

Compliance to Antihypertensive Therapy and its Predictors: A Cross-sectional Study in Western Coastal Region of India

AMRITA SARKAR¹, NARESH R MAKWANA², PRADEEP PITHADIA³, DIPESH V PARMAR⁴

ABSTRACT

Introduction: Hypertension (HTN) is a chronic Cardiovascular Disease (CVD) characterised by persistently raised Blood Pressure (BP >140/90 mmHg), leading to various complications and currently causing the highest mortality, worldwide. The risks of morbidity and mortality related to HTN can be diminished by proper compliance to pharmacotherapy.

Aim: To assess the compliance to treatment of HTN and to study its correlation with various sociodemographic variables, presence of other comorbidities, BP control, duration of disease and knowledge about duration of continuation of antihypertensives.

Materials and Methods: A cross-sectional study was conducted in a district of Gujarat, India for a period of one year. A sample size of 400 was calculated. Hypertensive patients attending Non Communicable Disease (NCD) clinics at the tertiary care hospital and Community Health Centres (CHCs) of Jamnagar district, Gujarat, India selected by simple random sampling, formed the study population. Data were collected from patients using a predesigned, pretested and semistructured questionnaire. The data were analysed by MedCalc 10.4.8.0 software applying Chi-square test.

Results: The rate of treatment compliance observed was 359 (89.8%). Among the non compliant patients, 28 (68.3%) had poor compliance whereas 13 (31.7%) had discontinued the treatment. Compliance to treatment showed highly significant association ($p < 0.001$) with age, type of family, educational status, socioeconomic status, locality of residence, health insurance status and knowledge about hypertensive treatment. Patients with improper knowledge about treatment were more likely to be non compliant. It was observed the duration of illness was inversely proportional to the treatment compliance and this was statistically significant ($p < 0.05$). Significant statistical association ($p < 0.05$) was also observed between marital status and occupation of the patient and compliance. The other reasons of non compliance were forgetfulness, financial reasons and it was also observed that patients did not like to carry their medications when away from home. It was observed that only 10 (24.4%) of the non compliant patients had controlled BP as compared to 150 (41.9%) in the compliant patients.

Conclusion: The findings of the study suggest measures should be taken for proper awareness among patients regarding HTN, its treatment and complications. Log book maintenance and other measures for checking compliance should be adopted.

Keywords: Cardiovascular disease, Control, Epidemic, Hypertension

INTRODUCTION

The HTN is a chronic, NCD and a leading cause of mortality and accounts for 16.5% of global deaths [1]. It is not only the most common CVD but also the most important risk factor for other CVDs [2]. Ranking third as a means of reduction in Disability Adjusted Life Years (DALY), it requires lifelong treatment for control of the disease and preventing its complications [3]. In India, NCDs like CVD, cancer, diabetes and others account for around 60% of all deaths. Therefore, the National Program for Prevention and Control of Cancer, Diabetes, CVDs and Stroke (NPCDCS) was launched in 2010 with a view to preventing and controlling the major NCDs [4].

It has been estimated that a 5 mmHg reduction of Systolic Blood Pressure (SBP) in the population would result in a 14% overall reduction in mortality due to stroke, a 9% reduction in mortality due to CHD, and a 7% decrease in overall cause of mortality [5]. Compliance or adherence to therapy is a good indicator for predicting clinical outcome in the hypertensive patients. Compliance is defined as conforming to the recommendations of the healthcare provider with respect to the timing, dosage, and frequency of medication taking [6]. However, since HTN is often asymptomatic and disease progression is slower than most other chronic diseases, hypertensives are more prone for non compliance [7]. Various epidemiological studies have shown non

compliance with outpatient drug therapy to be a major problem in management of HTN [8,9]. It was observed that while some patients discontinue treatment, as high as 54% to 83% turn non compliant within five years [10,11]. Hence, it becomes important to find out the reasons of non compliance so that necessary action can be taken to improve the disease management and halt its progress to complications. The study aimed to assess the compliance to treatment of HTN and to find out its association with various sociodemographic variables, presence of other comorbidities, BP control, duration of disease and knowledge about duration of continuation of antihypertensives.

MATERIALS AND METHODS

A quantitative, cross-sectional study was conducted in Jamnagar, a coastal district in the M.P. Shah Government Medical College, Jamnagar, Gujarat, India for a period of one year, from July 2013 to June 2014.

Sample size was calculated using standard formula, a sample size of 384 was calculated which was rounded up to 400 [12]. Out of the total sample size, half of the study subjects were selected from the tertiary care hospital of the study district and remaining 200 were selected from CHCs of study district. There were 11 CHCs in study district at the time of study, from which five CHCs were chosen

through simple random sampling technique. A total of 200 patients (40 patients×5 CHCs) was taken up from CHCs. Hypertensive patients attending NCD clinics at the Guru Govindsingh Government Hospital (GGH) and at the selected CHCs of Jamnagar district formed the study population.

The inclusion criteria for the study were patients aged 30 years or more, already diagnosed as having HTN and coming for the first time to the NCD clinic during the study. Patients who did not satisfy the inclusion criteria, or were unwilling to participate, critically ill, mentally ill and pregnant patients and those who were interviewed previously were excluded from the study.

Operational definitions: Joint National Committee (JNC) VII criteria have been used to define HTN [5]. Patient is said to be on treatment for HTN if there was regular use of a prescription medication for HTN [13]. Compliance was estimated by the direct method of self report by patient. Compliant patients are defined as those who have accepted their physician's advice to start drug therapy and who take their medication at least 80% of the time [8]. Control of HTN was defined as BP <140/90 mmHg in a subject on regular antihypertensive therapy [13]. Socioeconomic status was estimated on the basis of Modified Prasad's Classification (1961) which was modified according to AICPI (All India Consumer Price Index) of the year 2013 using AICPI [14].

Data collection: Data collection was done by personal interview that was carried out using a pretested, semistructured type of proforma designed by the investigators and it comprised of questions about sociodemographic factors, past history, family history, any other comorbid condition, his/her knowledge and attitude about HTN and their practices to control the disease including compliance to treatment. Along with clinical examination, anthropometric measurements like Height (Ht), Weight (Wt), Body Mass Index (BMI), Waist Circumference (WC) and Waist Hip Ratio (WHR) were taken as per standard recommendations. The BP was measured manually using a mercury column sphygmomanometer and stethoscope by the auscultatory method in a sitting position with the left forearm placed horizontal on the table. The subject was seated comfortably for at least 15 minutes before BP recording. Two readings were taken one before and one after the interview, and the two were at least 15 minutes apart. The average of these readings was recorded.

The study protocol was reviewed and approved by the Institutional Ethical Committee. An informed consent was taken from all participants of the study after fully explaining the purpose of the study and assuring them of full confidentiality. The interview was conducted in a language they well understood.

STATISTICAL ANALYSIS

The data entry was done using Microsoft Office Excel 2007 and data analysis was done using Microsoft Office Excel 2007 and MedCalc 10.4.8.0. The Chi-square test was used as the test of significance where $p < 0.05$ was considered significant.

RESULTS

In the present study, 228 (57%) of the hypertensives were female and the ratio between male and female patients was 1:1.33. More than 163 (40.75%) belonged to the age group of 60 years and above while 207 (51.8%) belonged to 40-59 years age group. Most i.e., 323 (80.8%) and 244 (61%) of the patients enrolled in the study were Hindus and belonged to nuclear families respectively. Majority i.e., 346 (86.5%) of the patients were married while 49 (12.3%) were either widow or widower. Though, 296 (74%) literacy was observed, most of the study subjects 195 (48.7%) were educated only up to primary level. Nearly half 181 (45.3%) of the study subjects were housewives. As per Modified Prasad's Classification, the highest proportion 145 (36.3%) of participants in this study belonged to lower middle class (IV) and the least 23 (5.75%) were from lower class (I).

Only 96 (24%) of the hypertensives were from rural areas. Health was not insured in 249 (62.2%) of the enrolled patients. Control of BP was achieved in only 116 (29%). Treatment compliance was seen in 359 (89.8%) of the patients [Table/Fig-1]. Among the non compliant patients, 28 (68.3%) had poor compliance whereas, 13 (31.7%) had discontinued the treatment.

Variables	Frequency (n)	Percentage (%)
Sex		
Male	172	43
Female	228	57
Age (in completed years)		
30-39	30	7.5
40-49	102	25.5
50-59	105	26.3
≥60	163	40.7
Religion		
Hindu	323	80.8
Muslim	75	18.7
Others	2	0.5
Marital Status		
Married	346	86.5
Never married	5	1.2
Widow/widower	49	12.3
Type of family		
Nuclear	244	61
Joint	86	21.5
Three generation	70	17.5
Education		
Illiterate	104	26
Up to primary	195	48.7
Secondary and above	101	25.3
Occupation		
Labourer	63	15.8
Businessman	34	8.4
Housewife	181	45.3
Retired	42	10.5
Others	80	20
Socioeconomic class		
I (Upper Class)	37	9.2
II (Upper Middle Class)	105	26.2
III (Middle Class)	90	22.5
IV (Lower Middle class)	145	36.3
V (Lower Class)	23	5.8
Locality		
Urban non slum	215	53.8
Urban slum	89	22.3
Rural	96	24
Health insurance status		
Insured	151	37.8
Not insured	249	62.2
Treatment compliance		
Compliant	359	89.8
Non compliant	41	10.2
Status of blood pressure control		
Controlled	116	29
Not controlled	284	71

[Table/Fig-1]: Profile of the hypertensive patients.

Compliance to treatment exhibited highly significant statistical association ($p < 0.001$) with type of family (whether nuclear, joint or three generation), education level of the patient, the area of patient's residence or locality (whether urban non slum, urban slum or rural), and socioeconomic and health insurance status of the patient. Statistical significant association ($p < 0.05$) was also observed between compliance with age, marital status and occupation of the patient. No statistical association was noted

between compliance with sex, religion and comorbidity ($p > 0.05$) [Table/Fig-2]. It was observed that nearly half i.e., 190 (47.6%) of the patients were diagnosed as having HTN during the last four years. And the duration of illness was significantly associated ($p < 0.05$) with compliance to the prescribed treatment, the lesser the duration of illness the more the compliance [Table/Fig-3]. We found highly significant association between knowledge about continuation of treatment and compliance; patients with improper

Variables	Compliant (%) (n=359)	Non compliant (%) (n=41)	Chi-square value (χ^2)	p-value
Sex				
Male	153 (88.9%)	19 (11%)	$\chi^2=0.208$	p=0.648*
Female	206 (90.3%)	22 (9.6%)		
Age (in completed years)				
30-39	28 (93.3%)	2 (6.7%)	$\chi^2=2.193$	p=0.006 [†]
40-49	95 (93.1%)	7 (6.9%)		
50-59	100 (95.2%)	5 (4.8%)		
≥ 60	136 (83.4%)	27 (16.6%)		
Religion				
Hindu	292 (90.40%)	31 (9.60%)	$\chi^2=0.777$	p=0.378*
Others	67 (87%)	10 (13%)		
Marital Status				
Married	315 (91%)	31(9%)	$\chi^2=4.640$	p=0.0312 [†]
Single [§]	44 (81.4%)	10 (18.51%)		
Type of family				
Nuclear	227 (93%)	17 (7%)	$\chi^2=64.266$	p=0.0001 [†]
Joint	79 (91.8%)	7 (8.2%)		
Three generation	53 (75.7%)	17 (24.3%)		
Education				
Illiterate	76 (73%)	28 (27%)	$\chi^2=44.398$	p<0.001 [†]
Up to primary	183 (93.8%)	12 (6.15%)		
Secondary and above	100 (99%)	1 (1%)		
Occupation				
Labourer	53 (84.1%)	10 (15.9%)	$\chi^2=11.359$	p=0.022 [†]
Businessman	33 (97%)	1 (3%)		
Housewife	162 (89.5%)	19 (10.5%)		
Retired	34 (80.9%)	8 (19.1%)		
Others	77 (96.2%)	3 (3.8%)		
Socioeconomic class				
I (Upper Class)	37 (100%)	0 (0%)	$\chi^2=54.377$	p<0.001 [†]
II (Upper Middle Class)	97 (92.4%)	8 (7.6%)		
III (Middle Class)	87 (96.6%)	3 (3.4%)		
IV (Lower Middle class)	127 (87.6%)	18 (12.4%)		
V (Lower Class)	11 (47.8%)	12 (52.2%)		
Locality				
Urban non slum	207 (96.2%)	8 (3.8%)	$\chi^2=25.077$	p<0.001 [†]
Urban Slum	77 (86.5%)	12 (13.5%)		
Rural	75 (78.1%)	21 (21.9%)		
Health insurance status				
Insured	125 (82.8%)	26 (17.2%)	$\chi^2=12.805$	p=0.0003 [†]
Not insured	234 (94%)	15 (6%)		
Status of BP Control				
Controlled	106 (91.4%)	10 (8.6%)	$\chi^2=0.471$	p=0.492*
Not controlled	253 (89%)	31 (11%)		
Comorbidity				
Yes	196 (90.3%)	21 (9.7%)	$\chi^2=0.169$	p=0.6810*
No	163 (89.1%)	20 (10.9%)		

[Table/Fig-2]: Correlates of compliance.

*not significant ($p > 0.05$), [†]significant ($p < 0.05$), ^{††}highly significant ($p < 0.001$) Single[§]: widow/widower and never married have been combined to form single

knowledge about treatment were more likely to be non compliant. In fact, in the current study all the 353 (100%) patients who had the knowledge that the medications need to be continued life long were compliant to the therapy [Table/Fig-4]. The other reasons of non compliance were forgetfulness, financial reasons and it was also observed that patients did not like to carry their medications when away from home.

Duration of illness (years)	No. of compliant patients (%) (n=359)	No. of non compliant patients (%) (n=41)	Total (%) (n=400)
<1	52 (14.5%)	3 (7.3%)	55 (13.8%)
1-4	127 (35.4%)	8 (19.5%)	135 (33.8%)
5-9	99 (27.6%)	12 (29.3%)	111 (27.8%)
10-14	57 (15.9%)	9 (22%)	66 (16.5%)
≥15	24 (6.6%)	9 (21.9%)	33 (8.2%)

[Table/Fig-3]: Association between duration of illness and compliance.

$\chi^2=15.37$, $df=4$, $p=0.00398$ (<0.05 , significant)

Knowledge	Compliant (%) (n=359)	Non compliant (%) (n=41)	Total (%) (n=400)
Medicines to be continued always	353 (98.3%)	0 (0%)	353 (88.3%)
To be discontinued when no problem (asymptomatic)	4 (1.1%)	37 (90.2%)	41 (10.2%)
Do not know	2 (0.6%)	4 (9.8%)	6 (1.5%)

[Table/Fig-4]: Association between knowledge and practice of compliance.

Chi-square value=346.267, $df=2$, $p<0.001$, highly significant

DISCUSSION

In the present study, more than half of the hypertensive patients were females. This was similar to findings of another study conducted in Sao Paulo [15]. Female predominance may be due to the fact that 40% of the respondents belonged to the age group of 60 years and above, hinting towards higher post menopausal women in the study. However, contrary to these findings, Jardim PC et al., found a male predominance in their study [16]. More than half of the patients belonged to the productive age group of 40-59 years. In a study done by Jesus ES et al., most of the patients were in 50 [15]. Similar to the findings of the study conducted in Sao Paulo, majority of the patients in present study were married (86.5%) and housewives (45.3%) [15].

A compliance rate of 89.8% was observed in the present study. This was higher as compared to those observed in studies conducted in Nigeria (77.5%), Ethiopia (64.6%), Brazil (46%), Malaysia (44.2%) and Iran (39.6%) [17-21]. We observed that amongst those who were non compliant to the prescribed pharmacotherapy, 68.3% had poor compliance while 31.7% had discontinued the treatment. Although, it has been suggested by some that it is possible to withdraw pharmacotherapy and continue lifestyle modification after several years, it has been observed that the patient becomes hypertensive again in absence of treatment and may sometimes result in grave complications [17,22].

In present study, most of the patients had no literacy (26%) or had minimum education (48.7%), belonged to middle class (48.75%) or lower class (42%) and without any health insurance (62.2%) and all these factors were found to be significantly associated with the status of compliance. Other factors found to be closely associated with compliance status were age of the patient, duration of illness, marital status and occupation of the patient, type of family (whether nuclear, joint or three generation), the area of patient's residence or locality (whether urban non slum, urban slum or rural). Similar to our study, Novick D et al., in a prospective study carried out in six East Asian countries also found association of age with compliance to treatment. They observed that older patients discontinued treatment

significantly earlier than younger patients [23]. The fact that married patients exhibited better compliance may be due to better support system and reminder to take medications.

Also, highly significant association between knowledge about continuation of treatment and compliance was observed; patients with improper knowledge about treatment were more likely to be non compliant. In a study carried out in Nigeria Familoni BO et al., reported that only about one-third of patients knew that HTN should ideally be treated for life, and more than half believed that antihypertensive drugs should be used only where there are 'symptoms' while others believed that the treatment should be for a period of time [24]. In the present study, patients blamed forgetfulness, financial reasons and the hassle of having to carry their medications when away from home as factors leading to non compliance. The reasons of non compliance elicited in the present study were mostly, in agreement with those found in various other studies conducted in India as well as other parts of the world [25,26]. In one study done in Nigeria, factors associated with non compliance included turning asymptomatic, forgetfulness, lack of funds to purchase drugs, side-effects of drugs, having a busy schedule but limited medication (3.6%) and tired of taking drugs [17]. In a study done in Cairo, Egypt, the main causes for discontinuation of treatment were becoming asymptomatic, when they consider themselves as cured, economic burden and the very long treatment period [25]. In another study done in the urban population of Tamil Nadu, socioeconomic factors, life style, nutrition, lack of patient motivation, lack of patient education programs and adverse reactions to antihypertensive drugs was found to contribute significantly to non compliance [26]. Though females have been found to be more compliant to any therapy, no statistical association was noted between compliance with sex in present study [27]. However, this was comparable to the finding of the study done by Novick D et al., in Asian patients taking antidepressants [23]. Similar to the study by Osamor PE and Owumi BE no statistical significant association was found between compliance and religion [17]. Overall control of BP was found to be very poor (29%). This was similar to the finding (32.5%) of the Prospective Urban Rural Epidemiology (PURE) study by Chow CK et al., [28].

LIMITATION

Compliance to treatment was based on self report and, therefore, suffers from recall bias and social desirability bias.

CONCLUSION

The study elicited the various factors leading to non compliance namely improper knowledge regarding continuation of medication, age, education, longer duration of illness, financial reasons amongst others. The findings of the study suggest measures should be taken for proper awareness regarding HTN and its treatment in patients. Patient Information Leaflets (PILs), use of awareness videos in waiting rooms of NCD clinics can play a role in this. Especially in aged patients suffering since a long duration, BP log book should be maintained to check compliance and patients with lower socioeconomic status should be prescribed medications that are available free of cost to ensure compliance.

ACKNOWLEDGEMENTS

The authors would like to thank all the study participants and the Medical Officers (MOs) of the NCD clinics where the study was carried out.

REFERENCES

- [1] Fact sheet on non-communicable diseases: WHO. Update March 2013. Available from: <http://www.who.int/mediacentre/factsheets/fs355/en/>.
- [2] Pescatello LS, Franklin BA, Fagard R, Farquhar WB, Kelley GA, Ray CA. Exercise and hypertension. *Med Sci Sports Exerc.* 2004;36(3):533-53.

- [3] Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. *J Hypertens*. 2004;22(1):11-19.
- [4] National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). Available from: http://dghs.gov.in/content/1363_3_NationalProgrammePreventionControl.aspx [Last accessed on 29th September 2017].
- [5] Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The seventh report of the joint national committee on the prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *JAMA*. 2003;289:2560-72.
- [6] Cramer JA, Roy A, Burrell A, Fairchild CJ, Fuldeore MJ, Ollendorf DA, et al. Medication compliance and persistence: terminology and definitions. *Value Health*. 2008;11(1):44-47.
- [7] Rampal L, Rampal S, Azhar MZ, Rahman AR. Prevalence, awareness, treatment and control of hypertension in Malaysia: a national study of 16,440 subjects. *Public Health*. 2008;122(1):11-18.
- [8] Rudd P, Ahmed S, Zachary V, Barton C, Bonduelle D. Antihypertensive drug trials, contributions from medication monitors. In patient compliance in medical practice and clinical trials. Edited by Cramer JA, Spilker B. New York: Raven Press, Ltd. 1991:283-99.
- [9] Srinivas G, Suresh E, Jagadeesan M, Amalraj E, Datta M. Treatment-seeking behaviour and compliance of diabetic patients in a rural area of south India. *Ann N Y Acad Sci*. 2002;958:420-24.
- [10] Juncos LI. Patient compliance and angiotensin-converting enzyme inhibitors in hypertension. *J Cardiovasc Pharmacol*. 1990;15(suppl 3):22-25.
- [11] Caro JJ, Speckman JL. Existing treatment strategies: does noncompliance make a difference. *J Hypertens*. 1998;16(suppl 7):31-34.
- [12] Lwanga SK, Lemeshow S. Sample size determination in health studies: a practical manual, World Health Organization, Geneva. 1991.
- [13] Lakshman A, Manikath N, Rahim A, Anilakumari VP. Prevalence and risk factors of hypertension among male occupational bus drivers in North Kerala, South India: a cross-sectional study. *ISRN Prev Med*. 2014;318532.
- [14] All India Consumer Price Index (General) for Industrial Workers, [cited 2013 July 22]. Available from <http://cyberjournalist.org.in/manisana/aicpinew.html>
- [15] Jesus ES, Augusto MA, Gusmão J, Mion Júnior D, Ortega K, Geraldo, Pierin AM. Profile of hypertensive patients: biosocial characteristics, knowledge, and treatment compliance. *Acta Paul Enferm*. 2008;21(1):59-65.
- [16] Jardim PC, Gondim MR, Monego ET, Moreira HG, Vitorino PV, Souza WK, et al. High blood pressure and some risk factors in a Brazilian capital. *Arq Bras Cardiol*. 2007;88(4):452-57.
- [17] Osamor PE, Owumi BE. Factors associated with treatment compliance in hypertension in Southwest Nigeria. *J Health Popul Nutr*. 2011;29(6):619-28.
- [18] Ambaw AD, Alemie GA, W/Yohannes SM, Mengesha ZB. Adherence to antihypertensive treatment and associated factors among patients on follow up at University of Gondar Hospital, Northwest Ethiopia. *BMC Public Health*. 2012;12:282.
- [19] Demoner MS, Paula Ramos ER, Pereira ER. Factors associated with adherence to antihypertensive treatment in a primary care unit. *Acta Paulista Enfermagem*. 2012;25(S1):27-34.
- [20] Hassan NB, Hasanah CI, Foong K, Naing L, Awang R, Ismail SB, et al. Identification of psychosocial factors of noncompliance in hypertensive patients. *J Hum Hypertens*. 2006;20(1):23-29.
- [21] Hadi N, Rostami-Gooran N. Determinant factors of medication compliance in hypertensive patients of Shiraz, Iran. *Arch Iran Med*. 2004;7(4):292-96.
- [22] Salako LA. Treatment of hypertension. In: *Cardiovascular diseases in Africa*. Gauteng: Ciba Geigy Ltd., 1979; pp. 22-27. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3259725>
- [23] Novick D, Montgomery W, Moneta V, Peng X, Brugnoli R, Haro JM. Antidepressant medication treatment patterns in Asian patients with major depressive disorder. *Patient Preference and Adherence*. 2015;9:421-28.
- [24] Familoni BO, Ogun SA, Aina AO. Knowledge and awareness of hypertension among patients with systemic hypertension. *JAMA*. 2004;96(5):620-24.
- [25] Ebid AM, Ali ZT, Ghobary MA. Blood pressure control in hypertensive patients: impact of an Egyptian pharmaceutical care model. *J App Pharm Sci*. 2014;4(09):93-101.
- [26] Sakthi SR, Thomas S, Sivakumar KK, Karhikayal J. Assessment of anti hypertensive prescribing pattern and patient counseling in an urban population. *Scholars Research Library Der Pharmacia Lettre*. 2010;2(4):156-63.
- [27] Manteuffel M, Williams S, Chen W, Verbrugge RR, Pittman DG, Steinkellner A. Influence of patient sex and gender on medication use, adherence, and prescribing alignment with guidelines. *J Womens Health (Larchmt)*. 2014;23(2):112-19.
- [28] Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA*. 2013;310(9):959-68.

PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Community Medicine, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, Meghalaya.
2. Professor, Department of Community Medicine, Shri M.P. Shah Government Medical College, Jamnagar, Gujarat, India.
3. Assistant Professor, Department of Community Medicine, Shri M.P. Shah Government Medical College, Jamnagar, Gujarat, India.
4. Professor and Head, Department of Community Medicine, Shri M.P. Shah Government Medical College, Jamnagar, Gujarat, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Pradeep Pithadia,
Assistant Professor, Department of Community Medicine,
Shri M.P. Shah Government Medical College, Jamnagar-36100, Gujarat, India.
E-mail: pradeep280683@gmail.com

Date of Submission: **Jul 24, 2017**
Date of Peer Review: **Sep 28, 2017**
Date of Acceptance: **Nov 18, 2017**
Date of Publishing: **Mar 01, 2018**

FINANCIAL OR OTHER COMPETING INTERESTS: None.