

Secondary Hypertension in the Libyan population: A Descriptive Analysis of Underlying Causes and Patient Outcomes

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Hypertension is the predominant modifiable risk factor for all-cause morbidity and mortality worldwide. Approximately 10% of hypertension patients have secondary causes that can be treated. This study aims to describe the causes, presenting symptoms and clinical outcomes of secondary hypertension patients attending the hypertension clinic at Tripoli University Hospital (TUH). This was a retrospective descriptive analysis of data collected from all adult patients with secondary hypertension followed up at the hypertensive clinic at TUH from 01/01/2020 to 31/12/2024. Secondary hypertension was defined as “elevated blood pressure, which is secondary to an identifiable cause. There were 82 secondary hypertension patients. There were 32 males (39%) and 50 females (60%), with a mean age of 45 years (range: 19–73 years). Secondary hypertension caused by renal disease ranked first and accounted for almost 44% of cases. This is followed by hypothyroidism and obstructive sleep apnoea syndrome rates of approximately 15% and 10%, respectively. Among the 26 patients with endocrine causes, 20 (77%) were women. While 5 (62%) of the 8 obstructive sleep apnoea syndrome patients were men, 44 (53.6%) of the total number of study patients had improved or reversed blood pressure after treatment for the underlying cause. Renal diseases are the most common cause of secondary hypertension. Secondary causes of hypertension are common and, in certain instances, potentially reversible. It is recommended that hypertensive patients be screened for secondary hypertension and that the underlying condition be addressed to mitigate the risk of cardiovascular complications.

Introduction

Hypertension is a major global public health concern, affecting more than 1.13 billion people worldwide [1]. While the majority of hypertension cases are classified as primary or essential hypertension, a significant proportion are attributed to secondary causes. Secondary hypertension refers to elevated blood pressure that results from an underlying medical condition or physiological state [2]. Hypertension is the predominant modifiable risk factor for all-cause morbidity and mortality worldwide, and less than half of hypertensive patients are aware of their condition [3]. The Libyan population has a high prevalence of hypertension, estimated to range from 28.8% to 37.1% [4-5].

Secondary hypertension is defined as hypertension that occurs due to an identifiable cause and can be resolved or controlled by treating the underlying cause [2]. The European Society of Cardiology/European Society of Hypertension (ESC/ESH) guidelines recommend screening for secondary hypertension for patients under 40 years of age, grade 3 hypertension, resistance hypertension, the presence of hypertensive organ damage, or worsening blood pressure readings in previously diagnosed hypertension patients [2]. A total of 10–15% of hypertension patients have a secondary cause that can be treated [3]. One important step in evaluating patients with hypertension is detecting secondary causes [4].

The actual burden of secondary hypertension is still significantly underestimated. It can be present in one-third of referred hypertension patients and may reach up to half in those who have difficulty controlling their blood pressure readings [5, 6]. Early diagnosis of secondary hypertension is an important step in treating this group of patients to achieve good blood pressure control and prevent cardiovascular complications [6].

The diagnosis and assessment of hypertension should always include an evaluation of other cardiovascular risk factors, including diabetes mellitus, hyperlipidaemia, family history, and smoking status. Important evidence suggesting an underlying secondary cause is as follows: (a) young patient < 30 years of age (renal causes or coarctation of the aorta); (b) symptoms or signs suggesting secondary causes; (c) indication of severe hypertension (BP \geq 180/110 mmHg) or resistant hypertension (BP \geq 140/90 mmHg despite

concurrent use of three antihypertensive medications from different classes, including a diuretic); and (d) acute worsening of hypertension in a patient with previously stable control [7].

The most common causes of secondary hypertension in young adults (< 40 years) are renal causes and thyroid dysfunction. In middle-aged adults (40–64 years), endocrine causes such as adrenal and thyroid disorders and OSAS are common. In older adults above 65 years, atherosclerotic renal artery stenosis, renal failure, and hypothyroidism are common causes [8].

The 2009 STEP survey reported that the proportion of individuals aged 25–64 years with high blood pressure or currently on medication for increased BP was 40.6% [9]. Reports from a recent STEP survey (2023) revealed a smaller percentage of 25.3% for both sexes, with a higher prevalence among Libyan men (26.6%) than among Libyan women (24%) [10]. However, data on the specific burden of secondary hypertension in Libya are limited. Understanding the epidemiology and causes of secondary hypertension is crucial because identifying and managing the underlying cause can lead to better blood pressure control and improved patient outcomes. This study aimed to investigate the prevalence, causes, and clinical characteristics of secondary hypertension among patients treated at the hypertensive clinic at Tripoli University Hospital (TUH) in Libya.

Methods

This was a prospective descriptive analysis of data collected from 1200 adult patients who were registered and regularly followed up with hypertension patients at the hypertensive clinic at TUH between 01/01/2020 and 30/06/2024. This study was reviewed and approved by the ethical board at Tripoli University Hospital. The study utilised a deidentified dataset, ensuring patient privacy and confidentiality. All personally identifiable information, including names, addresses, and medical record numbers, was removed from the data. Verbal informed consent was obtained from the patients at the clinic, as the data were anonymous.

All patients had their detailed history taken and received a comprehensive physical examination, which involved listening to the heart and lungs, checking peripheral pulses, and examining the fundus of the eye. Women of reproductive age were asked about their use of contraceptive pills and were tested for pregnancy. Furthermore, biochemical tests were conducted, including measurements of Hb, WBC, ESR, serum electrolytes, serum creatinine, serum uric acid, blood glucose, lipid profile, aspartate amino transferase and alanine amino transferase (ASAT and ALAT) and urine investigations. Electrocardiogram (ECG) was recorded for all patients.

Hypertension was defined as hypertension greater than 140/90 mm Hg. Secondary HT was considered in patients for whom clinical examination and investigations identified a specific cause.

Data to determine the proportion of patients with secondary HT who were completely reversed or improved after treating the underlying cause were collected at follow-up visits. Patients were considered "reversed" or "improved," depending on their blood pressure measurement and/or treatment. "Reversed" was defined as having a normal BP (less than 140/90 mm Hg) with lifestyle changes without treatment, whereas "improved" was defined as a reduction in blood pressure with the same treatment or less.

Results

Over the duration of the study, 82 patients, 6.8% of all patients followed up in the HT clinic, were diagnosed with secondary HT. The patients included 32 males and 50 females with a mean age of 46.1+/-12.4 years (19--73 years). Headache was the presenting symptom of most patients (56 patients; 68.3%), and 8 patients were asymptomatic. The duration of HT ranged from 6 months to 10 years. Table 1 shows the general characteristics of the study population (Table 1).

Secondary hypertension caused by renal disease was the most common, accounting for nearly 44% of cases. Hypothyroidism and obstructive sleep apnoea syndrome followed, with rates of approximately 15% and 10%, respectively. Among the 26 patients with endocrine causes, 20 (77%) were women, while 5 (62%) out of the 8 patients with obstructive sleep apnoea syndrome were men (Table 2).

The blood pressure of forty-four patients improved or reversed after treatment for the underlying cause. In addition, 34 of the 38 patients who did not improve did not receive any treatment for the underlying cause. As demonstrated in Table 2, only one patient with chronic kidney disease improved after haemodialysis. Renal artery stenting had a positive effect on all 3 patients with renal artery stenosis. In addition, lithotripsy had a positive outcome for all 9 (out of 11) patients with renal stones. Nephrostomy and resection of the cyst reversed HT in patients with hydronephrosis and renal cysts, respectively. Additionally, immunosuppressive treatment improved HT in 3 out of 4 patients with glomerular nephritis.

Table 1. General characteristics of the study population.

| General characteristics | Number | Percentage |
|--|--------|------------|
| Age | | |
| Over or equals 40 years | 54 | 65.8% |
| Under 40 years | 28 | 34.2% |
| Sex | | |
| Male | 32 | 39.0% |
| Female | 50 | 61.0% |
| Positive family history of hypertension | 25 | 30.5% |
| Presenting Symptoms | | |
| Headache | 56 | 68.2% |
| None | 9 | 10.1% |
| Loin swelling | 5 | 6.1% |
| Loin pain | 4 | 4.9% |
| Blurred vision | 3 | 3.6% |
| Haematuria | 2 | 2.4% |
| Renal colic | 2 | 2.4% |
| Day time somnolence | 2 | 2.4% |
| Palpitation | 2 | 2.4% |

Two patients out of 6 with adrenal adenoma underwent adrenalectomy, and one underwent resection of the adenoma, which led to one reversal and 2 improvements. The other 3 patients improved after receiving spironolactone. Surgical intervention also reversed patients with pheochromocytoma and improved those with parathyroid adenoma. All 8 patients with obstructive sleep apnoea syndrome had secondary HT that improved after continuous positive airway pressure (CPAP). Reducing the dose of steroids, stopping them or replacing them with cyclophosphamide improved HT in patients on steroids.

Table 2. Causes of secondary hypertension with interventions and outcomes.

| Cause | Total (Male) | Outcome after intervention |
|--|--------------|----------------------------|
| Renal | | |
| Chronic kidney disease | 40 (21) | 5 reversed, 13 improved |
| Renal stone | 11 (8) | 1 improved |
| Polycystic Kidney Disease | 11 (7) | 3 reversed, 6 improved |
| Membranous Glomerulonephritis | 5 (1) | No improvement |
| Renal artery stenosis | 4 | 3 improved |
| Renal cyst | 3 (3) | 1 reversed, 2 improved |
| Left kidney Hydronephrosis | 1 | 1 reversed |
| Nephrotic syndrome | 1 | No improvement |
| Renal cell carcinoma | 1 | 1 Improved |
| Renal artery thrombosis | 1 | No improvement |
| Atrophy of right kidney | 1 (1) | No improvement |
| Endocrine | | |
| Hypothyroid | 26 (6) | 3 reversed, 9 improved |
| Adrenal adenoma | 12 (1) | No improvement |
| Hyperthyroid | 6 | 1 reversed, 5 improved |
| Parathyroid adenoma | 4 | 1 reversed and 3 improved |
| Pheochromocytoma | 1 | 1 Improved |
| Phaeochromocytoma | 1 | 1 reversed |
| Other causes | | |
| Obstructive sleep apnea syndrome | 18 (5) | 1 reversed, 12 improved |
| Steroid treatment for rheumatoid arthritis | 8 (5) | 8 improved |
| Systemic Lupus Erythematosus | 6 | 1 reversed, 1 improved |
| Steroid treatment for bronchial asthma | 2 | 2 improved |
| Coarctation of aorta | 1 | No improvement |
| | 1 | 1 improved |

Finally, concerning the complications of hypertension in the study population, 31 (%) had complications, of which 10 had cerebrovascular stroke (2 with atrial fibrillation), 3 had left ventricular failure, and 5 had renal failure.

Discussion

The aims of this study were to explore the prevalence, underlying causes, and clinical outcomes of secondary hypertension among patients attending the hypertensive clinic of TUH.

The prevalence of secondary HT in the present study coincides with that reported in previous studies, which reported a prevalence of 5–10% in the population [11]. Moreover, in previous reports, renal causes were the main cause of secondary HT [12-13]. Unlike other studies, primary aldosteronism was not prevalent among patients attending hypertensive clinics [14], whereas the prevalence of hypothyroidism was higher than that reported previously [15]. Obstructive sleep apnoea was found to be the second cause of secondary HT among our sample, with a clear gender disparity in the prevalence of sleep apnoea [16], with men experiencing a higher rate than women do. In contrast, endocrine causes were more prevalent in women.

Screening and treating the primary cause of elevated hypertension is essential, especially in patients with reversible HT, such as those with obstructive sleep apnoea, where CPAP treatment has been shown to be beneficial and to reduce blood pressure in all patients.

To the best of the authors' knowledge, this is the first study investigating secondary HT in a major hospital in Libya. However, owing to the nature of sample selection, the prevalence of secondary HT in the general population may be higher or lower than the prevalence in our selected study population. In addition, Despite these limitations, this study contributes valuable knowledge and serves as a foundation for future research. These findings underscore the importance of thorough screening for sleep apnoea and renal and endocrine diseases in patients with suspected secondary hypertension and highlight the need for a comprehensive approach to diagnosis and treatment.

Conclusions

The findings from this study can inform clinical practice guidelines and public health strategies to better address secondary hypertension in the Libyan population. Screening for the aetiologies of secondary hypertension can mitigate the risk of cardiovascular complications, given the availability of effective therapeutic interventions for the majority of underlying causes, as well as the potential to lower or even reverse elevated blood pressure. Finally, screening for hypertension across different age groups is critical for the early detection and effective management of both primary and secondary hypertension.

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Conflict of interest.

 Nil

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المستخلص

ارتفاع ضغط الدم هو عامل الخطر السائد القابل للتعديل لجميع أسباب المرض والوفيات في جميع أنحاء العالم. يعاني حوالي 10% من مرضى ارتفاع ضغط الدم من أسباب ثانوية يمكن علاجها. تهدف هذه الدراسة إلى وصف الأسباب والأعراض الحالية والنتائج السريرية لمرضى ارتفاع ضغط الدم الثانوي الذين يرتادون عيادة ارتفاع ضغط الدم في مستشفى طرابلس الجامعي. كان هذا تحليلًا وصفيًا بأثر رجعي للبيانات التي تم جمعها من جميع المرضى البالغين المصابين بارتفاع ضغط الدم الثانوي الذين تمت متابعتهم في عيادة ارتفاع ضغط الدم في مستشفى طرابلس الجامعي من 2020/01/01 إلى 2024/12/31. تم تعريف ارتفاع ضغط الدم الثانوي بأنه "ارتفاع ضغط الدم الثانوي لسبب يمكن تحديده". كان هناك 82 مريضًا بارتفاع ضغط الدم الثانوي. كان هناك 32 ذكرًا (39%) و 50 أنثى (60%)، بمتوسط عمر 45 عامًا (المدى: 19-73 عامًا). احتل ارتفاع ضغط الدم الثانوي الناجم عن أمراض الكلى المرتبة الأولى وشكل ما يقرب من 44% من الحالات. ويلي ذلك معدلات قصور الغدة الدرقية ومتلازمة انقطاع النفس الانسدادي أثناء النوم بنحو 15% و 10% على التوالي. ومن بين 26 مريضًا يعانون من أسباب الغدد الصماء، كان 20 (77%) من النساء. وفي حين كان 5 (62%) من مرضى متلازمة انقطاع النفس الانسدادي أثناء النوم الثمانية من الرجال، تحسن ضغط الدم أو انعكس لدى 44 (53.6%) من إجمالي عدد مرضى الدراسة بعد العلاج من السبب الأساسي. وتعد أمراض الكلى السبب الأكثر شيوعًا لارتفاع ضغط الدم الثانوي. والأسباب الثانوية لارتفاع ضغط الدم شائعة، وفي بعض الحالات، يمكن عكسها. ويوصى بفحص مرضى ارتفاع ضغط الدم بحثًا عن ارتفاع ضغط الدم الثانوي ومعالجة الحالة الأساسية للتخفيف من خطر حدوث مضاعفات القلب والأوعية الدموية.