

Review Article

Burden of noncommunicable diseases and COVID-19 pandemic prevention and control strategies

Ashwini Katole*

Department of Community and Family Medicine, All India Institute of Medical Sciences (AIIMS), Raipur, Chhattisgarh, India

Received: 30 May 2024

Accepted: 22 August 2024

*Correspondence:

Dr. Ashwini Katole,

E-mail: ashwini.katole@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Noncommunicable diseases (NCDs) are the leading cause of death in 21st century. The risk factors for development and progression of NCDs include sedentary lifestyle, inadequate fruits and vegetables intake, tobacco use, high blood pressure, high total cholesterol levels, obesity, high salt intake, low physical activity, and air pollution. People with NCDs and comorbidities like hypertension, cardiovascular diseases, diabetes, chronic respiratory infection and cancer are more vulnerable to severe COVID-19 infection that ultimately results into mortality. To reduce the impact of NCDs on COVID-19 cases, prevention is the best measure. Primary and secondary level prevention of NCDs plays a main role to control bad outcome in COVID-19 cases. The strategies that are required to address this comorbidity includes integration and convergence of the existing communicable and NCD programs, strengthening health care systems by giving major focus on primary health care services, health and wellness centers, universal health coverage, updating guidelines, enhancing community participation, capacity building, appropriate policy making, multi-sectoral participation and coordination.

Keywords: Noncommunicable diseases, COVID-19 pandemic, Prevention and control, Strategies, Political approach, Burden

INTRODUCTION

Noncommunicable diseases (NCDs) are one of the major health challenges of the 21st century and are main area of focus. Around 41 million people are killed every year by NCDs, which is equivalent to 71% of all death globally. NCDs are the most important cause of premature deaths. Approximately, 15 million people of age group between 30 to 69 years die from NCDs each year. This is 85% of total premature deaths in the low and middle-income countries.¹ Since few decades, world is facing various kind of communicable diseases with main focus on severe acute respiratory syndrome (SARS). These viruses belonged to the same family that caused SARS-CoV in China (2002-3) and Middle East Acute Respiratory Syndrome (MEARS-CoV) in Saudi Arabia (2012).² COVID-19 spread through fomite droplets infection and

close contact with infected humans.³ On contacting infection, respiratory system is mainly involved and shows symptoms like fever, fatigue, dry cough, myalgias, anorexia and dyspnoea. The spectrum of infection ranges from mild illness, severe illness and critically ill, mild illness seen in 81% and includes no pneumonia or mild pneumonia.

Severe illness (14%) includes respiratory failure, pulmonary infiltrates >50% within 24 to 48 hours, and $\text{PaO}_2/\text{FiO}_2 < 300$ and critically ill (5%) includes septic shock, and/or multiple organ dysfunction or failure.⁴ Though all age group people are vulnerable for COVID-19 infection, but older age group people are more susceptible to get infection. In USA, as on 28th March 2020, total 1,22,653 laboratory confirmed cases of COVID-19 were present of which one-third patients had

at least one NCDs related comorbidity or risk factors. Out of these, 784 (10.9%) patients had diabetes, 656 (9.2%) had chronic lung diseases, and 647 (9.0%) had cardiovascular diseases.⁵ Another study from China analyzed the outcome in 52 patients admitted to the intensive care unit for severe SARS-CoV-2 pneumonia. All patients were residents of Wuhan city and were admitted to the hospital for treatment after getting severe illness. The mean age was 59.7 ± 13.3 years and 27 patients (52%) were older than 60 years. Pre-existing chronic medical illness was present in 40% patients. Risk factors identified in this study were diabetes in 17% patients, cerebrovascular diseases in 13.5%, chronic cardiac diseases in 10%, chronic pulmonary diseases in 8%, while malignancy and smoking were present in 4% patients each. It explains that chances of mortality in severe SARS-CoV-2 pneumonia with comorbidities of chronic illness are very high with negative outcome.⁶

In a systematic meta-analysis to study the prevalent comorbidities and its effect on severe SARS-CoV-2 patients, hypertension (21.1%, 95% CI: 13.0–27.2%), diabetes (9.7%, 95% CI: 7.2–12.2%), cardiovascular diseases (8.4%, 95% CI: 3.8–13.8%) and respiratory diseases (1.5%, 95% CI: 0.9–2.1%) were the most prevalent comorbidities. On comparing severely ill patient with other patients, most prevalent comorbidities were hypertension (OR 2.36, 95% CI: 1.46–3.83), respiratory system disease (OR 2.46, 95% CI: 1.76–3.44) and cardiovascular disease (OR 3.42, 95% CI: 1.88–6.22) respectively.⁷ In another large study from Wuhan, China involving 72,314 individuals with COVID-19 infection, patients who reported no comorbid conditions had a case fatality rate of 0.9%, whereas patients with comorbid conditions had much higher rates mainly 10.5% for those with cardiovascular disease, 7.3% for diabetes, 6.3% for chronic respiratory disease, 6.0% for hypertension, and 5.6% for cancer. High case fatality rate of 49% was reported for patients with critically ill condition.⁸

Centre of disease control (CDC) states that people of any age with chronic kidney diseases, chronic cardiovascular diseases, diabetes, chronic respiratory diseases, immune comprised state are more prone to COVID-19 infection and the outcome for illness is poor.⁹

PATHOPHYSIOLOGY OF NON-COMMUNICABLE DISEASES AND COVID-19 LEADING TO DEATH

Patients with chronic cardiovascular disease, chronic respiratory diseases, cancer, chronic kidney diseases and diabetes mellitus (DM) are in immune-compromised state. SARS-CoV-2 pathogen can easily enter the body allowing uncontrolled proliferation of pathogens within the host. This contributes in the hyperproduction of proinflammatory cytokines, interleukin-1 (IL-1), interleukin-6 (IL-6) and tumour necrosis factor. All these cytokines activity complicates the COVID-19 infection and ultimately, leads to acute respiratory distress

syndrome. Likewise, Type I interferon (IFNs) are cytokines that regulates the inflammatory and immune response. Type I IFN- β , that plays a critical role in the regulation of innate immunity, is secreted abundantly in response to viral infection in nearly all cell types. Inactivation of innate immune system and low proliferation of interleukins and cytokines are involved in defence system against COVID-19 infection in Chronic obstructive pulmonary diseases (COPD) patients.^{10,11}

COVID-19 or severe acute respiratory syndrome corona virus (SARS-CoV-2) binds the epithelial cells from lungs, kidney, intestine and blood vessels that expresses angiotensin-converting enzyme 2 (ACE2). Diabetes and hypertension are treated with ACE inhibitors and angiotensin II receptor blockers (ARBs). It reduces ACE2 cell surface expression while up-regulating angiotensin II signals in the lungs, causing acute lung injury. Treatment with ACE inhibitors or ARBs increases the ACE proliferation thereby facilitating fatal COVID-19 infections.^{11,12}

Cardiac failure is the common fatal complication in COVID-19 infection. Cardiac injury presenting as troponin I elevation causes worsening of the existing cardiovascular diseases.¹³ The cardiovascular system mostly gets affected by “Cytokine storm” due to interaction of viral particles with the host immune system, viral invasion of the myocardium and hypoxia due to acute respiratory distress syndrome (ARDS). The current evidences showed that the treatment of COVID-19 infection with anti-retroviral drugs interferes with the cardiac drugs, cardiac insufficiency and arrhythmias worsening the patient situations and ultimately poor prognosis.¹⁴

The COVID-19 pandemic has also increased the mental illness because of lockdown, fear of losing jobs, stress, anxiety related to health; making it a global, social and economic crisis.¹⁵ It is therefore essential to prevent and control this pandemic and reset the world as normal as before.

PREVENTION AND CONTROL OF NON-COMMUNICABLE DISEASES IN COVID-19 PANDEMIC ERA

World is already busy in dealing with various non-communicable diseases and mental health related problems. Similarly, malnutrition is a challenging health problem in the developing countries. While we were trying to cope up with all existing problems with the various health programs and strategies, suddenly in December 2019 COVID-19 outbreaks emerged and took a shape of pandemic. COVID-19 pandemic taught us that we should be prepared for emerging and re-emerging infectious diseases. The prevention and control strategies should be made and followed to control NCDs in the COVID-19 pandemic.

LIFESTYLE AND BEHAVIOUR AWARENESS REGARDING NCDs AND COVID-19

NCDs are the chronic diseases. People should be aware about the risk factors of NCDs like tobacco consumption, alcohol addiction, obesity, sedentary lifestyle, bad food habits and more salt intake. Awareness related to NCDs like cardiovascular diseases, diabetes, cancer and chronic lungs diseases and their complication is important. For NCDs related problems, people can approach to the nearest health care centre in the form of health and wellness centre, subcenter, primary health centre, secondary or tertiary health centre. COVID-19 pandemic has also interrupted routine health care facility. Hence, telemedicine can be used for seeking medical help. Consultation and follow up for routine check-up can be done by telemedicine. It can prevent the unnecessary exposure of hospital for regular check-ups.

For prevention for spread of COVID-19 infection social distancing is the best measures to follows. Home quarantine can be done for the mild infected cases as the case burden is increasing and there is shortage of bed and admission facilities. Hand washing with soap and water or alcohol-based sanitizer should be done. Coughing and sneezing antiques should be taught to prevent the spread of the COVID-19 infection. Testing facility should be increased for detection of COVID-19 cases. Use of mask should be compulsory for all people. Since, elderly and children are highly susceptible for the COVID-19 infection and outcome is poor in terms of mortality and morbidity, there should be restricted movement for them.

Information, Education and Communication (IEC) materials can be used for the spread of awareness of NCDs and COVID-19 infection. IEC material should preferably be in the local language for better understanding of people. Use of mass media communication like television, radio, and Internet media should be used to spread awareness.

POLITICAL APPROACH TOWARDS PANDEMIC COVID-19 AND NCDs

The COVID-19 pandemic has caused severe and long-lasting damage socially, economically and politically. It will take years to overcome from this pandemic infection. To reduce the impact of NCDs on COVID-19 infection, detection of cases, community screening, testing maximum number of suspected cases and treating them is must. A comprehensive approach is needed to include health, finance, transport, education, agriculture, and planning sectors.

To overcome damage caused to economic growth, political commitment is required. The necessary steps should be taken in terms of strengthening the health infrastructure, capacity building of frontline health care worker, human resource management, surveillance of cases, provision of protective equipment and its supply

and distribution, intersectoral coordination, collaboration of all needy sectors and community involvement. Health insurance is the most useful tool to reduce the burden of household expenditure on the health care interventions. It gives flexibility to avail health services.

EARLY DIAGNOSIS, TREATMENT AND TESTING OF NCDs IN COVID-19 PANDEMIC

As routine health care services got disturbed because of pandemic COVID-19, many diagnosed patients are not able to take treatment for cancer, cardiovascular diseases, chronic respiratory diseases, and diabetes. Telemedicine consultation can be a better option in such scenario. Those having high blood pressure, high glucose level, hypercholesterolemia, obesity and tobacco addiction should be motivated to take consultation and treatment from the nearest facility and proper follow up should be done. Healthy lifestyle with balance diet, regular exercise, yoga improves the health status. Promotion of healthy lifestyle can reduce modifiable risk factors.

Training of health care workers for emergencies of CVDs in COVID-19 infection is required. The web-based training for the healthcare workers on the regular basis can minimize the mortality. Since immediate action is required to treat cardiac emergency, help line numbers for emergency and mobile units can prevent the mortality.

RESEARCH FOR EMERGING AND RE-EMERGING INFECTION AND VACCINES

Research is best mode to know all the risk factors and causative agents for the diseases. Once the risk factors and causative agents are known, then the control of infection is simpler. Governments and health agencies should promote various researches related to infection.

PREPAREDNESS FOR THE INFECTIOUS EPIDEMIC IN COMING FUTURE

For preparedness, strengthening the health care system and national capacity building is required. Health related training to the health care worker and staff should be done. Disaster management team should be established to control the disease and prevent it. Use of proper technology for the early detection of disease is important.

CONCLUSION

COVID-19 infection with NCDs and related comorbidities are huge burden of disease for whole world. Primary and secondary level prevention plays a main role in controlling further cases. Early detection of the cases and contact tracing play major role to control the COVID-19 infection. The use of multimedia is important to spread awareness. Campaign should be done to reduce the stigmas related to coronavirus. Patients having symptoms of COVID-19 should get tested early so that positive cases can prevent the further spread. Due to

lockdown and sealing the borders of states and countries, this pandemic has caused global economic crisis by reducing the production, loss of daily income, import and export. It will take years for normalisation from this pandemic. Strategies to control non-communicable disease morbidities require well effective NCDs control program, effective implementation, strengthening the health system, social security, universal health coverage, community participation and multisectoral co-ordination. Finally, execution of all policies in proper way can help to reduce the COVID-19 pandemic with NCDs impact in the world.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- World Health Organization. Noncommunicable Diseases. 2018. Available at: <https://www.who.int>.
- Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *New Engl J Med*. 2020;382:1199-207.
- Lauer SA, Grantz KH, Bi Q. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med*. 2020;172:577-82.
- Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72. cases from the Chinese center for disease control and prevention. *JAMA* 2020;26:48.
- Chow N, Fleming-Dutra K, Gierke R, Hall A, Hughes M, Pilishvili T, et al. Preliminary estimates of the prevalence of selected underlying health conditions among patients with coronavirus disease 2019-United States. *Morbidity and Mortality Weekly Report*. 2020;28:69.
- Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: A single-centered, retrospective, observational study. *Lancet Respir Med*. 2020;8:475-81.
- Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: A systematic review and meta-analysis. *Int J Infect Dis* 2020;94:91-5.
- The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China. *China CDC Weekly*. 2020;2:113-22.
- Centers for disease control and prevention. groups at higher risk for severe illness. 2020. Available at: <https://www.cdc.gov>.
- Geerlings SE, Hoepelman AI. Immune dysfunction in patients with diabetes mellitus (DM). *FEMS Immunol Med Microbiol* 1999;26:259-65.
- García-Valero J, Olloquequi J, Montes JF. Deficient pulmonary IFN- β expression in COPD patients. *PLoS One* 2019;14:217803.
- AlGhatrif M, Cingolani O, Lakatta EG. The dilemma of coronavirus disease 2019, aging, and cardiovascular disease: insights from cardiovascular aging science. *JAMA Cardiol* 2020;13:29.
- Wrapp D, Wang N, Corbett KS. Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. *Science*. 2020;25:07.
- Kunal S, Gupta K, Sharma SM, Pathak V, Mittal S, Tarke C. Cardiovascular system and COVID-19: perspectives from a developing country. *Monaldi Arch Chest Dis*. 2020;90:1305;231-41.
- António Guterres. The Recovery from the COVID-19 crisis must lead to a different economy. 2020. Available at: <https://www.un.org/en/un-coronavirus>.

Cite this article as: Katole A. Burden of noncommunicable diseases and COVID-19 pandemic prevention and control strategies. *Int J Community Med Public Health* 2024;11:3731-4.