12.58	14.28	9.14	10.69
AGE 51-60 [%]	15.99	13.90	15.52	8.63
AGE 61-70 [%]	13.90	13.71	9.55	11.17
AGE 71-80 [%]	10.20	17.23	10.18	16.45
H + DIABETES II [%]	11.47	16.14	10.95	13.41
H + DISLIP. [%]	13.71	13.32	12.24	11.28
H + DISLIP. & DIABETES II [%]	12.59	14.83	4.44	10.40
SIMPLE H [%]	14.72	16.21	10.31	13.29
ANTIHYPERTENSIVE TREATMENT + DIURETICS [%]	14.14	14.49	11.23	11.86
ANTIHYPERTENSIVE TREATMENT WITHOUT DIURETICS [%]	10	14.40	6.32	11.92
3 ANTIHYPERTENSIVE DRUGS [%]	14.58	14.65	9.77	12.56
4 ANTIHYPERTENSIVE DRUGS [%]	13.05	13.66	12.87	10.59
AH+DIETARY SALT RESTRICTION	15.82	16.98	11.79	13.32

Separately, we have calculated the average and standard deviations and the variance of global SBP and DBP for all the 12 months of the study for each of the subgroups taken into considerations (TOTAL subjects, F women, B men, High school, higher education, etc.) for a comprehensive characterisation in the two situations, a group with *pharmaceutical care* (PC) compared to the control group (C) (Table 3).

Table no. *3.* Analysis of the average evolution of blood pressure in different subgroups of the study after the standard deviation (STDEV) and the variance in the 12 months of study.

	STDEV SBP Control (C)	**STDEV SBP PC**	**STDEV DBP Control (C)**	**STDEV DBP PC**
TOTAL				
Average	6.86	5.65	6.03	4.43
Variance	0.45	0.15	1.68	0.6
TOTAL Women				
Average	5.93	5.22	5.7	4.4
Variance	0.76	0.29	2.86	0.7
TOTAL Men				
Average	7.76	5.85	6.46	4.46
Variance	0.81	0.79	1.53	0.68
High school				
Average	5.89	5.22	5.73	4.4
Variance	0.81	0.29	2.54	0.7
Higher education				
Average	7.8	5.85	6.42	4.46
Variance	0.82	0.79	1.84	0.67
AGE 51-60				
Average	5.83	6.44	6.62	4.16
Variance	1.37	1.06	3.85	0.36
AGE 61-70				
Average	6.58	5.36	5.53	4.33
Variance	0.88	0.29	1.84	0.57
AGE 71-80				
Average	8.64	5.02	6.76	4.6
Variance	3.32	0.37	3.47	1.3
HYPERTENSION+DIABETES II				
Average	7.16	6.65	6.53	4.4
Variance	1.12	1.06	1.85	1.11
HYPERTENSION+DYSLIPIDEMIA				

Average	7.16	5.52	6.53	4.28
Variance	1.12	0.39	1.85	0.26
HYPERTENSION+DYSLIPIDEMIA+ DIABETES II				
Average	6.27	5.31	6.13	4.81
Variance	5.15	0.44	8.74	2.15
HYPERTENSION without co-morbities				
Average	6.06	4.84	4.62	4.47
Variance	1.09	0.3	2.02	1.06
Treatment WITH DIURETIC				
Average	6.77	5.5	5.97	4.46
Variance	0.37	0.29	1.74	0.53
Treatment WITHOUT DIURETIC				
Average	7.53	5.92	6.4	4.33
Variance	5.04	0.348	6.13	1.53
3 DRUGS IN TREATMENT				
Average	6.64	5.5	5	4.54
Variance	0.26	0.25	2.21	0.66
4 DRUGS IN TREATMENT				
Average	7.36	5.95	7.08	4.13
Variance	2.53	0.51	3.51	0.74

II.1.5.1. The efficacy of the pharmaceutical care in hypertension in the study group compared to the control group

After the 12 months of pharmaceutical assistance the mean values ± SD of the systolic blood pressure (SBP) and the diastolic (DBP) in the case of the patients in the group with *pharmaceutical care* were of 138.4/74.8 ± 6.1/3.7 mmHg (decrease with 14.47% for the SBP and with 11.89% for DBP) compared to 161.8/84.8±6.1/5.6 mm Hg, as it was at the beginning of the study, while the mean values of systolic and diastolic blood pressure of the patients in the control group decreased from 162.8/83.7 ± 6.9/6.5 mmHg to 140.6/74.8 ± 6.1/4.8 mm Hg (decrease with 13.65% for the SBP and with 10.65% for the DBP). There is a greater decrease in the values of the members of

the group with *pharmaceutical care* compared to the control group, statistically significant $p<0.05$, thus decreasing the cardiovascular risk.

Through the analysis of the evolution of the systolic blood pressure (SBP) and the diastolic blood pressure (DBP) it can be noticed that during the 12 months of monitoring and pharmaceutical assistance, their values decreased consistently in all the cases, in the subjects in the control group (M) as well as in the cases of the subjects with *pharmaceutical care* as an effect of the treatment (Fig. 1).

Comparing the monthly averages of the standard deviations of the systolic and diastolic blood pressure in the two groups during the 12 months of monitoring, it is noticed a decrease in the mean values of the standard deviation, with values uniformity from one month to another in the group of patients with *pharmaceutical care*, both in the SBP and the DBP (Fig. 2). In the control group there is not noticed this uniformity from one month to another, which shows that in the group there are patients whose blood pressure was not adequately controlled probably because of the poor adherence to the treatment. The difference in the averages of DS and BP for the 12 months (in the group with PC the average DS 5.65/4.43 compared to 6.86/6.3 of the DS in the group C for SBP/DBP; $p<0.05$) (Table no. 3) represents another argument in favour of PC. The study proves thus that through the *pharmaceutical care* the group of patients becomes more homogenous as far as the hypertension control is concerned, that is the patients with a poor adherence to treatment become more aware of the importance of compliance of the rules of the proper administration of the treatment, with an adequate control of the hypertension (Fig.2).

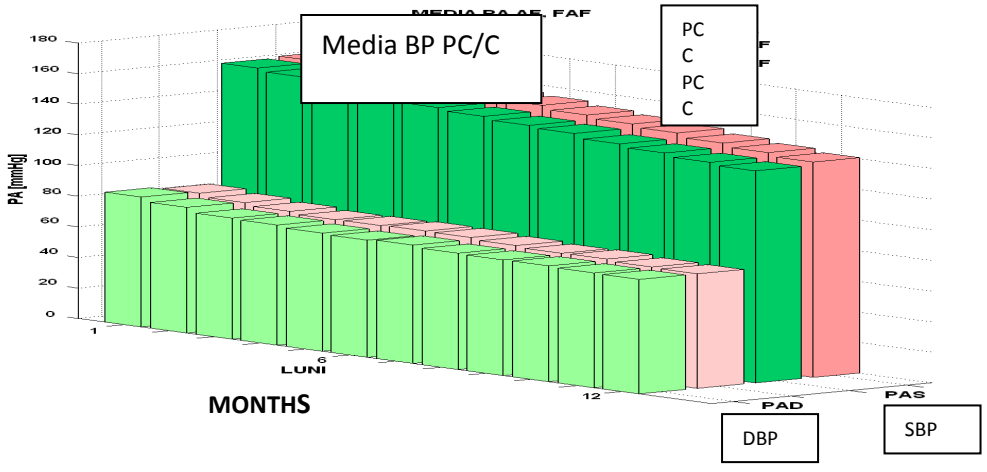

Fig.1. The average values of the systolic blood pressure (SBP) and diastolic (DBP) during 12 months in the case of patients with hypertension in the group with *pharmaceutical care* (PC) and in the control group (C).

We can emphasize the role of the *pharmaceutical care* through the analysis of the variance of DS of the averages SBP in the two groups (0.15 in the group with PC versus 0.45 in the group M for the SBP; 0.6 for the DBP in the group with PC versus 1.68 in the group M; correlation 0.99 for SBP and 0.95 for the DBP) (Table no. 4).

Table no. 4. Statistical analysis of the evolution of the BP in the case of the hypertensive patients under medical treatment (systolic –SBP and diastolic DBP) in the group with *pharmaceutical care* (PC) and in the control group (C).

	AVERAGE SBP C	AVERAGE SBP PC	AVERAGE DBP C	AVERAGE DBP PC	STDEV SBP C	STDEV SBP PC	STDEV DBP C	STDEV DBP PC
TOTAL								
Average (mm Hg)	152.2	149.5	78.2	77.6	6.86	5.65	6.03	4.43
Variance	59	53.9	9.2	6.5	**0.45**	**0.15**	**1.68**	**0.6**
Correlation	0.994		0.95					

STDEV – standard deviation

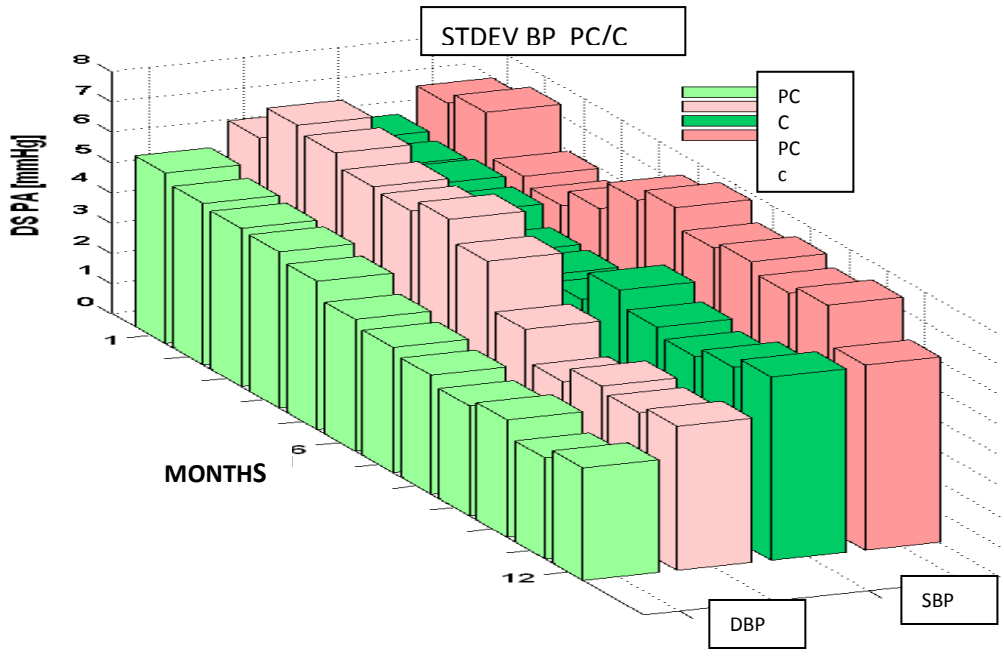

Fig. 2. The values of the standard deviations (STDEV) of the averages SBP and DBP in the group with pharmaceutical care and in the control group (PC-group with pharmaceutical care, C – the control group) in the case of the hypertensive patients.

II.1.5.2. The efficacy of the *pharmaceutical care* in hypertension in different subgroups of study compared to the control subgroups related to gender, education and training, age, H with or without comorbidities, therapeutic particularities, number of drugs/day, dietary salt restriction

Through the analysis on the same principles as in the previous study of BP values in the groups related to gender, education and training, age, hypertension with co-morbidities (diabetes, dyslipidemia, metabolic syndrome), essential hypertension without co-morbidities, treatment with or without diuretics, treatment with 3 or 4 drugs, non-pharmacological treatment with low-salt diet both in group with PC as well as in the group C there were registered at the end of the 12 months lower values of SBP and DBP in the subgroups with PC compared to the subgroups C, with the exception of the age subgroup 51-60 years. Also, the averages SD of total SBP and DBP on the total duration of the study and their variance were generally lower for all the subgroups, with the same exception.

II.1.5.3. Comparing the classification of the values of the blood pressure at the beginning and at the end of the study in the degree of hypertension after the international guidelines classifications in the group with *pharmaceutical care*

After the systolic blood pressure values in the case of the 99 patients with hypertension enrolled in the *pharmaceutical care* program at the beginning of the study 32 patients had values of the SBP assigned to the first grade of hypertension (between 140-159 mm Hg), 65 patients were assigned to the second grade (between 160 -179 mm Hg) and 2 patients were enrolled in the third grade of hypertension (≥180 mm Hg) (Fig.3). After 12 months of *pharmaceutical care* and blood pressure monitoring 52 patients had the blood pressure within normal limits, 45 patients were assigned to the first grade of hypertension, but there among these ones 44 patients were in the borderline subgroup after the hypertension classification (between 140 -149 mm Hg)[16].

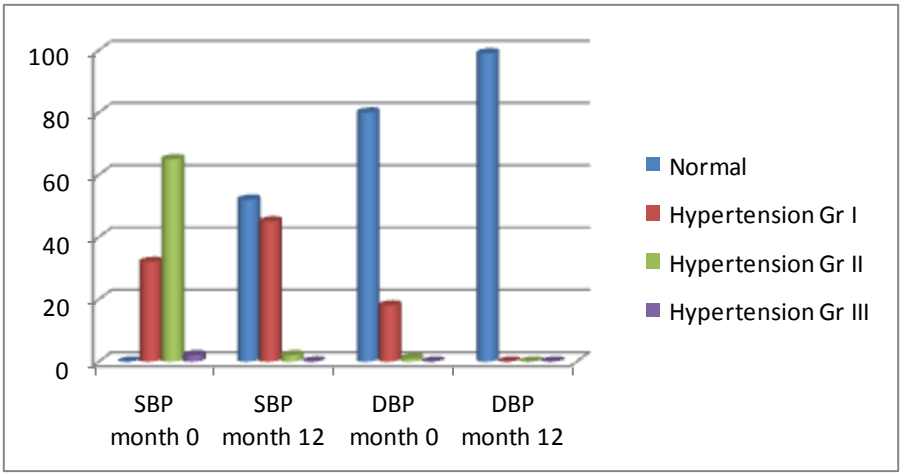

Fig. 3. Classification of the systolic (SBP) and diastolic (DBP) blood pressure at the beginning and at the end of the study of *pharmaceutical care* in the group of hypertensive with pharmaceutical care according to the values given by the recent international guidelines (5,6,7,8).

According to the diastolic blood pressure values at the beginning of the study 18 patients were assigned to the first grade, 1 patient to the second grade and there was no patient assigned to the third grade. After the 12 months of pharmaceutical care no patient had systolic blood pressure above 89 mm Hg.

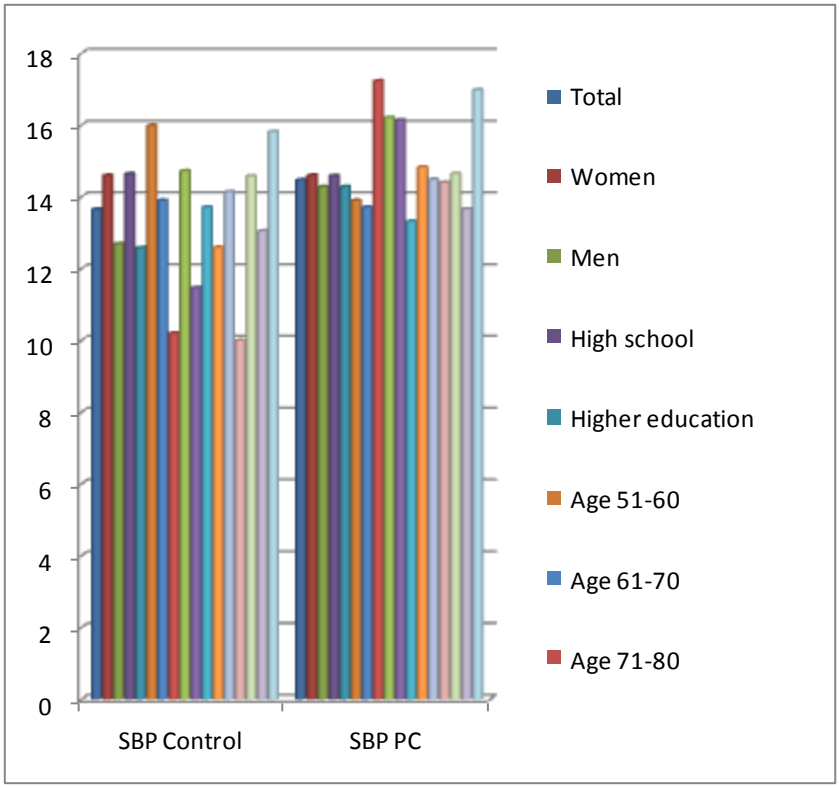

Fig.4. Values of percentage decrease of SBP in the group with *pharmaceutical care* (PC) and in the control group (C).

According to the figures 4 and 5 there is noticed a higher percentage decrease of SBP and of DBP in the group with the *pharmaceutical care* compared to the control group, in the group of women, in the subgroup with higher education, in the age subgroup 71-80, in essential hypertension without comorbidities, in hypertension + diabetes, in hypertension + dyslipidemia + diabetes in the case of SBP and in the group of men in the subgroup with secondary education, in the age subgroups 61-70 years and moreover 71-80 years, essential hypertension, hypertension + diabetes, hypertension + MS in the case of DBP.

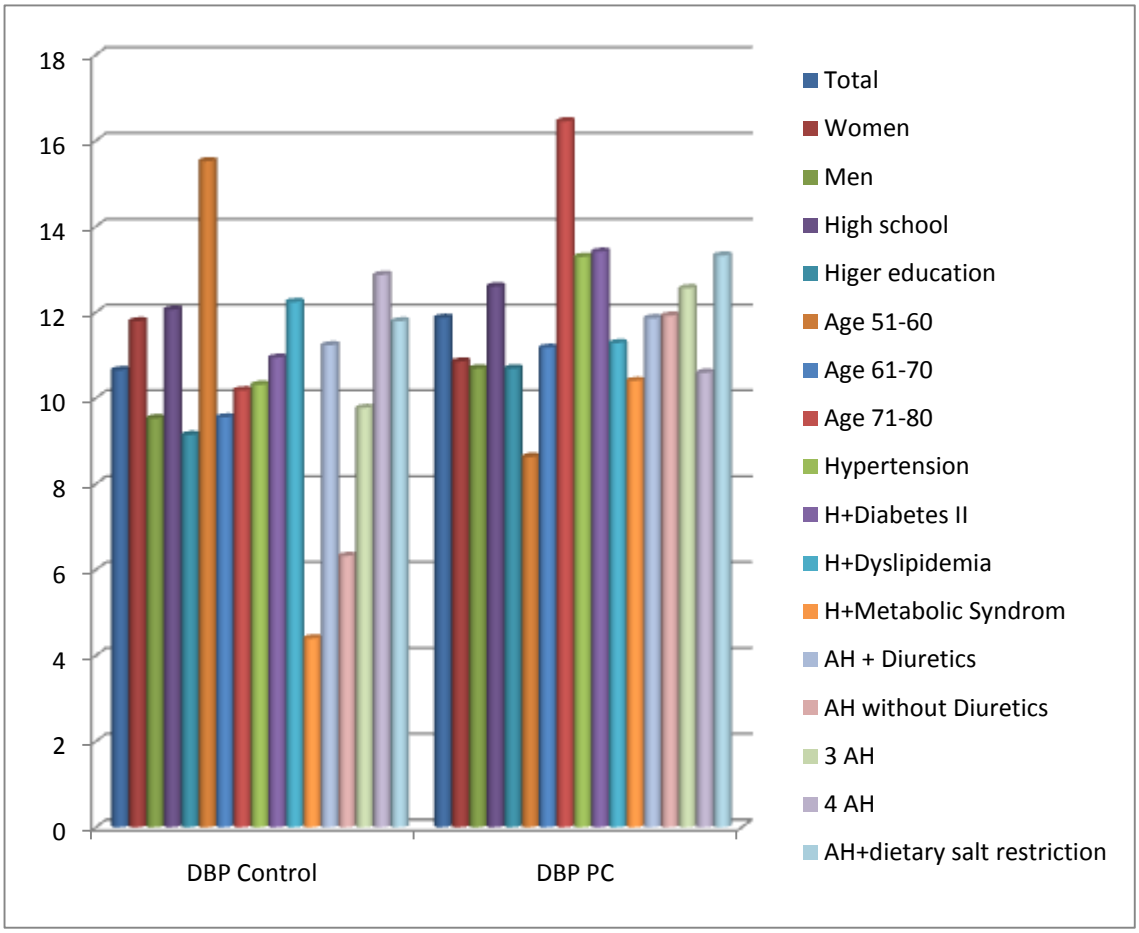

Fig. 5. Values of percentage decrease of DBP in the group with *pharmaceutical care* (PC) and in the control group (C).

II.1.6. Discussion of the results and Conclusions

1. The study of the influence of the *pharmaceutical care* on the hypertensive patient was conducted on a group of patients that were addressing the same community pharmacy in Piteşti in order to have their antihypertensive medicines prescribed by the family physician according to the recommendations of the cardiologist.

2. The group of study with the *pharmaceutical care* comprised 99 hypertensive patients, 50 women and 49 men and it was compared to a control group, comprising 50 patients, 25 women and 25 men that received minimal pharmaceutical recommendation, at the pharmacy counter.

3. *The pharmaceutical care* was performed in an adequate space of the pharmacy, keeping confidential the patient's personal data related to the demographic factors and to disease. The patients agreed to be recorded in the study.

4. According to the analysis of the values of the systolic and diastolic blood pressure it means that during the 12 months of *pharmaceutical care* and monitoring these have consistently decreased in all the cases, both in the subjects comprised in the *pharmaceutical care* program (PC), as well as in those with the habitual minimal pharmaceutical care (C) at the counter of the pharmacy, as an effect of the antihypertensive treatment.

5. Comparing the standard deviations, both in what the monthly average of SBP is concerned as well as the DBP in the two groups (PC and C), it is obviously noticed a decreased in the values of the standard deviation, with the uniformity of these in time in the group of the patients with the pharmaceutical care.

6. The 99 patients with hypertension comprised in the *pharmaceutical care* program have been classified according to the values of SBP in the beginning of the study, in the grades 1, 2 and 3 of hypertension and at the end of the study 52 patients had normal SBP and no patient had DBP above 89 mm Hg.

7. The study shows that at the end of the *pharmaceutical care* period the values of BP have decreased more in the subgroup women compared to men, there were no statistically significant differences between the 2 genders.

8. In the case of the patients with higher education there have been registered after the 12 months of *pharmaceutical care*, values of the SBP and DBP decreased, lower than in the patients with secondary education, but a statistical analysis of the averages BP and of the DS during the period of study it shows a greater influence of the PC in the group with higher education.

9. According to the age the patients have been grouped in three subgroups: patients with ages comprised between 51-60, 61-70 and 71-80 years.

10. The patients in the group 71-80 years had at the end of the period of *pharmaceutical care* the lowest values of SBP and DBP that is 133.6/73.3 mm Hg, as well as a reduced variance of the averages SD for SBP and DBP.

11. The subgroup of hypertensive patients without comorbidities with PC had the BP values at the end of the study lower than those in the subgroups with comorbidities.

12. Besides hypertension 15 patients have been diagnosed with diabetes type 2, 53 with dyslipidemia and 11 with metabolic syndrome.

13. In the subgroup of hypertensive patients and with diabetes with *pharmaceutical care* the values SBP and DBP have significantly decreased, approaching to the values recommended by the international guidelines, especially for the DBP, due to the monthly monitoring of the BP and to the glucose as well as to the pharmaceutical-therapeutic and dietetic education according to the *pharmaceutical care* program.

14. Lower results of the pharmaceutical care have been obtained in the subgroup of patients with hypertension and dyslipidemia.

15. In the subgroup of patients with metabolic syndrome (H+diabetes+ dyslipidemia) even though there have been noticed significantly different values between the subgroup of study and the control subgroup, at a statistical analysis more detailed (comparing the average values of the SD and of the averages SBP and DBP during the whole period of study between the group with *pharmaceutical care* and the control group and the variance values) it can been said that the *pharmaceutical care* has significantly influenced positively this group of patients.

16. The study of the influence of PC on the BP values in subgroups with diuretic and without diuretic in their treatment has demonstrated the efficacy of the pharmacological and therapeutic education in order to avoid the adverse reactions given by the diuretic.

17. Better results in the decrease of BP in the subgroup without diuretic are due to the classification of these patients in the majority in the subgroup with hypertension without co-morbidities and treatment with ACEI which therapeutic results have been obviously superior to the subgroup with co-morbidities.

18. The study conducted on the influence of the *pharmaceutical care* in the case of using a greater number of drugs (3 and 4 drugs) has demonstrate the existence of some significant differences compared to the control group in favour of the *pharmaceutical care.*

19. The analysis of the *pharmaceutical care* influence on the adherence to the non-pharmacological means as the reduction of salt consume, the hypocaloric diet or the diet of the diabetic patient has demonstrated a greater improvement of the results

compared to the control group with lower values of the averages SD for the 12 months and a lower variance.

20. There has not been registered an improvement of the BMI.

21. Fundamentally, beside the scientific research, the major benefit of the continuous monitoring of the monthly blood pressure has been of the patient's, and the physician and the pharmacist had arguments in favour of the therapeutic efficacy and tolerability. In our study the therapy has been individualised and significantly influenced by the result of the *pharmaceutical care*.

II.2. Researched on the improvement of the adherence of the hypertensive patient to the treatment through the *pharmaceutical care*

II.2.1.The motivation and the research objectives

In our study we had the following objectives of the pharmaceutical care:

1.The normalization of the values of the blood pressure or maintaining the arterial pressure values below 140/90 mm Hg in the case of the hypertensive patients or below 130/80 mm Hg in the case of the hypertensive patients with diabetes (through the educational program conducted by the pharmacist in the community pharmacy and based on the hypertensive patient's adherence to medication and the non-pharmacological treatment, through the patient's monitoring by the pharmacist and the periodical re-evaluation);

2.Monitoring the adverse reaction of the drugs administered;

3.Reducing the global cardiovascular risk through the educational program:

a. The reduction of the modifying risk factors: smoke, obesity, diabetes, dyslipidemia, lifestyle;
b. The correct treatment of the associated comorbidities;

4.Modification of the knowledge, the attitude and the practice related to the pharmacological and non-pharmacological therapy of the hypertensive patient and their application for the growth of adherence.

The aim of this study was to evaluate the effect of the *pharmaceutical care* on the adherence or the compliance of the hypertensive patients to the hypertension treatment.

II.2.2. The study design

The randomised, controlled, descriptive study was conducted on a group of 99 patients with essential hypertension, adults with BP values ≥ 140/90 mm Hg, with the

age between 51-80 years, in the urban, by the community pharmacist, Ph.D. candidate, through a *pharmaceutical care* program. The patients have been monitored and have received instructions about their treatment, their lifestyle for 12 months, in monthly discussions of 30 minutes inside the pharmacy.

There are frequently used two types of scales in the researches related to the compliance and the adherence to the pharmacological and non-pharmacological treatment of the hypertensive patient and these are ‘‘Hill-Bone Compliance to High Blood Pressure Therapy Scale’’ (Hill-Bone Scale) [9] and ‘‘the Self-Reported Measure of Medication Adherence’’ (Morisky-Green Scale) [10]. Both scales are short and the survey is easy to be done. Each patient in the group PC and in the group C received at the beginning and at the end of the study the two surveys in order to be filled in or for the older patients the pharmacist filled in the surveys according to their answers. Hill Bone Scale was simplified to 10 questions, even though Azuana Ramli and the collaborators used in 2012, 7 questions [11].

II.2.3. Statistical processing

The data are presented as an average with SD or as quantities expressed in percentage. The statistical comparison between the groups was done through the variance analysis.

The statistical processing of the data was done through the test Student t. $P < 0.05$ was considered significantly, and the data comparison was done through the test Lillefors.

II.2.4. Results

Table no. 5. The answers given by the patients in the group with the *pharmaceutical care* at the beginning and at the end of the study to questions after Morisky- Green scale.

Questions	YES (no. patients)	NO (no. patients)	P
Do you ever forget to take your medicine?	BPC 84 EPC 45	BPC 25 EPC 54	<0.001
Do you neglect taking your medicine on time?	BPC 82 EPC 43	BPC 17 EPC 56	<0.001
When you feel better, do you often stop taking the medicine?	BPC 64 EPC 14	BPC 35 EPC 85	<0.001
If you sometimes feel worse when you take the medicine, do you stop taking it?	BPC 59 EPc 12	BPC 40 EPC 87	<0.001

Score 1 for each answer Yes
BPC Beginning PC; EPC end PC.

-0 points = high adherence

-1-2 points = intermediate adherence

-3-4 points = low adherence

Of the 99 patients in the group of pharmaceutical assistance, after the survey in the Morisky-Green scale:

-8 patients had 0 points of PC and 51 patients had 0 points after 12 months of PC;

- 9 patients had 1 point before PC and 21 patients had 1 point after PC;

-10 patients had 2 points before PC and 19 patients had 2 points after PC;

-13 patients had 3 points before PC and 4 patients had 3 points after PC;

-59 patients had 4 points before PC and 3 patients had 4 points after PC.

So before the PC 8 patients had a high adherence, 19 had an intermediate adherence and 72 patients were non-adherent. After 12 months of pharmaceutical care 51 patients had a high adherence, 30 an intermediate adherence and 7 patients were non-adherent.

We have used an original method of quantification of answers given by the patients in order to measure the treatment adherence. At the beginning of the study according to the answers given for the Morisky scale showed a score of 2.91/patient so an intermediate adherence to low adherence. At the end of the study, the answers given for the same scale show a score of 1.15/patient which represents an intermediate adherence, much closer to the high adherence. Using this survey demonstrates a significant increase of the adherence to the treatment after the pharmaceutical care.

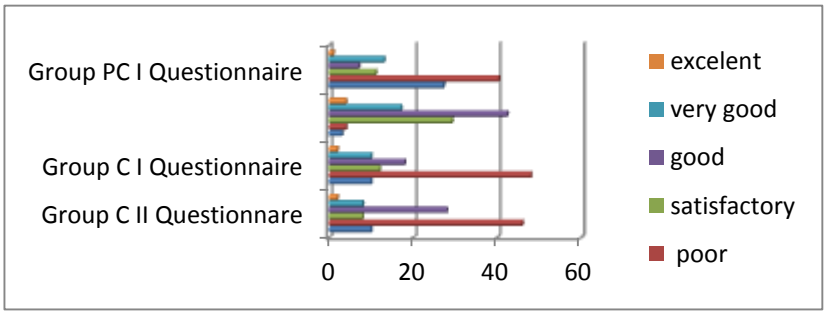

Fig.6. The graphic aspect of the compliance to the antihypertensive treatment before and after the pharmaceutical care – PC compared to the control (questionnaires I

and II initial and after 12 months of pharmaceutical care; Questionnaires I and II initial and after 12 months of the control group – C). It was used Hill-Bone scale.

Both scales that we have used showed an increase of the efficacy of the antihypertensive treatment in the group of pharmaceutical assistance as a result of the adherence to the treatment and the improvement of the non-pharmacological measures compared to the control group.

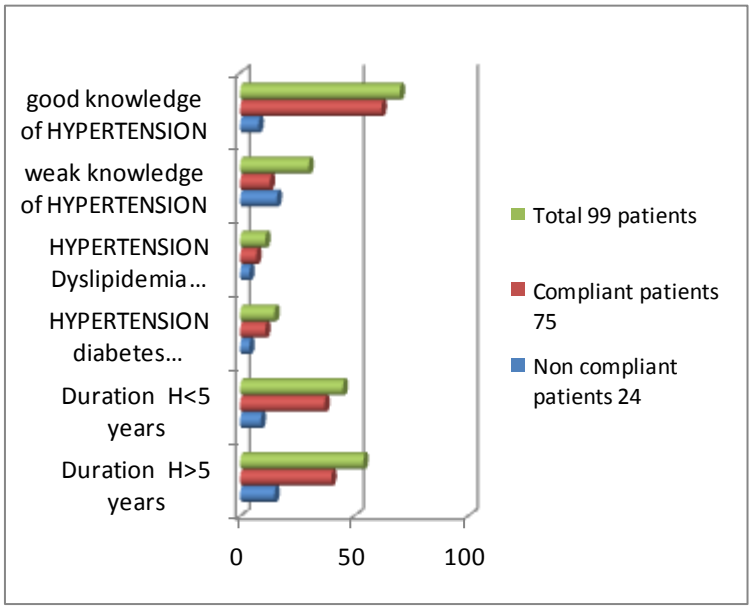

Fig. 7. The percentage aspect of the compliance and of the non-compliance in the group of hypertensive patients with pharmaceutical care after the duration of the disease, the presence of comorbidities (diabetes, dyslipidemia), knowledge of hypertension.

The frequencies of the problems related to the adverse reactions of the medicines that have led to non-adherence were the following:

-4 patients through the adverse reactions of ACEI;

-4 patients through the adverse reactions of the beta-adrenoblocants;

-5 patients through the adverse reactions of the diuretics;

-3 patients through the adverse reactions given by the drug associations.

Through the pharmaceutical assistance and the relation with the family physician these adverse reactions have improved.

II.2.5. Discussion of the results and Conclusions

1. The growth of adherence in hypertensive patients to the antihypertensive therapy and to the non-pharmacological treatment measures is essential in the control of the hypertension and in decreasing the cardiovascular morbidity and the mortality.

2. The communication physician-pharmacist-patient has been used as a strategy in order to improve the results obtained through the antihypertensive therapy.

3. At the beginning of the study a low adherence to the antihypertensive medication has determined a negative control of the arterial pressure. The development of the pharmaceutical care program in the group of study that addressed the identification to some factors that were producing the low adherence with its improvement has determined on its side an improvement in the control of the arterial pressure.

4. According to Morisky – Green scale at the beginning of the study in the group with the pharmaceutical care 72.72% of the patients had a low adherence to the antihypertensive therapy, and after 12 months of pharmaceutical care this percentage decreased to 7.07%. The percentage of those with a high adherence has increased from 8.08% to 51.51%. The percentage of the patients with adherence (high or intermediate adherence) to the treatment was at the end of the study of 81.01%.

5. According to Hill-Bone scale the compliance to the antihypertensive treatment (pharmacological and non-pharmacological) in the group with the pharmaceutical care was of 32.32% before and of 92.92% after the pharmaceutical care, while in the control group at the beginning of the study the compliance was of 30%, and in the 12th month it was of 36%.

6. Among the identified factors that negatively affect the adherence were the poor knowledge about the medication and the disease, the high number of medicines and the growth of frequency of the doses during daytime, which represent fewer factors through the pharmaceutical care.

7. The correct administration of the angiotensin converting enzyme inhibitors (ACEI) in the hypertensive patients had a good effect determining:

- ●the decrease in time of the dose and of the frequency of diuretics intake;
- ●the improvement of the major cardiovascular symptoms;
- ●the improvement of the symptoms and life quality;

8. The errors by omission of doses or by changing the interval between the doses, which lead to the inadequate therapeutic results and frame the patients in the group of patients non-adherent to treatment have corrected through the pharmaceutical care done monthly by the pharmacist.

9. The correct supervision of the patient represents one of the main means of increase of the adherence to treatment with the reduction of the cardiovascular complications of hypertension and of mortality in this group of patients.

10. Through the pharmaceutical care conducted it was noticed at the end of the study that in the group with the pharmaceutical care the use of non-pharmacological means was improved, what led to the decrease of the values of the blood pressure: 53% have reduced the salt consumption, 17.07% of the smokers have given up, 14.43% have reduced the alcohol consumption, and the regular physical activity (walks in fresh air) has accentuated in the group of age over 60 years.

II.3. Research on the influence of the pharmaceutical care on the quality of life of the hypertensive patient

II.3.1. The aim of the research

The quality of life does not represent a new concept. Many sciences such as sociology, psychology and economics have used in their researches this concept. In the research of health care, the quality of life has become very important. WHO defines health as being not only the absence of any disease or infirmity, but also as the period of time during which there is a good physical, mental and social state of being [12]. The term „life quality" and more specific „health related quality of life (HRQOL) refers to the physical, psychological and social domains of health, seen as distinct areas which are influenced by experience, convictions, hopes and perceptions [12].

Even if numerous studies addressed the relation between hypertension and the quality of life in what health is concerned, few studies have evaluated the impacts of hypertension on life quality. There are even fewer studies that quantify the influence of pharmaceutical care on the quality of life of the hypertensive patient.

The quality of life of the hypertensive patient can be affected by both disease and the adverse reactions of drugs.

The aim of this study was to examine the connection between hypertension and the quality of life in what health is concerned, on a group of people that address a pharmacy and which were assisted by pharmaceutical care.

II.3.2.The study design

In order to demonstrate if the pharmaceutical care has influenced the quality of life of the hypertensive patients, the patients in the study group (50 hypertensive patients with PC) and the control group (30 hypertensive patients with minimal pharmaceutical training) have filled in a questionnaire according to the study protocol. It was used a questionnaire with general information in order to correlate the general social and demographic characteristics, including age, gender, residence, marital status, educational level and the frequency of activities, but also a questionnaire which comprised questions related to the physical and mental status of the patients according to the scales used in the literature. The questionnaires were filled in at the beginning and at the end of the study.

II.3.3. Statistical processing

The statistical analysis was conducted by means of the Lillefors test which was used in order to evaluate the quality of life in what health status of the hypertensive patients under treatment is concerned, these ones being comprised in the pharmaceutical care program. The T-student test for the pairs was used to compare the averages between the group with the *pharmaceutical care* (PC) and the control group with minimal care (mPC) at the end of the study.

II.3.4.Results

Taking the antihypertensive treatment regularly has influenced the improvement of the health status of the hypertensive patients, inclusively the quality of life of these ones.

The results of the study have showed that in the group with PC 2% of the men had a health status just like at the beginning of the study, 38% had a better health status and 26% of them had a much better health status than at the beginning of the study, while 16% of the women had a health status rather better and 18% of these ones had a health status much better than at the beginning of the study.

In the group of patients without pharmaceutical care, 12 % of the male patients the health status was the same as at the beginning of the study, 50% had a rather

better health status, while 4% had a much better health status than at the beginning of the study, and 4% of the women had a health status just like at the beginning of the study, 22% of these ones had a health status rather better than at the beginning of the study and 8% of these ones had a much better health status.

We can mention the fact that the respondents have reported at the end of the study an increase of their life quality, the subjects representing a vulnerable population.

The significantly statistical differences between the two groups regarding the questionnaire used for the evaluation of the quality of life at the end of the study show us that this has improved in the case of the hypertensive patients after the pharmaceutical care. The constant phenomenon, more related to the physical activity quality, was due to the adherence to the antihypertensive treatment and due to a professional pharmaceutical care.

II.3.5. Discussion of the results and Conclusions

1. The quality of life was closely related to the medication compliance, which represents one of the biggest challenges that medicine is facing today. The presence of the pharmacist in the managerial team of the hypertensive patient is highlighted by our study through the pharmaceutical care on the influence of the quality of life of the patient's life.

2. The demographic factors (gender, age, marital status, educational level and social and economical level), the disease factors (how chronic it is, the absence of symptoms and subsequent consequences), concepts related to health, circumstances related to life have influenced the quality of life of the hypertensive patients.

3. The favourable results about the quality of life were due to the pharmaceutical care program with the increase of the adherence to the treatment during the 12 months of monitoring. The antihypertensive treatment and that of the co-morbidities had as a final aim to reduce cardiovascular mortality and morbidity and to improve the quality of life of the patients.

4. The pharmaceutical care program of 12 months, which implied multidisciplinary activities, personalised pharmaceutical care, easy access to the pharmacological treatment, increase of the knowledge about the disease and the treatment have undoubtedly contributes to the rate of success control obtained on the

hypertension and implicitly this has helped the improvement of the quality of life of patients.

5. The present study has demonstrated the fact that the pharmaceutical care has influenced positively the quality of life of the hypertensive patients, especially in the component of the physical activity and it has reduced the values of the blood pressure of the patients.

III. FINAL CONCLUSIONS

1. After having studied Romanian literature it seems that the study of the influence of the *pharmaceutical care* in the community pharmacy on the therapeutic efficacy of the antihypertensive treatment, of the increase of adherence to the treatment and the quality of life of the patient this represents the first study in this domain in Romania.

2. The study was conducted on a group of patients that addressed the same community pharmacy in Piteşti to have their medicines prescribed by the family physician after the recommendations of the cardiologist.

3. The group of study with pharmaceutical care comprised 99 hypertensive patients, 50 men and 49 women and it was compared to a control group, which consisted of 50 hypertensive patients, 25 women and 25 men, who received minimal pharmaceutical training. In both groups the BP was not well controlled.

4. According to the analysis of the evolution of the blood pressure it seems that during the 12 months of monitoring and pharmaceutical care, this decreased considerably in all the cases, both in the subjects comprised in the pharmaceutical care program as well as in those with minimal pharmaceutical care habitual at the pharmacy counter, as an effect of the antihypertensive treatment.

5. The ambulatory monitoring of blood pressure and the complete evaluation of the risk factors and of the organ affection, together with the pharmaceutical care have modified the initial framework of some important percentages of patients from a high cardiovascular risk level to a lower risk level.

6. The drug therapy was not changed during the study, but through the pharmaceutical training there was changed the medicines intake correctness and the compliance, which represent another factor in the efficacy of the *pharmaceutical care* program.

7. The pharmaceutical care has not significantly influenced the therapeutic results according to gender or educational training.

8. Compared to the patients in the age groups 51-60 years and 61-70 years the patients in the age group 71- 80 years had at the end of the *pharmaceutical care* period the lowest values of the averages SBP and DBP.

9. The hypertension without comorbidities was significantly influenced as a favourable evolution under treatment through the *pharmaceutical care.*

10. The presence of comorbidities such as diabetes or metabolic syndrome together with the hypertension has benefitted significantly of *pharmaceutical care.* There was a lower efficacy registered in the case of hypertension with dyslipidemia.

11. The study conducted about the influence of the *pharmaceutical care* in the case of the use of a greater number of drugs (3 or 4 drugs) has demonstrated the existence of some significant differences than the control group in favour of the *pharmaceutical care.*

12. The analysis of the influence of the pharmaceutical care on the adherence of the non-pharmacological means with the modification of the lifestyle has demonstrated a better improvement of the results compared to the control group with smaller values of the means of SD and AP for the 12 months and a more reduced variance.

13. By the means of the pharmaceutical education done there was noticed at the end of the study that in the group with *the pharmaceutical care* there were improved the non-pharmacological means that led to the decrease of the blood pressure values: the reduction of salt consume in food, the reduction of smoke of alcohol consume, the reduction of the sedentary.

14. At the beginning of the study a low adherence to the antihypertensive medication has affected a negative control of the arterial pressure. The development of the *pharmaceutical care* program in the group of study that addressed the identification of some factors that determined the low adherence, with its improvement, has determined on its tour an improvement of the control of the blood pressure of the hypertensive patient. For the analysis there were used Morisky – Green scale and Hill-Bone scale.

15. Among the identified factors that affect negatively the adherence there were the poor knowledge about the medication and the disease, the increased number of drugs and the increase of the frequency of the doses during daytime.

16. The errors due to dose omissions or to the modification of the interval between the doses, that led to inadequate therapeutic results and that frame the patient in the group of the non-adherents to treatment have corrected through the pharmaceutical care.

17. Through the *pharmaceutical care* program there have been solved the problems related to the adverse reactions of the drugs administered.

18. The self-control on the blood pressure by the patient by measuring it at home, due to the possession of a tensiometer has improved the disease evolution with the reduction of the number of hospitalisations.

19. The quality of life was closely related to the compliance with the medical therapy, which represents one of the greatest challenges medicine has to face nowadays. The presence of the pharmacist in the managerial team of the hypertensive patient is highlightened through our study by the pharmaceutical care on the influence of the quality of life of the patient.

20. The improvement of the quality of life was due to the *pharmaceutical care* program and to the more correct treatment by a greater number of patients during the 12 months of monitoring.

21. According to the questionnaire used in the study there has been demonstrated the fact that the *pharmaceutical care* has influenced positively the quality of life of the hypertensive patients, especially in the component of the physical activity and has reduced the arterial blood pressure of these ones.

22. The *pharmaceutical care* program which has implied multidisciplinary activities, personal assistance, easy access to the pharmacological treatment, has contributed to the control rate of success obtained on the hypertension and implicitly has improved the quality of life of patients.

23. According to the presented study in this thesis it is obvious that fundamentally, besides the scientific research, the major benefit of the *pharmaceutical care* and of the continuous monitoring of the blood pressure was the patient's, and the physician and the pharmacist have arguments for the therapeutic efficacy of the treatment and for the tolerability. In our study the therapy was significantly individualised and influenced by the pharmaceutical care result.

24. The presence of the pharmacist in the managerial team of the hypertensive patient is opportune, and the communication physician-pharmacist should be used as a strategy to improve the results obtained through the antihypertensive therapy.

25. Pharmaceutical care practice requires knowledge improvement and clinical qualification and neither of these ones are not complicated, but they require time, discipline and practical methodology in order to become perfect. *Pharmaceutical care* has been introduced in practice in the recent years and it will probably become the role of the pharmacist.

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