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Survey of Antihypertensive Drugs Sold from Different Pharmacy Shops of Selected Areas of Varanasi District of Uttar Pradesh

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The present study was based on shop to shop survey for the availability of different antihypertensive medicines which are being used in therapy of hypertension in Varanasi district of Uttar Pradesh. A total of 124 pharmacy shops including both allopathic and homeopathic were contacted during the survey. The results revealed that antihypertensive medicines from class calcium antagonists, angiotensin converting enzyme inhibitors, angiotensin receptor blockers and beta-blockers were present in all (100%) the pharmacy shops, followed by diuretics (94.50%), aldosterone antagonist (69.72%), alpha blockers (55.96%) and vasodilators (21.10%). Ayurvedic medicines were present in few of the pharmacy shops which were surveyed while homeopathic preparation of various makes was present in each of the homeopathic pharmacy shops which were used for treatment of hypertension.

Key Words: Antihypertensive, Hypertension, Medicine, Pharmacy, Varanasi.

INTRODUCTION

In India hypertension (HTN) is one of the most common disease which causes a significant burden on the health care system. Risk factors involved in the development of hypertension includes age, smoking, alcohol intake, increased body mass index (BMI), decreased consumption of vegetables/fruits, increase in consumption of fat and salt in diet, and an inactive life style. Hypertension contributes a significant risk factor for diseases like cardiovascular disease, cognitive impairment, chronic kidney disease, causes mortality and disability. Cardiovascular diseases are affecting around 1.39 billion adults and causing around 10.4 million deaths annually, among these diseases, hypertension is one of the major contributors (Unger *et al*, 2020). Cardiovascular diseases are responsible for one-third of total deaths taking place in India (Patel *et al*, 2011). The low and middle income countries are experiencing a significant raise in the occurrence of hypertension in contrast with the high income countries (Mills *et al*, 2020). As per data by Zhou *et al*, 2021 the sum total of people affected with hypertension around the world has increased by twofold in the previous 30 years. Despite global to increase in the access to different classes of extremely potent antihypertensive drugs (Neal *et al*, 2000), only one women out of four and one men out of five having hypertension have achieve the treatment targets (Zhou *et al*, 2021). In India hypertension is most prevailing disease, affecting 25.3% adult (18+ years) population (Gupta *et al*, 2018). The estimated value of adults having hypertension in India is at least one among four (Geldsetzer *et al*, 2018) and, among them only about 12% have their blood pressure under control range (Prenissl *et al*, 2019). Persistent high blood pressure can lead to development various cardiovascular diseases including stroke, coronary artery disease, and peripheral vascular

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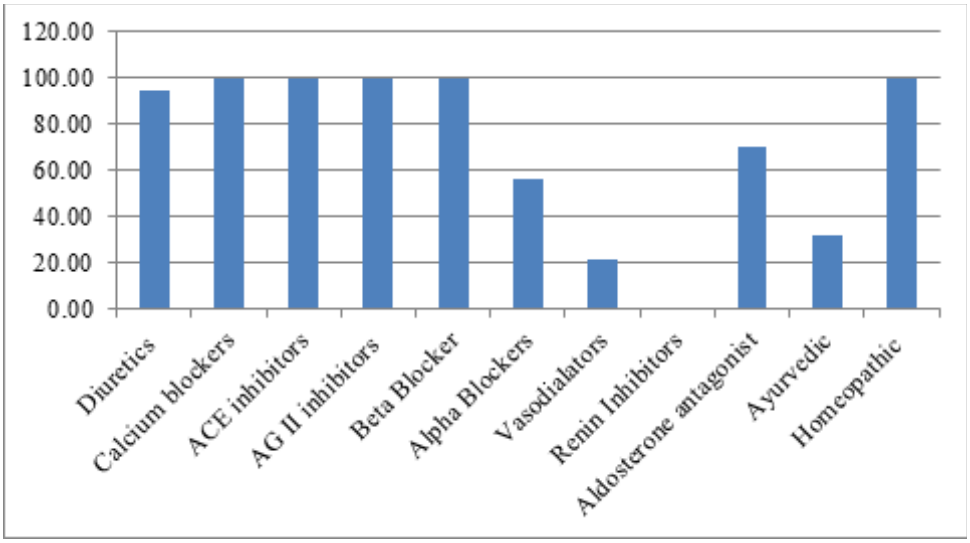

Fig.1: Antihypertensive drugs present (%) in pharmacy shops.

disease, retinopathy, nephropathy and possibly neuropathy (Arauz-Pacheco *et al*, 2003).

In India the patient accesses the medicines by mainly two ways either from government health facilities or through private facilities. Government either purchases the drugs or manufactures and distributes to the patient through government health facility centers. A large percentage of patients search for private sector for health care. In India, private sector is visited by the 70% of out-patient (NSSO, 2016). The private pharmacies are more commonly utilized by the patients than government services, because of easy approach, less waiting times, convenient opening times, availability of medicines and availability of medicines on credit (Basak and Sathyanarayana, 2010).

The different groups of drugs prescribed for decreasing blood pressure which are currently available in the market are diuretics, beta-blockers, calcium antagonists, angiotensin-converting enzyme inhibitors and angiotensin receptor blockers these entire groups of drugs are appropriate for the control of high blood pressure and these drugs can be used as a single drug therapy or in different mixtures of selected drugs (Mancia *et al*, 2013). Along with these ayurvedic medicines and homeopathic medicines are also used for the management of hypertension. Choice of antihypertensive drugs should be on the basis of availability of drug and information of drug's capacity to decrease blood pressure (BP) values, which is the first objective to evade cardiovascular problems in patients. As different drugs belonging to the same group does not contain equal antihypertensive strength and the choice of drug can definitely influence the possibility of attaining BP control.

India is a home to a large drug manufacturing units, producing allopathic, ayurvedic and homeopathic medicines. Hence, the present survey was carried out in order to establish the drug availability for treatment hypertension, in different Pharmacy shops of selected areas of Varanasi district of Uttar Pradesh.

MATERIALS AND METHODS

For this observational survey, a random sample from different Pharmacy shops in selected areas of Varanasi district of Uttar Pradesh were contacted to participate, during the period of two months from December 2022 to January 2023. Survey forms were filled out manually with existing drugs data available in the pharmacy shops.

RESULTS AND DISCUSSION

Antihypertensive drugs available from different groups in pharmacy shops

A total of 124 pharmacy shops (109

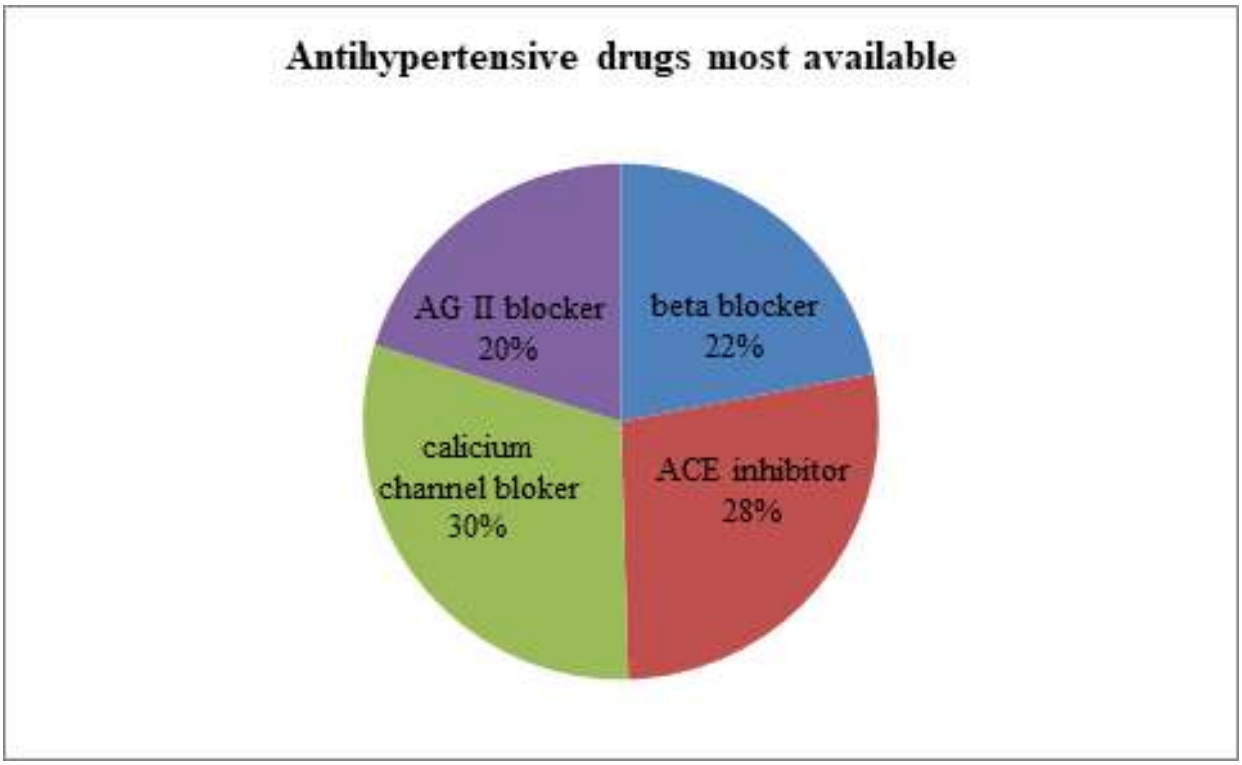

Fig.2: Antihypertensive medicines mostly present in pharmacy shops

allopathic + 15 homeopathic) were contacted during the survey. It was observed that antihypertensive drugs from calcium antagonists, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers and beta-blockers were present in all (100%) the pharmacy shops, followed by diuretics (94.50%), aldosterone antagonist (69.72%), alpha blockers (55.96%) and vasodilators (21.10%). Renin inhibitors were not found in any of the pharmacy shops. Ayurvedic drugs were present in 32% of the pharmacy shops which were surveyed (fig. 1). Homeopathic preparation of various makes was present in all (100%) of the homeopathic pharmacy shop for treatment of hypertension.

Antihypertensive drugs most available in pharmacy shops

The proportion of different antihypertensive drug in pharmacy was, in 30% pharmacy shop calcium antagonists was mostly available, angiotensin-converting enzyme inhibitors were mostly present in 28% shops, in 22% shops beta-blockers and in 20% shops angiotensin receptor blockers were mostly present in comparison to other antihypertensive drugs (fig.2).

Antihypertensive drugs least available in pharmacy shops

The antihypertensive drugs which was present in the least quantity in comparison with other drug in pharmacy shops were diuretics in 8.26% shops, beta-blockers in 15.60% shops, angiotensin-converting enzyme inhibitors in 19.27% shops, calcium channel blockers in 11.93% shops, AG II blocker in 13.76% shops, alpha blockers in 12.84% shops, vasodilators in 10.09% and aldosterone antagonist in 8.26% shops (fig. 3).

Antihypertensive drugs most affordable in pharmacy shops

According to pharmacy shop owner the most affordable drugs in their shops were beta-blockers in 22.94% shop, ACE inhibitors in 33.03% shop, calcium channel blockers in 31.19% shop, AG II blocker in 6.42% shop, diuretics in 4.59% shop, ayurvedic medicines in 0.92% shop and vasodilators in 0.92% shop (fig. 4).

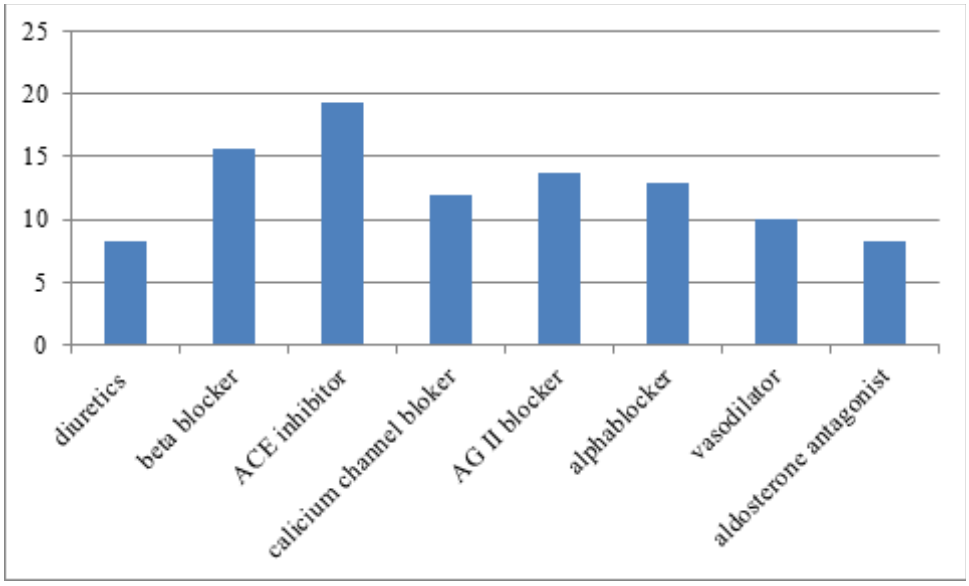

Fig.3: Antihypertensive drug least present in pharmacy shops

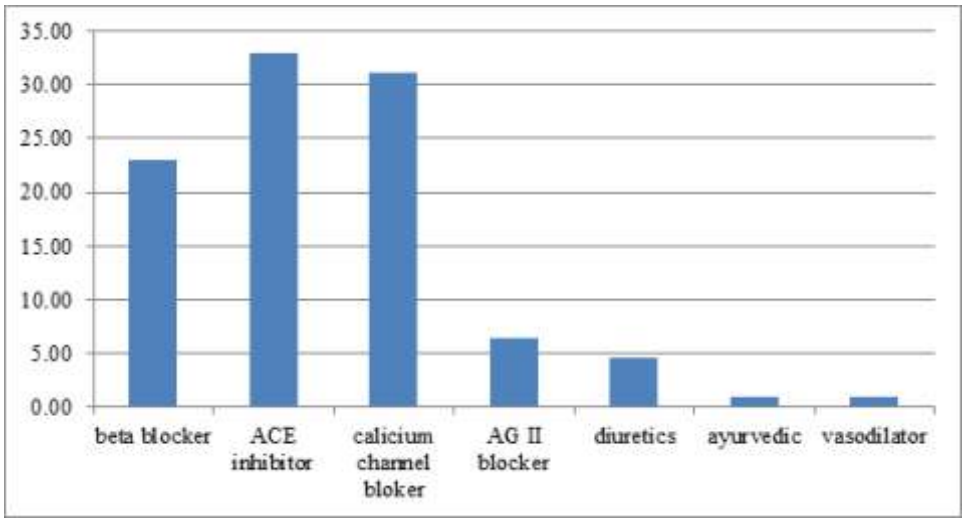

Fig.4: Antihypertensive drugs most affordable

Antihypertensive drugs sold over the counter in pharmacy shops

The list of drugs groups which are sold over the counter (without prescription) are beta-blockers in 18.35% shops, AG II blocker in 12.84% shops, calcium channel blockers in 37.61% shops, ACE inhibitors in 12.84% shops, diuretics in 2.75% shops, ayurvedic in 1.83% shops, while 13.76% shopkeeper replied can't say (fig.5).

It was found that antihypertensive drugs were sold in mostly in form of pills. In none of the pharmacy shops a drug was found which is used for IV administration. The antihypertensive drugs were used for long period of time or throughout whole life. Further it was found that antihypertensive drugs were purchased through both prescription and without prescription. The antihypertensive drugs were maximally used in case of adult and old age groups.

A high percentage of population with hypertension needs a combination of two or more antihypertensive drugs to control blood pressure (DiPette *et al*, 2019). There was presence of drugs which were used in single pill combination, while in India's recent national essential medicines list (EML) the single pill combinations drugs (SPCs)

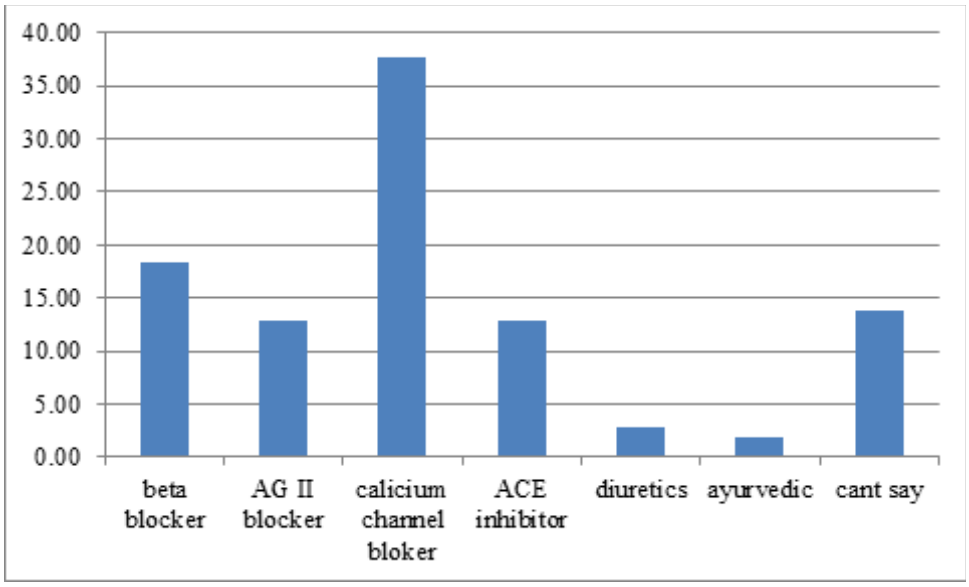

Fig.4: Antihypertensive drug most affordable

are not added (Anonymous, 2015), which highlights the trend of use of single pill combinations in the private health sector. Although The World Health Organization (WHO) had included SPCs had for management of hypertension in its EML (WHO, 2019). The prices of drugs used for SPCs are lower when compared with the prices of the individual drug, under the Government of India's flagship generic drug scheme (BPPI, 2020). Negi *et al*, 2021 was found that the prices of SPCs in India's private sector are not more than individual drug components.

CONCLUSION

It was concluded that calcium antagonists, ACE inhibitors, angiotensin receptor blockers and beta-blockers were present in all (100%) the pharmacy shops

REFERENCES

Arauz-Pacheco C, Parrott MA and Raskin P (2003). American Diabetes Association. Treatment of hypertension in adults with diabetes. *Diabetes Care* **26** (1): S80-2.

Basak S and Sathyanarayana D (2010). Evaluating medicines dispensing patterns at private community pharmacies in Tamil Nadu, India. *Southern Med Rev* **3**(2): 27-31

Bureau of Pharma PSUs of India (BPPI). Government of India. Product and MRP list. 2020. http://janaushadhi.gov.in/ProductList.aspx (accessed 10 Dec 2020).

DiPette D J, Skeete J, Ridley E, Campbell NRC, Lopez-Jaramillo P, Kishore SP, Jaffe MG, Coca A, Townsend RR, and Ordunez P (2018). Fixed-dose combination pharmacologic therapy to improve hypertension control worldwide: Clinical perspective and policy implications. *J Clin Hypert* **21** (1): 4–15. https://doi.org/10.1111/jch.13426

Geldsetzer P, Manne-Goehler J, Theilmann M, Davies JI, Awasthi A, Vollmer S, Jaacks LM, Bärnighausen T and Atun R (2017). Diabetes and Hypertension in India: A Nationally Representative Study of 1.3 Million Adults. *JAMA Intern Med* 178(3): 363-372. doi: 10.1001/jamainternmed.2017.8094. PMID: 29379964; PMCID: PMC5885928.

Government of India (2015). Ministry of Health and Family Welfare. National List of Essential Medicines. https://www.nhp.gov.in/NHPfiles/NLEM%2C%202015.pdf.

Gupta R, Gaur K and Ram CVS (2018). Emerging

trends in hypertension epidemiology in India. *J Hum Hypert* **33**(8): 575-587. https:// doi.org/10.1038/s41371-018-0117-3.

James P A, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, Lackland D T, LeFevre ML, MacKenzie TD, Ogedegbe O, Smith SC, Svetkey LP, Taler SJ, Townsend RR, Wright JT, Narva AS, and Ortiz E (2014). Evidence-Based Guideline for the Management of High Blood Pressure in Adults. *JAMA* 311(5): 507. https://doi.org/10.1001/jama.2013.284427

Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Bohm M, Christiaens T, Cifkova R, De Backer G, Dominiczak A, Galderisi M, Grobbee DE, Jaarsma T, Kirchhof P, Kjeldsen SE, Laurent S, Manolis AJ, Nilsson PM, Ruilope LM, Schmieder RE, Sirnes PA, Sleight P, Viigimaa M, Waeber B and Zannad F (2013). ESH/ESC Guidelines for the management of arterial hypertension: the Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *J Hypert* **31**(7): 1281-357. doi: 10.1097/01.hjh.0000431740.32696.cc. PMID: 23817082.

Mills KT, Stefanescu A and He J (2020). The global epidemiology of hypertension. *Nat Rev Nephrol* **16**(4): 223-237. doi: 10.1038/s41581-019-0244-2.

Neal B, MacMahon S and Chapman N (2000). Blood Pressure Lowering Treatment Trialists' Collaboration. Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overviews of randomised trials: Blood Pressure Lowering Treatment Trialists' Collaboration. *Lancet* 356(9246): 1955-1964. doi:10.1016/s0140-6736(00)03309-9

Negi, S, Neupane, D, Sahoo, SK, Mahajan T, Swaroop K, Moran AE, Sharma B and Pathni AK (2020). Prices of combination medicines and single-molecule antihypertensive medicines in India's private health care sector. *J Clin Hypert* 23(4): 738–743. https://doi.org/10.1111/jch.14143

NSSO. Health in India - NSS 71st Round (2014). New Delhi, India: Ministry of Statistics and Programme Implementation; 2016. http://mospi.nic.in/sites/default/files/publication_reports/ nss_rep574.pdf. Accessed 10 March 2020.

Oparil S, Acelajado MC, Bakris GL, Berlowitz DR, Cífková R, Dominiczak AF, *et al*, (2018). Hypertension. *Nat Rev Dis Primers* **4**: 18014. doi: 10.1038/nrdp.2018.14

Panda BB, Pati MR and Sahu PK (2015). Survey of Prescription Pattern of Antihypertensive Drugs in Hypertensive and Diabetic Hypertensive Patients. *Asian J Pharm Clin Res* **8**(1): 250-252.

Patel V, Chatterji S, Chisholm D, Ebrahim S, Gopalakrishna G, Mathers C, Mohan V, Prabhakaran D, Ravindran RD and Reddy KS (2011). Chronic diseases and injuries in India. *Lancet* 377(9763): 413–428. https://doi.org/10.1016/s0140-6736(10)61188-9

Prenissl J, Manne-Goehler J, Jaacks LM, Prabhakaran D, Awasthi A, Bischops AC, Atun R, Bärnighausen T, Davies JI, Vollmer S and Geldsetzer P (2019). Hypertension screening, awareness, treatment, and control in India: A nationally representative cross-sectional study among individuals aged 15 to 49 years. *PLoS Med* **16**(5): e1002801. doi: 10.1371/journal.pmed.1002801. PMID: 31050680; PMCID: PMC6499417.

Sahoo, SK, Pathni AK, Krishna A, Moran AE, Cohn J, Bhatia S, Maheshwari N and Sharma B (2021). The Research Letter: Antihypertensive Drugs Market in India: An Insight on Size, Trends, and Prescribing Preferences in the Private Health Sector, 2016–2018. *Glob Heart* **16**(1): 51. DOI: https://doi.org/10.5334/gh.999

Shah SN, Munjal YP, Kamath SA, Wander GS, Mehta N, Mukherjee S, Kirpalani A, Gupta P, Shah H, Rohatgi R, Billimoria AR, Maiya M, Das MK, Goswami KC, Sharma R, Rajapurkar MM, Chawla, R, Saboo B and Jha V (2020). Indian guidelines on hypertension-IV (2019). *J Hum Hypert* 34(11): 745–758. https://doi.org/10.1038/s41371-020-0349-x

Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, Ramirez A, Schlaich M, Stergiou GS, Tomaszewski M, Wainford RD, Williams B and Schutte AE (2020). International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension*, 75(6):1334-1357. doi: 10.1161/HYPERTENSIONAHA.120.15026. Epub 2020 May 6. PMID: 32370572.

World Health Organization (2019). Model List of Essential Medicines, 21st List, 2019. Geneva: World Health Organization. 701 https://apps.who.int/iris/bitstream/handle/10665/325771/WHO-MVP-EMP-IAU-2019.06-eng.pdf.

Zhou B, Carrillo-Larco RM, Danaei G, Riley LM, Paciorek CJ, Stevens GA, Gregg EW, Bennett JE, Solomon B, Singleton RK, Sophiea MK, Iurilli ML, Lhoste VP, Cowan MJ, Savin S, Woodward M, Balanova Y, Cifkova R, Damasceno A and Ezzati M (2021). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet* 398(10304): 957–980. https://doi.org/10.1016/s0140-6736(21)01330-1

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