Annexure A

Dissertation at IIHMR, DELHI

A Report By:

SHIVANGI YADAV
(PG/19/077)

Under the Guidance of:

Dr. B. S. SINGH
(Associate Professor)

Post-Graduate Diploma
in
Hospital and Health Management
2019-2021

IIHMR DELHI

Annexure B

Internship Training

at

International Institute of Health Management Research,

New Delhi

ASSOCIATED RISK FACTORS OF HYPERTENSION AND MANAGEMENT OF HYPERTENSION IN DIGITAL ERA

by

Name : ***SHIVANGI YADAV***
Enroll No. : ***PG/19/077***

Under the guidance of:

Dr. B. S. SINGH
(Associate Professor)

PGDHM (Hospital & Health Management)
2019-21

International Institute of Health Management Research
New Delhi

Annexure C

(Title Page)

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Annexure D

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **SHIVANGI YADAV** student of PGDHM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training at **IIHMR, New Delhi** from **01/03/2021** to **31/05/2021**.

The Candidate has successfully carried out the study designated to him during internship training and his/her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all his/her future endeavors.

Ms. DIVYA AGGARWAL
Associate Dean, Academic and Student Affairs
IIHMR, New Delhi

Mentor
IIHMR, New Delhi

Annexure E

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**ASSOCIATED RISK FACTORS OF HYPERTENSION AND MANAGEMENT OF HYPERTENSION IN DIGITAL ERA**" and submitted by (Name) **SHIVANGI YADAV** Enrollment No. ***PG/19/077*** under the supervision of **Dr. B. S. SINGH, Associate Professor** for award of PGDHM (Hospital & Health Management) of the Institute carried out during the period from **01/03/2021** to **31/05/2021** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature

Annexure F

FEEDBACK FORM

Name of the Student	:	**SHIVANGI YADAV**
Dissertation Organisation	:	**IIHMR, New Delhi**
Area of Dissertation	:	**Hypertension**
Attendance	:	100%
Objective Achieved	:	Conceptual learning about Government programs related to Hypertension and current scenerio of prevalence of Hypertension.
Deliverables	:	Narrative review on lifestyle or environmental factors associated with High Blood Pressure.
Strength	:	Time management and hard working.
Suggestions for Improvement	:	Need to know more about Public Health Domain.
Suggestions for Institute (course curriculum, industry interaction, placement, alumni)	:	

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date:

Place:

ABSTRACT

Introduction : Hypertension, also known as high blood pressure (BP), is a chronic condition marked by persistently high arterial blood pressure. Lifestyle measures including reduction of salt intake, stopping tobacco intake, and reduction of body weight in those who are obese, are part of management of all patients with hypertension. One of the most important aspects of hypertension treatment is lifestyle change. Recurrent, low-intensity physical activity, such as 6 minutes per hour, has been shown to have substantial health benefits, including blood pressure reduction. Technologies like mHealth applications are now being used to help doctors improve hypertension care. **OBJECTIVE:** To assess whether environmental or lifestyle (smoking, excess alcohol, urban living, psychological stress, reduced physical activity, unhealthy diet, excess salt intake, overweight and obesity etc.) factors are associated with high blood pressure. To assess the use of technology to prevent hypertension. **METHODOLOGY:** Various articles have been taken from databases like MEDLINE database (via PubMed interface), Google Scholar, NFHS 4 and NFHS 5 Data, NHSRC India and MOHFW. **Inclusion Criteria**: Randomized Controlled Trials (RCTs) for the use of technology to prevent hypertension. Age group between 20-64 age to assess whether environmental or lifestyle factors are associated with high blood pressure. Conducted on human subjects. technology-based interventions to improve self-management of hypertension. Study published in last 20 year. **Exclusion Criteria:** Management of other conditions. **Result:** Tobacco usage can produce a temporary increase in blood pressure. Too much salt in the diet causes blood pressure to rise. Exercise boosts blood flow across all of the body's arteries results into lowering blood pressure. People who are physically inactive have a greater heart rate. More than two drinks per day can cause hypertension. High amounts of stress can cause a brief but significant rise in blood pressure. Recent research has shown that mHealth apps can be beneficial in terms of hypertension. **Conclusion:** There is a positive relation relationship between environmental or lifestyle factors with high blood pressure. The lack of a widely recognised standard for the validation of both apps and novel non-invasive devices is a major concern, and current methods simply do not cover them.

ACKNOWLEDGEMENT

It is great pleasure for me to undertake this project. I feel highly doing the project entitled "**Associated Risk factors of Hypertension and Technology interventions to prevent it".**

I am grateful to my project guide**, Dr. B. S. SINGH, Associate Professor, of IIHMR, DELHI.** This project would not have completed without their enormous help and worthy experience. Whenever I was in need they were there behind me. Although this project has been prepared with utmost and deep routed interest. Even then I accept respondent and imperfection.

Shivangi Yadav

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ACRONYMS / ABBREVIATION

ACE inhibitors	Angiotensin converting enzyme
CHD	Coronary heart disease
NCD	Non communicable disease
NPCDCS	National programme for prevention and control of Cancer, Diabetes, Cardiac vascular diseases and Stroke
CCU	Cardiac care unit
CVD	Cardiovascular disease
IEC	Information, Education and Communication
BCC	Behaviour change communication
RBSK	Rashtriya Bal Swasthya Karyakram
IPC	Interpersonal communication
ANM	Auxillary nurse midwife
ARBs	Angiotensin II receptor blocker
CCBs	Calcium channel blocker
VHSNC	Village health, sanitation and nutrition
ULB	Urban local bodies
HBPT	Home based pressure telemonitoring
NGOs	Non- Government organizations
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
CHCs	Community Health Centres
KFT	Kidney Function Test
LFT	Liver Function Test
XR	Extended Release
ECHO	Echocardiogram
TCC	Tertiary Care Unit
IHCI	India Hypertension Control Initiative

ASSOCIATED RISK FACTORS OF HYPERTENSION AND MANAGEMENT OF HYPERTENSION IN DIGITAL ERA

1. INTRODUCTION

Hypertension, often known as high blood pressure (BP), is a long-term disorder characterised by high arterial blood pressure. Secondary hypertension (10%) is caused by specific causes such as chronic kidney disease, Cushing syndrome, hyperparathyroidism, primary aldosteronism, hyperthyroidism, and certain medications; primary hypertension (90%) is caused by an unknown pathophysiologic aetiology and has no cure; primary hypertension (90%) is caused by an unknown pathophysiologic aetiology and has no cure; primary hypertension (90%) is caused by an unknown pathophysiologic (e.g., corticosteroids, ACE inhibitors).

Several lifestyle variables have been linked to an increased risk of stroke. Lack of exercise, alcohol, diet, obesity, smoking, drug use, and stress are all examples. All individuals with hypertension should follow a healthy lifestyle plan that includes limiting salt intake, quitting smoking, and losing weight if they are overweight. These lifestyle changes may be enough to treat Grade 1 hypertension, lessen cardiovascular risk in all grades of hypertension, and minimise the quantity of medication needed to control hypertension. One of the most critical aspects of hypertension care is a shift in lifestyle. According to the American Heart Association's most recent guidelines. Physical activity has been found to reduce the risk of premature death and cardiovascular disease when done on a daily basis. When compared to inactive adults, moderate and high levels of physical exercise have been linked to a lower risk of coronary heart disease [CHD]. Repetitive, low-intensity physical activity, such as 6 minutes per hour, has been found to have significant health advantages, including lowering blood pressure. (4) According to the World Health Organization (2015), India's total prevalence of hypertension was 23.5 percent, with male and female prevalence rates of 24.2 percent and 22.7 percent, respectively.

Doctors are increasingly turning to mobile health apps to assist them in providing better hypertension care. App-based clinical decision support systems are

cutting-edge technology that allows patients to input their data into an app and have hypertension treatment recommendations sent by management algorithms. These apps have been found to be viable and straightforward to integrate into healthcare professionals' processes, making them particularly valuable in resource-constrained environments. Furthermore, apps can help with hypertension management by encouraging regular blood pressure monitoring, patient-provider communication, and patient education, as well as reinforcing behaviour through reminders like medication and appointment reminders. Although some of the findings are positive, there is still a lack of knowledge on the impact of implementing such mHealth techniques due to the limited and short-term nature of these research. More research, particularly large-scale randomised clinical trials with user-centered design, is needed to assess the potential scalability and use of such mHealth apps in the setting of resistant hypertension.

2. Hypertension in India (NFHS 4)

a) Prevalence of hypertension in all the Indian states and union territories

According to the NFHS 4 data, 22.4 percent of people have high blood pressure (for both men and women, totaling all three categories). Hypertension is prevalent in both rural and urban populations in India. In comparison to their female counterparts, males have a substantially higher prevalence overall and across all three categories. The first group, slightly over normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg), has the most respondents (6.7 percent for women and 10.4 percent for males).

Stage 1: **Slightly above normal (systolic 140-159 mm Hg and/or diatolic 90-99 mm of Hg%)**

Stage 2 : **Moderately high (systolic 160-179 mm of Hg and /or diastolic 100-109 mm of Hg%)**

Stage 3 : **Very high (systolic >_180 mm of Hg and/or diastolic >_ 110 mm of Hg%)**

	Stage 1				Stage 2				Stage 3			
	Women		Men		Women		Men		Women		Men	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
India	7.3	6.5	11.4	9.8	1.6	1.3	2.7	2	0.7	0.7	1.0	0.8

Bottom five lowest prevalence rates (men and women) (NFHS 4)

Top five highest prevalence rates (men and women) (NFHS4)

S. No.	State /UT	Stage 1		Stage 2		Stage 3	
		Women	Men	Women	Men	Women	Men
1.	Andaman & Nicobar	7.1	20.9	1.3	3.3	0.6	3.7
2.	Andhara Pradesh	7.6	11	1.7	3.6	0.7	1.6
3.	Arunachal Pradesh	10.4	15.5	2.8	3.9	1.8	2.2
4.	Assam	11.7	15	3	3.1	1.3	1.5
5.	Bihar	4.4	7.6	0.9	1.3	0.6	0.5
6.	Chandigarh	7.4	0.6	1.5	2.9	0.4	0
7.	Chattisgarh	6.8	9.5	1.3	2.3	0.7	0.9
8.	Dadar and Nagar Haveli	5.6	9.8	1.2	1.7	0.6	0.6
9.	Daman and Diu	5.1	6.5	1.7	0.6	0.6	0.5
10.	Goa	6.3	10.5	1.5	2.7	0.7	0
11.	Gujarat	7.4	9.9	1.5	2.3	0.8	0.8
12.	Haryana	7.6	14.4	1.1	1.8	0.5	0.6
13.	Himachal Pradesh	9.4	17	1.8	3.8	0.9	1.1
14.	Jammu & Kashmir	8.9	10.9	1.8	1.7	0.9	1.1
15.	Jharkhand	5.9	9.3	1.2	2	0.7	0.9
16.	Karnataka	7.1	12	1.9	2.2	0.7	1.2
17.	Kerala	5.5	7.5	0.8	1.3	0.5	0.7
18.	Lakshdweep	7.4	9.1	2.7	0	0.8	0.8
19.	Madhya Pradesh	6.1	8.2	1.2	2	0.6	0.7
20.	Maharashtra	7.1	11.5	1.4	3.6	0.6	0.8
21.	Manipur	8.5	16	1.9	3.1	1	1.3
22.	Meghalaya	7.2	7.9	1.9	1.5	0.8	1
23.	Mizoram	7.4	12.8	1.8	4.5	0.6	0.6
24.	Nagaland	10.5	16.7	3.3	5.1	2.2	1.3
25.	NCT Delhi	5.9	3.7	1	0.4	0.7	0.1
26.	Odisha	6.9	9.7	1.4	2	0.7	0.8
27.	Puducherry	6.8	11.5	1.6	2.4	0.7	1.2
28.	Punjab	10.5	17.4	2	3.1	0.7	1.3
29.	Rajasthan	5.5	10.2	0.9	1.7	0.5	0.5

S. No.	State /UT	Stage 1		Stage 2		Stage 3	
		Women	Men	Women	Men	Women	Men
30.	Sikkim	11.7	19.6	3.1	4.7	1.7	3
31.	Tamil Nadu	6.2	11.5	1.6	2.8	0.5	1.2
32.	Telangana	7.4	12.2	1.7	3.3	1	2.7
33.	Tripura	9.7	11.9	1.8	1.5	1.1	0.2
34.	Uttar Pradesh	5.9	8.2	1.1	1.4	0.6	0.5
35.	Uttarakhand	7.2	13.1	1.6	3.3	0.8	0.8
36.	West Bengal	7.8	9.9	1.8	1.7	0.7	0.8

According to the NFHS 4 (1) study, the top five states with the highest prevalence€ are Sikkim (43.8%), Nagaland (39.1%), Andaman & Nicobar (36.9%), Arunachal Pradesh (36.6%), and Assam (36.6%). (35.6 percent). In the case of males and women, there are inter and intra discrepancies in prevalence rates. The highest prevalence (27.9%) is found in Andaman and Nicobar Island, while the lowest (3.5%) is found in Chandigarh. In Sikkim and Bihar, the greatest and lowest prevalence rates for women are 16.5 percent and 5.9 percent, respectively.

b) Hypertension among adults (age 15 years and above) in all the Indian states and union territories (NFHS 5)

S. No.	State /UT	Stage 1		Stage 2		Stage 3	
		Women	Men	Women	Men	Women	Men
1.	Andaman n Nicobar Island	15.3	20.6	4.9	6.5	25.3	30.2
2.	Andhara Pradesh	13.6	17.6	5.9	7.1	25.3	29.0
3.	Assam	11.0	12.9	4.8	4.4	19.1	20.3
4.	Bihar	8.7	11.2	3.6	4.3	15.9	18.4
5.	Dadra n Haveli and Daman n Diu	7.7	9.8	4.0	3.7	14.9	15.4
6.	Goa	12.1	14.8	3.6	4.7	27.5	26.8
7.	Gujarat	11.7	13.1	4.6	4.4	20.6	20.3
8.	Himachal Pradesh	11.9	16.5	5.1	4.9	22.2	24.4

S. No.	State /UT	Stage 1		Stage 2		Stage 3	
		Women	Men	Women	Men	Women	Men
9.	Jammu n Kashmir	11.7	12.3	3.0	2.8	20.0	18.9
10.	Karnataka	14.8	17.2	6.2	6.7	25.0	26.9
11.	Kerala	15.5	19.2	6.6	6.7	30.9	32.8
12.	Ladakh	10.4	11.2	1.7	2.3	15.7	17.4
13.	Lakhadweep	13.9	16.6	6.5	5.1	24.8	24.7
14.	Maharashtra	13.7	16.0	5.0	5.3	23.1	24.4
15.	Manipur	13.6	20.8	5.9	9.3	23.0	33.2
16.	Meghalaya	10.0	14.2	3.9	3.8	18.7	21.4
17.	Mizoram	10.7	16.2	3.2	5.4	17.7	25.2
18.	Nagaland	13.8	19.1	7.6	8.9	22.4	28.7
19.	Sikkim	18.5	25.0	11.8	13.9	34.5	41.6
20.	Telangana	13.6	18.5	6.3	8.1	26.1	31.4
21.	Tripura	11.0	13.4	5.0	5.2	20.9	22.7
22.	West Bengal	11.5	13.1	5.3	4.2	20.5	20.1

The NFHS-5 was performed in approximately 6.1 lakh homes in 2019-20 and collected data. With the exception of Goa and Lakshadweep, the proportion of men suffering from hypertension is higher than the proportion of women across the states. Only about 5% and 6% of women and men with hypertension, respectively, had moderate or severe raised blood pressure. A major chunk of this population has mildly elevated blood pressure.

Sikkim, one of the smaller NE states in Phase 1, has a disproportionately high proportion of the population with moderate-to-severe high blood pressure. It also has a higher prevalence of hypertension in the general population.

Among the larger states, Kerala, Telangana and Andhra Pradesh top the list.

Meanwhile, Bihar records a lower proportion of the population suffering from hypertension and it is more prevalent in Urban areas compared to that in Rural areas.

c) Among age group between 15-49, percent distribution by blood pressure levels, according to background characteristics, India, 2015-16

Background characteristics	Stage 1		Stage 2		Stage 3	
	Women	Men	Women	Men	Women	Men
Age						
15-19	1.5	2.3	0.2	0.2	0.2	0.1
20-29	3.4	7.0	0.4	1.0	0.3	0.4
30-39	8.3	13.4	1.6	2.8	0.7	0.9
40-49	14.2	17.7	3.7	4.9	1.6	2.1
Nutritional Status						
Thin (BMI<18.5)	3.2	4.1	0.6	0.7	0.4	0.3
Normal (BMI 18.5-24.9)	5.6	9.4	1.1	1.8	0.5	0.7
Overweight (BMI 25.0-29.9)	12.5	19.1	2.9	5.0	1.2	1.9
Obese (BMI>_30.0)	17.6	24.6	4.3	7.5	1.6	2.5
Respondent not measured	5.5	21.6	2.0	0.3	1.2	1.5
Wealth index						
Lowest	5.9	7.8	1.1	1.3	0.7	0.5
Second	6.1	8.6	1.3	1.6	0.6	0.4
Middle	6.4	10.2	1.3	2.4	0.7	0.4
Fourth	7.5	11.8	1.7	2.8	0.7	0.6
Highest	7.6	12.3	1.6	2.9	0.6	0.5

Background characteristics	Stage 1		Stage 2		Stage 3	
	Women	Men	Women	Men	Women	Men
Told by a doctor or health professional that he/she has hypertension or high blood pressure						
Yes	14.3	19.6	5.1	7.1	2.5	3.9
No	6.0	9.7	1.0	1.9	0.5	0.7
Schooling						
No schooling	8.9	11.3	2.0	2.2	1.0	0.9
<5 years complete	8.7	12.5	2.1	3.0	0.9	1.2
5-7 years complete	7.5	10.6	1.6	2.7	0.7	1.1
8-9 years complete	5.6	9.2	1.1	1.9	0.5	0.7
10-11 years complete	5.4	9.4	1.0	2.2	0.5	0.8
12 or more years complete	4.7	10.8	0.9	2.3	0.4	0.8

Age- Men age group between 40-49 shows highest stage1 BP in percentage that is 17.7 and least in age group between 15-19 aged men of stage 3 hypertension.
Nutritional status- Obese men shows highest stage 1 hypertension in % that is 24.6 and least is 0.3 in thin men.

Wealth Index- Highest is 12.3 of stage 1 type in men of highest wealth index characteristics.

Highest is 19.6 of stage 1 type of hypertension in men who has hypertension told by the doctors or health professionals.

Schooling- Highest in men who has schooling <5 years complete followed by no schooling that means education plays an important role in having symptoms of hypertension.

3. NATIONAL PROGRAMME FOR PREVENTION & CONTROL OF CANCER, DIABETES, CARDIOVASCULAR DISEASES & STROKE (NPCDCS) 2017 (41)

a) PROGRAMME BACKGROUND

The NPCDCS was launched in 2010 with the goal of preventing and controlling major NCDs by focusing on infrastructure, human resource development, health promotion, early diagnosis, management, and referral.

NCD Cells will be established to manage the programme at the national, state, and district levels, and NCD Clinics will be established at the district and community health centre levels to provide early diagnosis, treatment, and follow-up for common NCDs. Patients who visit NCD clinics can receive free diagnostic services and medications as part of the initiative. The initiative was administered in 100 districts across 21 states from 2010 to 2012.

b) PROGRAMME PERFORMANCE

The initiative had been implemented in all 36 states and territories as of March 2016. There are 298 District NCD Cells and 293 District NCD Clinics around the country. More than 1.29 crore persons were screened at NCD clinics in the years 2015-2016. Hypertensive patients accounted approximately 12% of those who visited the NCD Clinic. In 2015-2016, about 96 lakh persons were examined for common NCDs as part of several outreach programmes (camps and PHC/SC), and they were sent to higher centres for diagnosis and treatment.

c) Integration with AYUSH:.

Through the primary health care network, AYUSH doctors can play an essential role in the prevention and control of NCDs. They can engage in health promotion activities such as behaviour change, counselling patients and their relatives on healthy lifestyles (healthy diet, physical activity, salt reduction, avoidance of alcohol and tobacco), meditation, Yoga, opportunistic screening for early detection of noncommunicable diseases and their risk factors, and Indigenous System of Medicine

treatment. AYUSH practitioners, who should be involved into national NCD prevention and control initiatives, particularly NPCDCS, can help to operationalize these activities.

d) Public private partnership:

At the national, state, district, and local levels, it is recommended to involve NGOs, civil society, and the commercial sector in health promotion, early diagnosis, and treatment of prevalent NCDs through appropriate guidelines as needed.

e) RECENT INITIATIVES UNDER NPCDCS

States will be given guidelines for implementing "Population-based Screening of Common NCDs," which will enlist the help of frontline workers and health workers in the current primary healthcare system to detect diabetes, hypertension, and common cancers early in the community.

A pilot study on AYUSH-NPCDCS integration has been launched in six districts across the country. For the prevention and management of common NCDs, AYUSH facilities and methodologies are being integrated with NPCDCS services, with Yoga as an integral part of the intervention.

4. HYPERTENSION (36)

a) SCREENING

All individuals over the age of 18 in India should be subjected to opportunistic screening by healthcare practitioners at all locations where they are treated, either as part of their routine visits to health facilities or as a separate screening examination if the individual requests it. Community screenings for high-risk populations such as the elderly (>60 years), obese, current smokers, diabetics, those with cardiovascular disease, and those with a significant family history of heart disease or stroke can be conducted by non-physician practitioners.

b) DIAGNOSIS AND CLASSIFICATION OF HYPERTENSION

Hypertension should be diagnosed using validated and calibrated blood pressure monitoring technologies and a standardised blood pressure testing procedure in primary health centres and facilities above that level.

Except in hypertensive emergencies and urgencies, where hypertension is diagnosed on the first visit, hypertension should be diagnosed by taking at least two measurements in the clinic or by a healthcare practitioner on at least two visits, at least 1-4 weeks apart.

The following system should be used to classify hypertensive patients:

Grade 1 : Hypertension is characterised as a systolic pressure of 140-159 millimetres and/or a diastolic pressure of 90-99 millimetres.

Grade 2 : Hypertension is characterised as a systolic pressure of 160-179 millimetres and/or a diastolic pressure of 100-109 millimetres.

Grade 3 : Hypertension is characterised as a systolic pressure of 180 or more and/or a diastolic pressure of 110 or more.

Isolated systolic hypertension is characterised as a systolic pressure greater than 140 mm but less than 90 mm in the diastole.

c) PATIENT EDUCATION AND ASSESSMENT

Although hypertension is often asymptomatic, it can lead to serious and life-threatening problems such as stroke, heart attack, and kidney failure. Patients should be counselled on the need of consistent drug use, educated on blood pressure management goals, and encouraged to assess medication efficacy through regular check-ups, which may include home blood pressure monitoring.

d) THERAPEUTIC RECOMMENDATIONS

All individuals with hypertension should follow a healthy lifestyle plan that includes limiting salt intake, quitting smoking, and losing weight if they are overweight.

In individuals with grade I hypertension who have no organ damage, diabetes mellitus, or clinical cardiovascular disease, drug therapy should be begun following a 1–3 month trial of lifestyle adjustments.

All people with Grades 2 and 3 hypertension should take medication, which should be taken in conjunction with lifestyle adjustments.

All forms of antihypertensive drugs, including calcium channel blockers, ACE inhibitors/ARBs, and diuretics; beta-blockers, have similar efficacy in decreasing blood pressure and improving outcomes, with beta-blockers being linked to a lower risk of stroke. Not all pharmacological combinations, however, are equally effective, and some are preferred. Varying types of drugs have different side effect profiles and monitoring requirements, which could influence how they are prescribed and used in the healthcare system.

5. Government’s hypertension screening program to cover all states (37)

The programme was launched in November 2017 by the Ministry of Health and Family Welfare. The programme will hasten the introduction of high-quality hypertension medicine for more than 15 crore people.

New Delhi, India: IHCI, the government's hypertension screening programme, will be expanded to 100 districts across all states in the near future.

After the ministry of health and family welfare launched the project in the states of Punjab, Madhya Pradesh, Kerala, Telangana, and Maharashtra, more than three lakh patients with high blood pressure were enrolled in government health institutions in 25 specific districts across the country.

“The government has formed a national action plan for the prevention and control of noncommunicable diseases, with a goal of lowering high blood pressure by 25% by 2025.

Vital Strategies' "Resolve to Save Lives" initiative, which is also the program's global technical partner, is supporting the effort. By simplifying hypertension treatment protocols in primary care facilities, prioritising adequate quantities of quality medicine and blood pressure monitors, and providing comprehensive training for healthcare workers on current hypertension practises, the IHCI hopes to contribute

to the strengthening of the health system. Patient counselling and follow-up will be provided by nurses, health workers, and ASHAs as part of the programme, as well as patient-centered services, which will improve patient support, reduce reliance on larger hospitals far from the patient's home, and increase use of "Health and Wellness Centers" and primary health centres. As well as a reduction in the utilisation of emergency rooms

Denationalization is “BP check-up and drug refills at the sub-centre level/HWC level” Principle of comprehensive primary health care: Time to care < 30 mins. Decentralization was initiated as a pilot in select facilities in IHCI districts of Telangana.

The following strategies were adopted:

- Training of ANMs on IHCI components and BP measurement by Cardiovascular health officer and Senior treatment supervisor.
- Orientation of ASHAs on components of IHCI.
- Ensuring functional BP apparatus at all sub-centres.
- Copies of original treatment cards given to ANMs to maintain at sub-centre.
- Drugs supplied to sub-centres from the PHCs based on number of patients registered in those sub-centres.
- Details of patients’ visits entered in the copy of treatment card or in the register maintained by ANM during the follow-up visits.
- ANM refills drugs for patients with controlled BP, while patients with uncontrolled BP are referred to PHC.
- Data of follow up visits in the copies of cards transferred to the original cards at the PHC during monthly meetings.
- ANM identified defaulters at the end of the month, and the information of those patients was forwarded to the appropriate ASHA for tracking and retrieval through home visits.

6. ASHA's role in management of NCDs.(39)

a) Role of ASHA in addressing tobacco and alcohol as risk factor

1. Raise public knowledge about the dangers of smoke and alcohol to one's own health and the health of others around them.
2. Increase awareness of the money spent on cigarette and alcohol usage, as well as the anticipated expense of treatment if they become unwell.
3. Make sure that both boys and girls, as well as youngsters and adolescents, are informed of the dangers of cigarette and alcohol use. These teachings can be disseminated through teenage meetings and the Rashtriya Kishor Swasthya Karyakram (RKSK).
4. Work with people who use cigarettes and alcohol to persuade them to give up their habits by outlining the negative repercussions of these addictions. Request assistance from your community's Male Multipurpose worker/ASHA Facilitator or male volunteers.
5. Collaborate with the VHSNC on community initiatives to determine how many young people use tobacco and alcohol and to disseminate this information. With the VHSNC, you can organise community action against tobacco and alcohol availability, such as the establishment of stores, illicit tobacco and alcohol supply, and manufacture in the community.
6. Locate tobacco cessation and de-addiction centres in your area and advise individuals about how to get in touch with them.
7. Encourage those who use cigarettes and alcohol to get screened for non-communicable diseases as soon as possible. Support people with hypertension and diabetes and encourage them to quit smoking and drinking.

b) Role of ASHA in promoting healthy diet and physical activity

1. Educate members of the community about the benefits of eating a balanced diet and assist them in making appropriate food choices depending on local food availability.

2. Participate in group activities to develop awareness about the many food categories accessible locally.
3. Describe the advantages of physical activity and its involvement in the prevention of Non-Communicable Diseases (NCDs).
4. Collaborate with VHSNC/MAS and Panchayati Raj Institution (PRI)/ULB officials to establish safe and clean spaces such as parks and walking paths.
5. Programs for group physical activity should be planned.
6. Identify people with NCDs in group or community meetings, and follow up with them via home visits to counsel them on diet changes and regular physical activity.

c) Role of ASHA in helping people to manage stress

1. Assist people in determining the source of their stress.
2. Recognize that stress management differs from one person to the next.
3. Assist such folks in forming supportive relationships - It is critical to establish a positive and secure bond between persons who can provide emotional and social assistance.
4. Discuss the problem and causes of stress with the individual's family, friends, and community members.
5. Encourage these people to exercise on a regular basis - walking, yoga, jogging, and other activities can all help to enhance mood and reduce stress.
6. Educate them on how to make beneficial behavioral adjustments such as eating a healthy diet, controlling anger, managing sadness, and appreciating the good in themselves and others.

d) Role of ASHA in helping an individual to reduce weight

1. Encourage an overweight person to make a determined decision to reduce weight and change their lifestyle to become healthier.
2. Help her/him make tiny lifestyle changes, such as reducing the number of chapattis she/he eats from three to two or one.

3. Encourage family and friends to offer encouragement and motivation to the overweight person.
4. Advise her/him to cut down on fried foods, sugary meals, and high-fat items in their meals.
5. Explain that they should not use deceptive weight-loss methods such as tablets, churan, combinations, or operations that claim quick results.
6. Encourage them to abstain from smoking and using alcohol. Encourage them to abstain from smoking and using alcohol.
7. Encourage them to make regular physical activity a part of their daily routine.
8. Changes in the individual's weight or any linked health concerns must be monitored on a regular basis.

e) Role of ASHA in management and control of high blood pressure

1. ASHA should encourage people with high blood pressure to stop using tobacco in any form (smoking or chewing) and to avoid secondhand smoke exposure.
2. Reduce alcohol consumption.
3. Reduce the quantity of salt eat to a maximum of 1 teaspoon (5 gms) every day.
4. Reduce intake of refined grains, high-fat/oily foods, and sugary foods.
5. Reduce the amount of tea, coffee, and cola drinks consume (rich in caffeine).
6. Increase intake of fresh fruits, vegetables, whole grains, and pulses.
7. Maintain a healthy weight; overweight people should reduce weight.
8. Maintain a healthy level of physical activity.
9. Ensure that blood pressure is checked at least once a month.

7. Role of medical officer in NCDs management.(40)

a) MEDICAL OFFICER'S ROLE 3 I's

IDENTIFY –Tobacco, alcohol, stress, nutrition, and physical inactivity are all things to consider.

INTERVENE – Investigate for NCD/risk factor complications – Provide feedback – Motivate risk factor behavioural change – Provide stress reduction, cigarette and alcohol cessation, a balanced diet, and physical exercise recommendations – Encourage change

INVOLVE - To address risk factors for NCDs, a multidisciplinary team of health professionals in prevention and care is needed.

COMMUNITY HEALTH WORKER'S ROLE 'T A L K'

T – TELL about risk factor and NCDs at every opportunity

A - ADVISE healthy lifestyles and measures to reduce risk factors; connect health issues to risk factors and the need for assistance.

L - LEAD small group conversations on ways to combat NCDs and encourage people to explore their own health issues.

K - KNOW that people can obtain extra support and help to address risk factors.

b) Role of medical officer in TOBACCO cessation

- The Medical Officer can give a quick and efficient smoke cessation intervention.
- Tobacco cessation counselling is an effective intervention.
- Pharmacotherapy for tobacco dependency is available and must be advised when a patient is unable to quit on their own.
- Other health professionals, such as a counsellor, a nurse, a community health worker, a laboratory, and a district hospital, should be involved.

1. Assistant to a behavioural change counsellor: Examining tobacco use (Fagerstrom Nicotine Dependence Questionnaire) Providing brief counselling: informing clients about health consequences, motivating them with a balance sheet, and discussing relapse prevention techniques.

2. A community health professional for follow-up (patients who miss their follow-up appointments) and home visits (to monitor progress)
3. For expert care, go to a specialist (TCC Clinic) or a district hospital.

c) Role of medical officer in ALCOHOL cessation

- There is a strong correlation between alcohol usage and noncommunicable diseases.
- Assess for intoxication, withdrawal, and complications by asking about alcohol consumption and identifying patterns of hazardous/harmful and dependent use.
- A full assessment requires a physical examination and investigations.
- Three distinct groups receive various interventions.
- Counselors, Community Health Workers and specialists, as well as the District Hospital, can help with detoxification and relapse prevention.
- A combination of counselling and medications works better for alcohol dependence than either one alone.

DETOXIFICATION IN PHARMACOTHERAPY

- Diazepam – 10 mg qid or 20 mg qid for 3-7 days for withdrawal.
- 5-10 mg qid with strict monitoring in patients with hepatic impairment
- Lorazepam (1 mg lorazepam=5 mg diazepam) may be used if liver function cannot be determined.
- Thiamine 100 mg/day orally for 5 days or longer
- Other vitamin supplements as needed

d) Medical Officer role to address UNHEALTHY DIET as a risk factor for NCDs.

Assessing unhealthy dietary habits (24-hour recall method and unhealthy dietary checklist).

Providing brief counselling: educating about health repercussions, motivating with a balance sheet, and discussing healthy eating ideas Follow-up (patients who skip

follow-up dates) and home visits by a Community Health Worker (to monitor progress).

DIETARY SODIUM INTAKE:

Sodium in natural diets (cereals, pulses, vegetables, millets, animal and marine foods): 300-400 mg/day

- Salt consumption in Indian diets varies from 5 to 30 mg depending on state.
- A daily salt intake of 5 gms is suggested.
- 40 percent of Indian families consume about 10 g of salt per day
- Increased salt intake is linked to hypertension, atrophic gastritis, and cancer
- High sodium intake is linked to increased calcium excretion, which leads to decreased bone density
- Sodium: potassium ratios are important for blood pressure control

TIPS TO REDUCE SODIUM INTAKE

- Reduce salt in regular cooking
- Avoid putting extra salt onto food while eating
- Reduce salt in breads and chutneys
- Reduce salt in salads
- Avoid Food that has been processed, Pizza, pasta, and noodles from restaurants, Papads and pickles, Salted almonds, Chips, fries, samosas, and other fried dishes.

e) Role of the Medical Officer to address LESS PHYSICAL ACTIVITY as a risk factor for NCDs

- Motivate the person to engage in physical activity by understanding the risks of physical inactivity and sedentary lifestyles, as well as the benefits of physical activity
- Discuss the optimal physical activity using the FIT approach
- Check for the presence of a common mental disorder such as anxiety or depression
- Involve other health-care providers to provide assistance (Arrange)

f) Role of the Medical Officer to address STRESS as a risk factor for NCDs

IDENTIFY stress as a risk factor for NCDs.

INTERVENE to address stress-related issues and offer brief mental health counselling.

INVITE other health-care providers to pitch in and assist.

ASSESSMENT FOR STRESS

- A complete physical examination Physical illness should be ruled out, and the problem should be treated.
- As needed, investigations (lab etc.)
- Examining your mental state Make sure you don't have any typical mental illnesses like anxiety or sadness.

SYMPTOMS INDICATING STRESS

Headache, muscle tension or pain, chest pain, recurring episodes of infection, high blood pressure, exhaustion, thirst, weight gain or loss, stomach upset, skin diseases, back discomfort, sleeplessness, and loss of interest in sexual activity are some of the physical symptoms.

Anxiety, restlessness, lack of drive or attention, irritability or wrath, sadness or depression are all emotional symptoms.

Overeating or under eating, angry outbursts, difficulty concentrating or memory impairment, drug or alcohol abuse, tobacco use, social withdrawal, taking medication without a prescription or overuse are some of the behavioral symptoms (pain killers etc.)

INTERVENE FOR DEPRESSION

- Encourage healthy coping and support
- Encourage a healthy lifestyle (nutrition, sleep, physical activity, and abstinence from alcohol and cigarettes)
- Recognize any thoughts of self-harm or suicide and offer assistance; identify and include supporting family members.

TIPS FOR SELF-HELP:

- Enlist the help of family and friends
- Challenge negative thinking
- Practice self-care
- Sleep
- Do things you enjoy Exercise on a daily basis and eat a healthy diet If your depression worsens or you have thoughts of self-harm, seek help.

8. OBJECTIVE

1. To assess whether environmental or lifestyle (smoking, excess alcohol, urban living, psychological stress, reduced physical activity, unhealthy diet, excess salt intake, overweight and obesity etc.) factors are associated with high blood pressure.
2. Use of technology to prevent hypertension.

9. METHODOLOGY

Study type : Narrative review

Selection criteria: Inclusion criteria: Age group between 20-64 age to assess whether environmental or lifestyle factors are associated with high blood pressure. Conducted on human subjects. Technology-based interventions to improve self-management of hypertension. Study published in last 20 years. **Exclusion criteria:** Management of other conditions.

Source of Data: Various articles have been taken from databases like MEDLINE database (via PubMed interface), Google Scholar, NFHS 4 and NFHS 5 Data, NHSRC India and MOHFW.

Search Words: Excess alcohol, Environmental risk factors, Technology, Internet, mHealth, psychological stress

Literature Review of 30 articles is done on the basis of selection criteria in which 22 articles are related to associated risk factors of hypertension and 8 articles are of technology intervention like internet based telemonitoring, telephone based telemonitoring and sms-text message for Hypertension management.

10. LR MATRIX

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
1	Prevalence of sustained hypertension and obesity among urban and rural adolescents: a school-based, cross-sectional study in North India(3)	2019	Bishav Mohan et al	National library of Medicine National centre of biotechnology information	National
2	Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi(5)	2017	Singh, S. et al	International Journal of Hypertension	International
3	Prevalence of hypertension and determination of its risk factors in rural Delhi(6)	2016	J. Kishore et al	International Journal of Hypertension	International
4	Association between Stress and Hypertension among Adults More Than 30 Years: A Case-Control Study (7)	2018	Sandip Bhelkar et al	National journal of Community Medicine	National
5	Unhealthy behaviors and risk of uncontrolled hypertension among treated individuals-The CONSTANCES	2020	Cherfan, M.et al	Scientific reports	International

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
	population-based study(8)				
6	Relationship between diet and blood pressure in a representative Mediterranean population(9)	2002	H Schröder et al	European Journal of Nutrition	European Journal of Nutrition
7	Prevalence and determinants of hypertension in the urban and rural population of a north Indian district(10)	2009	Midha T et al	East Africa Journal of Public Health	East Africa Journal of Public Health
8	Effects of Psychological Stress on Hypertension in Middle-Aged Chinese(18)	2015	Hu, B.et al	PLOS ONE	PLOS ONE
9	Blood Pressure Reactivity to Psychological Stress Predicts Hypertension in the CARDIA Study (19)	2004	Matthews, K. A. (2004).et al	Circulation	Circulation
10	Association between psychosocial stress and hypertension: a systematic review and meta-analysis (20)	2017	Liu, M.-Y.et al(2017)	Neurological Research A Journal of Progress in Neurosurgery, Neurology and Neurosciences	Neurological Research A Journal of Progress in Neurosurgery, Neurology and Neurosciences
11	Impact of dietary and lifestyle factors on the prevalence of	2005	Geleijnse, J. M. et al (2005)	Journal of Human Hypertension (2005)	Journal of Human Hypertension (2005)

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
	hypertension in Western populations(21)				
12	An Analysis of Anthropometric Indicators and Modifiable Lifestyle Parameters Associated with Hypertensive Nephropathy (22)	2016	Aryee, C.et al(2016)	Hindawi Publishing Corporation International Journal of Hypertension	Hindawi Publishing Corporation International Journal of Hypertension
13	Effect of lifestyle modifications on blood pressure by race, sex, hypertension status, and age(23)	2005	Svetkey, L. P.et al	Journal of Human Hypertension (2005)	Journal of Human Hypertension (2005)
14	Effect of lifestyle modification on blood pressure control(24)	2003	Writing group of the premier collaborative research group	American medical association	American medical association
15	Blood Pressure and Hypertension: Findings from 20 Years of the Tehran Lipid and Glucose Study (TLGS)(25)	2018	Hengameh Abdi et al	International Journal of Endocrinol Metab	International
16	Impact of dietary and lifestyle factors on the prevalence of hypertension in Western Populations.(26)	2005	JM Geleijnse et al	Journal of Human Hypertension (2005)	Journal of Human Hypertension (2005)

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
17	Diet and Lifestyle Risk Factors Associated With Incident Hypertension in Women.(27)	2009	John P. Forman et al	American Medical Association	American Medical Association
18	Outcomes following a programme for lifestyle changes with people with Hypertension.(28)	2005	Eva Drevenhorn MSN et al	Blackwell Publishing Ltd, Journal of Nursing and Healthcare of Chronic Illness in association with Journal of Clinical Nursing	Blackwell Publishing Ltd, Journal of Nursing and Healthcare of Chronic Illness in association with Journal of Clinical Nursing
19	India Hypertension Control Initiative—Hypertension treatment and blood pressure control in a cohort in 24 sentinel site clinics.(29)	2020	Prabhdeep Kaur DNB, MAE-FETP et al	The journal of clinical Hypertension	The journal of clinical Hypertension
20	Development of an entirely remote, non-physician led hypertension management program.(30)	2019	Naomi D.L. Fisher et al	Journal of clinical cardiology	Journal of clinical cardiology
21	Clinical usefulness and cost effectiveness of home blood pressure telemonitoring: meta-analysis of	2013	Stefano Omboni et al	Journal of Hypertension	Journal of Hypertension

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
	randomized controlled studies.(31)				
22	The prevalence of hypertension and hypertension risk factors in a rural Indian community: A prospective door-to-door study(33)	2012	Bansal, S. K.et al (2012).	ELSEVIER Journal of Cardiovascular Disease Research	International
	Technology Intervention				
1.	Impact of 12-Month Smartphone Breathing Meditation Program upon Systolic Blood Pressure among Non-Medicated Stage 1 Hypertensive Adults(11)	2020	Jessica Chandler et al	International Journal of Environmental Research and Public Health	International
2.	Impact of a Culturally Tailored mHealth Medication Regimen Self-Management Program upon Blood Pressure among Hypertensive Hispanic Adults (12)	2019	Jessica Chandler et al	International Journal of Environmental Research and Public Health	International
3.	Evaluation of an mHealth Medication Regimen Self-Management	2015	Tatiana M. Davidson et al	Journal of Personalized Medicine	Journal of Personalized Medicine

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
	Program for African American and Hispanic Uncontrolled Hypertensives (13)				
4.	Hypertension Management Using Mobile Technology and Home Blood Pressure Monitoring: Results of a Randomized Trial in Two Low/Middle-Income Countries(14)	2011	John D. Piette et al	Telemedicine Journal and E-Health	Telemedicine Journal and E-Health
5.	APP Study Group Mobile health applications for the management of primary hypertension: A multicenter, randomized, controlled trial Medicine (Baltimore)(15)	2020	Ke Gong et al	Medicine	Medicine
6.	Improving treatment adherence for blood pressure lowering via mobile phone SMS-messages in South Africa: a qualitative evaluation of the SMS-text Adherence SuppoRt (StAR) trial(16)	2015	Leon, N.et al	BioMedCentral	BioMedCentral

S. No.	Title of the study	Year	Authors	Name of the journal	National/ International
C1	C2	C3	C4	C5	C6
7.	Mobile Phone Text Messages to Support Treatment Adherence in Adults With High Blood Pressure (StAR): A Single-Blind, Randomized Trial(17)	2016	Bobrow, K.et al	Circulation	Circulation
8.	Apps to Support Self-Management for People With Hypertension: Content Analysis.(32)	2019	Chi Yan Hui et al	JMIR Publications mHealth and uHealth	International

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
1.	Study Objective	Study Design	Study Location	Study Setting
2.	study evaluates the prevalence of sustained hypertension and obesity and their risk factors among urban and rural adolescents in northern India(3)	A school-based, cross-sectional survey	conducted in the urban and rural areas of Ludhiana, Punjab, India	A school-based, cross-sectional survey was conducted using standardised measurement tools.
3.	To assess the prevalence of hypertension and its associated factors and to estimate awareness, treatment and	Cross sectional study	Varanasi, India	A community based cross-sectional study with multistage sampling design was conducted. A modified WHO STEPS interview

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	adequacy of control of hypertension among study subjects(5)			schedule on 640 study subjects aged 25–64 years was used.
4.	To finding prevalence of hypertension and its risk factors in a rural area in Delhi.(6)	Cross sectional study	Delhi	a community based cross-sectional study conducted in two rural areas in Delhi among 1005 subjects selected using systematic random sampling method. WHO STEPS approach was used to collect data. Blood pressure, body mass index, and blood sugar were measured.
5.	To study the association between hypertension and stress among hypertensive subjects aged above 30 years using perceived stress scale. (7)	Case control study	Maharashtra	Newly diagnosed hypertensive patients aged 30 and above with age and gender matched controls were selected. Socio-demographic variables, history of addiction and physical activity were recorded using predesigned proforma. BMI was calculated for assessing

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				obesity. Stress was assessed using Perceived Stress Scale. Blood pressure was recorded as per JNCVII criteria.
6.	To examine the individual and combined associations between unhealthy behaviors and uncontrolled hypertension among treated hypertensive adults. (8)	Cross sectional study	Analysis was conducted using data from CONSTANCES, an ongoing French population-based cohort study	CONSTANCES is a prospective epidemiological cohort composed of randomly selected adult participants aged 18–69 years at inception affiliated with the French National Health Insurance Fund database following a sampling scheme stratifed on age, gender, socioeconomic status and region of France.
7.	the present study to investigate dietary habits among groups with different blood pressure status (normotensive, non-medicated hypertensive, medicated hypertensive) and to analyze the association between blood	Cross-sectional, population-based survey	Gerona, Spain	Non-institutionalized Spanish men and women, between the ages of 25 and 74, participated in a population-based cross-sectional study conducted in the province of Gerona from September 1994 to January 1996.

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	pressure and intakes of selected nutrients in normotensive and non-medicated hypertensive subjects (n = 1357), and furthermore in those undergoing hypertension drug treatment (n = 210)(9)			
8.	To determine the prevalence of hypertension in the urban and rural population in Lucknow, To study relationship of hypertension with age and To study determinants of hypertension in the urban and rural Lucknow.(10)	Cross sectional study	Lucknow, India	A community-based cross-sectional study was conducted in four randomly selected areas in urban and rural parts of Lucknow district, respectively. Two-stage stratified random sampling technique was used.
9.	To examined the effect and relative contributions of different types of stress on the risk of hypertension(18)	Cross sectional study	China	From 2009 to 2011, community-based participants in urban and rural areas in the Chinese province of Hebei were recruited via cluster sampling.

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				Four representative urban and rural communities were selected and all individuals 40–60 years of age living in the selected communities more than 5 years were interviewed and participated voluntarily.
10.	To examine the association of stress responses and hypertension during a 13-year interval after reactivity testing and to test whether the strength of the association varied by race or ethnicity.(19)	Prospective study	Multicenter study at Birmingham, Ala; Chicago, Ill; Minneapolis, Minn; and Oakland, Calif	In 1985 to 1986, 5115 black and white men and women 18 to 30 years of age were recruited and examined at Birmingham, Ala; Chicago, Ill; Minneapolis, Minn; and Oakland, Calif. Participants were recruited to achieve a balance at each site by race (black, white), sex, education (high school degree or less, more than high school), and age (18 to 24 years, 25 to 30 years)
11.	The objective of this study is twofold. First, a review of recent	Systemic review	China	Systematically searched and identified relevant studies

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	advancements in our understanding of the relationship between psychosocial stress and hypertension. Second, a meta-analysis aiming to assess the relationship between chronic psychosocial stress and blood pressure.(20)			from five databases, including PubMed, Cochrane Library, China National Knowledge Infrastructure (CNKI), CQVIP, and the Wanfang Database until April 2016. Eleven studies encompassing 5696 participants were included in the final analysis
12.	To quantified the contributions of body weight, physical inactivity and dietary factors to the prevalence of hypertension. (21)	Randomized controlled trial	Finland, Italy, the Netherlands, United Kingdom (UK) and USA.	The effect of risk factors on BP was assessed by meta-regression analysis of randomized trials, published between 1966 and March 2001
13.	To compare the association between different modifiable lifestyle practices, adiposity indices, renal function parameters, and hypertension as well as the predictive implications for	Case control study	Kumasi, Ghana	A hospital-based case-control study was conducted between November 2012 and September 2013.One hundred and eighty (108) non-diabetic hypertensive patients were attending clinic at the Komfo

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	levels of these parameters in target cardiac organ damage among an urban Ghanaian hypertensive population.(22)			Anokye Teaching Hospital (KATH) and the Precise Specialist Clinic, all in Kumasi, Ghana, and sixty-one (61) age-matched normotensive controls were from the Kumasi metropolis.
14.	Control of high blood pressure (BP) emphasize lifestyle modification, including weight loss, reduced sodium intake, increased physical activity, and limited alcohol consumption. (23)	Randomized controlled trial	USA	The target population consisted of generally healthy adults with above-optimal BP including individuals with stage 1 hypertension, who met the national guidelines criteria for at least a 6-month trial of non pharmacologic therapy.
15.	To determine the effect on BP of 2 multicomponent, behavioral interventions. (24)	Randomized controlled trial		Randomized trial with enrollment at 4 clinical centers (January 2000-June 2001) among 810 adults (mean [SD] age, 50 [8.9] years; 62% women; 34% African

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				American) with above-optimal BP, including stage 1 hypertension (120-159 mm Hg systolic and 80-95 mm Hg diastolic), and who were not taking antihypertensive medications.
16.	Focuses on the key findings derived from the Tehran Lipid and Glucose Study (TLGS) data documented on different aspects of blood pressure (BP) and HTN.(25)	Randomized controlled trial	Tehran	All TLGS articles related to BP parameters and/or HTN were searched using PubMed, Scopus and Web of Science with appropriate keywords since January 1999 up to December 2017.
17.	The impact of dietary and lifestyle factors on the prevalence of hypertension was quantified for Finland, Italy, The Netherlands, UK and USA(26)	Randomized controlled trial	Multicenter-Finland, Italy, The Netherlands, UK and USA	Combined data of blood pressure (BP) and risk factors distributions in these five countries with BP estimates from randomized controlled trials of dietary and lifestyle factors to obtain population attributable risk percentages

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				(PAR%) for hypertension
18.	-	Cohort study	Brigham	Prospective cohort study of 83 882 adult women aged 27 to 44 years in the second Nurses' Health Study who did not have hypertension, cardiovascular disease, diabetes, or cancer in 1991, and who had normal reported blood pressure (defined as systolic blood pressure of 120 mm Hg and diastolic blood pressure of 80 mm Hg), with follow-up for incident hypertension for 14 years through 2005.
19.	The purpose of the study was to explore the effects of using a structured nursing intervention programme in hypertension care.(28)	Pre-test-Post-test study	Sweden	All 177 patients diagnosed with hypertension visiting a health centre in Southern Sweden were invited to be counselled by a public health nurse about hypertension, cardiovascular risk factors and

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				non-pharmacological treatment with 15 months follow up.
20.	To describes the change in blood pressure control from baseline to follow-up in a cohort of hypertensive patients who initiated treatment in the IHCI sentinel health facilities.(29)	Cohort study	Punjab, Madhya Pradesh, Maharashtra, and Telangana	Out of the 24 sites, eight were secondary care facilities located in urban areas remaining 16 facilities, eight were primary health care centers (PHC), and eight others were larger community health centers (CHC).All patients above 18 years of age registered under the IHCI program in the selected public sector facilities from January 2018 to June 2019, with follow-up analyzed until September 2019
21.	To develop a remote, navigator- led hypertension innovation program that would leverage algorithmic care pathways, home BP measurements	Cohort study	Boston	A multidisciplinary group of clinical experts from subspecialties and primary care collaborated to develop an evidence- based clinical algorithm,

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	and patient coaching to allow rapid and complete medication titration.(30)			designed to be automated and administered by non- licensed patient navigators.
22.	To systematically review data from randomized controlled studies on the effectiveness of home blood pressure telemonitoring (HBPT) versus usual care with respect to improvement of BP control, healthcare resources utilization and costs, patient's quality of life and adverse events.(31)	Randomized controlled trial		Electronic databases were searched for publications in English. The benefit and relative risk (RR) were estimated applying a random-effect model. Peer-review journals from inception to February 2012.
23.	To identify the prevalence and risk factors for hypertension in a rural community in north-east India.(33)	A prospective door-to-door study	North-East India	The site is approximately 250 km north-east of India's capital, Delhi. Data was collected between 17th March and 15th April 2010. The date for calculating the point prevalence was 1st of April 2010.

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	TECHNOLOGY INTERVENTION			
1.	To examine the impact of our BAM (a smartphone-delivered breathing awareness meditation)program on resting SBP, DBP, and perceived stress (11)	Randomized controlled trial	Charleston SC	This investigation was an ancillary analyses of a two-arm, 12-month, small-scale efficacy randomized controlled study (RCT) among a subgroup of adults now classified as having stage 1 non-medicated systolic hypertension. As part of the main RCT, there were two groups: (1) an experimental group (TT) and (2) a lifestyle education program delivered via smartphone (SPCTL) group. The Institutional Research Board of the Medical University of South Carolina approved the study. All participants provided written informed consent. The study spanned from November

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
				2016 to November 2018.
2.	The purpose of the current study was to assess efficacy of the SMASH l (Smartphone Med Adherence Stops Hypertension)fo r Hispanics program in establishing SBP (Systolic BP)control via increased MA (medication adherence)acros s a 9-month period among Hispanics with poor MA and uncontrolled EH (Essential hypertension) (12)	Randomized controlled trial	US	The research design was a 9-month, two-arm efficacy trial including an experimental (Smartphone Med Adherence Stops Hypertension, SMASH) group and an enhanced standard care (ESC) group. SMASH participants utilized a SMASH app which interfaced with a Bluetooth-enabled BP monitor for BP self-monitoring and an electronic medication tray. The ESC participants received text messages including links to PDFs and brief video clips containing healthy lifestyle tips for attention control.
3.	The purpose of this study was to corroborate and extend those findings in a small-scale 6-	Randomized controlled trial	USA	Monolingual Hispanic participants were contacted by Spanish-speaking staff,

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	month efficacy RCT of SMASH among AA and Hispanic adults with uncontrolled EH(13)			and, if interested, were scheduled for a clinic BP screening. The Medical University of South Carolina Internal Review Board (IRB) approved the study protocol.
4.	: Hypertension and other non-communicable diseases represent a growing threat to low/middle-income countries (LMICs). Mobile health technologies may improve non-communicable disease outcomes, but LMICs lack resources to provide these services. We evaluated the efficacy of a cloud computing model using automated self-management calls plus home blood pressure (BP) monitoring as a strategy for improving systolic BPs	Randomized controlled trial	Honduras and Mexico	: This was a randomized trial with a 6-week follow-up. Participants with high SBPs (≥140 mm Hg if non-diabetic and ≥130 mm Hg if diabetic) were enrolled from clinics in Honduras and Mexico. Intervention patients received weekly automated monitoring and behavior change telephone calls sent from a server in the United States, plus a home BP monitor.

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	(SBPs) and other outcomes of hypertensive patients in two LMICs(14)			
5.	The purpose was to assess the impact of m-Health apps on blood pressure control, medication adherence(15)	Randomized controlled trial	China	This study was a multicenter, randomized, controlled trial. This clinical trial was approved by the Ethics Committee of the Second Affiliated Hospital of Chongqing Medical University. This clinical trial was registered in the Chinese Clinical Trial Registry.
6.	Patients' experiences of the trial, including usage, perception, and response to SMS-text messages, as well as obstacles and facilitators to providing care support via SMS-text message, were explored in the qualitative assessment.(16)	Randomized controlled trial	Cape Town, South Africa	The trial took place among the general adult population attending the outpatient chronic disease services in a single large public sector clinic in Cape Town, South Africa.
7.	Conducted an effectiveness trial (SMS-Text Adherence suppoRt, or	Randomized controlled trial	South Africa	In this pragmatic single-blind, three-arm randomized trial (StAR),

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	StAR) to see whether adherence support provided via SMS text-messages via information only or interactive SMS text messaging is more successful than normal care in terms of sustaining and enhancing medication adherence and blood pressure control.(17)			undertaken in South Africa, patients treated for high blood pressure were randomly allocated in a 1:1:1 ratio to information-only or interactive SMS text-messaging, or usual care. Analyses were intention to treat. Between June 26, 2012 and November 23, 2012, 1372 participants were randomized to receive information-only SMS text-messages (n=457), interactive SMS text messages (n=458), or usual care (n=457).
8.	To identify the self-management features (HBPM and broader support strategies) offered by currently available apps and to determine the features associated with	Practical Systematic Review of Self-Management Support (PRISMS)	United Kingdom	Searched Google Play store, Apple App store, National Health Services Apps Library and myhealthapps.net (first search on February 1, 2018; updated August 18, 2018). We

S. No.	Study Objective	Study Design	Study Location	Study Setting
C7	C8	C9	C10	C11
	download frequency and user ratings.(32)			included high blood pressure apps available in the United Kingdom and extracted their features, number of downloads, and the average users' rating from the app stores.

S. No.	Results	Conclusion
C12	C13	C14
1	Sustained hypertension was found to be present in 5.7 percent of rural areas and 8.4 percent of urban areas, respectively. Obesity was found to be present in 2.7 percent of rural schoolchildren and 11.0 percent of urban schoolchildren, respectively. The modified multiple regression model revealed that living in a city (relative risk ratio (RRR): 1.7, 95 percent confidence interval (CI) 1.01 to 2.93), having high blood pressure (RRR: 7.4, 95 percent CI 4.21 to 13.16), and having a high socioeconomic status (RRR: 38.6, 95 percent CI 16.54 to 90.22) were all significantly linked to an increased risk of obesity. Self-reported daily physical activity, on the other hand, had a protective effect against obesity in teenagers (RRR: 0.4, 95 percent CI 0.25 to 0.62). Adolescents who were overweight (RRR: 2.66, 95 percent CI 1.49 to 4.40) or obese (RRR: 7.21, 95 percent CI 4.09 to 12.70) and reported consuming added salt in their diet (RRR: 4.90, 95 percent CI 2.83 to 8.48) had a higher risk of developing hypertension.	In a northern Indian state, a high prevalence of chronic hypertension and obesity was discovered among urban school children and adolescents. Overweight and obesity were found to be positively correlated with hypertension in adolescents (high BMI). To reduce the risk of cardiovascular disease in adults, prevention and early detection of childhood obesity and high blood pressure should be increased.

S. No.	Results	Conclusion
2	According to the findings, there is a connection between alcohol and tobacco use and hypertension. In comparison to nonusers, tobacco users (OR: 1.86) and alcohol users (OR: 1.55) had higher rates of hypertension.	One-third of the participants were hypertensive, and half were pre-hypertensive, with low levels of comprehension, care, and regulation of high blood pressure.
3	Hypertension was found to be prevalent in 14.1 percent of the study participants. Individuals over the age of 35 had substantially higher blood pressure than people under the age of 35. Those who consume alcohol have substantially higher blood pressure.	In Delhi's rural areas, hypertension is a significant problem. Hypertension was linked to age, education, and cholesterol levels, all of which were independent risk factors.
4	Hypertension was found to be linked to high stress levels. Hypertension was found to be linked to being overweight or obese, as well as a lack of enough physical activity. These variables were investigated using a logistic regression model. Stress was discovered to be a risk factor for hypertension on its own.	High stress levels are linked to hypertension and are an independent risk factor for the condition.
5	A total of 56.1 percent of hypertensive treated volunteer participants had uncontrolled hypertension; 2.0 percent, 24.5 percent, 54.0 percent, and 19.5 percent of them displayed 0, 1, 2, or 3 harmful habits, respectively. In men, heavy alcohol consumption was associated with an increased risk of uncontrolled hypertension (adjusted odds ratio 1.34, 95 percent CI 1.10–1.63), low as well as medium adherence to dietary guidelines was associated with a higher risk of uncontrolled hypertension (p0.05 for both), and overweight or obesity was associated with a higher risk of uncontrolled hypertension (p<_ 0.001 for both).Furthermore, men who reported a combination of three risky habits had a 1.67 (95 percent CI 1.09–2.53) increased risk of hypertension relative to men who reported none.	Men who consume a lot of alcohol, are overweight or obese, and engage in unhealthy behaviours are more likely to develop hypertension.
6	Nutrient intake was similar among groups with different blood pressure levels after adjusting for sex, age, and	These findings highlight the significance of diet and total sodium consumption as a non-

S. No.	Results	Conclusion
	energy consumption. Multiple linear regression analysis showed that sodium intake in the diet was directly related to blood pressure after controlling for several confounders. The sodium-to-potassium ratio followed a similar trend, and neither was influenced by hypertension medication. The relationship between blood pressure and dietary calcium intake, on the other hand, was discovered to be inverse. Moderate sodium intake (2400 mg Na/d) reduced the risk of hypertension by 30% and 52% in normotensive and non-medicated hypertensive subjects, respectively (Odds ratio 0.70; 95 percent CI 0.52-0.94, respectively). Furthermore, moderate sodium in combination with a calcium intake of more than 800 mg/d reduced the risk of inadequate blood pressure control by 52 percent in hypertension drug treatment subjects (Odds ratio 0.48; 95 percent CI 0.24-0.95). Patients with regulated hypertension consume significantly more calcium than those with uncontrolled hypertension.	pharmacological approach to hypertension prevention and care.
7	Hypertension was found to be prevalent in 32.8 percent of urban residents and 14.5 percent of rural residents. In the metropolitan area, the mean blood pressure was 128.4 +/- 18.8 mmHg systolic and 82.6 +/- 10.2 mmHg diastolic, while in the rural area, the mean blood pressure was 120.5 +/- 16.1 mmHg systolic and 77.8 +/- 8.8 mmHg diastolic.	In both urban and rural populations, age and gender were risk factors for hypertension, and a lack of physical activity substantially increased the risk of hypertension.
8	After controlling for all other risk factors, women who experienced stress at work or at home had a higher risk of hypertension: OR = 1.285, 95 percent CI (1.027, 1.609) and OR = 1.231, 95 percent CI (1.001, 1.514), respectively. Stress, on the other hand, did not appear to raise the risk of hypertension	In a middle-aged Chinese study, psychological stress (including stress at work and at home) was linked to a higher risk of hypertension, and stress could account for about 9% of the risk of hypertension. Psychological stress was also linked to a higher

S. No.	Results	Conclusion
	in men. General stress increased the risk of hypertension by 9.1% (95 percent confidence interval [3.1, 15.0]). As a result, psychological stress was linked to an increased risk of hypertension, though the increased risk did not vary by gender.	risk of hypertension in women than in men.
9	After adjusting for ethnicity, gender, covariates (education, BMI, age, and resting pressure), and significant interactions, the larger the BP responses to each of the three tasks were, the sooner hypertension developed (P<0.0001 to 0.01). In race- and gender-specific models, the systolic BP effect for the cold pressor task was observed in women and whites, while the diastolic BP effect for the video game was observed in men.	Young adults who have a high blood pressure reaction to psychological stress may be at risk for hypertension as they get older.
10	Psychosocial stress was linked to a higher risk of hypertension (OR = 2.40, 95 percent CI = 1.65–3.49), and hypertensive patients had a higher rate of psychosocial stress (OR = 2.69, 95 percent CI = 2.32–3.11) than normotensive patients. Chronic psychosocial stress can be a risk factor for hypertension, according to their meta-analysis.	They assume there is a strong link between psychosocial stress and hypertension, based on their findings. However, further research is needed to determine if psychosocial stress is a risk factor for hypertension.
11	Overweight contributed the most to hypertension, with PAR percent ranging from 11 percent in Italy to 25 percent in the United States (USA).Physical inactivity had a PAR of 5–13 percent, high sodium intake had a PAR of 9–17 percent, low potassium intake had a PAR of 4–17 percent, and low calcium intake had a PAR of 4–8 percent. Intake of magnesium In all populations, the influence of alcohol was minimal (2–3%). Inadequate PAR percentages varied by population. Calcium (2–8%), magnesium (4–8%), coffee (0–9%), and fish fatty acids (3–16%) are all good sources of calcium.	Being overweight, physical inactivity, high sodium intake, and low potassium intake are the major contributors to hypertension in Western cultures. The relative importance of various risk factors varies by population, which is crucial for prevention strategies.

S. No.	Results	Conclusion
12	When compared to those who did not smoke, a significantly higher proportion of smokers (37.9%) were found to have Chronic Kidney Disease (15.9 percent) Self-reported smoking was 13.3% of the total study population, with hypertensives smoking at a substantially higher rate than normotensives (16.1 percent versus 4.9 percent).	Chronic kidney disease was linked to hypertension and cardiac disorders in this urban population. Hypertension and renal insufficiency is linked to obesity. Smoking and alcoholism, two modifiable lifestyle habits, increased the risk of hypertension, while smoking increased kidney target organ damage in hypertensives.
13	The Est intervention reduced systolic (S) blood pressure by 1.2 mmHg in AA women, 6.0 mmHg in AA men, 4.5 mmHg in non-AA women, and 4.2 mmHg in non-AA men. In the four race–sex subgroups, the mean effects of the Est Plus DASH intervention were 2.1, 4.6, 4.2, and 5.7 mmHg, respectively. While interaction tests were non-significant, hypertensive BP changes were consistently greater than non-hypertensive BP changes. Individuals over and under the age of 50 experienced statistically significant BP declines as a result of the Est intervention. The Est Plus DASH intervention reduced blood pressure in all age groups, but slightly more so in the elderly.	Various groups of people should follow a variety of lifestyle changes that can help them regulate their blood pressure and reduce their risk of cardiovascular disease.
14	The established group's mean net systolic BP reduction was 3.7 mm Hg (P<.001), while the established plus DASH group's was 4.3 mm Hg (P<.001). The systolic BP difference between the established and established plus DASH groups was 0.6 mm Hg (P =.43). At 6 months, the prevalence of hypertension in the advice only group was 26%, the established group was 17% (P =.01 compared to the advice only group), and the established plus DASH group was 12% (P<.001 compared to the advice only group; P =.12 compared to the established group).	Individuals with high blood pressure, including those with stage 1 hypertension, can make a variety of lifestyle changes to lower their blood pressure and lower their risk of cardiovascular disease.

S. No.	Results	Conclusion
15	HTN was found to be prevalent in 23% of the TLGS population under the age of 20. The crude incidence rate (95 percent CI) of new-onset Hypertension identified as systolic BP (SBP) 140 mmHg and/or diastolic BP (DBP) 90 mmHg and not taking antihypertensive medication was 33.63 (32.0 - 35.3) per 1000 person-years over a decade of follow-up. For the development of isolated systolic HTN, age, baseline Systolic BP, and body mass index were significant risk factors; for isolated diastolic Hypertension, baseline Diastolic BP was a significant risk factor.	According to evidence on the prevalence and incidence of prehypertension and Hypertension, as well as their contribution to cardiovascular morbidity and mortality in the Tehran lipid and glucose study population as a representative sample of the Tehranian population, strategies for lifestyle changes for the prevention and effective management of prehypertension/Hypertension should be prioritize.
16	Excess sodium intake (9–17 percent), low potassium intake (4–17 percent), physical inactivity (5–13 percent), and low intake of fish oil (3–16 percent) have contributed significantly to hypertension (PAR percent : 11–17 percent).Low calcium intake (2–8%), low magnesium intake (4–8%), excessive coffee consumption (1–9%), and excessive alcohol consumption (2–3%) all had lower PAR percentages.	In Western cultures, diet and lifestyle have a significant effect on hypertension. The relative importance of various risk factors varies by population, which is crucial for prevention strategies.
17	Women who had all 6 low-risk factors (0.3% of the population), the hazard ratio for incident hypertension was 0.22 (95 percent confidence interval [CI], 0.10-0.51); the hypothetical PAR for women without these low-risk variables was 78 percent (95 percent CI, 49 percent -90 percent). The ARD (absolute incidence rate difference) was 8.37 instances in this hypothetical situation. Based on 1000 person-years The PARs were 72 percent (95 percent confidence interval: 57 percent to 82 percent; ARD, 7.76 instances).For five low-risk variables (0.8 percent of the population), 58 percent (95 percent) (per 1000 person-years)ARD, 6.28 instances per 1000 person-years) for four low-risk variables (CI, 46 percent	Self-reported hypertension was shown to be considerably reduced when people followed low-risk dietary and lifestyle factors. Low-risk dietary and lifestyle changes have the ability to avoid a high percentage of new-onset hypertension in young women.

S. No.	Results	Conclusion
	-67 percent; ARD, 46 percent -67 percent).(1.6%) of the population, and 53% (95 percent CI, 45 percent -60 percent; ARD, 6.02 cases per 1,000 people)For three low-risk factors, 1000 person-years) (3.1 percent of the population).	
18	A total of one hundred patients took part in the research. Overall, systolic blood pressure fell (p <0.01); three patients with significant alcohol consumption were recognized; two smokers quit smoking; two new diabetics were discovered; physical activity increased (p =0.035); and one-third of the patients switched medications.	The most noticeable findings of this intervention trial were an increase in exercise and a reduction in systolic blood pressure and women's weight.
19	26.3 percent of patients returning for follow-up had their blood pressure under control at registration, and 59.8% had it under control at follow-up (p<.001). Primary care facilities improved blood pressure control by more than twice as much (48.1 percentage points) as secondary care facilities (22.9 percentage point increase)	This study shows that a scalable public health hypertension management programme, especially in primary care settings, can result in significant BP control gains.
20	In an average of 7 weeks, 81 percent of all participating patients and 91 percent of those who routinely assessed home blood pressure achieved their objective. Control was achieved in the same way regardless of race, gender, or age.	Non-physicians may conduct a home-based blood pressure control programme that is efficient, successful, and quick, proposing a novel approach to hypertension therapy. This approach is effective, long-term, adaptive, and scalable to match present and future national healthcare systems.
21	HBPT reduced office SBP by 4.71 mmHg [95 percent confidence interval (CI): 6.18, 3.24; P< 0.001] and DBP by 2.45 mmHg (3.33, 1.57; P <0.001) when compared to standard treatment. In the intervention group, a higher proportion of patients (<140/90 mmHg nondiabetic patients and <130/80 mmHg diabetic patients) achieved	Although it is still more expensive than standard therapy, Home Blood Pressure Telemonitoring may be a beneficial technique for improving hypertension control and associated healthcare outcomes.

S. No.	Results	Conclusion
	office BP stabilisation (RR: 1.16 (1.04, 1.29); P< 0.001). Antihypertensive drug prescriptions were considerably higher after HBPT [R0.40 (R0.17,R0.62), P< 0.001].The physical component of quality of life was improved by using HBPT [SF-12 or SF-36 questionnaire: +2.78 (+1.15, +4.41) P <0.001]. The risk of adverse events was not different [RR: 1.22 (0.86, 1.71); P = 0.111].	
22	All those aged 15 and over were assessed (n=968, or 71.8 percent). Hypertension was found in 30.9 percent (95 percent CI 25.6 to 36.0) of males and 27.8 percent (95 percent CI 23.4 to 32.2) of females (BP 140/90 mmHg or cases of known hypertensive on medication). When compared to the WHO world population, the overall prevalence is 32.3 percent (95 percent confidence interval, CI 28.9 to 35.8). In both sexes, increasing age and BMI were independent predictors of hypertension, with psychosocial stress being an additional independent predictor in males.	Hypertension rates in the study's rural community are comparable to those in high-income countries and urban India. All of the risk factors identified, with the exception of age, were possibly controllable.
	TECHNOLOGY INTERVENTION	
1	SBP had a substantial group x time impact (p< 0.01), according to mixed modelling findings. At months 3 ((8.0 vs. 1.9), 6 ((10.0 vs. 0.7), and 12 ((11.6 vs. 0.4 mmHg; all p values 0.04), the TT community demonstrated greater SBP reductions. The TT (Tension Tamer) app was found to be effective in lowering SBP in adults with stage 1 systolic HTN. For stage 1 HTN, the TT app may be a promising and scalable first-line strategy. An efficacy RCT involving unregulated stage 1 HTN patients is being planned.	A properly powered study to help assess BAM's impact on blood pressure regulation in stage 1 hypertensive adults could be warranted, according to a breathing awareness meditation programme provided through a wellness app. With a limited sample size and a long trial duration, the researchers were able to show the efficacy of a twice-daily meditation programme and tentative long-term blood pressure reductions.
2	No one had a regulated systolic blood pressure at the start of the study (SBP). The SC and SMASH groups' baseline SBP averages did not vary (150.7 and	Our findings suggest that our culturally adapted smartphone-enabled medical regimen self-management software may be a

S. No.	Results	Conclusion
	152.3 mmHg, respectively; p = 0.53). SBP averages were slightly lower in the SMASH versus SC classes at the 1, 3, 6, and 9-month time points (month 1: 125.3 vs. 140.6; month 3: 120.4 vs. 137.5; month 6: 121.2 vs. 145.7 mmHg; month 9: 121.8 vs. 145.7 mmHg; all p-values <0.01). There was a major difference in the percentage of participants in the SC and SMASH groups meeting the 7th Joint National Committee cutoffs for SBP control at months 3, 6, and 9 (month 3: 62.5 vs. 92.0 percent; month 6: 57.9 and 94.4 percent; month 9: 27.8 and 92.3 percent; both p-values <_0.01). The SMASH group's average medical regimen adherence, as measured by time stamped drug consumption and blood pressure control, ranged from 89.1 to 95.2 percent over the course of the 9-month study.	useful tool for promoting MA (medication adherence) and lowering SBP in Hispanic adults with uncontrolled HTN.
3	Prior to randomization, resting blood pressure measurements were taken, as well as at months 1, 3, and 6.Statistically important time-by-treatment interactions (p< 0.0001) were seen in the SMASH group vs. the standard care (SC) control group at all time points, suggesting significant decreases in resting systolic blood pressure (SBP) and diastolic blood pressure (DBP). At month 1, 70.6 percent of SMASH subjects and 15.8% of the SC community had achieved blood pressure regulation (140/90 mmH) (<p 0.001). At month 6, 94.4 percent of the SMASH group had managed blood pressure compared to 41.2 percent of the SC group (p <0.003).	Among historically underserved and hard-to-reach ethnic minority groups, the mHealth medical regimen self-management programme encourages and assists in maintaining medication adherence and blood pressure control. Next, a multisite efficacy/effectiveness RCT with longer post-trial follow-up evaluations will be conducted to address key questions about the application, distribution, and use of SMASH for best practise healthcare in self-management of MNA and uncontrolled EH.
4	181 (90%) of the 200 patients who were recruited completed follow-up, and 117 of the 181 had low literacy or high hypertension information needs. The average educational attainment	In LMICs, automated telephone care management combined with home blood pressure monitors can improve hypertensive patients' outcomes. These

S. No.	Results	Conclusion
	was 6.5 years, with a median annual income of $2,900 USD. Patients' SBPs dropped 4.2 mm Hg at the follow-up intervention (95 percent confidence interval: 9.1, 0.7; p=0.09) compared to controls. Intervention patients' average SBPs fell 8.8 mm Hg (14.2, 3.4, p=0.002) in the subgroup with the highest knowledge needs. At follow-up, intervention patients showed less depressive symptoms (p=0.004), fewer drug complications (p<0.0001), improved general health (p<0.0001), and higher satisfaction with treatment (p<_0.004) as compared to controls.	resources may be made available in areas with minimal capacity for patient-focused informatics support using a cloud computing model within regional telecommunication centres.
5	At the conclusion of the analysis, there were no statistically significant discrepancies in baseline characteristics between the two groups (P>.05).Participants in both groups had lower systolic and diastolic blood pressure than they did at baseline, with the intervention group showing a slightly greater decrease in systolic and diastolic blood pressure than the control group (P<.05). Furthermore, the intervention group had a higher proportion of participants with managed blood pressure (P<.05). The intervention group's drug adherence was significantly higher than the control group's (P<.05).	M-Health applications are useful for managing hypertension; they can help with medication adherence and blood pressure control. Perhaps m-Health apps can help with blood pressure management.
6	The majority of the participants were familiar with SMS text messaging technology. A wide variety of participants found the messages to be appropriate, important, and useful. The SMS material, polite tone, and delivery (timing of reminders and frequency) were all highly valued, as was the relational element of trial participation (feeling cared for). Those who had been struggling with adherence due to high levels of personal stress were the ones who benefited the most. The intervention seemed to align with their	Even for those who already had their own reminder systems in place, adherence support for treatment of raised blood pressure delivered via SMS-text message on the patient's own phone was found to be appropriate, important, and helpful. Our results begin to describe who the SMS-text message intervention appears to work best for and what core elements of the intervention tend to work best in a low-resource

S. No.	Results	Conclusion
	readiness for improvement, and it offered both practical and emotional support for strengthening adherence. Increased awareness of their health status, as well as a shift in attitude toward greater self-responsibility, may have aided reform. As a wider obstacle to adherence behaviour, a complex interaction of psycho-social stressors and health-care issues was identified.	operational environment, topics that future research can delve further into.
7	With information-only SMS, the mean modified improvement in systolic blood pressure was -2.2 mm Hg (95 percent confidence interval, -4.4 to -0.04) after 12 months, and with interactive SMS, it was -1.6 mm Hg (95 percent confidence interval, -3.7 to 0.6). When comparing information-only messaging to normal treatment, the odds ratios for participants with a blood pressure of <140/90 mm Hg were 1.42 (95 percent confidence interval, 1.03-1.95) for information-only messaging and 1.41 (95 percent confidence interval, 1.02-1.95) for interactive messaging.	We observed a modest reduction in systolic blood pressure regulation relative to normal treatment in this 12-month randomised study of an electronic adherence support programme provided via SMS text-message in a general outpatient population of adults with high blood pressure. An interactive intervention did not appear to increase this impact.
8	There were 151 apps in total. The three most popular characteristics were: blood pressure (BP) monitoring and charting logs; lifestyle (exercise or nutritional) recommendations; and hypertension information. The remaining 11 PRISMS taxonomic components were rarely mentioned. Only two unusual features had borderline significant relationships with download statistics and rating scores, indicating that there was limited evidence to support correlations between specific traits and download statistics and rating scores. The number of downloads was weakly but significantly (R2=.04, P=.02) linked with the presence of social support components such as a forum. Apps tailored to individual BP	The existing apps' capabilities are restricted to logging blood pressure, providing lifestyle advice, and delivering hypertension information. Future app development should examine widening the scope to create a system that can adapt flexibly to the various types of support available to help people manage their hypertension on their own.

S. No.	Results	Conclusion
	monitors/smart watches were only faintly related with a higher rating score (R2=.05, P.001). More downloads were connected with apps with higher ratings (R2=.91, P.001).	

11. Result

Our review reveals that there is possible relationship between smoking, excess alcohol, urban living, psychological stress, reduced physical activity, unhealthy diet, excess salt intake, overweight and obesity with the high blood pressure.

Tobacco usage can result in a temporary increase in blood pressure as well as artery damage. Cigarette smoke contains nicotine, which is a major contributor to the condition. It elevates blood pressure and heart rate, narrows and hardens arteries, and makes blood clot more easily. It puts a pressure on your heart and raises the risk of a heart attack or stroke.

When you eat too much salt, your body retains fluid and your arteries constrict. Blood pressure rises as a result of both of these factors. Getting enough nutrients from a variety of sources is essential for good health. High blood pressure is linked to a high-salt diet, as well as one high in calories, saturated and trans fats, and sugar. Multiple meta-analyses of interventional trials have shown that reducing dietary salt intake lowers blood pressure significantly, primarily in hypertension patients but also to a lesser extent in normotensives. Healthy eating habits, on the other hand, can aid in blood pressure reduction.

By boosting blood flow through the arteries, exercise stimulates the body to release natural hormones and cytokines that relax blood vessels and reduce blood pressure. Physically inactive people have a higher heart rate. The higher your heart rate is, the harder your heart has to work with each contraction and the greater the force on your arteries. Obesity has also been linked to a lack of physical activity. Exercise has been linked to considerable systolic blood pressure reductions in the short term. Post-exercise hypotension, or the first drop in blood pressure after exercise, can last up to 24 hours, with those with higher baseline blood pressure seeing the most substantial consequences. The exercise training response is a term that

describes how increasing the frequency or duration of exercise leads to longer-lasting blood pressure reductions.

More than two drinks per day can activate the adrenergic nerve system, resulting in blood vessel constriction as well as an increase in blood flow and heart rate. On the other hand, long-term use paired with high blood alcohol levels causes a temporary elevation in blood pressure. Furthermore, Blood pressure levels are most significantly connected to alcohol intake in the previous 24 hours, and drop within hours to days after cessation or reduction. As a result, the effect of alcohol on blood pressure is more likely to be mediated by short-term physiologic changes rather than long-term structural alterations.

A transient but considerable spike in blood pressure can be caused by high levels of stress. The use of relaxation and meditation techniques can effectively lower blood pressure. Although sympathetic responses to acute stress have been widely documented, the mechanism by which stress causes long-term blood pressure elevation is uncertain. Hypertension can be caused by repeated activation of this system, difficulty to return to resting levels after stressful events, failure to habituate to recurrent stressors of the same type, or a combination of these factors.

According to recent studies, mHealth apps can aid with hypertension self-assessment, therapy, and control, and are especially useful in distinguishing and managing genuine and pseudo-resistant hypertension. Tele-healthcare management is a tried-and-true method of improving non-communicable disease outcomes (NCDs). Home blood pressure (BP) monitoring is highly effective for hypertensive people when combined with telehealth follow-up. Even in low-resource countries, the majority of adults have access to a telephone. New approaches, including new technologies, are needed to improve community screening, identification, and control of high blood pressure.

12. DISCUSSION

At the individual and combined level, unhealthy behaviours such as heavy alcohol use, non-adherence to dietary requirements, and being overweight are linked to uncontrolled hypertension, particularly in men. Improvements in modifiable lifestyle factors could have a significant impact on hypertension management.

Obesity and overweight were found to be positively correlated with hypertension in adolescents according to Bishav Mohan et al(3) study and Geleijnse, J. M et al(21)also concluded the same finding related to overweight and hypertension relationship that is overweight ,physical activity(28),sodium intake and low-potassium intake are the major contributors to hypertension. In both urban and rural population lack of physical activity substantially increased the risk of hypertension.(10). Bansal, S. K et al study(33) results reveal that the prevalence of hypertension in rural India to be similar to that seen in urban India and other world regions. Although rates of hypertension in males were higher than in females, the difference was not significant.

H Schröder et al(9) mentioned in their study that Patients with regulated hypertension consume significantly more calcium than those with uncontrolled hypertension. Many more studies(23)(24)(25)(26)shows the same result regarding diet and lifestyle changes helps in regulating high BP. Lifestyle changes have the ability to avoid high percentage of new onset hypertension in young women(27).Tobacco users and alcohol users had higher rates of hypertension(5)(6)(8)(22).

According to Dempsey PC et al study high stress levels are linked to hypertension same result found in Liu, M.-Y et al(20) and Ke Gong et al(18) study in a middle aged China people where women were at more risk as compare to men and young adults who have high BP reaction to psychological stress may be at high risk of hypertension as they get older(19).

Several studies have found evidence to support the use of smartphones to manage hypertension. Various technologies implemented in the studies like study of Chandler Jessica et al (11) , Davidson Tatiana M. et al (13) , Piette John D. et al (14) and Ke Gong et al(15) shows same results that is technology intervention in patients shows decreased blood pressure as compared to non-intervention group ,intervention included internet-based telemonitoring and education, telephone-based telemonitoring(31) and education, internet-based education, telemedicine via videoconferencing, telehealth kiosks and automated modem device whereas in study of Bobrow, K.et al (17) a small reduction in SBP control compared with usual care at 12 months. mHealth like SMS -text message on patients' phone was found to be

appropriate, important and helpful in hypertension management (16). There was no evidence that an interactive intervention increased this effect. The existing apps capabilities are restricted to logging blood pressure, providing lifestyle advice and delivering hypertension information(32).

13. Conclusion

Hypertension is still a major public health issue around the world. The relevance of primary preventive measures in decreasing the worldwide burden of hypertension and cardiovascular illnesses cannot be emphasised, given that most of the key risk factors for hypertension are modifiable and there is good evidence that hypertension can be prevented entirely.

Thanks to improvements in mobile technology, mHealth methods can be used to overcome hurdles such as access, distance, and a lack of human resources while simultaneously benefiting patients. The growing availability of smartphones and mobile health apps opens up new possibilities for remote monitoring of parameters such as blood pressure, breaking away from traditional cuff-based measurement, however there is no proof of accuracy or utility at this time.

Although current smartphone market penetration among the elderly is insufficient for widespread adoption of technology such as smartphone apps among this age group, M-health has the potential to aid screening and diagnosis in younger adults, pregnant women, children and adolescents, as well as older populations, as technology becomes more commonplace.

The lack of a generally accepted standard for app and innovative non-invasive device validation is a serious challenge, because existing techniques simply do not cover them.

14. Recommendation

Weight loss, greater physical activity, increased fruit and vegetable consumption, and a reduction in tobacco and alcohol use are all necessary and suggested interventions.

To examine the scalability and effectiveness of such mHealth apps in the setting of resistant hypertension, more research is needed, particularly large-scale RCTs with a user-centered design.

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