International Journal of Science and Healthcare Research
Vol.7; Issue: 1; Jan.-Mar. 2022
Website: ijshr.com
Review Article *ISSN: 2455-7587*

Latest Strategies to Tackle Hypertension

Shaheen Shah[1], RNS Yadav[2]

[1]Centre for Studies in Biotechnology, Dibrugarh University, Assam, India
[2]Department of Life Sciences, Dibrugarh University, Assam, India

Corresponding Author: Shaheen Shah

DOI: https://doi.org/10.52403/ijshr.20220130

ABSTRACT

Hypertension (high blood pressure) is the world's most widespread non-communicable disease, attaining the status of a global epidemic. It results due to excess pressure of blood in the arterial wall. The cause of such a condition may be hereditary or acquired (such as an unhealthy lifestyle). This condition is the primary cause of mortality and morbidity worldwide. Hypertension, the most severe menace, is like a calm killer if untreated and affects our vital parts like our renal organs, heart, and brain. It is a fatal disease causing the untimely death of individuals. Around 26% of the world's population suffers from this disease, and approximately a 3% increase is expected by 2025. In developing countries, two-thirds of all cases are due to exposure to the increased risk factor of the disease, while around 46% of individuals are oblivious of the situation. So tackling hypertension to lessen the burden of society becomes the need of the hour. This review attempts to discover all the latest approaches available today for hypertension management. Technologies like smartphones and telemonitoring, artificial intelligence approach, information and communication technology, e-health strategy and mHealth app, wearable blood pressure monitors are coming up nowadays for tackling hypertension. Such technologies are a boon to society. Mass awareness among the people about these recently available technologies through media (T.V., radio) or local announcements, particularly in developing countries, could change their perspective about the disease. Such awareness would prevent them from overlooking the severe hypertension consequences controlling the further increase globally.

Keywords: hypertension, calm killer, tackling, latest, technologies

INTRODUCTION

Hypertension or high blood pressure is the constant, elevated blood pressure in the arteries. During each heartbeat, blood is pumped out and creates pressure against arteries. Elevated pressure makes the heartbeat strenuous. Chronic hypertension may result in serious health problems such as heart failure, kidney disease, stroke, impairment of the eye (Leu *et al*., 2017). Based on the causes, hypertension may be primary or secondary hypertension. Primary hypertension occurs independently of any other therapeutic ailment, while secondary occurs in the presence of other medicinal disorders like kidney, heart, endocrine glands (http://stanfordhealthcare.org/ medical-conditions/blood-heart-circulation/ resistant-hypertension/types.html). Around 1.13 billion peoples suffer from hypertension worldwide. Hypertension has become the leading cause of untimely death of individuals around the world due to overlooking on the severe conditions which can happen later in one's life (http://www.who.int/ health- topics/ hypertension# tab= tab_1 hypertension). There are many management guidelines to tackle hypertension in weaker sections of the population, such as children, pregnant women, and older people. Compiling all management guidelines and new approaches into a single forum would make it people convenient to follow the handling

techniques without any hesitation and more efficiently.

Some of the latest strategies to tackle high blood pressure are as follows- smartphones and telemonitoring via Bluetooth (Kitt et al.,2019);eHealth plan, which is web-based solutions, mobile Health (m Health)app, virtual clinics, and smartphone apps; artificial intelligence (A.I.) approach for predicting the initial stage of high blood pressure (hypertension); information and communication technology (ICT)- based hypertension management; wearable blood pressure monitors (Kitt et al.;2019,2020; Akber et al., 2019; Krittanawang et al.,2018; Kario, 2020)

Most people worldwide either remain undetected or untreated in the sense that they do not follow the medicine protocol for treatment (http://digital.nhs.uk/data-and-information/). To overcome such shortcomings, new technology of telemonitoring comes into play. It is a web-based data entry of patient's physiological data such as blood pressure, weight, heart rate, oxygen saturation, etc. are sent via automated electronic means viz, smartphones, and Bluetooth to a physician for analysis. e-Health enables patients to self-monitor their health conditions, thus conveniently screening or detecting the above-normal blood pressures very conveniently through video conferencing or A.I. (artificial assisted) management. Cuff-based monitors and blood pressure monitoring devices are the instrument required for this approach (Mc Manus RJ et al., 2018). The only drawback of smartphone apps technology is that it does not have the agreed optimum standard for validation. No apps have approval from the FDA (i.e., United States Food and Drug Administration) or the European Commission. So there is only limited use of this app by the physicians (Burke LE; 2015). However, self-assessment of blood pressure during the gestational period of a pregnant lady enables faster detection of hypertension than the usual standard care obtained by visiting clinics (Tucker et al.;, 2017). Several research studies showed the positive impact of digital health technology in faster and improved management of elevated blood pressure in individuals. e-Health recent technology requires validation before use in our daily lives (Kitt et al.,2020).

Another new approach for treating blood pressure is through information and communication technology (ICT) which is at the infancy stage in development. Nowadays, many B.P. measuring apps are available on smartphones. Some of such B.P. measuring apps have only recording and displaying facilities, while others can transmit data and store it. Some sphygmomanometers can count B.P, humidity, luminance, temperature, date, time. In contrast, others like Omron HEM-72514 can compute the temperature at the B.P. measurement time, enabling physicians to better understand the patient B.P. variations at different times of the year and thus get a clearer picture of the individual for diagnosis and treatment.

Many apps lack the storage facility of the measured results of B.P., making it very difficult to communicate the data instantly to the virtual clinics (Iwahori et al., 2018). Some of the recent use of B.P. telemonitoring is as follows-

Tucker et al., 2017 found that self-assessment of B.P., along with other factors like training on medicine and diet and lifestyle change, can significantly lower B.P. (Tucker et al., 2017).In a randomized control trial, pharmacists' and nurses' HBP telemonitoring lowers B.P. to some extent (Margolis et al., 2013; Lu et al., 2019).

Telemed EASE app for HBP management of Japan provides patients with multiple features such as virtual chatting, an appointment with physicians, online prescription in addition to a cashless transaction. Furthermore, the scientist should develop a technologically advanced app to tackle multiple co-morbidities of patients' needs. Telemed EASE connects other devices viz; pedometer, weight, and activity monitoring devices to the internet,

enabling combined data management for better interpretation.

This B.P. telemonitoring has also been beneficial for pregnant and postpartum women and children by skipping all the stressful processes required while planning to visit physical clinics (Hoppe KK et al., 2019). This ICT (Information and communication technology) control of HBP (high blood pressure) is beneficial to middle-income countries (Muller et al.,2016). The only drawback of the ICT approach is data security. As no web-based system is entirely safe, looking at the benefits, which are far more important than the risk, people should embrace this new technology and find ways to minimize the technology-based risks.

Moreover, massive information by this ICT approach may certainly create confusion between physicians and patients. There always should be a team to manage and take care of the most relevant data and exclude the unnecessary data junks.

Many shortcomings are there, but this technology will be our future management strategy for HBP cannot be ignored (Yatabe et al., 2021).

Another recent HBP (high blood pressure) control is the mobile health (mHealth) app. A person's health condition improves when he follows all requirements suggested by the physician, both therapeutic and non-therapeutic (Uchmanowicz et al., 2018). Therapeutic is the strict following of medication while non –therapeutic includes self-checking of blood pressure, diet modification, and other practices (Gewehr et al.,2018). The mHealth app supports patients in carrying out their non-therapeutic parts efficiently. This app elevates consciousness among the patients regarding health habits, guidance in tackling the disease, and providing mental support. It also facilitates a liaison between physicians and patients (Lu et al., 2019). This app reminds of all daily requirements for patient health management (hypertension), leading patients to better manage their Health in between their busy schedules (Kitt et al., 2019). The detailed feature of this app is variables recording relating to blood pressure, sleep, mood, waist circumference, participation in physical activities. Patient information is kept in the cloud of the web, allowing authorized physicians to observe the patient's data distantly and give necessary suggestions accordingly (Cechetti et al., 2019). Many research indicated that patients using the mHealth app have better-managed hypertension when compared to the control group (Debon et al., 2020). Thus the mHealth app should provide a user-friendly experience to patients to maximize their involvement in managing hypertension (Volpi et al.,2021).

Another new approach for managing hypertension is the A.I. (Artificial Intelligence) approach which gathers all the investigative data about specific components that may influence their blood pressure and notify the physician and patients.

Presently, the A.I. approach is used only to scrutinize possible factors that could lead to hypertension (Krittanawong et al., 2018).

The A.I. technology is of great advantage, and people benefit from it in daily life. A.I. employs deep learning by analyzing massive datasets and making decisions without human support (Le Cun et al., 2015). So it is already making its way into the medical management system. A.I. technology also bypasses human experts in identifying certain diseases, including cancer (Topol EJ,2019). Thus this technology will enhance performance related to image diagnostic and save time and effort of humans in analyzing such substantial data images related to diseases (Rajkumar A et al.;2019). The deep learning algorithms model of A.I. could even predict six-month-old diabetic nephropathy with high precision (Makino M et al., 2019). Similarly, A.I. models also help guide patients with hypertension by providing the most appropriate strategy for personally handling the disease.

However, further research is required to analyze its benefits in a grander-scale medical environment. A.I. is applied in multiple life sciences areas of omics research, namely, transcriptome, proteome, microbiome, etc., and drug development. So this technology will help move a step forward for developing drugs for hypertension and related complexity (Matsuoka R et al., 2020).

CONCLUSION

Hypertension is a burning problem worldwide and needs tackling very wisely. Although approaches such as (DASH), i.e., dietary strategies to stop hypertension, have been implemented from the past 90's up to the present hypertension problem could not be efficiently tackled. So eHealth app, A.I. approach must be implemented to address this hypertension issue further. With the advancement of new technology in recent times such as mobile Health (mHealth), ICT- based hypertension management, A.I. approaches, smartphones and telemonitoring, and wearable monitoring devices, this problem is trying to be sorted out. Making these approaches user-friendly by researching the area can breach the gap between patients and physicians. The day is not too far when we will be able to manage the problem of hypertension with these new technologies very efficiently and hence lessen the overall burden of society and the entire world.

Conflict of Interest: The authors declare that they have no conflict of interest.

Acknowledgement: The authors acknowledge Director, Centre for Studies in Biotechnology, Dibrugarh University for help, guidance and constant encouragement.
Source of Funding: None

REFERENCES

1. Akber S, Hafeez A, Sikander S, Khan AW, Yasmin R(2019).a systematic review on dietary approaches to stop hypertension (DASH) to control raised blood pressure among hypertensive patients. Pak J Public Health.9(4):199-202.
2. Burke LE, Ma J, Azar KMJ et. al. Current Science on consumer use of mobile health for CVD Prevention: A Scientific Statement from the American Heart Association. Circulation. 2015 Sep 22; 132(12): 1157–1213.
3. Cehetti NP, Bellei EA,Biduski D,Rodriguez JPM, Roman MK,De Marehi ACB (2019). Developing and implementing a gamification method to improve user engagement, a case study with a mHealth application for hypertension monitoring. Telematics and informatics. 41(3):126-138. Doi://10.1016/j.tele.2019.04.007
4. Debon R, Bellei Ea,Biduski D, Volpi SS, Alves ALS, Portella MR, De Marchi ACB 2020. Effects of using a mobile health application on the health conditions of patients with arterial hypertension: a pilot trial in the context of brazil's family health strategy. Scientific Reports 10(1):6009. doi://10.1038/s41598-020-63057-w
5. Gewehr DM, Bandeirs VAC, Gelatti GT, Colet Cd F, De Oliveira KR 2018. Adesao ao tratamento farmacologico da hipertensao, arterial na Atencao Primaria a Saude. Saude em Debate 42(116): 179-190 doi: 10.1590/0103-1104201811614
6. Hoppe KK, Williams M, Thomas N, Zella JB, Drewry A, Kim K (2019). Kitt J,Fox R, Tucker KL (2020).Digital health:New approaches I Hypertension management. J. Cardiol and Cardiovasc Sciences. 4(1):18-23
7. http://stanfordhealthcare.org/medical-conditions/blood-heart-circulation/resistant-hypertension/types.html
8. http://www.who.int/health-topics/hypertension
9. Iwnhori T, Miura K, Obayashi K, Nakazima H, Shiga T (2018). Seasonal variation in home blood pressure: findings from nationwide based monitoring in Japan. BMJ Open 2018; 8:e017351
10. Krittanawong, Bomback AS, Baber U, Bangalore S, Messerli FH, Tang WHW (2018). Future direction for using artificial Intelligence to predict and manage hypertension. Current Hypertension Reports. 20(75):1-16
11. Kario (2020). Management of hypertension in the digital Era small wearable monitoring

devices for remote blood pressure monitoring. Hypertension. 640-650.
12. Kitt J,Fox R, Tucker KL (2020). Digital health: New Approaches in hypertension Management. J Cardiol and Cardiovasc Sciences. 4(1):18-23.
13. Lau DH, Nattel S, Kalman JM, Sanders P. Modifiable Risk factors and atrial fibrillation. Circulation Review. 136(6):583-596. doi://101161/CIRCULATIONAHA 116023163 PMID 28784826
14. Le Cun, Bengio Y, Hinton G(2015).Deep learning, Nature.521:436-44
15. Lu X, Yang H, Xia X, Lu X, Lin J, Liu F, Gu D (2019). Interactive mobile health intervention and blood pressure management in adults. Hypertension. 74(3):697-704
16. Lu JF, Chen CM, Hsu CY. Effect of home telehealth care on blood pressure control: a public health care centre model. J Telemed Telecare. 2019:35-45
17. Makino M, Yashimoto R, Ono M, Itoko T, Katsuki T, Koseki A (2019). Artificial Intelligence predicts the progression of diabetic kidney disease using big data machine learning. Sci Rep. 9:11862
18. Mc Manus RJ, Mant J, Franssen M(2018). Efficiency of self monitored blood pressure, with or without telemonitoring for titration of antihypertensive medication (TASMINH4): an unmasked randomized controlled trial. Lancet 391(10124):949-59
19. Margolis KL, Asche SE, Bergdall AR, Dehmer SP, Goen SE, Kadrmas HM, et al. Effect of home blood pressure control: a cluster randomized clinical trial. JAMA. 2013; 310:46-56
20. Matsuoka R, Akazawa H, Kodera S,Komuro I (2020). The dawning of the digital era on the management of hypertension. Springer Nature. Hypertension Research. Pg 1-6
21. Muller AM, Alley S, Schoeppe S, Vandelanotte C. The effectiveness of e and m Health interventions to promote physical activity and healthy diets in developing countries: a systematic review. Int J Behav Nutr Phys Act. 2016; 13: 109
22. National Statistics health Survey for England-2011, Health, Social care and lifestyles 2012. http://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/health-survey-for-england-2011-health-social-care-and lifestyles.
23. Rajkomar A, Dean J, Kohane I (2019). Machine learning in medicine. N England J Med.380:1347-58
24. Topol EJ(2019). High performance medicine: the convergence of human and artificial intelligence. Nat Med.25:44-56
25. Tucker KL, Taylor KS, Crawford C (2017). Blood pressure self monitoring in pregnancy: Examining feasibility in a prospective cohort study. BMC Pregnancy childbirth 17(1):1-16
26. Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP (2017). Self monitoring of blood pressure in hypertension: a systematic review and individual patient data meta- analysis. PLOS Med. 2017;14:e1002389
27. Uchmanowicz B, Chudiak A, Uchmonowiezi, Rosinczuk J, Froelicher Es 2018. Factors influencing adherence totreatment in older adults with hypertension. Clinical interventions in Aging 13:2425-2441
28. Volpi SS, Biduski D, Bellei EA,Tefili D, Mclleary L, Alves ALSA, Marchi ABCD (2021). Using a mobile health app to improve patient's adherence to hypertension treatment: a non –randomised clinical trial. Peer J:1-16: e11491 DOI 10.7717/peerj.11491
29. Yatabe J, Yatabe MS,Ichihara a (2021). The current state and future of internet technology- based hypertension management in Japan. Hypertension Research. 44:276-285

How to cite this article: Shah S, RNS Yadav. Latest strategies to tackle hypertension. *International Journal of Science & Healthcare Research.* 2022; 7(1): 188-192. DOI: *https://doi.org/10.52403/ijshr.20220130*

******