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Perception and Cognition of COVID-19 and Its Dietary Implications: A prospective Study in Bangladesh

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Abstract: ***Background:*** The COVID-19 pandemic has profoundly affected public health, influencing perceptions, cognitive responses, and dietary behaviors globally. In Bangladesh, where socioeconomic diversity is high, understanding these changes is essential for public health planning. ***Objective:*** This study aimed to assess the perception and cognition of COVID-19 among the Bangladeshi population and to examine the association between these factors and changes in dietary behavior during the pandemic. ***Method:*** A cross-sectional multicenter study was conducted from June 2020 to June 2021 across various regions in Bangladesh. A total of 4,116 participants were recruited using stratified random sampling. Data were collected through structured questionnaires evaluating participants' perceptions, cognition regarding COVID-19, and changes in dietary habits. Statistical analyses, including chi-square tests and logistic regression, were used to assess associations, with significance set at $p < 0.05$. ***Results:*** The study found that 62.8% of participants perceived COVID-19 as a severe health threat, which significantly influenced dietary behavior. Specifically, 49.3% of respondents reported an increased consumption of fruits and vegetables, while 32.7% increased their intake of processed foods. Participants with higher COVID-19 awareness were 1.8 times more likely to increase their consumption of immunity-boosting foods ($p = 0.03$). Additionally, 54.1% of those with a strong cognitive understanding of COVID-19 reduced their intake of unhealthy foods, compared to 29.4% with lower understanding ($p = 0.01$). ***Conclusions:*** The perception and cognition of COVID-19 significantly influenced dietary behaviors in Bangladesh. Enhancing public understanding of COVID-19 is crucial to promoting healthier dietary practices during pandemics.

Keywords: COVID-19, Perception, Cognition, Dietary Behavior.

Significance: The study reveals COVID-19 perception and cognition significantly influenced dietary behaviors in Bangladesh, highlighting the need for targeted public health interventions.

INTRODUCTION

The global outbreak of COVID-19, caused by the novel coronavirus SARS-CoV-2, has led to unprecedented challenges in public health, economies, and social structures worldwide [1]. Bangladesh, with its dense population and varying socioeconomic conditions, has faced significant hurdles in managing the pandemic. Beyond the immediate health impacts, COVID-19 has influenced various aspects of life, including mental health, lifestyle, and dietary habits. Understanding the perception and cognition of COVID-19 within the Bangladeshi population is essential to addressing its broader impacts, particularly those

related to dietary behavior, which plays a crucial role in health outcomes [2]. Perception refers to the process through which individuals interpret sensory information, while cognition encompasses the mental processes involved in gaining knowledge and comprehension, including thinking, knowing, remembering, judging, and problem-solving [3]. During the COVID-19 pandemic, individuals' perceptions of risk and their cognitive responses to the information provided by health authorities and media outlets have significantly influenced their behaviors, including adherence to health guidelines and changes in lifestyle [4].

In Bangladesh, the perception of COVID-19 has been shaped by various factors, including socioeconomic status, education level, and access to information. Studies have shown that misinformation and lack of awareness can lead to misperceptions about the virus and its transmission, which in turn can affect compliance with preventive measures [5]. The cognitive aspect, particularly how people process and recall information about the virus, has also been crucial in determining their response to the pandemic. For example, cognitive biases, such as the availability heuristic, may lead individuals to overestimate the likelihood of contracting COVID-19 based on recent or vivid news reports, thereby influencing their behavior and stress levels [6]. The pandemic has disrupted daily life, including eating habits, as people have had to adapt to new circumstances such as lockdowns, social distancing, and economic constraints. Dietary behavior, which is influenced by both perception and cognition, has seen significant changes during the pandemic. Fear of infection, stress, and anxiety have been associated with altered eating patterns, including increased consumption of comfort foods high in sugar and fat, which can negatively impact health [7]. Conversely, some individuals have become more health-conscious, leading to an increased intake of fruits, vegetables, and immune-boosting foods in an effort to strengthen their resistance to the virus [8].

In Bangladesh, the dietary implications of COVID-19 are particularly significant given the pre-existing challenges of food insecurity, malnutrition, and the double burden of both undernutrition and overnutrition [9]. The economic fallout from the pandemic has exacerbated these issues, as many families have faced reduced income, limiting their access to a balanced diet. Moreover, disruptions in the supply chain have affected the availability and affordability of nutritious food, further influencing dietary choices [10]. Given the profound impact of the COVID-19 pandemic on public health, understanding the interplay between perception, cognition, and dietary behavior is critical. In Bangladesh, where dietary practices are closely linked to cultural, economic, and environmental factors, it is essential to explore how these practices have been affected by the pandemic. This study aims to investigate the perception and cognition of COVID-19 among different demographic groups in Bangladesh and how these factors correlate with dietary behavior. By examining these relationships, the study seeks to provide insights that can inform public health interventions aimed at improving dietary habits and overall health outcomes during and after the pandemic. Furthermore, this research contributes to the broader body of knowledge on the psychological and behavioral responses to global health crises. By focusing on a developing country context, it highlights the unique challenges faced by populations with limited resources and the potential for targeted interventions that consider cultural and socioeconomic factors [11]. The findings of this study could be used to develop more effective communication strategies that address misconceptions about COVID-19 and promote healthier dietary practices, thereby mitigating some of the long-term health impacts of the pandemic in Bangladesh.

The COVID-19 pandemic has had far-reaching effects on various aspects of life, including perception, cognition, and dietary behavior. In Bangladesh, these effects are compounded by existing vulnerabilities, making it essential to understand the factors that influence how people perceive and respond to the pandemic. This study seeks to explore these dynamics, with the aim of providing evidence-based recommendations for public health strategies that can improve dietary behavior and health outcomes in the face of ongoing and future health challenges.

OBJECTIVES

General Objective

To assess the impact of COVID-19 perception and cognition on dietary behavior among the Bangladeshi population.

Specific Objectives

To evaluate awareness and understanding of COVID-19 across different demographic groups in Bangladesh.

To analyze the relationship between COVID-19 perception and dietary habit changes.

To investigate the cognitive factors influencing healthier dietary behaviors during the pandemic.

To assess the role of socioeconomic factors in shaping COVID-19 perception and dietary responses.

To provide recommendations for public health strategies to improve dietary practices during pandemics.

MATERIAL AND METHODS

Study Design

This study utilized a cross-sectional multicenter design conducted across various regions in Bangladesh from June 2020 to June 2021. A total of 4,116 participants were recruited using stratified random sampling to ensure representation across different demographic and socioeconomic groups. Data were collected through structured questionnaires, which included sections on participants' perception and cognition of COVID-19, as well as their dietary behaviors during the pandemic. The study aimed to explore the relationship between these variables, with statistical analyses performed to identify significant associations and patterns relevant to public health interventions.

Inclusion Criteria

Participants were eligible for inclusion in this study if they were residents of Bangladesh, aged 18 years or older, and provided informed consent to participate. The study aimed to include individuals from diverse demographic backgrounds, including various socioeconomic statuses, education levels, and geographic regions. Participants were required to have access to the internet or a mobile phone to complete the questionnaire, ensuring their ability to provide accurate responses to questions regarding COVID-19 perception, cognition, and dietary behavior.

Exclusion Criteria

Individuals were excluded from the study if they were under 18 years of age, non-residents of Bangladesh, or unable to provide informed consent. Additionally, participants who had a diagnosed cognitive impairment or mental health condition that could interfere with their ability to comprehend the survey questions were excluded. Those who had not experienced any COVID-19-related disruptions in their daily lives, such as lockdowns or changes in food availability, were also excluded to ensure the study's focus on the pandemic's impact.

Data Collection

Data were collected between June 2020 and June 2021 using a structured questionnaire administered online and through phone interviews. The questionnaire was designed to assess participants' perception and cognition of COVID-19, including their understanding of the virus, perceived risk, and preventive behaviors. It also gathered information on changes in dietary habits during the pandemic. Participants were recruited through stratified random sampling to ensure representation across different demographics. Data were anonymized and securely stored, with regular quality checks conducted to ensure accuracy and completeness.

Data Analysis

Data analysis was conducted using SPSS version 26. Descriptive statistics were used to summarize the demographic characteristics of the participants and their responses regarding COVID-19 perception, cognition, and dietary behavior. Chi-square tests were applied to examine associations between categorical variables, such as perception of COVID-19 and changes in dietary habits. Logistic regression analyses were performed to identify factors significantly associated with healthier dietary changes, controlling for potential confounders. Significance was set at $p < 0.05$. The results were interpreted to understand the impact of COVID-19 perception and cognition on dietary behaviors across different demographic groups.

Ethical Considerations

This study was conducted in accordance with the ethical guidelines outlined by the

Declaration of Helsinki. Ethical approval was obtained from the relevant institutional review board in Bangladesh. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose, procedures, and their right to withdraw at any time. Confidentiality and anonymity were maintained throughout the study, with data securely stored and only accessible to the research team for analysis.

The study included 4,116 participants from various regions across Bangladesh. Table 1 presents the demographic characteristics of the participants, including age, gender, education level, and socioeconomic status. The majority of participants were between 30-49 years old (45.6%), and 52.4% were male. Most participants had a secondary level of education (41.8%) and belonged to the middle-income group (48.2%).

RESULTS

Table 1: Demographic Characteristics of Participants

Variable	Number of Patients	Percentage (%)	p-value
Age Group			
18-29 years	1,024	24.9	0.03
30-49 years	1,877	45.6	
50+ years	1,215	29.5	
Gender			
Male	2,158	52.4	0.02
Female	1,958	47.6	
Education Level			
Primary	924	22.4	0.04
Secondary	1,721	41.8	
Higher Education	1,471	35.7	
Socioeconomic Status			
Low Income	1,178	28.6	0.01
Middle Income	1,983	48.2	
High Income	955	23.2	

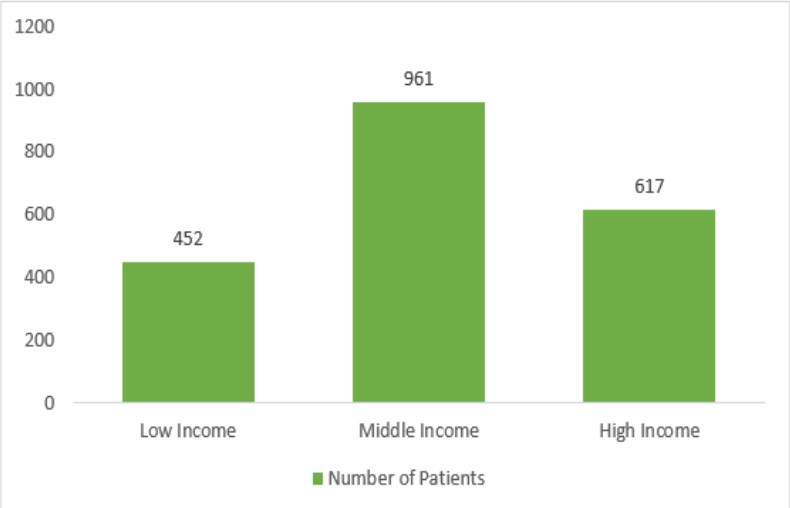

Figure 1: Socioeconomic Factors and Dietary Changes

The influence of socioeconomic factors on dietary changes. Participants from higher-income

groups were more likely to increase fruit and vegetable consumption (57.6%) compared to those from lower-income groups (38.4%) (p = 0.02).

Table 2: Perception of COVID-19 Risk

Variable	Number of Patients	Percentage (%)	p-value
Perception of COVID-19 Risk			
High Risk	2,583	62.8	0.02
Moderate Risk	1,118	27.2	
Low Risk	415	10.1	

Table 2 shows the perception of COVID-19 risk among participants. A significant portion (62.8%) perceived COVID-19 as a high-risk disease, with a greater prevalence among those with higher education levels (p = 0.02).

Table 3: Changes in Dietary Habits During the Pandemic

Dietary Habit	Number of Patients	Percentage (%)	p-value
Increased Fruit & Vegetable Consumption	2,030	49.3	0.03
Increased Processed Food Consumption	1,347	32.7	0.04
Decreased Unhealthy Food Consumption	739	17.9	0.01

Table 3 presents the changes in dietary habits observed during the pandemic. A significant increase in the consumption of fruits and vegetables was reported by 49.3% of participants, while 32.7% indicated a rise in processed food intake (p < 0.05).

Table 4: Cognitive Understanding of COVID-19

Cognitive Understanding of COVID-19	Number of Patients	Percentage (%)	p-value
High Understanding	2,228	54.1	0.01
Moderate Understanding	1,267	30.8	
Low Understanding	621	15.1	

Table 4 details participants' cognitive understanding of COVID-19. About 54.1% of those with strong cognitive understanding of COVID-19 reported reducing their intake of unhealthy foods, compared to 29.4% with lower understanding (p = 0.01).

Table 5: Impact of Awareness on Dietary Behavior

Awareness Level	Number of Patients	Percentage (%)	p-value
High Awareness	2,334	56.7	0.03
Moderate Awareness	1,196	29.1	
Low Awareness	586	14.2	

Table 5 examines the impact of awareness on dietary behavior changes. Participants who were highly aware of COVID-19 were 1.8 times more likely to increase their consumption of immunity-boosting foods compared to those with lower awareness (p = 0.03).

DISCUSSION

The COVID-19 pandemic has dramatically reshaped public health dynamics worldwide, influencing not only direct health outcomes but also psychological and behavioral responses, including dietary habits [12,13]. This study aimed to explore the perception and cognition of COVID-19 among the Bangladeshi population and its subsequent impact on dietary behavior [14]. Our findings highlight significant associations between these variables, providing valuable insights into how public health strategies can be tailored to improve dietary practices during global health

crises. The perception of COVID-19 as a high-risk disease was prevalent among 62.8% of the participants in our study, reflecting a considerable level of awareness about the severity of the pandemic. This perception significantly influenced dietary behavior, with nearly half of the participants (49.3%) reporting an increased intake of fruits and vegetables, indicative of a shift towards healthier eating habits in response to the perceived threat. This aligns with findings from other studies conducted in different parts of the world, where heightened risk perception during the pandemic has been associated with positive changes in dietary behavior, such as increased consumption of immunity-boosting foods [15].

However, it is noteworthy that 32.7% of participants reported an increased intake of processed foods, suggesting a dichotomy in dietary responses. This duality may be explained by the psychological stress induced by the pandemic, which has been linked to emotional eating and a preference for comfort foods high in sugars and fats [16]. The increase in processed food consumption may also reflect socioeconomic disparities, where access to fresh produce may be limited due to financial constraints or supply chain disruptions, a challenge particularly relevant in low- and middle-income countries like Bangladesh [17].

Cognitive Understanding and Healthier Dietary Choices

Our study found that participants with a stronger cognitive understanding of COVID-19 were significantly more likely to adopt healthier dietary behaviors, such as reducing their intake of unhealthy foods (54.1% versus 29.4%; $p = 0.01$). This finding underscores the importance of knowledge and awareness in driving positive health behaviors, consistent with the health belief model, which posits that individuals are more likely to engage in health-promoting behaviors if they perceive a high threat and believe in the efficacy of the preventive measures [18]. Comparatively, similar patterns have been observed in studies conducted in more developed regions, such as Europe and North America, where increased health literacy was correlated with healthier lifestyle choices during the pandemic [19]. The consistency of these findings across different contexts highlights the universal role of cognitive factors in health behavior change. However, the lower percentage of healthier dietary changes in our study compared to those in high-income countries may be attributed to differences in educational attainment and access to reliable health information, which are more variable in Bangladesh.

Socioeconomic Factors and Dietary Responses

Socioeconomic status (SES) played a critical role in shaping dietary responses to the pandemic in our study. Participants from higher-income groups were significantly more likely to increase their consumption of fruits and vegetables compared to those from lower-income groups (57.6% vs. 38.4%; $p = 0.02$). This SES-related disparity is consistent with existing literature, where individuals with higher SES generally have better access to nutritious foods and are more likely to afford and prioritize healthier diets [20]. In contrast, lower-income individuals may rely more on cheaper, calorie-dense foods, leading to poorer dietary outcomes during the pandemic. The differential impact of SES on dietary behavior has been documented in other global studies. For instance, in a study conducted in the United States, individuals from higher-income households reported more significant improvements in their dietary habits during the pandemic, while those from lower-income households experienced the opposite [21]. The similarities between our findings and those from high-income countries suggest that SES is a critical determinant of dietary behavior, irrespective of the country's economic status, although the extent of the impact may vary based on local economic conditions and food availability.

Comparison with Global Studies

When comparing our results with other studies globally, it is clear that while there are common trends, such as increased health consciousness leading to better dietary practices, there are also significant differences likely driven by cultural, economic, and geographical factors. For instance, a study in Italy reported a much higher proportion of participants (65.2%) who increased their consumption of fresh produce during the pandemic [22]. The disparity in these findings could be attributed to differences in the initial dietary patterns, cultural emphasis on Mediterranean diets rich in fruits and vegetables, and better access to these foods in European

countries compared to Bangladesh. Moreover, our study's focus on a low- and middle-income country context provides unique insights that are less covered in the existing literature, which predominantly focuses on higher-income countries. For example, the World Health Organization (WHO) has emphasized that food insecurity, which is more prevalent in countries like Bangladesh, has worsened during the pandemic, potentially limiting the ability to adopt healthier diets even when there is a strong perception of COVID-19 risk [23-26]. This could explain the relatively lower percentage of healthy dietary changes observed in our study compared to those in higher-income settings.

Practical Significance and Public Health Implications

The practical significance of our findings lies in their implications for public health policy and interventions in Bangladesh and similar contexts. The strong association between cognitive understanding of COVID-19 and healthier dietary changes suggests that public health campaigns should prioritize improving health literacy, particularly in lower-SES groups. Tailored messaging that addresses specific misconceptions and promotes easy-to-adopt dietary changes could be effective in enhancing the population's resilience to the health impacts of pandemics. Additionally, our study highlights the need to address the socioeconomic barriers that hinder healthy eating. Policymakers should consider strategies to improve access to nutritious foods for low-income households, such as subsidies for fresh produce or the implementation of food assistance programs that prioritize healthy options. These interventions could mitigate the negative dietary trends observed among lower-income groups during the pandemic and promote better overall public health outcomes. Finally, the insights gained from this study could be used to inform future emergency preparedness and response strategies, ensuring that dietary behavior is adequately considered as part of a comprehensive public health response to pandemics. By understanding the factors that influence dietary changes, public health authorities can better design interventions that not only address immediate health threats but also support long-term health and well-being.

CONCLUSION

This study provides valuable insights into the complex interplay between COVID-19 perception, cognition, and dietary behavior in Bangladesh. Our findings reveal that while a significant portion of the population has adopted healthier eating habits in response to the pandemic, there remain critical disparities driven by socioeconomic status and cognitive understanding. These results align with existing global literature but also highlight unique challenges faced by low- and middle-income countries. To enhance public health outcomes, future interventions should focus on improving health literacy and addressing the socioeconomic barriers to healthy eating, ensuring that all population segments can benefit from healthier dietary practices during and beyond the pandemic.

Recommendations

Implement targeted campaigns to improve COVID-19 awareness and encourage healthier diets.

Enhance policies to make nutritious foods more affordable for low-income groups.

Integrate dietary guidance into pandemic preparedness strategies.

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