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Abstract: Objective - To determine the level of hypertension awareness and pharmacological management in patients from a rural community of Australia. Subjects and Methods - Patients were recruited from Albury-Wodonga and surrounding districts, located in a rural area of south-eastern Australia. For all patients, demographic information and medical history were recorded. Clinical measurements were also recorded. Results - A total of 665 patients were studied. Only 43.4% patients with hypertension were aware of its existence. Blood pressure was inadequately controlled in 88.9% of all hypertensive patients according to the management guidelines of the National Heart Foundation of Australia. Of all the patients who had hypertension, 55.0% were not receiving antihypertensive therapy. In those patients who were receiving therapy, 65.3% patients were receiving only one antihypertensive (monotherapy). The most commonly used antihypertensive classes were angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists, diuretics, β -blockers and calcium channel blockers. Conclusion - The level of hypertension awareness and management appears to be poor in hypertensive patients living in a rural community. Actual hypertension control was extremely poor, and a major potential cause of this may be the poor use of antihypertensive medications in these patients. Strategies need to be implemented to improve the awareness of hypertension and its required management in patients residing in rural communities.

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Awareness and Pharmacotherapy of Hypertension in a Rural Community

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Abstract

Objective – To determine the level of hypertension awareness and pharmacological management in patients from a rural community of Australia.

Subjects and Methods – Patients were recruited from Albury-Wodonga and surrounding districts, located in a rural area of south-eastern Australia. For all patients, demographic information and medical history were recorded. Clinical measurements were also recorded.

Results – A total of 665 patients were studied. Only 43.4% patients with hypertension were aware of its existence. Blood pressure was inadequately controlled in 88.9% of all hypertensive patients according to the management guidelines of the National Heart Foundation of Australia. Of all the patients who had hypertension, 55.0% were not receiving antihypertensive therapy. In those patients who were receiving therapy, 65.3% patients were receiving only one antihypertensive (monotherapy). The most commonly used antihypertensive classes were angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists, diuretics, β -blockers and calcium channel blockers.

Conclusion – The level of hypertension awareness and management appears to be poor in hypertensive patients living in a rural community. Actual hypertension control was extremely poor, and a major potential cause of this may be the poor use of antihypertensive medications in these patients. Strategies need to be implemented to improve the awareness of hypertension and its required management in patients residing in rural communities.

Keywords: hypertension; awareness; pharmacotherapy; rural

Introduction

Australia has a population of approximately 21 million people; an estimated one third of these residing in rural areas [1]. Australia's population and life expectancy are continuing to increase [1], increasing the importance of correct disease management.

Hypertension is one of the most prevalent diseases in Australia, with a prevalence of 28.6% in Australian adults [2]. In Australian general practice, hypertension is one of the most frequently managed problems and is responsible for 8.6% of all patient-doctor encounters and 7.9% of all medication prescriptions [2]. Hypertension has known links with other conditions such as diabetes mellitus and obesity [3], reported to have an increasing incidence in Australia [4], increasing a patient's cardiovascular risk, and need for appropriate management.

Little is known about the levels of hypertension awareness in Australian patients, particularly those residing in rural areas. One current study [5], determined a 62.1% awareness of hypertension in a rural Australian population. Internationally, there was a significant difference between hypertension awareness levels in rural and urban patients in Spain [6], with rural patients showing a poorer level of awareness.

The levels of hypertension control also appear to be poorer in rural areas compared to urban areas [7-10]. Several mechanisms and reasons have been proposed for this including a lack of or poor implementation of guidelines such as those provided by the National Heart Foundation, and poor patient compliance with treatment regimes [11-13].

The most common method of treatment for hypertension is with antihypertensive medications. Of all the hypertensive patients identified in the 1999-2000 AusDiab Study, only 46.9% were receiving antihypertensive medications, while the remaining 53.1% were untreated [2]. Of the hypertensive patients receiving antihypertensive treatment, 60.3% had a blood pressure that was above the accepted level of <140/90mmHg which should have been attained with adequate treatment [2].

The awareness of hypertension, and the adequate treatment and management of blood pressure levels in hypertensive patients appears to be poor in Australia, and residing in a rural area appears to worsen this further [2, 5, 6]. The primary objectives of this study were to determine the level of awareness of hypertension in patients living in a rural community, and to investigate the pharmacological management of hypertension in this population.

Subjects and Methods

This study received ethical approval from the Charles Sturt University Human Ethics Committee. Informed written consent was obtained from all participants.

Study Background and Location

This study is part of a study entitled the Diabetes Screening Complications Research Initiative (DiScRI) conducted at the Albury-Wodonga campus of Charles Sturt University. The main objective of the study being to determine the prevalence of risk factors for diabetes complications, as well as the effects of an annual health screening facility on the community.

Participants were recruited to DiScRI from Albury-Wodonga and surrounding districts. Albury-Wodonga is a rural inland city with an approximate population of 100,000 persons, located on the New South Wales-Victorian border in south-eastern Australia.

Patient Recruitment

Patients were recruited to the study through a public media campaign involving various different advertisements. These included a newspaper article in the Border Mail, a news story on local television, advertisements in general practice and community health centres, and radio announcements. People were requested to contact the university if they wished to undergo a health check, and were accepted regardless of whether or not they had known diabetic or cardiovascular

disease. An appointment was made by those interested in the study, to attend the health screening clinic. Each participant who attended received an information sheet and signed an informed consent form to participate in the study, and have their collected data used for research purposes [14, 15].

703 adult patients attended the health screening clinic. 38 patients were excluded on the basis of a total absence of any recorded blood pressure measurements, due to surgery, discomfort, recent blood donation, skin disease, or choosing not to have their blood pressure measured at the time. The final study population used for analysis consisted of 665 adult patients.

Definitions of Hypertension

The hypertension definitions and guidelines used in this study were obtained from the Hypertension Management Guide for Doctors 2004 [11] which were current at the time of **the study**. In this study, patients were classified as hypertensive if they had a known previous history of hypertension and/or had a blood pressure measurement which was classified as hypertensive according to the **2004** National Heart Foundation guidelines.

Data Collection

Patient information was collected via a demographic and clinical history questionnaire, as well as via a clinical examination.

The information collected from the questionnaire included patient age, sex, current prescribed medications, diabetes status (including type if known), years of diabetes presence, and whether there was any known family history of diabetes.

Other information was measured clinically, including blood glucose, body mass index and blood pressure. Blood glucose levels were measured using an AccuChek Advantage II glucometer (Roche Australia P/L), body mass index was calculated from the patient's measured height and weight at the clinic, and blood pressure measurements were taken using a standard mercury

sphygmomanometer (Welsh Allyn). Two blood pressure readings were recorded using a cuff of appropriate size for the patient after they had rested for at least 5 minutes in the supine position. If the supine position was not possible for a patient, blood pressure was recorded in the sitting position with the arm supported at the height of the heart. A standing blood pressure was also recorded 3 minutes post standing from a supine position. For each patient, the mean of two blood pressure measurements taken 1 minute apart, was recorded in each measured position.

All information collected and the clinical measurements were completed within 1 hour at the one site, with the final part of the visit being a consultation with the research coordinator. Here, feedback was provided to patients about their test results, as well as recommendations for follow-up based on the relevant guidelines from the Australian Diabetes Society and the National Heart Foundation of Australia [15].

Statistical Analysis

All data are presented as mean \pm standard deviation (range). The specific statistical tests used for the analysis were: student t-tests for paired two samples, ANOVA for more than three groups, and Chi-square for categorical data such as the awareness and control of hypertension. A *p*-value of less than 0.05 was considered statistically significant in this study.

Results

General Findings

The mean age of the 665 participants was 60.9 ± 13.1 (23-93) years, with slightly more females (n=380, 57.1%) than males (n=285, 42.9%). The general findings concerning cardiovascular risk factors for the total study group are provided in Table 1.

29.5% of patients were aware that they had been previously diagnosed with hypertension, while 469 (70.5%) patients were unaware of any previous diagnosis of hypertension.

A known diagnosis of diabetes mellitus was present in 165 (24.8%) patients; of these 143 (86.7%) had type 2 diabetes and 22 (13.3%) had type 1 diabetes mellitus. The average blood glucose level present at clinical examination was 5.5 ± 3.0 (2.2-28.1) mmol/L, and the average duration of diabetes was 1.8 ± 5.2 (0.0-48.0) years.

Of the 464 patients who were classified as either overweight or obese by their body mass index, 257 (55.4%) patients were classified as overweight and 207 (44.6%) were classified as obese.

Hypertension Patients

In this study, 499 (75.0%) patients had either a known history of hypertension, or an elevated blood pressure (>140/90mmHg), at the time of the study. The general findings of these patients are provided in Table 2.

Hypertension Awareness and Management

An awareness of hypertension was present in only 43.4% of all patients with hypertension, with the remainder being unaware of their hypertensive condition. Of the 195 patients who were aware that they had a previous diagnosis of hypertension, blood pressure was controlled (<140/90 mmHg) adequately in only 46 (23.6%) patients.

Of the total number of hypertensive patients in the study, including those who were unaware of their condition, only 50 (11.1%) patients had adequately controlled blood pressure levels.

Use of Antihypertensive Medications

An overview of the use of antihypertensive medications and the specific number of medications used per patient for the total 449 hypertensive patients in this study is provided in Table 3.

Of the total number of patients with hypertension, 55.0% were not currently taking any antihypertensive medications. The remaining 45.0% were taking differing numbers of antihypertensive medications each. The majority of these (65.3%) were receiving only one

antihypertensive medication (monotherapy). Three patients reported the use of an unspecified number of antihypertensive medications.

Excluding those patients who were taking zero antihypertensive medications, the remaining 202 (45.0%) patient's total medication class usage was analysed. The specific medication classes included were angiotensin converting enzyme inhibitors (ACEI), angiotensin II receptor antagonists (ARB), calcium channel blockers (CCB), β -blockers, diuretics, α -blockers, and centrally acting α_2 agonists.

Monotherapy occurred in 29.4% of the hypertensive patients. The most commonly used antihypertensives as monotherapy in this study were ACE inhibitors and ARBs. The least commonly used were α -blockers and α_2 agonists.

Discussion

The major findings of this study are a low awareness of hypertension with concomitant low use of antihypertensive medications, resulting in poor control and management of hypertension.

Awareness of Hypertension

Knowledge of hypertension presence is essential before further treatment and management is possible. An enhanced awareness of hypertension in patients educated in one study has resulted in significant improvement in patient treatment and outcome [16]. The awareness of hypertension in this study, in all patients who had hypertension was very poor; only 43.4% of patients with hypertension aware of having a previous diagnosis. This could reflect poor communication with patients about their medical conditions and/or poor diagnoses being made by these patients' doctors. The extent of these factors however, could not be determined within this study design. From patient interviews, it was discovered that most patients do not get their blood pressure checked regularly if they perceive themselves as healthy.

The level of awareness in this study, is similar to a study from Spain which identified that only 44.5% of hypertension patients were aware of their hypertension [6]; however in this Spanish study only 50% of the patients had hypertension compared to 75% of the patients in this study, so the level of hypertension awareness may be worse in this Australian study. Another study of a rural Australian population found 62.1 % of their patients were aware of their hypertension [5]. This figure is greater than what was found in this study, perhaps due to the study incorporating three different rural locations which may have differing circumstances, and also slightly larger patient numbers. One other large study conducted recently in the United States also reported higher hypertension awareness than this study, with the awareness of hypertension being 71.8%; perhaps indicating more proficient health care promotion strategies exist in the United States compared to what is available in rural Australia [17].

Control and Pharmacotherapy of Hypertension

The control of hypertension was very poor in this study. Only 11.1% of all hypertensive patients had adequately controlled blood pressure according to the 2004 guidelines provided by the National Heart Foundation [11]. This study is the first in Australia to discover such extremely poor levels of hypertension control, and while these are comparable to European levels of control which range from 5% to 13%, this level is much worse than that of many other countries. In Canada the control of hypertension is estimated to be 21% and in the United States it is 36% [18].

Even in those patients aware of their hypertension, the level of control was still extremely poor, with less than 25% of those aware, having a controlled level of blood pressure <140/90mmHg. In a study by Janus et al. [5], hypertension control was found to be slightly better than in this study, with hypertension controlled in 55% of women and 35% of males residing in an area of rural south-east Australia. Possible reasons for this difference may be similar to those for awareness, including diverse patient locations and larger patient numbers, but this is not certain.

Usage of Antihypertensive Medications

The use of antihypertensive medications was analysed to investigate any possible impact on hypertension control. Of all patients with hypertension, only 45.0% were taking antihypertensive medications. This figure is similar to that of one Australian study [5], which documented that only 51.1% of their hypertensive study participants were receiving antihypertensive treatment.

In this study, monotherapy was the most commonly used antihypertensive treatment option, occurring in 29.4% of patients. Other findings from rural populations have recorded monotherapy as occurring in 55% of those receiving antihypertensive treatment [5]. There is evidence which supports that monotherapy as treatment for hypertension is generally not adequate enough to control blood pressure levels to recommended target levels [13]. The findings of the present study support this.

The National Heart Foundation has recommended ACE inhibitors and ARBs, CCBs, and in patients over 65 years, thiazide diuretics, as first line antihypertensive medication choices [13]. In this study, ACEI and ARB were the most commonly prescribed classes overall, followed by CCBs, β -blockers, and diuretics; findings which appear to follow the recommendations of the National Heart Foundation. The class of antihypertensive being prescribed for patients receiving only monotherapy was also analysed. This comparison was very similar to total class use, and provides an overview of the popularity of the different antihypertensive classes prescribed as monotherapy. ACEIs and ARBs were the most popular classes used by around 30% of patients each, followed by CCBs, β -blockers, and diuretics as the next most popular, based on patient feedback.

The reasons for the low use of antihypertensive medications however are not clear. Possible factors may include a lack of patient follow-up with doctors, cost, and accessibility. Particularly in rural areas, where some if not all of a patients' income may be derived from the land, the cost of antihypertensive medications may potentially be prohibitive [19], reducing the use of these

medications. Also particular perhaps to a rural area are large distances between patients, healthcare facilities, and suppliers. Interruptions and time delays in transport may affect supply of medications, and patient travelling distances may influence their obtaining medications and complying with medication prescription [20].

One possible plan of action to improve hypertension awareness and management in rural areas is to provide free blood pressure checks at local pharmacies and doctors clinics. These places are centrally located in most townships providing easy accessibility, and the promotion of quick, easy, and no cost checks would assist with attendance rates. Those found to have high blood pressure could then be provided with educational information, and advice to visit a doctor for a more thorough health check-up. Any plan which is relatively inexpensive and situated locally would be suitable for most rural Australian areas and people.

A potential limitation of this study is that specific medication dosages were not recorded, which made the analysis of drug dosage and blood pressure control impossible.

In conclusion, the levels of hypertension awareness (43.4%) and reaching optimal blood pressure targets (11.1%) are poor in these patients from a rural Australian community. Also, more than half of the patients with hypertension are not receiving any antihypertensive medications, partially explaining the low levels of hypertension control. New and improved strategies need to be developed and implemented to help improve the awareness and control of hypertension in rural areas. These strategies must be aimed directly at the general population to increase the awareness of hypertension, especially in those with asymptomatic disease and underlying hypertension, as seen in this study.

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Table 1: Cardiovascular risk factors of the total study population

Risk Factor	N (n=665)	%
Mean age (years)	60.9 ± 13.1 (23-93)	-
Sex - male	285	42.9
Smoking	41	6.2
Alcohol consumption	103	15.5
Overweight/Obese (BMI≥25kg/m ²)	464	69.8
Awareness of hypertension diagnosis	196	29.5
Known type 2 diabetes mellitus	143	21.5
Family history of diabetes mellitus	248	37.3

Table 2: Demographic and Clinical Findings in Patients with Hypertension

Characteristics	Values (n=449)
Mean age (years)	63.5 ± 12.0 (23-93)
Sex - male	198 (44.1%)
Mean blood glucose level at clinic (mmol/L)	5.6 ± 2.6 (2.9-26.5)
Diabetes mellitus	118 (26.3%)
Mean duration of diabetes mellitus (years)	6.8 ± 7.9 (0.1-40.0)
Family history of diabetes mellitus	164 (36.5%)
Smoking	24 (5.4%)
Alcohol consumption	82 (18.3%)
Mean body mass index (BMI) (kg/m ²)	27.9 ± 7.8 (2.9-26.5)
Overweight/Obese (BMI≥25kg/m ²)	332 (74.0%)

Table 3: Number of antihypertensive medications used per patient

Antihypertensive Medications	Hypertension patients (n=449)
	# (%) of total group
0 medications	247 (55.0%)
1 medication	132 (29.4%)
2 medications	51 (11.4%)
3 medications	13 (2.9%)
4 medications	2 (0.4%)
5 medications	1 (0.2%)
Unknown number of medications	3 (0.7%)