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From Awareness to Action: Evaluating India's Comprehensive Approach to Hypertension Control

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Abstract

Hypertension, often termed the "silent killer," poses a significant public health challenge in India. Recognizing the urgency of addressing this silent killer, India has made efforts to increase awareness and implement strategies for hypertension control. With an estimated 200 million adults affected by this condition, it poses a considerable burden on individuals, families, and the healthcare system.India has implemented a multifaceted approach known as the India Hypertension Control Initiative (IHCI), a joint initiative involving various partners, to combat this growing health concern. Its primary objective is to improve the management of hypertension in primary healthcare facilities, aligning with the current screening program in place. By implementing evidence based strategies and reinforcing the fundamental aspects of hypertension control, IHCI aims to drive progress in tackling non-communicable diseases in India by collaborating with key stakeholders such as the Ministry of Health & Family Welfare, State Governments, ICMR, and WHO India. By working together, IHCI and its partners strive to achieve the targets set by the Government of India in addressing the burden of non-communicable diseases and improving the health outcomes of the population. In this comprehensive review article, a critical examination is conducted, delving deep into the strategies, successes, challenges, and pivotal transition from mere awareness to impactful action in the realm of hypertension control, specifically within the unique and intricate fabric of the Indian context. It underscores the importance of addressing hypertension comprehensively, from awareness campaigns to sustained healthcare interventions, while highlighting lessons for global public health efforts.

Keywords: Hypertension; Silent killer; Public Health; India; Awareness; Control; Healthcare system; Collaboration; Non-communicable diseases.

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INTRODUCTION

Cardiovascular diseases (CVDs), including heart attacks and strokes, are a leading global health concern, particularly in India where they account for a third of all deaths.[1,2] Hypertension, or high blood pressure, is a major contributor to CVDs and affects 1.4 billion people worldwide.[1,2] Despite its prevalence, only 14% of those affected have their condition under control.[1,2,3] In India, hypertension is especially prevalent, with an estimated 200 million adults affected, yet awareness and control of the condition remain low.[4,5] Effective management of hypertension is crucial in reducing the burden of CVDs.[7] Stroke

and coronary artery disease are among the most common causes of morbidity and fatality globally; in India, they constitute more than one-third of all mortality.[5] Low-income nations are witnessing an increase in CVD-related death from the disease, whereas developed nations are witnessing a decline in these fatalities.[14] This review article meticulously analyzes India's efforts in combating hypertension, highlighting the crucial transition from raising awareness to implementing effective interventions. It aims to provide valuable insights for healthcare professionals, policymakers, and researchers globally, fostering excellence in hypertension management.

Uncontrolled blood pressure is a significant risk factor for CVD and is believed to be accountable for over 10 million deaths annually (fig. 1), surpassing the combined total of all infectious diseases.[2] Hypertension, or high blood pressure, is a leading cause of morbidity and mortality globally.[8] India is no exception, with a rising prevalence of hypertension contributing to the burden of non-communicable diseases.[9,10] The Hypertension Control Initiative in India seeks to address this challenge.[8] Hypertension contributes to approximately 1.6 million deaths each year in India, specifically due to ischemic heart disease and stroke.[3,4]

More lives can be saved by the primary health care treatment of hypertension than by any other programme. The majority of hypertension related deaths are preventable. Regulating high blood pressure has the greatest potential for life-saving benefits when compared to other evidence-based treatments for non-communicable diseases.[4,7]

Over a period of twenty-five years, it is estimated that bringing the coverage of antihypertensive drugs to 70% among individuals with high blood pressure alone will prevent 39.4 million lives worldwide (Fig. 2).[5,6]

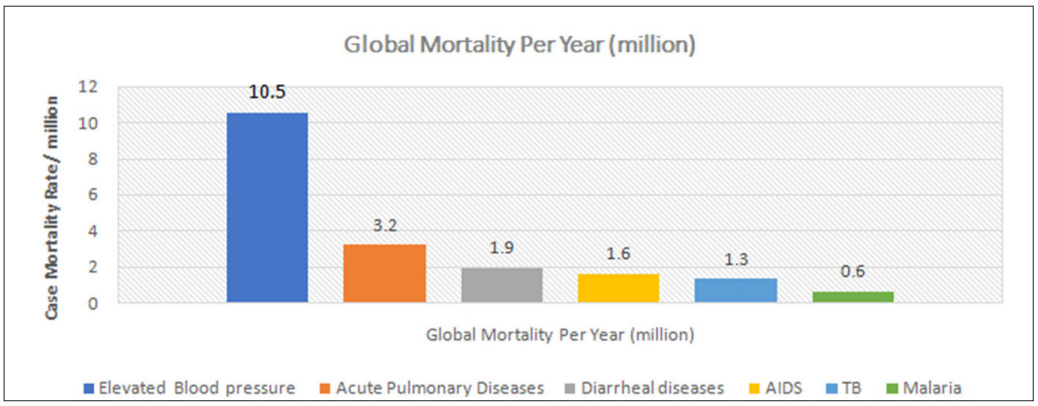

Fig. 1: The leading cause of death globally is high blood pressure, surpassing the combined mortality rates of all infectious diseases

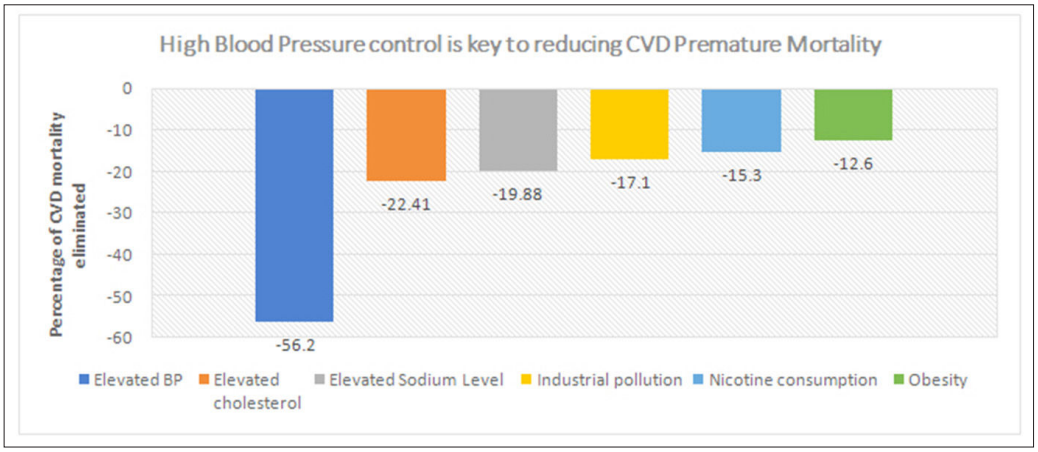

Fig. 2: High Blood Pressure control is key to reducing CVD Premature Mortality (***Source:*** Institute for Health Metrics and Evaluation, 2015 data)

In response to this concern, the Government of India has wholeheartedly embraced the ambitious "25 by 25" objective, a noble endeavor aiming to curtail premature mortality stemming from non-communicable diseases (NCDs) by a significant margin of 25% before the dawn of 2025.[7,8] A voluntary objective was set by the Indian government to reduce the prevalence of elevated blood pressure by one quarter in the same period, as per a recent declaration by MoHFW.[7,8] This review article aims to provide a thorough analysis of India's efforts in tackling hypertension, emphasizing the critical transition from creating awareness to taking effective action, and offering valuable insights for healthcare professionals, policymakers, and researchers in India and worldwide. Additionally, this article evaluates India's multi-faceted approach to hypertension control and its impact on public health.

The India Hypertensive Control Initiative: An Overview

The India Hypertension Control Initiative (IHCI) is a collaborative effort launched in 2017 to improve hypertension management in primary healthcare across India. Expanding from 25 districts to 120 districts, IHCI has enrolled millions in its simplified, affordable treatment protocols.[7,8] The initiative is part of the Global Hearts Initiative, which includes WHO's five technical packages aimed at reducing cardiovascular diseases through interventions like managing hypertension, reducing tobacco and salt intake, eliminating trans fats, and promoting physical activity.[8,9]

To effectively manage hypertension and control blood pressure, a five step approach is essential.[8] It begins with the implementation of practical treatment protocols that standardize the approach to drug dosage and steps for uncontrolled blood pressure. A consistent supply of medication and equipment is crucial to ensure that patients receive what they need when they need it.[8] Community-based care allows healthcare workers to provide, adjust, and intensify treatment as necessary. Patient-centered services aim to reduce barriers to care, such as cost and inconvenience while simplifying medication regimens. Lastly, establishing robust information systems is vital for continuous monitoring and data analysis, which helps in enhancing patient care and the performance of health systems.[8] These steps are designed to streamline the treatment process, making it more accessible and effective for patients suffering from hypertension.[8,9]

Strategies for Raising Awareness

One aspect of the initiative focuses on raising awareness among the Indian population about the dangers of hypertension. India acknowledges the necessity of comprehensive public health strategies to tackle hypertension. The government has implemented guidelines for healthcare providers that highlight the significance of precise blood pressure measurement, diagnosis, and suitable treatment. These policies also emphasize the importance of lifestyle adjustments, such as dietary modifications and increased physical activity.[10] By integrating hypertension management into existing healthcare systems, India aims to guarantee that every individual receives timely and sufficient care. This section examines the tactics employed, including health education campaigns, media involvement, and community outreach, to achieve this goal.

Blood Pressure Screening and Diagnosis

Early detection is key to hypertension control. This section evaluates the implementation of blood pressure screening programs, diagnostic accuracy, and their reach across urban and rural areas.Blood pressure screening is crucial for adults aged 30 and above, who should undergo annual checks as part of the population-based screening program.[8] Additionally, health facilities should conduct opportunistic screenings for all adults over 18 years old. Proper measurement is essential: patients should avoid stimulants and exercise for 30 minutes prior, rest for 5 minutes, and have an empty bladder.[7,8] They should sit with back support and feet flat, remaining silent during the process. The correct cuff size is key, with dimensions based on the patient's arm circumference, and it should be applied snugly above the elbow while the arm is supported at heart level. This streamlined approach ensures accurate diagnosis and management of hypertension.[7,8]

To measure blood pressure, use a digital device by turning it on, instructing the patient to stay calm, and pressing start. The cuff inflates and deflates to display readings, which should be recorded without rounding. If unsuccessful, retry after adjusting the cuff. For manual measurement, inflate the cuff to 200 mmHg, then deflate slowly, listening for the first and last thumps to note systolic and diastolic pressures.[10] Challenges in measuring blood pressure include the need for affordable, accurate devices, and trained personnel. Devices range from mercury and aneroid sphygmomanometers to digital monitors. India is phasing out mercury devices due to environmental concerns.

Lifestyle Modification Programs

Managing hypertension effectively involves lifestyle changes and, if necessary, medication. Lifestyle modifications are beneficial for those with pre-hypertension to prevent high blood pressure and for those with hypertension to potentially reduce medication needs. Key changes include reducing sodium and fat intake, increasing potassium and fiber, exercising regularly, and managing stress.[10]

The DASH diet, which is high in fruits, vegetables, and low in sodium, along with regular physical activity, has been proven to significantly lower blood pressure. The JNC-7 guidelines recommend these lifestyle changes, and the PREMIER trial showed that combining the DASH diet with other lifestyle modifications leads to the greatest blood pressure reductions.For dietary management, it's advised to limit sodium intake to 65-100 mmol/day, eat a diet low in saturated fats and cholesterol, and consume plenty of fruits, vegetables, and low-fat dairy, along with whole grains and plant proteins. Moderating alcohol intake is also recommended.[11]

Pharmacological Interventions

The World Health Organization (WHO) and the Ministry of Health and Family Welfare, Government of India (MoHFW GOI), recommend that adults with a systolic blood pressure (SBP) of 140 mmHg or higher and/or a diastolic blood pressure (DBP) of 90 mmHg or higher should receive treatment for hypertension. Immediate intervention is necessary for those with an SBP of 160 mmHg or a DBP of 100 mmHg or more.[33,34] The goal of treatment is to control blood pressure, aiming for an SBP below 90mmHg. The primary medications for managing hypertension include calcium channel blockers, renin-angiotensin system inhibitors, and thiazide diuretics, with amlodipine, telmisartan, and chlorthalidone being the preferred choices in India.[35,36] In specific cases, low-dose aspirin and statins may be prescribed, particularly for patients with a history of heart attack or stroke. For individuals with significantly elevated blood pressure, a combination of antihypertensive drugs may be necessary to reach the desired blood pressure target.[39] Diuretics, which are divided into thiazides, loop diuretics, and potassium-sparing diuretics, are also used, with thiazides being especially useful for conditions like stroke, heart failure, and coronary artery disease.[12,15,16]

In addition to above anti-hypertensive medications, below medicines can be used in specific **cases:**

ACE inhibitors: These medications block the conversion of angiotensin I to angiotensin II, leading to lower blood pressure. They also increase bradykinins and prostaglandins, which contribute to their blood pressure lowering effects. Recommended for heart failure, post-myocardial infarction, high risk of coronary artery disease, diabetes, chronic kidney disease, and stroke.[12,35]

Angiotensin II receptor blockers (ARBs): ARBs inhibit the binding of angiotensin II to its receptors, preventing blood vessel constriction and fluid retention. Studies like ONTARGET have shown that ARBs like telmisartan are as effective as ACE inhibitors in reducing cardiovascular and renal issues in high-risk patients without heart failure.[12,38]

Renin inhibitors: Aliskiren, a renin inhibitor, blocks the conversion of angiotensinogen to angiotensin I, thereby reducing the production of angiotensin II. It's approved for use alone or with other antihypertensive agents.[12,16]

Calcium channel blockers (CCBs): These drugs block calcium entry into vascular smooth muscle cells, causing vasodilation and reduced muscle contraction. There are two types: dihydropyridines, which mainly affect peripheral blood vessels, and non-dihydropyridines, which affect both cardiac and peripheral vessels. Dihydropyridines are particularly effective in older patients for reducing cardiovascular events and strokes.[12,15]

Beta-blockers: By blocking beta-1 adrenergic receptors, beta-blockers decrease heart rate, cardiac contractility, and cardiac output, which lowers blood pressure. They are recommended for acute myocardial infarction and for hypertension in patients with congestive heart failure or asymptomatic left ventricular hypertrophy.[12,35]

Alpha-blockers: These medications inhibit alpha-1 adrenoreceptors on vascular smooth muscles, leading to vasodilation and lower blood pressure. They are beneficial for men with hypertension and benign prostatic hyperplasia but are not typically the first choice for treatment.[12,38]

Direct vasodilators: Agents like hydralazine and minoxidil directly relax vascular smooth muscle. They are effective in lowering blood pressure but are usually used as additional treatments due to side effects like reflex tachycardia and fluid retention. Hydralazine is also used in hypertensive emergencies.[12,35,38]

Each class of medication plays a specific role in managing hypertension and associated cardiovascular risks, often as part of a combination therapy to achieve optimal outcomes. It is essential

for healthcare providers to prescribe medications based on individual patient needs and monitor their effectiveness over time to ensure optimal treatment outcomes.

Role of Healthcare Providers

Healthcare providers are at the forefront of hypertension control.

Role of Medical Officers

In the India Hypertension Control Initiative, Medical Officers have a crucial role that involves screening all adults for high blood pressure, prioritizing those aged 30 and above. They are responsible for treating individuals with a systolic blood pressure of 140 mmHg or more, or a diastolic blood pressure of 90 mmHg or more, following confirmation of these readings. Treatment should be initiated in line with the standardized protocol approved by the state. Patients must be monitored and their treatment adjusted, if necessary, at intervals of one to three months. Once patients achieve their target blood pressure, they should be referred to the nearest health and wellness center or sub-center for ongoing care.[42] Additionally, Medical Officers must ensure the accuracy and timely submission of quarterly and annual reports by the designated health staff.[7,8,13]

Role of Nurses

Nurses in the India Hypertension Control Initiative have a multifaceted role that includes conducting opportunistic screening by measuring blood pressure for adults, with a focus on those aged 30 and above, and referring individuals with high readings to the Medical Officer. They manage patient registration, follow-ups, and medication refills for those with controlled blood pressure, while also providing lifestyle management counseling. Nurses coordinate follow-up visits for patients with stable blood pressure and refer others with high readings or symptoms to the Medical Officer. They are responsible for contacting patients who miss appointments and work with community health workers for home visits. Additionally, nurses are tasked with maintaining accurate patient records, updating treatment apps, and generating reports for their facility.[7,8,13]

Role of Pharmacists

Pharmacists play a crucial role in healthcare, starting with drug stock maintenance where they work alongside medical officers to estimate drug needs and ensure a consistent supply through timely requests. They're responsible for maintaining drug quality by adhering to proper storage practices and conducting regular inspections.[13] Monthly monitoring of stock levels at various health facilities is also part of their duties, ensuring stock is replenished based on patient numbers. In terms of drug dispensing, pharmacists provide patients with at least a 30-day supply of medication, as per the prescription, while also offering necessary counseling.[7,8] They maintain meticulous records of drug issuance and monitor daily consumption at the dispensing counter.

For recording and reporting, pharmacists update all drug related records in both the Logistics Management Information System (LMIS) and physical logs.[39] They maintain a hypertension patient tracker to monitor medication regularity and submit monthly reports on drug consumption and stock levels to district program officers. Lastly, pharmacists contribute to awareness generation by supporting and actively participating in community and health facility activities related to non-communicable diseases (NCDs), helping to educate and inform the public.[40,41]

Role of Physiotherapists

Physical inactivity is a significant risk factor for developing hypertension. Higher levels of physical activity are associated with reduced hypertension incidence, with an inverse relationship between physical activity dose and hypertension risk. Physiotherapists hold a vital position in the management of hypertension within the India Hypertension Control Initiative (IHCI).[13] Their role encompasses the assessment and implementation of individualized exercise programs tailored to enhance cardiovascular health and reduce blood pressure levels. They are tasked with educating patients on the importance of regular physical activity and its benefits in controlling hypertension. Physiotherapists also monitor patients' progress, adjusting exercise regimens as needed to ensure optimal outcomes. They collaborate closely with Medical Officers and Nurses to provide a comprehensive approach to hypertension management, focusing on lifestyle modifications alongside medical treatment. Furthermore, physiotherapists contribute to the IHCI by leading community-based exercise sessions, promoting awareness about the significance of physical fitness in preventing and managing high blood pressure, and encouraging a culture of health and wellness within the community.

The World Health Organization (WHO) emphasizes physical activity as a non-pharmacological approach to complement antihypertensive medications, recommending exercise as part of every non-pharmacological regimen. The American College of Sports Medicine (ACSM) supports exercise as a preventive, treatment, and control measure for hypertension, advocating a combination of endurance and muscle-strengthening exercises.[17] The latest guidelines suggest 150–300 minutes of moderate or 75–150 minutes of vigorous aerobic activities weekly, along with muscle strengthening twice a week.[18]

Exercise mitigates predisposing factors for hypertension like high sodium, body fat levels, stress, cholesterol, and arterial stiffness, with minimal side effects compared to pharmacological treatments. It enhances arterial compliance, endothelium dependent vasodilation, and reduces arterial stiffness and peripheral resistance. [19]Endurance or aerobic exercise consistently lowers blood pressure significantly compared to non-exercise groups, as evidenced by various systematic reviews.[20] This reduction is attributed to decreased systemic vascular resistance through the modulation of sympathetic and renin-angiotensin systems, akin to ACE inhibitors, alongside enhanced insulin sensitivity, improved vasodilation, heightened baroreceptor sensitivity, and increased arterial compliance.

The impact of Resistance training exercise positively influenced the decrease in blood pressure. A key observation was that the average decrease in blood pressure from resistance training was consistent for both systolic and diastolic pressures, contrasting with aerobic exercise which primarily lowered systolic values. The decrease in blood pressure associated with resistance training is thought to stem from enhancements in endothelial function, arterial flexibility, sympathetic activity, and heart rate variability.[21]

Isometric exercise is known to help lower blood pressure by enhancing muscle blood flow through acute metaboreflex stimulation. It also improves vascular endothelial function, influences baroreflex sensitivity, and long-term autonomic balance. Combining isometric exercise with aerobic exercise is beneficial in clinical settings for overall health and well-being.[22]

A comprehensive exercise regimen combining aerobic, resistance, and isometric exercises is optimal for managing hypertension. Systematic reviews support the use of exercise to reduce blood pressure in individuals with elevated levels, highlighting the minimal risks associated with exercise compared to other treatment modalities like medications, surgical procedures, or device-based treatments.

Additional supporting staff may jointly contribute a vital role in lifestyle modification and counselling to the IHCI Programme.

Weekly Supportive Supervision at Facility level (DHH/SDH/CHC/PHC-HWC/SC-HWC)

In the IHCI Programme, Cardiovascular Health Officers (CVHO) and Senior Treatment Supervisors (STS) play a crucial role by conducting 10-15 supervisory visits each month, using a detailed checklist to ensure adherence to quality standards. Their feedback and comprehensive reports on the program's progress and challenges are vital for health authorities at the state and district levels. Supervision doesn't end with the visit; it's essential to follow up on any issues discussed, particularly those related to equipment or drug supply. Supervision is a continuous effort that requires regular data analysis for performance assessment, maintaining communication with staff to implement recommendations from visits, and, if necessary, additional follow-up visits to support the healthcare team and address any urgent problems identified.[7,8]

Challenges and Barriers

The IHCI Programme faces several challenges in managing hypertension effectively. Monitoring treatment outcomes is critical, as early 2021 data showed a notable percentage of patients with uncontrolled blood pressure and a lack of follow-up.[7] Ensuring the availability of drugs is another hurdle, with procurement processes being protracted. The quality of blood pressure monitors is also a concern, affecting the accuracy of diagnoses. Human resources are stretched thin, with a notable shortage of dedicated NCD nurses and healthcare staff, especially in phase II states under IHCI Programme.[8,13] Additionally, inadequate documentation due to staff shortages hampers patient follow-up and program analysis. Addressing these issues requires a multifaceted approach that includes improving awareness, access to healthcare, affordability of treatments, medication adherence, and training for healthcare providers, alongside policy changes, community engagement, and bolstering healthcare infrastructure.[26,27]

Success Stories and Case Studies

Lachamma, a 65-year-old hypertensive patient, faced challenges in accessing her medication due to COVID-19 disruptions. The India Hypertension Control Initiative (IHCI) responded by decentralizing blood pressure monitoring and drug refills to local Health and Wellness Centres (HWCs), significantly improving care continuity and medication adherence. Despite an initial 76% drop in new patient registrations during the lockdown, the IHCI's strategy led to a 37% recovery in registrations as patients began utilizing nearby HWCs. Dr. Sanjeev Kumar from Nagpur Division highlighted the critical need to maintain essential health services for patients with comorbidities and commended the WHO-IHCI team for their support in doorstep delivery of medications.[9]

During the lockdown, the IHCI team established a system for home delivery of medications, with state and district advocacy supporting the distribution by health workers like MLHPs, ANMs, and ASHAs. These workers, using IHCI's patient lists, delivered drugs directly to homes, with CVHOs managing drug supply and STSs overseeing the process. The IHCI program reached over 8 lakh beneficiaries, with about 52% receiving their hypertension medication at home during April and May 2020.[9,13] This community distribution, backed by the WHO-IHCI team and state governments, ensured continued care during the pandemic. Dr. Yogita Rana of Telangana highlighted the successful implementation of this strategy, which allowed 52% of patients to receive their medications during the lockdown.[9,13]

Data Collection and Monitoring

Effective data collection and monitoring are essential for evaluating the impact of hypertension control initiatives and tracking progress over time.[27] By collecting data on blood pressure levels, treatment adherence rates, cardiovascular outcomes, and healthcare utilization patterns, policymakers can assess the effectiveness of interventions and identify areas for improvement. Regular monitoring of key indicators allows for timely adjustments to strategies and ensures that resources are allocated efficiently to achieve optimal results in hypertension management.[23,24]

Future Directions and Sustainability

Looking ahead, future directions for hypertension control in India involve sustaining the momentum of existing initiatives while expanding outreach efforts to reach more individuals at risk of hypertension.[28,29] This includes scaling up community-based screening programs, strengthening primary healthcare services for early detection and treatment, integrating hypertension management into existing chronic disease programs, and leveraging technology for remote monitoring and telemedicine services.[37] Sustainability of these efforts requires continued investment in healthcare infrastructure, capacity building for healthcare providers, and ongoing collaboration with stakeholders across sectors.[25,26]

Digital Health Intervention

Digital health technology is rapidly advancing in managing hypertension, with mobile health apps like **Simple App** leading the charge. These apps help monitor vital health metrics and offer educational support to patients. Developed with the Indian Hypertension Control Initiative (IHCI), Simple allows healthcare providers to track patient data and manage care efficiently. The IHCI's approach includes standardized treatment protocols, consistent medication supply, patient centered services, and team based care, all supported by robust monitoring systems. This digital shift is pivotal for enhancing hypertension care and patient outcomes.[7,8,13]

Information and communication technology (ICT)

The modern era's technological advancements have made Information and Communication Technology (ICT) pivotal, especially in healthcare. ICT's role in managing hypertension is noteworthy, enabling continuous blood pressure monitoring and addressing circadian variations, which is vital for hypertensive patients. Its application is especially useful in remote areas, during disasters, or health crises.[14]

ICT offers a promising way to improve hypertension management by combining self-monitored blood pressure with lifestyle changes, ensuring accurate control. It addresses medication noncompliance and could reduce clinical inertia in treatment. By automating blood pressure data delivery, ICT could enhance 24-hour monitoring, making it a cost-effective addition to standard care, with significant public health advantages.[14]

In Chhattisgarh, India, "Mitanins" were instrumental in improving blood pressure management. These community health workers, known as Mitanins in Chhattisgarh and Accredited

Social Health Activists (ASHA) elsewhere, were crucial in monitoring hypertensive individuals. They diligently conducted follow-ups, screened patients, and ensured timely medication refills for those under their care.[14]

International Collaboration and Global Implications

In 2016, the World Health Organization (WHO) and the United States Center for Disease Control and Prevention initiated the Global Hearts Initiative to work towards the global goal of reducing hypertension prevalence by 25% by 2025.[7,8] Aligned with the United Nations Sustainable Development Goal 3 (SDG 3) focusing on ensuring healthy lives and well-being, India is striving to provide standard care to 75 million individuals with hypertension or diabetes by 2025.[30,32] This effort includes initiatives like IHCI and the government's emphasis on non-communicable disease screening and treatment at the primary healthcare level.

CONCLUSION

Despite significant advancements in screening and prevention, hypertension remains a global health concern, affecting over a billion people and leading to increased morbidity and mortality. While a vaccine for hypertension is not available, initiatives like the India Hypertension Control Initiative (IHCI) are making headway by integrating community efforts with technology, offering free comprehensive healthcare services, and utilizing tools like the Simple App for data management. The IHCI's approach, if sustainable, could serve as a model for global data collection and hypertension management, emphasizing the importance of a holistic strategy for controlling this silent killer and improving public health worldwide. India's comprehensive approach to hypertension control demonstrates a commitment to addressing a significant public health issue through awareness raising activities, improved access to healthcare services, lifestyle modifications, pharmacological interventions, data collection, monitoring, and collaboration with international partners. By focusing on prevention, early detection, and effective management of hypertension, India has made significant strides in reducing the burden of high blood pressure on its population. Moving forward, sustained efforts are needed to overcome challenges, build on success stories, enhance data driven decision-making, and ensure the long-term sustainability of hypertension control initiatives for better health outcomes in India and beyond.

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