

A Pilot Collaborative Pharmacist-Physician Practice Improves Hypertension Outcomes in Rural India

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ABSTRACT

Background: In rural India there is a significant shortage of healthcare professionals to address the healthcare needs of the population. **Objectives:** This investigation examines whether pharmacists working under a collaborative practice agreement with physicians can improve healthcare outcomes in rural India in a cost-effective manner. **Materials and Methods:** Nissi Joseph, a registered pharmacist and pastor, established a collaborative practice with physician Dr. Madhavi Nelluri to address hypertension within his congregation in rural India. Of 74 interested patients, monthly screenings over three months identified 18 as normotensive, 42 as pre-hypertensive, and 14 as hypertensive. Seventeen patients who were unable to afford their medications agreed to receive monthly counseling from the pharmacist in exchange for free antihypertensive medicines. Joseph met with these patients monthly to inform them about their hypertension status, discuss non-pharmacological management approaches and distribute the prescribed medications. **Results:** Among 17 patients, mean SBP decreased over four visits from 165 ± 5.9 to 132.6 ± 1.6 ; DBP changed from 87.1 ± 1.5 to 82.2 ± 1.6 , and both were statistically significant at $p < 0.005$. Initially, only two patients had SBP/DBP below 140/90; by the fourth visit, only three patients remained above this level. **Discussion:** The economic constraints faced by rural communities are considerable and physician visit expenses including medicine and diagnostics would consume a substantial portion of an individual's income. Follow-up visits are uncommon. The pharmacist collaborative model reported here would provide a cost-effective alternative. **Conclusion:** This study shows that pharmacists, working with physicians, can effectively manage hypertension and improve healthcare access for India's rural population.

Keywords: Collaborative Practice, Hypertension, Pharmacist managed, Rural India.

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INTRODUCTION

In the span of three decades since 1990, the global population with hypertension has increased twofold, from 650 million to 1.3 billion (Global Report, 2023). The number of patients with hypertension in India is estimated to be 220 million (Varghese *et al.*, 2023), and only 12% of those individuals have adequately controlled blood pressure (The World Bank, 2024). Varghese *et al.* (2023) study suggests that 90% of adults with hypertension in India are either undiagnosed, untreated, or treated but are not optimally controlled. As chronic hypertension is a major risk factor for cardiovascular disease (Mills *et al.*, 2020) and is a

significant contributor to mortality in India (Reddy *et al.*, 2005), any effort to address this widespread healthcare problem should consider involving all healthcare professionals and other society stakeholders.

Around the world, pharmacists are the most underutilized healthcare professionals (Kibicho *et al.*, 2015). India has only 7.3 physicians per 10,000 people (Karan *et al.*, 2023), with most rural patients seeking treatment from non-degree allopathic practitioners without a medical degree near their village (Gautham *et al.*, 2011). This population could certainly utilize the skills of other healthcare professionals - especially pharmacists in managing chronic health care problems.

A recent randomized controlled study found that pharmacists can manage hypertension in outpatient settings in India (Sekar and Gottipati, 2026). This pilot study applies those findings in a real-life rural setting in India on whether pharmacists working under a collaborative practice agreement with physicians could improve the healthcare outcomes of the patients.



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MATERIALS AND METHODS

Study Site

Three churches in the Guntur district. Mr. Nissi Joseph, a registered pharmacist and a pastor in India, set up a collaborative practice agreement with physician Madhavi Nelluri to address hypertension within his congregation in rural India.

Collaborative Practice

Under this collaborative practice agreement, Dr. Madhavi Nelluri (Physician) authorized pharmacist Nissi Joseph to measure the blood pressure of patients enrolled in the pilot study and dispense medications from a pre-approved list of medicines in accordance with International Society of Hypertension guidelines.

Study Design

Prospective observational study.

Study Duration

Nine months.

Inclusion criteria

All adult males and females in the congregation who agreed to get their hypertension managed under this collaborative agreement of the pharmacist and physician.

Exclusion criteria

Children, and adults who did not consent.

Statistical Analysis Paired t-test was used to compare changes in SBP and DBP values.

Design and Data Collection

An Excel data collection sheet was used by the pharmacist to collect all relevant information required for this study. In his

congregation, 74 patients agreed to be managed under this collaborative agreement. Monthly screenings for blood pressure were carried out by the pharmacist with Omron HEM 7156 T Digital Blood Pressure Monitor with 360° accuracy Intelli Wrap cuff (all arm sizes), following the International Society of Hypertension - Global Hypertension Practice Guidelines. Following 3 months of monthly blood pressure measurements, hypertension distribution in this population was established.

Fourteen of these patients who were hypertensives and three pre-hypertensive patients, who could not afford their medications, agreed to a monthly visit with a pharmacist for counseling and getting their blood pressure checked in return for free medications that were funded by a sponsor. At every engagement, pharmacist informed them of their blood pressure numbers, discussed non-pharmacological management approaches, and distributed their prescribed medications. All prescriptions followed hypertension practice guidelines and were approved by collaborating physician.

RESULTS

Age distribution of the patient population is shown in Figures 1 and 2 shows the hypertensive status distribution following monthly measurements at the end of three months for these 74

Table 1: Patients treated with various antihypertensive drugs and their cost for one month.

Drug	Number of Patients	Cost [Rs; \$]
Nifedipine	5	900;10
Telmisartan	4	900;10
Telmisartan + Hydrochlorothiazide	4	1050;12
Cilnidipine	4	900;10

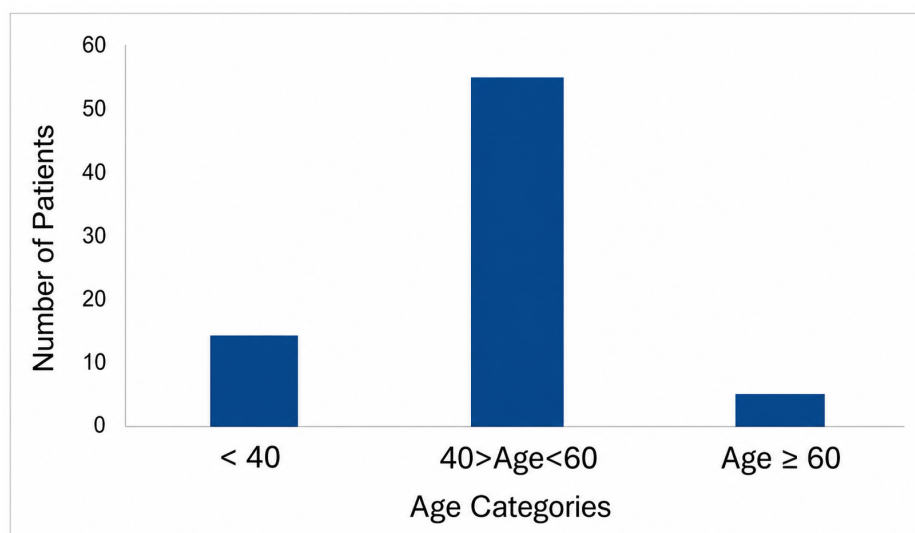


Figure 1: Age Distribution of Patients.

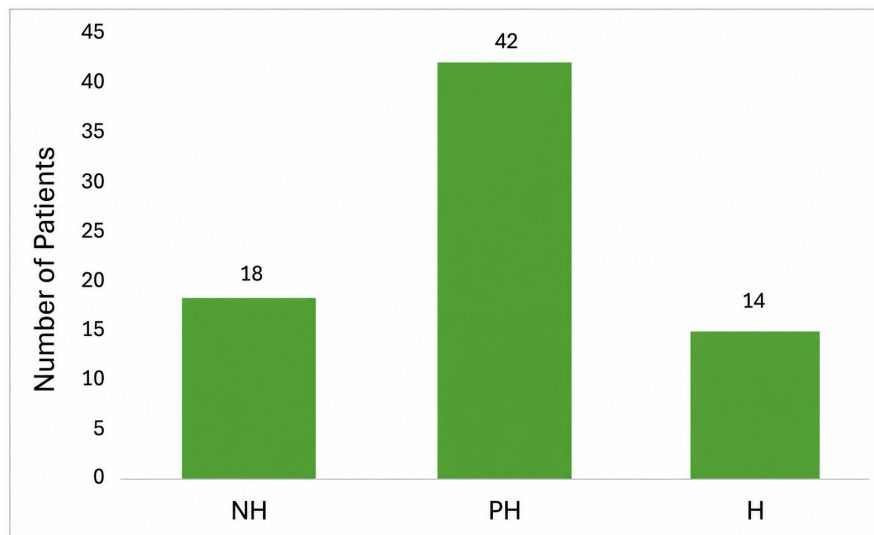


Figure 2: Hypertensive status distribution of the patients. NH-Normotensive, PH-Prehypertensive, H-Hypertensive.

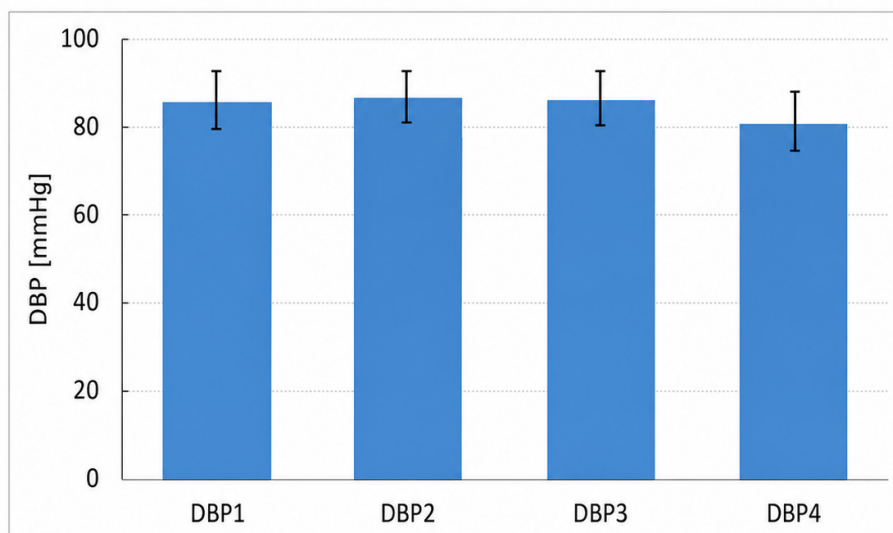
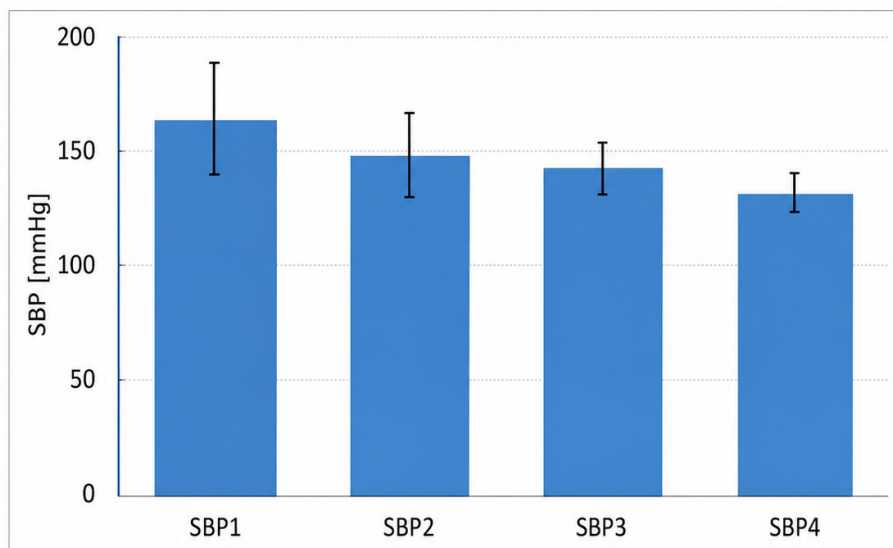


Figure 3: Mean blood pressure of 17 patients during the four visits.

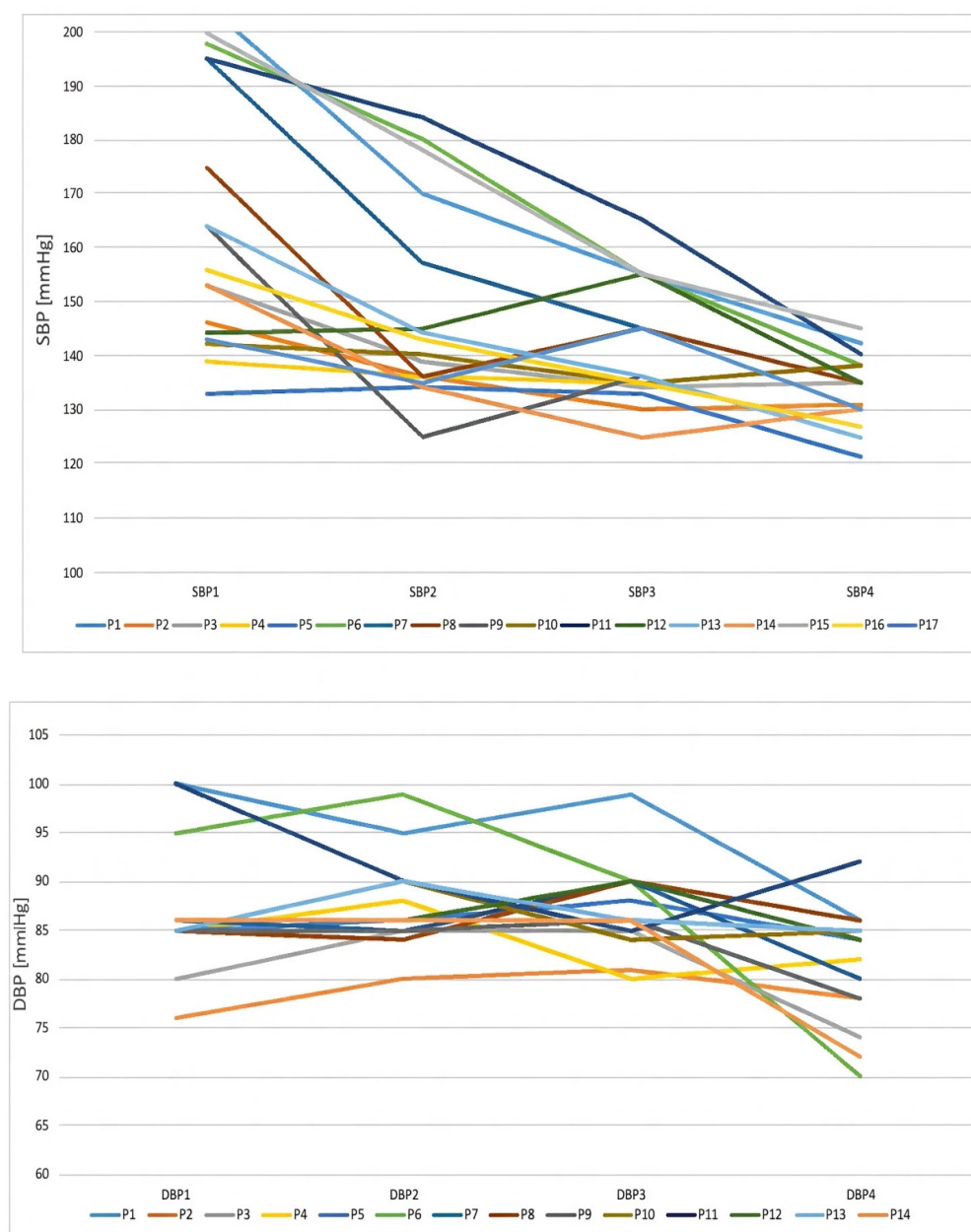


Figure 4: SBP/DBP of 17 patients treated by pharmacists with monthly counseling over 6 months.

patients - 18 patients as normotensive (SBP < 120 and DBP < 80), 42 as pre-hypertensive (SBP $\geq$ 120 and SBP < 140 or DBP $\geq$ 80 and DBP < 90), and 14 as hypertensive (SBP $\geq$ 140 or DBP $\geq$ 90).

Among 17 patients who were managed by the pharmacist in this pharmacist-physician collaborative agreement - mean SBP decreased over four visits from 165 ± 5.9 to 132.6 ± 1.6 ; DBP changed from 87.1 ± 1.5 to 82.2 ± 1.6 and both were statistically significant at $p < 0.005$ (Figure 3).

Figure 4 shows the individual SBP and DBP value for each patient over the duration of the study. Each of the 17 patients benefited and had better blood pressure control by being treated in this collaborative practice. Table 1 lists the number of patients and the medication used to manage their hypertension.

DISCUSSION

Even in developed countries such as the United States of America, there is a shortage of physicians and primary care providers in rural areas (Goodfellow *et al.*, 2016). Proposals to address this gap include effective implementation of non-physician healthcare providers, including pharmacists in the health care delivery (Smith *et al.*, 2013). Pharmacists collaborating with physicians at the physician's office is effective in improving blood pressure control (Carter *et al.*, 2012; Chisholm-Burns *et al.*, 2010).

Stewart *et al.* (2021) has reported results from pharmacist-led hypertension management for under-resourced patients. Sixteen patients who completed all five visits with pharmacists in that study had a 23 mm drop in SBP, which was very comparable to

our observation in this study with 17 patients (Figure 3). When the primary outcome of the study was to determine time to achieve blood pressure control of 140/90 - Median time to BP goal was 36 days versus 259 days in the physician pharmacist collaborative group versus the regular care group (Dixon *et al.*, 2018). Further effectiveness of pharmacist involvement in improving hypertension outcome is demonstrated by the fact that discontinuation of physician-pharmacist collaborative intervention resulted in deterioration of blood pressure control (Carter *et al.*, 2010). Recently, Sekar and Gottipati (2026) have demonstrated in a randomized controlled study that physician-pharmacist collaborative intervention in an ambulatory setting in India was extremely effective in improving patient's hypertensive status.

High systolic blood pressure made the largest contribution to age standardized CVD-DALYS [Cardiovascular Disease disability adjusted life years] with 2,841.1 per 100,000 in South Asia (Mensah *et al.*, 2023). With 7.3 physicians per 10,000 patients in India (Karan *et al.*, 2023) most of whom practice in urban centers, rural India experiences a significant shortage of healthcare professionals to address the health needs of the population. Furthermore, the economic constraints faced by rural communities are considerable. Expenses related to loss of wages, transportation, consultations, and medications can total up to 3,000 INR per visit, when patients need to travel several kilometers to see a physician in the city - representing a substantial portion of individual income. Even when patients attend such appointments, follow-up visits to monitor conditions such as blood pressure are uncommon. The Pharmacist collaborative model described in this manuscript may offer one possible solution to address the healthcare needs of the rural population in a cost-effective manner.

CONCLUSION

This study shows that pharmacists, working with physicians, can effectively manage hypertension and improve healthcare access for India's rural population.

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ABBREVIATIONS

SBP: Systolic Blood Pressure; **DBP:** Diastolic Blood Pressure; **CVD-DALYs:** Cardiovascular Disease Disability-Adjusted Life Years; **INR:** Indian Rupees.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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