Cognitive Biases Affecting the Maintenance of COVID-19 Pandemic

Kawthar Mohamed[1,2,3], *Niloufar Yazdanpanah*[1,2], *Amene Saghazadeh*[1,2], *Nima Rezaei*[2,4,5]

[1]MetaCognition Interest Group (MCIG), Universal Scientific Education and Research Network (USERN), Tehran, Iran; [2]Research Center for Immunodeficiencies, Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran; [3]Network of Empirical, Gustatory, and Olfactory Aesthetics (NEGOA), Universal Scientific Education and Research Network (USERN), Tehran, Iran; [4]Department of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran; [5]Network of Immunity in Infection, Malignancy and Autoimmunity (NIIMA), Universal Scientific Education and Research Network (USERN), Tehran, Iran

Abstract

All countries and regions have already been infected with the novel coronavirus disease (COVID-19). This super small guest has paralyzed the entire world's economy, from the drastic fall of oil prices to the bankruptcy of great companies or even the small retail shops. The people's lifestyle is undergoing significant changes, which is leaving a negative impact on their psychological and physical health. The atmosphere is filled with dual accusations from each one of the governments and their citizens. Recognizing cognitive biases that have potentially affected decision-making during the COVID-19 pandemic would help consider behavioral changes for curbing this global viral infection.

Introduction

Novel coronavirus disease (COVID-19), an outbreak that developed into a pandemic (1), is a complex literal problem that accompanies many intricacies and solutions. In the resultant chaotic situation, the brain, in order to counteract the high weight of uncertainty, would assess its prior knowledge, connect it to the current complex problem, and apply the best solution. The tendency to the same thing is called cognitive bias. Cognitive biases are vividly present in decisions taken in critical conditions, and the COVID-19 crisis is not an exception (2).

Cognitive biases and decision-making at the government level

COVID-19 is a prototype of scenarios that accurately portrays a sequential emergence of different cognitive biases and related defects in decision-making that at least in part have played a role in the widespread of the disease. Almost all countries have taken identical decisions in controlling this pandemic, therefore carrying identical cognitive biases too. (3) Initially, it was thought that COVID-19 resembles the severe acute respiratory syndrome (SARS) pandemic in merely involving the eastern part of

Asia, and it is not spreading through other regions. This is called anchoring bias, which means to judge based on the first received information without considering the undergoing alterations through the time. Subsequently, leaders started to believe this small enemy can attack each and every country in the world. However, this time, the Western countries from Italy to the US had the idea of not being much exposed to this pandemic, and they ignored repetitive warning facts, plus being confident about their strong infrastructural ability to cope with this pandemic. These two ideas are called confirmation bias and overconfidence effect, respectively. Next, the choice supportive bias came on the scene, being represented in the UK choice of the herd-immunity strategy as the primary approach to overcome the pandemic and their ignorance of all other facts that can potentially defeat the efficiency of this strategy (4, 5).

Other cognitive biases involved in the context of declining people's trust in the governments during the COVID-19 pandemic include the Dunning-Kruger effect, selective perception bias, and optimism bias. The Dunning-Kruger effect occurs when a person overestimates his knowledge about a particular topic, despite the limited available data in that area. The idea of injecting disinfectants to patients with COVID-19 and considering COVID-19 as a cold or flu are a few examples of this bias committed by some heads of government.

The idea of thinking of COVID-19 as flu might also implicate the selective perception bias, by which messages and actions are usually perceived according to one's frame of reference, and any other contradictive messages and facts are not considered at all. Finally, attempts of some governments to promote the use of unapproved drugs as miracles in the treatment of COVID-19 resulted in a bias called Ostrich bias or Optimism bias (5, 6).

The mentioned cognitive biases are only those which could be detected in the literature. There are, of course, other cognitive biases that remained elusive due to the lack of public announcements, particularly in countries other than the US and European countries.

Statistical biases and decision-making at healthcare system level

The four main combatant measures against the COVID-19 pandemic can be recapitulated as early prevention, early detection, early diagnosis, and early treatment. Some countries benefited from the opportunity of early response to COVID-19 by repatriating their citizens, restricting the country border, stockpiling protection equipment, declaring a mandatory quarantine and lockdown, and starting massive testing programs to detect asymptomatic patients (7). However, most countries have missed that early response; the most probable reason for this delay might be underestimating COVID-19 pace of transmission and action in disregard of the asymptomatic patients' role. This initial delayed response results in the sudden emergence of severe symptomatic cases and a surge in the number of undiagnosed asymptomatic cases. Therefore, as the initial number in the exponential graph of COVID-19 raised, the number of infected cases grew ultra-rapidly. Consequently, the control of the infection spread became harder.

Statistical biases have affected medical decision-making during the COVID-19 pandemic. In some countries, the COVID-19 test is performed on patients who have already been hospitalized. Therefore, a large percentage of results come back positive, leading to an unreliable report on the mortality rate in patients who tested positive for COVID-19. This is called selection bias that can influence the COVID-19 mortality rate in different countries. Besides, more various factors play a role in this context. The proportion of the elderly population who appear most vulnerable to COVID-19 and the fact that a patient diagnosed with COVID-19 might expire due to another pathology while some other patients die because of their undiagnosed COVID-19 infection are examples of missed variable bias. Broadcasting these statistical discrepancies and unreliability within the country or across countries could potentially cause the individual's personal interpretation of the mentioned data, and the probable occurrence of cognitive biases in decision making is highly debated.

Accordingly, some issues need to be considered when reporting COVID-19 statistics at the country

level and the state level. First, given the unequal distribution of population within the country, the use of aggregated data from country-level to calculate the state or national statistics might result in a biased overall estimated COVID-19 growth rate due to the higher spread rate and the number of deaths in hotspot regions (8). Second, the population of each country must be considered when the number of infected patients is reported. As the population of a country increases, the number of infected cases is expected to increase, which is an issue that must be considered in determining the severity of countries' states (9). Third, the number of performed COVID-19 tests is a crucial factor to be considered when comparing the condition of countries in terms of the number of confirmed cases. As the number of performed cases in a country increases, the number of diagnosed asymptomatic cases increases, resulting in a high disease rate report for that country. Indeed, this country is prosperous in detecting a large percentage of both symptomatic and asymptomatic cases and isolates them to cease the infection spread, while the reported rate can add biases that the mentioned country has failed in disease control.

Media biases and decision-making at social level

It is a common trend for using social and news media to track disease outbreaks. In particular, at the beginning of an outbreak, people have a dominant tendency to pick up information from informal media rather than official sources since the data released by the official sources might be delayed by a few weeks. When official sources start covering outbreak news, people's primary interest might shift to the information coming from official sources while continuing to use informal media as alternative sources of data. Overall, informal media and official sources complementarily contribute to the community's understanding of the epidemiology of an emerging outbreak.

During the COVID-19 outbreak, there has been an increasing interest in publishing posts on social media. Using the available date in these social environments, the exponential growth rate of COVID-19

could be estimated to fall within the range of 1.42 to 2.64 (10). The rate is comparable to that reported by published articles for the same duration (11), implying the reliability of data gathered from social media. However, unreliable posts published in social media are an issue of rising concern; as unreliable posts are less than that of reliable posts published in social media, the number of reactions to unreliable posts is much more than that to reliable posts. During the COVID-19 outbreak, Twitter has appeared as a neutral social media (12), YouTube and Reddit as the media of cutting unreliable data, and Gab as the one of amplifying unreliable posts (10).

The engagement in social media was most pronounced on 20th January, 2020, when the world health organization (WHO) declared the novel coronavirus as a pandemic species – spreading as quickly as more than four million cases being affected in only four months. Consequently, the COVID-19 became the subject of an infodemic – referred to as the circulation of misinformation about the disease (10). Effects of this infodemic – which is formed chiefly by informal media – on the people's perception have been extended to people's behavior and action, leading to a further worsening of the COVID-19 outbreak. To exemplify, CNN, on 8th March 2020, announced that Italy would impose a lockdown in the northern region. Therefore, a substantial portion of the northern population decided to travel to the southern region. It caused overcrowding in trains and airports, and since then, Italy has increasingly encountered new cases of COVID-19 for two weeks.

Now unreliable posts have the power to affect people's perception disproportionally; it is necessary to avoid the sharing of these posts in the first place. Studies show that the diffusion of unreliable posts concerning the COVID-19 outbreak is mainly due to nonthinking, and the force should be primarily directed to those who share the posts. Analytical thinking is an effective intervention for the problem. In a study (13), when people simply received a reminder to analyze the issue and judge the accuracy of the claim, they were more likely to indeed discriminate between true and false content on COVID-19.

Conclusions

The emergence of the COVID-19 outbreak was not a choice, but its persistence might result from the cognitive biases that primarily affect medical, strategic, and consumer decision-making. Due to the lack of sufficient knowledge, there are many scientific uncertainties associated with the COVID-19 pandemic, and uncertainties are a potential source of meta-cognitive bias and poor performance. Such cognitive biases broadly consist of the following four categories: prior hypotheses and focusing on limited targets, exposure to limited alternatives, insensitivity to outcome probabilities, and the illusion of manageability (14). For a strategic decision-making process, cognitive biases happen at the level of research, education, and execution. A systematic review of studies identified 19 cognitive biases that threaten medical decision-making (15). They can occur at the screening, diagnostic, and therapeutic levels. Biases imposed by unreliable data or delayed data release occur at different data sharing levels. Figu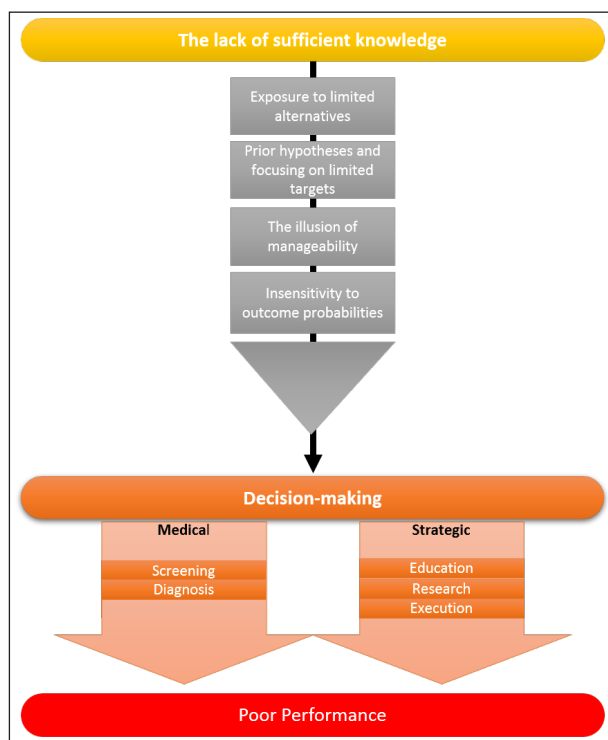re 1 is a schematic illustration of the levels of decision-making under the influence of different cognitive biases. In this manner, a rational mode of action should not be limited to decision-making in a single area of interest but requires decision makers in different management areas to frame the least biased outlet of decision-making.

Conflicts of interest: Each author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangement, etc.) that might pose a conflict of interest in connection with the submitted article.

Figure 1. Potential cognitive biases affecting the maintenance of COVID-19 pandemic.

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Correspondence: Prof. Nima Rezaei
Children's Medical Center Hospital, Dr. Qarib St, Keshavarz Blvd, Tehran 14194, Iran
Tel: +9821-6692-9234; Fax: +9821-6692-9235
E-mail: rezaei_nima@tums.ac.ir, rezaei_nima@yahoo.com