

ISSN:2456-9836  
ICV: 60.37

## Research Article

## Monitoring Of Hypertension Control In Urban Slum Of Pune Through Community Ownership.

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## ARTICLE INFO

## ABSTRACT

Article History:Received on 18<sup>th</sup> January, 2021Peer Reviewed on 29<sup>th</sup> January, 2021Revised on 11<sup>th</sup> February, 2021Published on 27<sup>th</sup> February, 2021Keywords:

Hypertension, volunteer, monitoring, community ownership

**Abstract:** Hypertension affects 1 in 4 men and 1 in 5 women (2015) worldwide. Though asymptomatic, diagnosis is quick, painless, simple to detect and confirm. Fewer than 1 in 5 hypertensives have their BP under control. A diagnostic gap exists in developing countries access for BP measurement which is critical step towards control. Hence a study was planned to assess adherence, feasibility and monitor hypertension control in urban slum of Pune by involving stakeholders using community ownership.

**Methods:** The study was conducted in an urban slum field practice area exclusively under the community medicine department of tertiary care hospital from February 2014- January 2015. Overall 1043 were examined. Prevalence of

Hypertension obtained, pharmacological adherence assessed. Volunteers were recruited and trained for 2 days. Each volunteer allotted 50-60 hypertensives in nearby locality. At end of 6 months of monitoring, adherence was assessed. Focal group discussions were conducted. Epi Info 7 was used for data analysis.

**Results:** Prevalence of hypertension (>18yrs age) was 25.6% with mean age of hypertensive patients was 48.58±15.75. Of the 267 hypertensives, 40.82% were aware of their hypertensive status and amongst those aware 61.46% were on anti-hypertensives. 4.48% of those on hypertensives were fully adherent while 47.76% were least adherent. 41.79% of hypertensives on medications were controlled prior to community ownership. At end of 6 months 53.73% of hypertensives on medications were controlled. The least adherent decreased to 43%.

**Conclusion:** Community ownership is feasible and can help in better pharmacological adherence and control of hypertension.

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## INTRODUCTION:

Globally, Noncommunicable diseases (NCDs) are the leading causes of death contributing two-thirds of all deaths<sup>[1]</sup>. Out of the 17 million deaths due to cardiovascular diseases worldwide, high blood pressure is the leading single risk factor globally accounting for an estimated 9.4 million deaths and 7% of global DALYs (Disability-Adjusted Life year) in 2010, thus attributing to about 18% of the total 52.8 million deaths during that year<sup>[2]</sup>. In 2015, 1 in 4 men and 1 in 5 women had hypertension. Hypertension disproportionately affects the low and middle-income countries where health systems are weak. Pooled epidemiological studies show the average prevalence of hypertension in India is 25% in Urban and 10% in rural population. Hypertension is a significant public health problem in urban and rural areas of India. Reported Prevalence ranges from 3-40% among adults and the diagnosis is simple to detect (non-invasive sphygmomanometer measurement) and confirm.<sup>[3]</sup>

It is important to satisfactorily control Hypertension through effective medicines and behavior change. However, the recent population surveys confirmed that the proportion of hypertensives that are treated and controlled is less than 30%<sup>[4][5]</sup>. WHO has stressed that increasing effectiveness of adherence interventions may have a greater impact on the health of population than any improvements in specific medical treatments? It is also stressed that family, community and patients play key factor for success in improving adherence. There is urgent need to focus on developing community-based hypertension control program.<sup>[6]</sup> Measurement of blood pressure is a critical step in the diagnosis of hypertension. A diagnostic gap<sup>[7]</sup> exists in developing countries for which efforts have to be made to improve access of BP measurement to general population. Community support is pivotal in management of Hypertension<sup>[8]</sup>. Evidence is accumulating that public wants more involvement in its own care and access to sphygmomanometers in community pharmacies is one such method<sup>[9]</sup> A study by Adams et al.<sup>[10]</sup> in a population survey has shown that those with not necessarily health professional background are able to take BP if trained adequately. With a view to extend the access of BP measurement towards volunteers from community and involving

them in the monitoring of hypertension control, it was decided to conduct the study in the field practice area exclusively served by tertiary care hospital.

## METHODS.

This was a Community based experimental prospective (before after study design) study conducted in an urban slum, the field practice area exclusively served by Department of Community Medicine, of tertiary care hospital of Pune from February 2014- January 2015.

**Inclusion criteria-** For the Participants

>18 years of age, resident of the area, of either sex, willing to participate in the study.

**Exclusion criteria-** Participants.

Pregnant and those not willing to participate/ not giving consent.

**Inclusion Criteria-** Volunteers

Willing to participate voluntarily, 10<sup>th</sup> pass at least in education, able to read English numbers as displayed on BP monitor and able to dedicate at least 2 hours per week for visiting the households and measure BP of patients.

The population served by the urban health setting was 7623. This was divided into 5 blocks with around 1500 population in each block. A block was randomly selected from amongst this and selected for the study. Total population of study block was 1568. Total population above 18 years of age which was to be surveyed was 1110; 67 (6%) who did not consent to participate in the study, were excluded from the study, 1043 (93.96%) individuals above the age of 18 years of age participated in the study. After obtaining ethical clearance, cross sectional survey for calculating prevalence was carried out from Feb 14-June 14. At the end of survey data was processed and prevalence of hypertension was obtained. A List of hypertensive patients was prepared.

The volunteers who had expressed (nine volunteers) their willingness to participate (during prevalence study) were approached. Similarly, inclusion criteria for volunteers were applied. Five volunteers turned

out for training at urban health center. Comprehensive two-day training for the volunteers was carried out in urban health center. Day 1 of training included introduction to BP measurement and importance of each step, demonstration to them more than once using digital BP apparatus. The volunteers were then paired and asked to record each other BP readings. Their technique was closely observed and corrected by trainers if they went wrong. On day 2 of training, BP measurement exercise was repeated with other persons and staff of urban health center. This was done to familiarize them with element of variability amongst subjects. They were given handout of health education for hypertension control and asked to read it aloud to other volunteers. Each of the volunteers was allotted a list of 50-60 hypertensive patients in their nearby vicinity and OMRON™ digital BP apparatus and spare set of batteries. Volunteers were asked to report back to investigator immediately over telephone for any doubt or error reported in OMRON™ digital BP apparatus.

The volunteers visited the house of hypertensives and recorded their blood pressure readings. This process

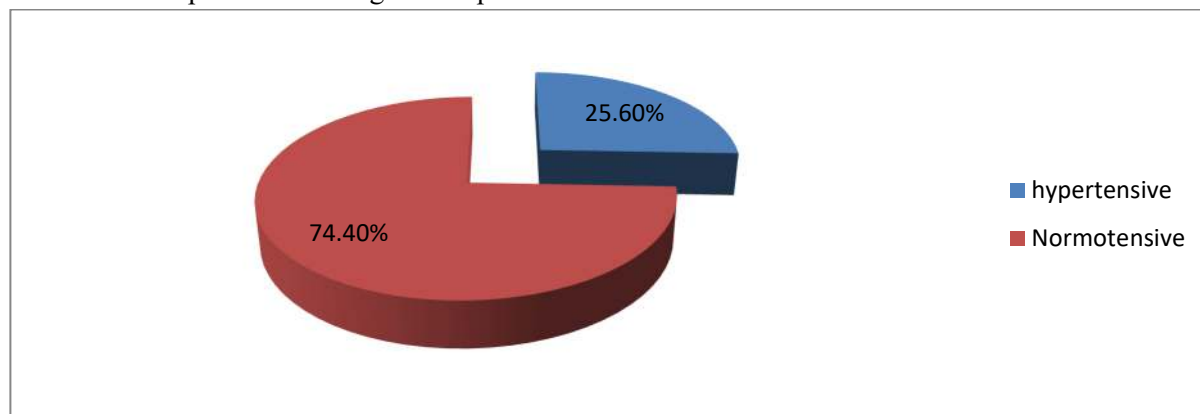
was carried out from period of August 2014 to January 2015. During this period review meetings were conducted every two months for any problem faced. At the end of 6 months the pharmacological adherence was assessed by the investigator using Morrisky<sup>[11][12]</sup> scale. In Feb 2015, data obtained from volunteers was compiled and entered into MS excel.

Two Focus group discussions were done at the urban health center with volunteers who had conducted the community ownership. First time the knowledge and belief of volunteers regarding hypertension was assessed while in the second their perception, experience about the community ownership project was assessed.

Data analysis was carried out using Epi info 7. Descriptive and inferential analysis was carried out by using qualitative and quantitative methods, t test and Wilcoxon test. Construction of appropriate diagrams for data presentation wherever required.

## RESULTS

Total 1043 individuals participated in the study, out of which 267(25.6%) were hypertensives.

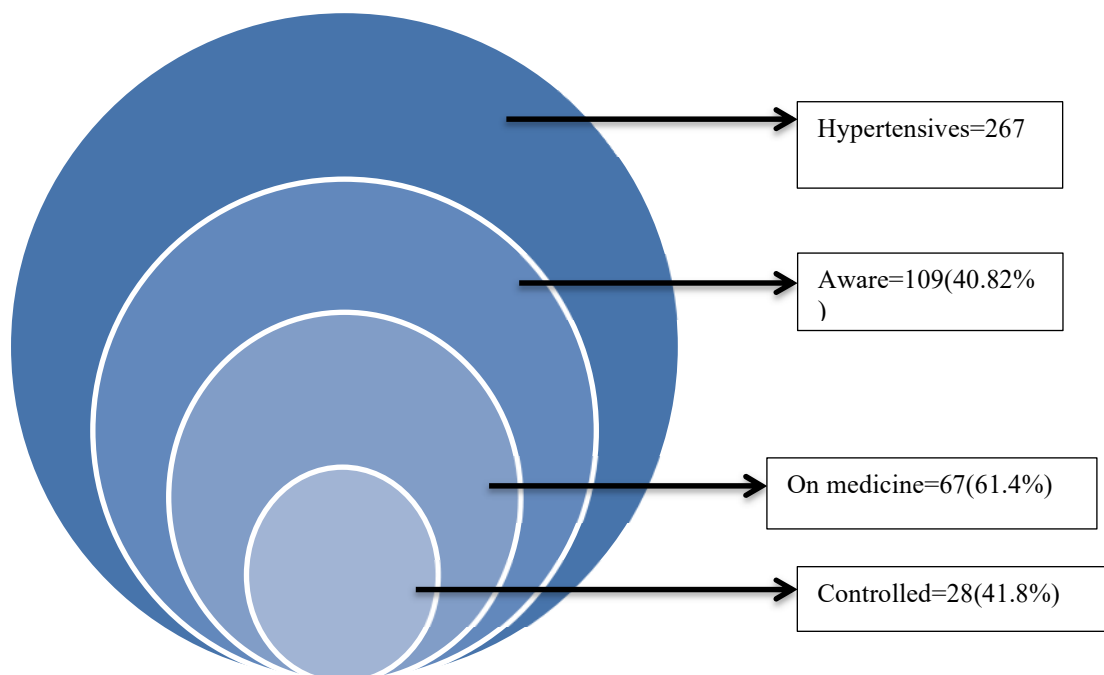


*Figure 1: Prevalence of Hypertension (N=1043).*

*Table 1: Awareness about hypertensive status amongst hypertensives (n=267)*

Awareness status	Number	(%)	$\chi^2=5.647$ df=1, P<0.05
Aware	109	40.82	
Not Aware	158	59.18	
Total	267	100	
Education	Aware(%)	Not aware(%)	Total
Illiterate	25(25.51)	73(74.49)	98(100)
Primary	12(25.53)	35(74.46)	47(100)

Middle school	14(40)	21(60)	35(100)
High school	26(65)	14(35)	40(100)
HSSC	27(67.5)	13(32.5)	40(100)
Graduate	6(85.7)	1(14.3)	7(100)
Total	109	158	267



*Figure 2: Awareness, under treatment and Control amongst Hypertensives (N=267)*

In this study, 109 (40.82%) out of the 267 hypertensives were aware about their disease. Illiterates made up 98 (36.70%) out of 267 of the hypertensives. Out of these 98 illiterates, 25(25.51%)

were aware of their hypertensive status. Out of those who were aware, 67 (61.46%) of cases were on anti-hypertensive medications.

*Table 2: Adherence to anti-hypertensive medications amongst those on anti-hypertensive treatment (n=67)*

Adherence to anti-hypertensive medications	Number	(%)
Least adherent	32	47.76
Moderately adherent	32	47.76
Fully Adherent	3	4.48
Total	67	100

Table 2; illustrates the pharmacological adherence to anti-hypertensive medications amongst those on BP controlling medications. 47.76% of those on

medications were least adherent to their medications, while 52.24% were moderate to fully adherent.

*Table 3: Adherence to anti-hypertensive medications and control of hypertension pre and post intervention.*

Hypertension control – June 2014				
Adherence category	Controlled		Uncontrolled	
	Number	(%)	Number	(%)
Least adherent( $n_1=32$ )	6	18.75	26	81.25
Moderately adherent( $n_2=32$ )	20	62.5	12	37.50
Fully adherent( $n_3=3$ )	2	66.7	1	33.33
Total( $n=67$ )	28	41.79	39	67.21
$\chi^2= 10.47, p<0.05, S$				
Hypertension control- Jan 2015				
Least adherent( $n_x=29$ )	8	27.58	21	72.42
Moderately adherent( $n_y=34$ )	25	73.52	9	26.47
Fully adherent( $n_z=4$ )	3	75	1	25
Total( $n=67$ )	36	53.73	31	46.28

Table 3 illustrates the adherence and control of hypertension amongst the hypertensives, before and after the community ownership. At the end of 6 months out of 67 hypertensives on medications, 36(53.73%) were controlled in contrast to 31(46.28%) who were still uncontrolled. After 6 months the proportion of controlled cases increased from 41.79% to 53.73%. The increase in controlled cases of hypertension is seen across all the classes of adherence.

#### **Community Ownership.**

Study of community ownership on hypertension was done. It was observed that 484 out of 1043 participants

were educated till 10<sup>th</sup> standard making them eligible to be enrolled as volunteers. However 9(1.85%) had expressed their willingness to work as volunteers and devote their free time. Later 2 persons opted out citing personal commitments. Remaining 7 were considered for inclusion criteria and called for training at the Urban health center which is 500m away from volunteers residence. At the time of training 2 out of the 7 did not turn up. They were persuaded over the phone followed by a personal visit. They withdrew as volunteers citing personal reason.

*Table 4: Demographic profile of volunteers (n=5)*

COD E	Age	Gender	Religion	Caste	Educational	Occupation	Income	Relationship with patient
A	19	F	Hindu	SC	10	Student	NA	Grand daughter
B	31	M	Hindu	OBC	Grad	Private job	10	Brother
C	50	F	Muslim	Open	12	unemployed	NA	Self
D	37	M	Hindu	Open	10	Self employed	15	Self
E	30	F	Hindu	OBC	10	Housewife	NA	Daughter

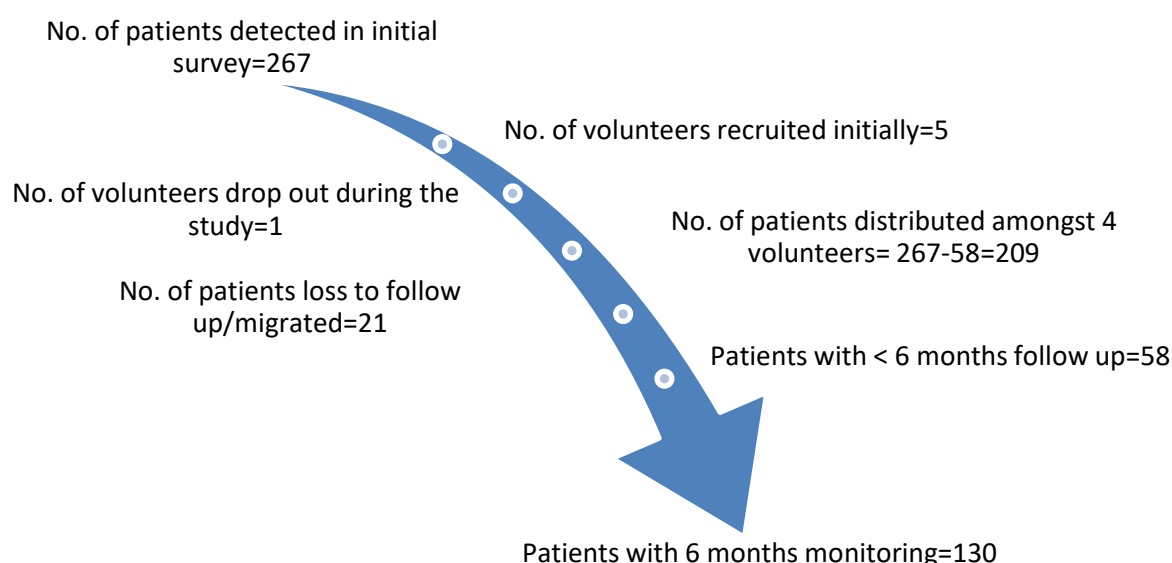
*Table 5: Compliance of volunteers with steps involved in measurement of blood pressure.\**

Sr.	Steps Involved	A	B	C	D	E
1	Knocking at the door	Yes	Yes	Yes	No	Yes
2	Introducing the purpose	No	Yes	No	Yes	No
3	Participant asked to sit quietly and rest for 10 min	Yes	Yes	Yes	Yes	Yes
4	Right arm of participant placed on the arm chair or on the floor for support.	Yes	Yes	No	Yes	Yes
5	Clothing on the right arm to be removed/ rolled up.	No	Yes	Yes	Yes	Yes
6	Cuff positioned 2-3 fingers above the elbow	Yes	No	Yes	No	Yes
7	Level of the cuff same as that of heart.	No	Yes	Yes	Yes	Yes
8	Noting down the reading	Yes	No	Yes	Yes	Yes
9	Giving health education	Yes	Yes	Yes	Yes	Yes
	Overall number of correct steps(out of 9)	6	7	7	7	8

\*No. of different patients supervised for each volunteer=5.

Table 5 illustrates the compliance of volunteers with steps involved for BP monitoring in community. The compliance was verified during the first week and corrected for errors if found any. For each volunteers 5 different patients were supervised. The volunteers adhered to minimum 6 steps out of 9. Introduction to their purpose of visit was the least adhered step. The volunteers were supposed to donate their spare time for this activity. The visits by male volunteers and a female volunteer was between 4-6 pm, while 2 female volunteers preferred to visit the community in the afternoon. Female volunteers mentioned their

household commitments in the early hours making it difficult to give morning time. One female volunteer who was college attending preferred morning time. On inquiry the volunteers mentioned the BP monitor to be lightweight, portable and easy to carry. None of the volunteers used their personal mobile devices to make contact with patient in their locality. The blood pressure of the other family members was also checked on request. Referral to urban health facility was done when BP levels were above 140/90. A review meeting at the end of 2 months was conducted and inquired for any difficulties faced in community.

*Figure 3: Community Monitoring- Summary*

4 out of the 5 volunteers attended. Difficulty in finding spare times for visiting household and lock down houses were issued common to all the volunteers. One volunteer who did not attend review meeting was visited personally. The volunteer 'A' expressed her inability to continue as volunteer. On probing further volunteer expressed non acceptance of her from nearby houses in the slum area. Volunteer A was a 19 year, unmarried female, student and belonging to SC category with allotted 58 patients. At this time it was

not possible to search for new volunteer and hence other 4 volunteers were requested to share the allotted cases of A amongst themselves. The remaining 4 volunteers did not agree.

A second review meeting at the end of November 2014 was done. The volunteers at this meeting expressed difficulties of locked down houses on account of festival season. They also mentioned expectation of remuneration of Rs. 10/ per patient for each month.

*Table 6: Analysis of visit conducted and referrals by volunteers from community (n=209)*

Criteria	Scheduled	Observed
Average number of visit expected per patient in 6 month.	6	4.59
Total no. of visit in 209 patients	1254	960(76.55%)
Total no. of referred patients to UHC		88
Total no. of new Hypertensive detected		4

During the home visits 88 referrals were made to urban health center and four new hypertensives were detected during the first 6 months of follow up.

*Table 7: Mean SBP and DBP of patients over 6 month of monitoring*

Month	Mean SBP	SD	P value	Mean DBP	SD	p value
1	136.65	13.443	p<0.001	89.80	6.896	P<0.001
2	135.79	11.115		89.15	6.354	
3	135.95	9.642		88.14	6.553	
4	134.37	14.716		87.52	5.985	
5	132.78	11.407		87.35	6.386	
6	132.36	11.713		86.95	6.841	
Before Intervention	136.65	13.443	t=3.945	89.80	6.896	t= 4.585
After intervention	132.36	11.713	p<0.001	86.95	6.841	p<0.001

Table 7 illustrates significant difference observed in the mean SBP and DBP of the hypertensives at the end of 6 months of monitoring.



*Table 8: Adherence score of subjects initially and at the end of 6 months (n=67)*

Adherence score	N	Mean	SD	Wilcoxon Z	P value
Initially	67	5.27	1.176	5.008	P<0.001
At the end of 6 months	67	6.00	0.975		

A significant increase in the adherence score was observed at the end of six months of BP monitoring amongst the hypertensives.

#### **Focus Group discussions (FGD) with Volunteers**

Sentences expressed by patients are in *italics*

- a. General perceptions about the causes, prevention and control of hypertension:
  - *High blood pressure is commonly seen in our area in older people.*
  - *It happens when there is too much blood in the body.*
  - *It also happens when there is too much of tension in person's life.*

Volunteers had some understanding regarding the link between excess of salt intake, weight gain and hypertension. They perceived a link between hypertension and eating of fried foods. Poverty was perceived as a hurdle in their life and causing hindrance in seeking treatment.

- *If BP medicines are not taken on time there can be an attack of paralysis.*
- *We need to earn wages for family, we cannot think of taking medicines as entire day goes in hospital.*
- *We think BP is caused by weight increase and no exercise. But in our area we see many thin people getting Hypertension. Hypertension is unavoidable.*
- *We cannot afford food for a lifetime, how are we going to afford medicines for lifetime?*

#### **Perception of Community monitoring amongst volunteers.**

They perceived their work similar to that of Anganwadis and experienced openness from community people over 6 months. Finding spare time, reluctance from community, lack of monetary incentive were few of hindrances perceived

- ✓ *This is similar to Anganwadis of our area. She also goes to people in the area.*

- ✓ *When initially we went to house in our area, they were doubtful if we really know how to take BP. But after some days people came to know about us and were more cooperative.*
- ✓ *If anybody declines us first time, we don't feel like going to same house again.*
- ✓ *Can you give us some money as you give it to Anganwadis in our area? Rs 10 per month for a patient are good.*
- ✓ *We feel good that we are doing something for our society. We had met people to whom we were unknown. Finding spare time is difficult.*

#### **Focus group discussions amongst community:**

Few community people had some understanding of Hypertension, causes, complications and availability of medicines. Some of them expressed increasing frequency of urination due to medicines, difficulty in remembering to take medicines on time.

- *Disease of BP can happen if you eat more of oily and masala food.*
- *Increase in BP can lead to paralysis and heart attack.*
- *There is no cure to BP. We will have to take medicines for life.*
- *BP will pass from parents to their children.*
- *I take half table instead of full because after full tablet I have to go to pass urine frequently.*

#### **Focus group discussion amongst community at end of 6 months.**

At least one of the allotted houses of each volunteer was inquired into. Community perceived monitoring by trained local volunteers in a positive way. Initially they did not believe that local people can take BP. Community member expressed their inability to be at home when the volunteers arrive. However they mentioned willingness to go to volunteers place every month. Some perceive changes in their lifestyle in the 6 months.



- ✓ *This is useful for us. We can go there any day. The person measuring BP is known to us. Now we don't have to spend Rs. 20 to get our BP measured.*
- ✓ *We had doubt about the BP measurement by members of our area. But the machine is doing actual measurement. They have to place it on our arm.*
- ✓ *Our timings and theirs (volunteers) sometimes doesn't match. We would go to their place once a month.*
- ✓ *I have stopped putting extra salt over my food and Pickle papad eating.*

## DISCUSSION:

Globally the prevalence of hypertension (above 25 yrs. age) ranges from 32.6-41% in North America, Australia, China and India. [13] The published report of integrated disease surveillance project under Ministry of health and family welfare carried out in Maharashtra in the age group 15-64 years observed the prevalence of hypertension at 20.1% with prevalence in the urban area to be 18.8%. [14]

In this study, the prevalence of Hypertension was found out to be 25.6% above 18 years of age. In this study  $\geq 65$  yrs. of age group contributed maximum number 63 (23.6%) of hypertensive patients. This higher prevalence may be due to the inclusion of all individuals over 18 yrs. of age while the study conducted by IDSP included only 15-64 age group people. This prevalence was similar to a study conducted for age group  $>18$  yrs. of age urban slum of Mumbai by Dhikale et al which found the prevalence of hypertension to be 23.59%. [15] There is a difference in the prevalence among various studies conducted all around the world and also in India. This may be due to the different age group in which the study was conducted, urban or rural settings.

## Awareness about hypertensive status.

Reports published by WHO, SE Asia 'Regional Health Forum' has observed in India 11.4-51.8% of the hypertensive patients are aware about their hypertensive status [16] Chadha [17] et al. in urban slum of Delhi observed that 49.15% of hypertensives were aware about their disease while Dhikale [14] et al in Mumbai urban slum found it to be 33.8%. In our study (40.82%) 109 out of 267 patients were aware about their hypertensive status. Illiterates made 98(36.70%) of the hypertensive. This significant number of illiterates could be one of the

reasons for observed lower figure of awareness about hypertensive status as compared to other studies Report published by WHO [16] showed that 46.2-76.8% of those aware about their hypertensive status were taking antihypertensive medications. Similar study by Babu [18] et al, showed it to be 32.1%, while by Panesar [19] et al. as 38.9%. In our study it was observed that of the 109 who were aware about their hypertensive status, 67(61.42%) were taking anti-hypertensive medicines. This higher proportion of those on medications may be due to presence of a local Practitioners in nearby area and proximity to a tertiary care hospital nearby.

## Pharmacological Adherence and Hypertension:

Report published by WHO [13] regarding the adherence to long term therapies have mentioned that despite the availability of the effective treatment, over half of the patients being treated for hypertension drop out of the care entirely within a year of diagnosis and those who remain under medical supervision, only 50% adhere to the treatment. Moderate to fully adherent patient's ranges from 52-74%. Srikanth [20] et al. Study on elderly in urban slum of Bangalore found that 61.5% were having good adherence. Nagarkar [21] et al. conducted a study on patients in a government tertiary care set up of Pune found 23.4% to be adherent to antihypertensive medications while remaining were poorly adherent. In our study 35(52.2%) out of the 67 were having moderate to full adherence while 47.8% were poorly adherent. This difference from other studies may be due to the criteria for defining the poor and good adherence. Srikanth [20] et al. had defined score of 2 and above as good while Nagarkar [21] et al had considered a score of 8 and above as adherent. Besides the study setting of both settings were different.

## Monitoring of Hypertension control by Community ownership.

Amarchand et al. [22] in a study conducted in Delhi has demonstrated that Blood pressure measurement could be included in the job responsibilities of the health workers. In this study the responsibilities had been given to the community health workers which included the cadre of ASHA, peer educators, supervisors who had some experience in the medical field. All the volunteers were females.

In our study out of the 209 hypertensives monitored, community volunteers could monitor 151(72.24%) patients for atleast 3 months and 130(62.20%) patients for 6 months. Considering their non-medical background and no prior experience their performance can be considered to be satisfactory. However we explored the reason for lack of completion of the remaining 38% hypertensives. 21(10%) had migrated out of the study area while traveling to other places on account of long vacation during the study period of Ganapati, Diwali and Dusshera. A 19 year female volunteer dropped out during the study period. She perceived non acceptability by her community people on account of her caste. However her very young age could have been one of the reasons as a barrier for non-acceptability by community. Mean adherence score as 5.27(SD 1.176) at the beginning while after six months increased to 6 (SD=0.975). A significant increase in the adherence score could be seen amongst those taking anti-hypertensive medications. Similarly improvements could be seen in the areas of the mean systolic and mean diastolic BP of the patients.

Volunteers were expected to cover 50 houses in a month. A weekly target of approx. 12 houses was fixed. In our study volunteers required around 20 minutes for a visit to one household. On a given day they could cover 4-5 patients in the community. The volunteers worked around 1.5-2 hours in a given day with no remuneration which could have deterred many hypertensives to work as volunteers.

We need to explore the possibilities of reducing the time required for monitoring blood pressure amongst hypertensives. A similar possibility could be explored about patients visiting volunteers in the proximity of their area. Enrolling the petty shop owners (panwalla, Kirana shop), religious priest as volunteers can be explored. The petty shop owners can keep the BP monitor in their shops and hypertensives can visit the shop to their BP checked at their disposal. Our study reveals that overall community was happy about community ownership. Free Blood pressure checkup, doorstep access, flexible timings, reliable tool for measurements were some of the identified reasons for favorable attitude towards the initiative.

## CONCLUSIONS

Hypertension is a public health problem affecting the slum population as well. In our study prevalence of

hypertension was 25.6%. Awareness about hypertensive status was low, under treatment were lower. Monitoring of hypertension control using community ownership is feasible in the community as well as challenging. Though hypertension is easy to confirm, a diagnostic gap exist which can be bridged in a sustainable way using community volunteers. The community ownership was feasible and had been done in a small area of slum. However before this exercise is recommended as a standard practice, other non-technical issues need to be addressed including the total workload on volunteers, drop outs, incentive, funding.

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**How To Cite This Article:**

**Murlidhar P. Tambe, S. P. Rao, Malangori A. Parande, Ajinkya J Niwal** *Monitoring of Hypertension Control in Urban Slum of Pune Through Community Ownership Br J Pharm Med Res*, Vol.06, Issue 01, Pg. 3019 - 3029, January – February 2021. ISSN:2456-9836 Cross Ref DOI : <https://doi.org/10.24942/bjpmr.2021.771>

**Source of Support:** Nil

**Conflict of Interest:** None declared

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