Blood pressure response to out-patient drug treatment of hypertension in 1973 – 1993 at Korle-Bu Teaching Hospital, Accra, Ghana.

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Summary

A retrospective audit of the first twelve months of out patient drug treatment of hypertension at the Korle--Bu Teaching Hospital during the period 1973 – 1993 is reported. A previous study had shown that at least 7 drug regimes were used to treat hypertension at Korle-Bu during the period. The aim of the present study was to compare the effect and efficacy of these antihypertensive drug treatment regimes on blood pressure during the first 12 months of treatment.

Result of 155 (47%) case notes, which met the inclusion criteria, are presented. One month of drug treatment of hypertension significantly reduced systolic and diastolic blood pressure by 21.4 ± 30.5 (p<0.001) and 13.8 ± 16.5 (p<0.001)mmHg, respectively. This reduction in blood pressure was maintained to the 12th month. At 12 months, systolic and diastolic blood pressures were unchanged in 19% and 28% of patients, respectively, indicating no response to drug treatment. Recommended target blood pressure of ≤ 140/90mm Hg was achieved in only 25.6% of all patients.

All drug treatment regimes significantly reduced blood pressure to a similar extent so that any differences were not statistically significant. However, the efficacy of the drug regimes differed significantly (p=0.02). It was greatest in patients treated with monotherapy with either diuretic or reserpine, intermediate with two drug combinations and least with 3 or 4 drugs. The data showed that diuretics were marginally better than reserpine as first line monotherapy. Furthermore, any diuretic based 2-drug regime was equally efficacious although a beta--blocker or methyldopa as second drug seemed favoured by the data. The addition of a third or fourth drug was counter productive as the increased number of drugs did not decrease blood pressure significantly.

Keywords: ***Hypertension, Antihypertensive drugs, Blood pressure treatment, Ghanaian, African.***

Résumé

Une vérification retrospective pendant les douzee premiers mois du traitement ambulatoire d'hypertension au Centre Hospitalo-Universitaire de Korle-Bu pendant la période de 1973 à1993 est l'objet de cet étude. Une étude précédente avait montré qu'au moins 7 regimes des drogues ont été utilisés pour soigner l'hypertension à Korle-Bu pendant cette période. L'objet de cet étude était de comparer l'effet et l'efficacité de ces drogues anti hypertension, régime de traitement sur la tension artérielle pendant les premiers 2 mois du traitement.

Il s'agit des résultat des dossiers médicaux de 55 soit 47% des cas qui ont satisfait des critères de sélection. La durée d'un mois du traitement d'hypertension a sensiblement baissé la tension artérielle systolique et diastolique par 21,4± 30,5 (P<0,001) et 13,8 ± 16,5 (P<0,001) mm hg, respectivement. Cette baisse de la tension artérielle a été gardée jusgu' au douzième mois.

Au douzième mois, la tension artérielle systolique et diastolique était stationnaire chez 19% et 28% des patients respectivement, ce qui montre qu'il n'y a pas une réaction au traitement avec des drogues. L'objectif de la tension arterielle conseille de <-140/90mmHg était réalise seulement chez 25,6% de tous les patients.

Tous les régimes de drogue pour le traitement de cette maladie ont sensiblement baissé la tension artérielle à un semblable niveau en pareil cas, aucune difference n'était pas statistiquement sensible. Cependant, l'efficacité des régimes de droque est sensiblement differente (P=0,02). Elle est trop remarquée chez des patients soignés avec la mono thérapie avec soit diurétique soit la réserpine en moyenne avec la combinaison de deux drogues et moins remarqué avec 3 ou 4 drrogues.

Les données avaient indiqué que les diurétiques étaient légèrement mieux plus que la réserpine de prime abord mono thérapie. De plus, n'importe quel régime diurétique du niveau 2-drogues était de même degré d'efficacité mais un beta-blocker ou methyle dope comme la deuxième drogue parait préféré par les données. L'adjonction de la troisième ou quatrième drogue avaient eu des effets contraires comme de plus en plus de drogues n'arrivent pas à baisser la tension artérielle sensiblement.

Introduction

There is now overwhelming evidence from many randomised controlled clinical trials to show that lowering of blood pressure by drug treatment results in reduced incidence of cardiovascular disease morbidity and mortality[1,2,3]. This beneficial effect of blood pressure management is especially evident in stroke incidence reduction[1,2].

Clinicians for a long time in Korle-Bu Teaching Hospital (KBTH), Accra, Ghana, have therefore been treating hypertensive patients with various drugs in order to reduce and control the blood pressure. A previous study showed that there were at least seven drug treatment regimes used for the treatment of hypertension in KBTH[4]. That study showed that during the period of 1973 – 1993, "old" antihypertensive drugs were commonly used in a diuretic based "step care" regime in the care of patients with hypertension in Accra. The purpose of this paper is to report a retrospective audit of 12 months of drug treatment of hypertension on blood pressure control in Ghanaian hypertensives attending medical clinics at KBTH during the period of 1973 – 1993.

Methods

Selection of case notes

Case notes of hypertensive patients attending medical clinics at the Korle-Bu Teaching Hospital were examined and those which met the criteria for selection were reviewed. For selec-

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tion, case notes should have shown that patients had:

1. hypertension, that is, systolic blood pressure ((SBP) ≥160mmHg and/or diastolic blood pressure (DBP) ≥95mmHg, for at least 2 weeks taken on three occasions while patient was not on any-hypertensive drug treatment at the first clinic attendance; and
2. consistent antihypertensive drug treatment for at least the first three months of treatment.

At the clinics, patients were usually followed up at monthly intervals. At each visit, blood pressure (BP) was measured in the right arm using a mercury sphygmomanometer with the patient in the sitting position and after 5 minutes rest. Disappearance of the Korotkoff sounds (fifth phase) was taken as the diastolic pressure. For each patient the sitting SBP, DBP and drug treatment were extracted from the case notes.

Data analysis

The data was analysed according to the antihypertensive treatment regime prescribed and results presented as mean ± standard deviation (SD). The homogeneity of treatment groups with respect to the baseline variables was assessed by one-way analysis of variance (ANOVA). For the comparison of treatment groups with one another, ANOVA, omnibus F test, Student's t-test, Bartlett's Chi square test and Kruskal-Wallis one-way analysis of variance[5] were used. Changes in blood pressure from baseline at 1,2,3 and 12 months were assessed by paired Students' t-test. The efficacy of treatment was taken as excellent if SBP was reduced to ≤140mmHg and/or DBP was reduced to ≤90mmHg, good, if SBP was reduced by at least 10mmHg but not reduced to ≤140mmHg or DBP was reduced by at least 5mmHg but was not reduced to ≤90mmHg and poor, if SBP was reduced by less than 10mmHg or increased, or DBP was reduced by less than 5mmHg or increased. The efficacy of drug treatment in each group was analysed by means of the Chi square test.

In all comparisons a two-sided P value of <0.05 was taken as significant. Significant pair differences were described in footnotes to each table.

Results

A total of 330 case notes were reviewed out of which 155 (47%) met the criteria for inclusion. Of those excluded, hypertension treatment was inconsistent in 70 (48.3%), the criteria for hypertension were not met in 30(20.7%) and the records were incomplete in 45 (31.0%).

Patient characteristics and drug usage

The baseline characteristics of the patients are summarised in Table 1. According to treatment prescribed, patients fell into seven groups. All treatment groups were similar in age and sex distribution. Systolic and diastolic blood pressures were significantly (p<0.001) different among the groups.

Blood pressure response to treatment

All treatment groups

For the whole group, mean SBP and DBP were significantly reduced by treatment to 166.2 ± 27.3 (p<0.001) and 98.2 ± 13.9 mmHg (p<0.001), respectively, at one month of antihypertensive treatment and these were maintained to the end of the year. The SBP and DBP response to treatment and these were maintained to the end of the year. The SBP and DBP response to treatment was excellent in 31.4% and 45.5%, good in 49.6% and 26.5%, and poor in 19.0% and 28.0%, respectively, of all patients at 12 months. Recommended target blood pressure of ≤140/90mmHg was achieved in 25.6% of patients at 12 months.

Individual treatment groups

Table 2 and 3 show that the mean SBP and DBP significantly decreased over 12 months for all treatment groups with no significant differences between the treatment groups.

Figure 1 shows that the efficacy of the drug regimes differed significantly (p=0.02). Treatment with diuretics was most efficacious, followed by those on 2 drugs and then those on 3 or more drugs. Chi square test for trend showed that there were significant (p<0.02) differences in the responses, with the best

Table 1 characteristics of patients at baseline

Treatment groups	Number (%)	Sex M	Sex F	Age (years)	SBP (mmHg)	DBP (mmHg)
Diuretics	13(8.4)	5	8	56.2 ± 12.9	160.9 ± 17.3	101.5 ± 8.8
D+BB	26 (16.8)	3	23	54.5 ± 8.8	179.2 ± 20.6	108.5 ± 11.6
D+M	23(14.8)	6	17	53.8 ± 13.5	184.3 ± 32.9	113.9 ± 18.3
D+R	41(26.5)	7	34	53.6 ± 10.8	182.0 ± 28.8	106.1 ± 14.8
Multiple Drugs	34(21.9)	10	24	54.2 ± 8.4	198.8 ± 24.7	119.4 ± 16.4
Others	9(5.8)	2	7	64.2 ±10.1	191.1 ± 16.2	110.0 ± 10.0
Reserpine	9 (5.8)	2	7	61.2 ± 7.3	164.4 ± 14.2	102.2 ± 12.0
All groups	55	35	120	55.0 ± 7.3	183.3 ± 27.2	110.2 ±15.4
P‖		0.6		0.17	0.0003	0.0006

‖*Probability based on omnibus test for differences among the treatment groups*
M indicates Male and F Female
SBP indicates Systolic Blood Pressure
DBP indicates Diastolic Blood Pressure
D+BB indicates Diuretics plus Beta-Blocker
D+M indicates Diuretic plus Methyldopa
D+R indicates Diuretic plus Reserpine
Others indicates 2-drug combinations of various drugs not included above
Multiple drugs indicates 33 or more drug combinations.

Table 2 Months of outpatient antihypertensive drug treatment according to drug treatment regime

Treatment groups	1 Month	2 Months	3 Months	12 Months
Diuretics	– 19.3 ± 22.4‡	– 26.2 ± 28.2‡	– 11.8 ± 18.9‡	– 23.8 ± 21.9†
D+BB	– 24.7 ± 9.4§	– 14.7 ± 29.3*	– 9.1 ± 28.3	– 22.5 ± 24.1§
D+M	– 34.4 ± 35.2§	– 23.2 ± 34.2†	– 25.3 ± 52.2	– 30.6 ± 40.2†
D+R	– 17.3 ± 27.4†	– 24.2 ± 23.5§	– 22.1 ± 34.9§	– 22.9 ± 25.3§
Multiple Drugs	– 16.5 ± 38.2*	– 13.3 ± 34.6	– 10.0 ± 34.5	– 15.2 ± 37.5*
Others	– 33.8 ± 22.6*	– 23.3 ± 30.0*	– 27.8 ± 24.9§	– 34.3 ± 19.9†
Reserpine	– 2.5 ± 29.2	– 3.8 ± 24.5	– 7.5 ± 15.8	– 15.7 ± 16.2*
All groups	– 21.4 ± 30.5§	–19.0 ±29.7§	– 16.1 ± 33.8§	– 22.5 ± 29.7‡
P‖	0.16	0.53	0.30	0.70

‖*Probability based on omnibus test for differences among the treatment groups*
*Groups are defined as in table 1. * indicates P<0.05 compared to baseline; † indicates p<0.01 compared to baseline; ‡ indicates p<0.02 compared to baseline § indicates p<0.001 compared to baseline.*

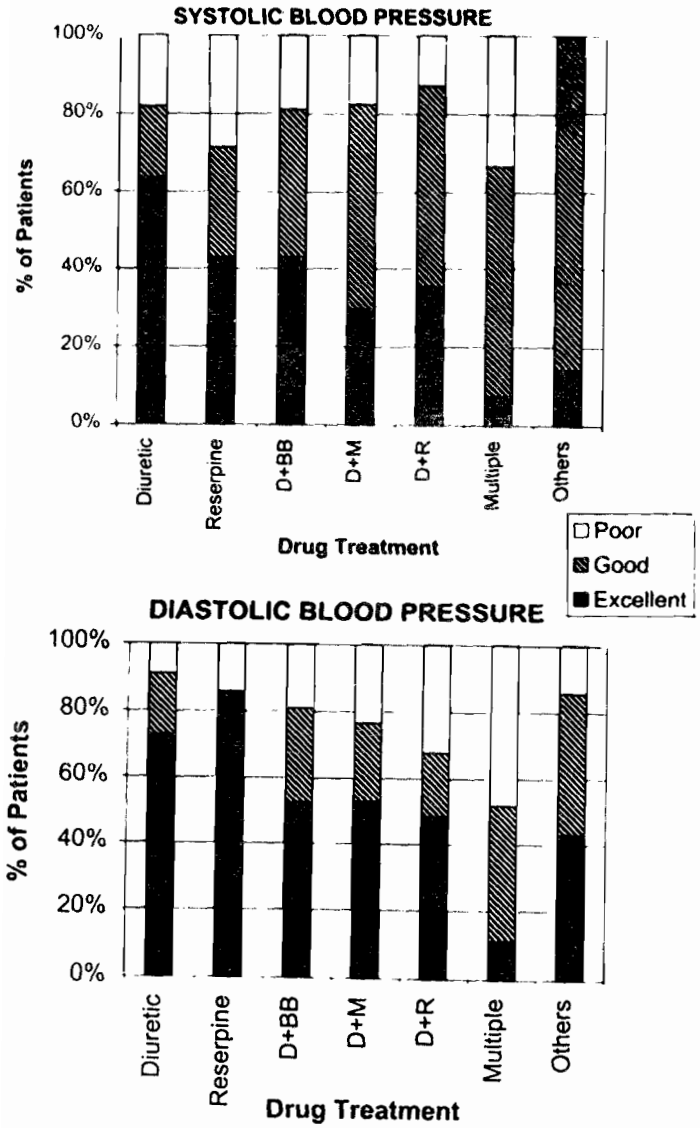

Fig. 1 ***The efficacy of outpatient antihypertensive drug treatment at 12 months of treatment in each treatment group.***

response in those treated with monotherapy (diuretics or reserpine) followed by those treated with two drugs (diuretic plus beta blockers, methyldopa or reserpine) and least with those treated with 3 or more drugs (odds ratio: 1.0, 0.19, and 0.09, respectively).

Discussion

The primary goal of the treatment of hypertension is to reduce blood pressure so as to reduce the risks of cardiovascular morbidity and mortality while avoiding the side effects and excessive cost of lifetime of medication. This study found that the goal of blood pressure reduction was achieved with some success at the Medical clinics in Korle-Bu Teaching Hospital, Accra, Ghana, during the period 1973 – 1993. Blood pressure was significantly reduced at 12 months in all patients in this study by 22.5mmHg for systolic and 12.2 mmHg for diastolic BP. From observational studies a prolonged fall of BP of this magnitude should reduce stroke, which is the number one cardiovascular pathology secondary to hypertension in Ghana, by about 60%[3,6]. This is encouraging for it means that despite the many difficulties of managing hypertension in a low socio-economic environment in Ghana, significant benefits are being obtained.

Despite the significant fall in blood pressure with treatment the recommended target pressure of ≤140/90[8] was achieved in only 25.6% of all patients. Furthermore, SBP and DBP were unchanged or increased in 19.0% and 28% of patients, respectively. Similar results have been obtained in large scale studies in which between one-fifth to almost one-half of all patients did not reach the defined goal pressure[7,8,9].

The benefits of hypertensive treatment with diuretics and beta--blockers have been well established by many clinical trials[1,2,10,11]. Indeed, because of this fact, these two drugs were recommended as first line drugs in the treatment of hypertension[10,11]. In general, no large scale clinical trials has shown any significant differences, in blood pressure reduction, between the various classes of antihypertensive drugs[1,2]. In the present study also, no significant differences in the mean of the absolute changes in SBP and DBP were observed.

Comparison of the drug efficacy showed that patients who were treated with multiple drugs responded less well to treatment than those who were treated with one drug or two drugs. Since the efficacy of a drug in lowering blood pressure is not dependent on the initial blood pressure[1,2,10,11], it is not likely

Table 3 Mean change in diastolic blood pressure (mmHg) from baseline during the first 12 months of outpatient antihypertensive drug treatment according to drug treatment regime.

Treatment groups	1 Month	2 Months	3 Months	12 Months
Diuretics	– 6.8 ± 11.2	– 8.5 ± 11.6*	– 7.5 ± 10.3*	– 7.7 ± 6.8†
D+BB	– 11.4 ± 11.8§	– 14.2 ± 17.1†	– 13.2 ± 12.5§	– 15.8 ± 14.1§
D+M	– 23.3 ± 19.1§	– 15.3 ± 8.4†	– 16.7 ± 28.7*	– 18.2 ± 21.3†
D+R	– 14.1 ± 16.0§	– 14.5 ± 17.7§	– 9.5 ± 18.6†	– 9.8 ± 15.5‡
Multiple Drugs	– 12.4 ± 20.1	– 4.8 ± 22.8	– 12.5 ± 19.3†	– 8.5 ± 22.9
Others	– 13.8 ± 9.2	– 3.3 ± 22.9	– 14.4 ±10.1†	– 14.3 ± 12.7‡
Reserpine	– 12.5 ± 14.9*	– 11.3 ± 15.5	– 12.5 ± 12.8*	– 15.7 ± 11.3*
All groups	– 13.8 ± 16.5§	– 11.0 ± 19.0§	– 11.9 ± 17.8§	– 12.2 ± 17.4§
P‖	0.25	0.31	0.59	0.55

‖*Probability based on omnibus test for differences among the treatment groups*
Groups are defined as in table 1. Abbreviations and symbols are as defined in Table 2.

that a patient intrinsic factor(s) determined the differences in BP response to drugs found in this study. Indeed, experience in managing such cases show that when they are managed under strict supervision in hospital, the blood pressure responds to treatment in most cases.

One most likely explanation is patients' compliance of drug treatment, as non-compliance with therapy is an important cause of poor blood pressure control[12]. Patients with higher baseline blood pressure had more drugs to take. This meant that their drug bills were higher. As patients in Ghana have to finance their own drug purchase in the absence of health insurance or any form of assistance, these patients were therefore less likely to buy and take all their needed drugs. This is compounded by the fact treatment compliance is inversely related to the number of drugs taken, the more the drugs the less likely that they are taken[13]. All these factors make it most likely that those with higher pretreatment BP and on multiple drugs were probably less compliant with treatment and therefore tended to be less "responsive" to treatment. The data therefore indicates that puttting patients on more than 2 drugs may be counterproductive.

Comparison of the effects of single drug regimes showed that diuretics reduced SBP more than reserpine. Indeed, the effect of reserpine on SBP was minimal. Similarly, reserpine only slightly reduced DBP more than diuretics. However, both drugs were equally efficacious. Diuretics therefore seem to be a better choice as first line monotherapy in the treatment of mild to moderate hypertension in the Ghanaian. Beta-blockers were not used as monotherapy indicating that physicians were aware of the less effectiveness of this class of anti-hypertensive as monotherapy on the black population as a whole[1,2].

The data also showed no significant difference in absolute blood pressure reduction in the diuretic based 2-drug treatment regimes. However, diuretic beta-blocker combination seemed to be more efficacious for DBP as it produced the least percentage of patients with uncontrolled DBP (>100mm Hg) compared with diuretic-reserpine and diuretic-methyldopa combinations (4.7% compared with 16.1% and 29.4%, respectively).

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