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VIEWPOINT

Health Promotion to Reduce Hypertension Patients' Vulnerability to Coronavirus Disease-19 (COVID-19)

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Abstract

Hypertension remains a prominent risk factor for cardiovascular diseases. It is not a coincidence that 23% to 30% of coronavirus disease-19 (COVID-19) confirmed cases are hypertensive patients, and the case-fatality rate of adult COVID-19 cases with hypertension was estimated at 6%. It is important that hypertensive patients be aware of their vulnerability to COVID-19, which may be achieved by a health promotion program in addition to preventive measures.

Introduction

Hypertension is a serious disease that affects more older than younger individuals. The current clinical practice guideline of the American Academy of Pediatrics reports an increasing prevalence of hypertension between the age range of 14 to 19 years, in addition to a high prevalence among adults according to current blood pressure thresholds.[1,2] Parallel in Clinical Practice Guideline.

The young population is also susceptible to coronavirus disease 2019 (COVID-19), an ongoing pandemic. In early July 2020, the death toll from COVID-19 had already hit 517,877, in addition to about 10,710,005 confirmed cases globally. The Americas accounted for half of these numbers, followed by Europe.[3] However, the elderly population is more likely to be affected and become critically ill, with high case-fatality rates.[4] Furthermore, the prevalence of hypertension is alarmingly high worldwide - 31.1%, occurring predominantly among vulnerable individuals.[2] These individuals would be benefited tremendously from adequate protection and individualized health promotion. Although old age cannot be regarded as an independent risk factor of hypertension, it is a congruence of multiple vulnerabilities and poor prognostic determinants.[5]

Coronavirus belongs to the family of severe acute respiratory syndrome (SARS). The relative genome instability of SARS-CoV-2 was indicated by experts in next-generation sequencing experts. A dynamic mutation of the virus was also pointed out, with a high transmission of the virus even among asymptomatic people.[6] The angiotensin-converting enzyme 2 (ACE2) receptor mediates the entry of SARS-CoV-2 into human cells *in vivo* and *in vitro*.[7] The ACE 2 can be found in different parts of the human body – the tongue, nose and throat, and the lower part of the bowel. A substantial amount can also be found in the kidneys, lungs, vessels, and heart, which may explain the occurrence of multiple organ dysfunction in coronavirus patients.[7,8,9]

Hypertensive patients, who additionally use antihypertensive drugs such as angiotensin-converting enzyme inhibitors (ACEI) and angiotensin II receptor blockers (ARB) may suffer a significant expression of ACE2, due to their opposing effects on the renin-angiotensin system. Hence, these antihypertensive agents seem to play a double edge effect on COVID-19 susceptibility and lung epithelial cells protection. The intense expression of ACE2 was equally noted with other drugs like thiazolidinedione and ibuprofen.[9]

The spike glycoprotein of SARS-CoV-2 binds to ACE2 to enter and infect the cells, multiply its genetic material, and proliferate in a wide range of cells. By using more

Keywords

COVID-19; Betacoronavirus; Hypertension/complications; Antihypertensive Agents; Health Promotion.

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than 80% of angiotensin receptor 2 (AT2) found in 64% of ACE2 in the epithelial cells to colonize the lungs. Coronavirus damages several alveolar epithelial cells, which is aggravated by a poor immune system, which, in turn, also destroys almost the affected cells. This complex mechanism causes the extensive loss of gaseous exchange and shortness of breath. [8, 10]

Although hypertension is growing in low- and middle-income countries, the east and southeast Asia, Europe and North America have a large number of elderly people, and likely high prevalence of hypertension and other comorbidities. [11] In China, studies showed that hypertension was highly prevalent among patients with comorbidities associated with coronavirus disease. Hypertension was present in 17% (17 ± 7, 95% CI 14-22%) of COVID-19 confirmed cases, as reported in an investigation of 46,248 coronavirus patients. Another meticulous research which involved 1,099 of confirmed participants, showed that 23.7% were hypertensive. Clinical data revealed that hypertension was present in 30% of confirmed cases and 48% of patients who died from COVID-19. [12] Due to the fact that hypertension is one of the main comorbidities among elderly patients, and due to the seriousness of coronavirus in about 20% of critical patients, we believe that health promotion programs for hypertensive patients are a reasonable and cheap approach to improve their prognosis.[2,13-15]

The use of ACEI/ARBs for Hypertensive Patients During Coronavirus Outbreak

Current studies show that hypertensive patients are more vulnerable to COVID-19 than any other population. This may be due to the advanced age of most of the hypertensive patients, presence of other comorbidities and deficient immune system. Although antihypertensive drugs such as ACEI and ARBs have been prescribed due to their cardiovascular protection and stroke prevention effect, these drugs appear to exert a twofold effect in the context of COVID-19. The first effect is to raise the susceptibility to SARS-CoV-2 infection by increasing the expression of ACE 2; SARS-CoV-2 has a high affinity and better recognize human ACE2 than SARS-CoV, resulting in increased ability to spread from person to person. [7] The second effect is to protect epithelial cells of the lungs from injury during the severe acute respiratory syndrome (SARS-CoV). Based on these, there is an urgent need to prevent the outbreak propagation by reducing the susceptibility to SARS-CoV-2 infection. Also, there is evidence supporting the administration of recombinant human angiotensin-converting enzyme 2 (rhACE 2) in SARS-CoV-2 infected patients to protect the lungs and heart. [15, 16]

A recent study showed that influenza A (H7N9, H1N1, and H5N1) share with the SARS-CoV-2 the same mechanism of using the ACE2 receptor, and that the use of ACE inhibitors and ARBs was associated with either no effect on the incidence of influenza or a lower incidence, depending on the duration of use. [17]

Although some clinical studies have not recommend discontinuing the use of ARBs and ACEI by hypertensive patients, these medications seem to provide no significant beneficial in critically ill patients with spontaneous breathing activity during acute respiratory distress syndrome. [18]

COVID-19: Health Promotion and Mortality Reduction

Currently, almost the entire global population is in social distancing due to the COVID-19 pandemic. The most vulnerable people must be aware of their susceptibility to the disease, and account for 20% of all coronavirus patients who are at higher risk for severe illness and death. [12] Lockdown was applied as a traditional health promotion strategy to block the outbreak of SARS-CoV-2 and aggressively reduce mortality. However, the lockdown measure has presented lots of negative psychosocial and economic impact on global community. In this context, a health promotion program is a key, cheap, simple strategy to ease these lockdown effects. Health promotion is also the impetus to reduce the morbidity and mortality of hypertensive patients during coronavirus epidemic. Its application during and after lockdown is possible through the workplace, social media, and electronic channels (TV, radio, WhatsApp, YouTube, etc.) and other technological tools (drone-based healthcare delivery). The health promotion strategy for hypertensive patients during pandemic may be conceptualized as a six-stage program and presented as a funnel plot (Figure 1):

(1) Screening for hypertensive patients and identification of anti-hypertensive drugs in use;

(2) Age stratification of hypertensive COVID-19 patients; according to Fei et al., while 23% of patients aged 45-58 years survived, 48% of hypertensive patients aged 63-76 years succumbed;

(3) Evaluation and monitoring of other comorbidities that may affect the immunity of

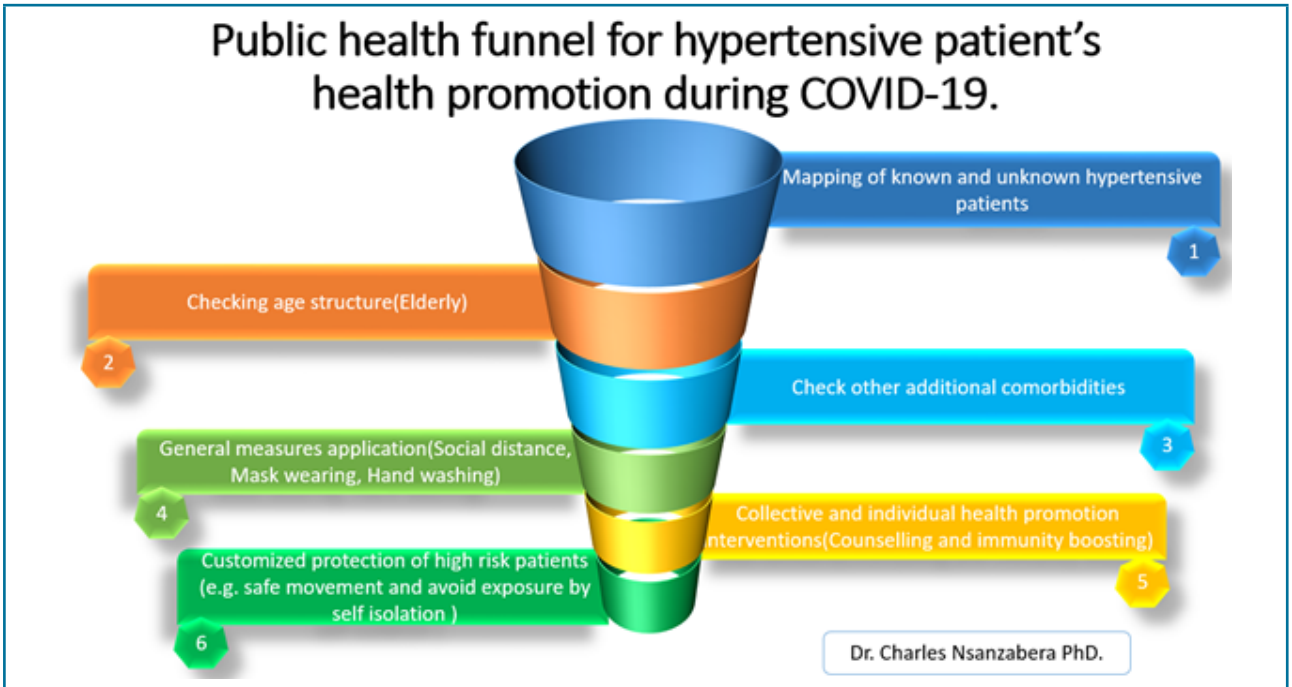

Figure 1 – Public health funnel for hypertensive patient's health promotion during COVID-19.

hypertensive patients like diabetes and other cardiovascular diseases;

(4) Application of general measures in hypertensive groups (local community and workplace) like social distancing, mask-wearing, hand washing and compliance of personal protective equipment for health professionals;

(5) Collective and individual health promotion interventions (awareness, education, counseling, and immunity-boosting mechanism);

(6) Personalized protection of high-risk patients with regards to health status, socioeconomic status and profession; and coronavirus propagation level in the region where the patients are living to ensure safe movement and avoid exposure by quarantine, self-isolation, orientation, and guidance.

Conclusion

Health promotion would primarily support hypertensive patients to understand their vulnerability to COVID-19 and adopt preventive behaviors and guidance obtained via all communication and delivery channels.

We suggest that this health promotion strategy targeting these vulnerable patients with hypertension be adopted by different government and healthcare levels in the countries. We also encourage vulnerable people to safeguard their health and follow protection measures. This could prevent the overcrowding in intensive care units, deaths and other negative impacts of COVID-19, in addition to inform current guidelines on hypertension.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

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Author Contributions

Conception and design of the research: Nsanzabera C. Acquisition of data: Nsanzabera C. Analysis and interpretation of the data: Nsanzabera C. Writing of the manuscript: Nsanzabera C. Critical revision of the manuscript for intellectual content: Nsanzabera C.

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