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Crimean-Congo Hemorrhagic Fever and Autoimmunity: A Georgian Viewpoint Improved by Awareness Survey

[1]Aruna Rajeswari Balaprakash Bhavani; [2]Sona Bijunath; [3]Ashwin Shajith
Medicine; Tbilisi State Medical University, Tbilisi, Georgia

Abstract:- The virus responsible for Crimean Congo Hemorrhagic Fever (CCHF) posed a health risk in Georgia as recent outbreaks underscored the importance of enhanced education and preventive measures. This study examined the level of awareness regarding CCHF and perceptions of autoimmunity among the population by encompassing survey data. The results highlighted the pressing need for targeted campaigns to address knowledge gaps and common misunderstandings. Recommendations for enhancing public health education were explored to encourage an informed and proactive community response to diseases and autoimmune conditions.

Keywords:- *Viral, Autoimmune, Public Health, Georgia, Student Awareness, Infectious Diseases, Congo Hemorrhagic Fever, CCHF, Virus.*

I. INTRODUCTION

Crimean Congo hemorrhagic fever (CCHF) is primarily transmitted through the Hyalomma tick a virus found in the Bunyaviridae family. The disease spreads when an individual is bitten by a tick or comes into contact, with one directly. Additionally consuming milk or being exposed to contaminated animal tissues or blood can lead to transmission. While human-to-human transmission can occur through contact with blood or bodily fluids such cases are mostly observed in settings.

Around one out of every five individuals infected with the virus shows signs of illness whereas animals and ticks do not exhibit any symptoms of infection. People infected with CCHF typically experience a specific fever at the onset, which may progress rapidly into a hemorrhagic syndrome causing organ failure and potentially leading to death in severe instances.

Georgia, located in the South Caucasus region shares borders with countries where CCHF transmission is prevalent. Given that, nearly half of Georgia's population engages in agriculture and resides in areas where they may be at risk, of contracting CCHF. In 2009 the National Electronic Integrated Disease Surveillance System (EIDSS) was introduced to monitor cases in Georgia.

Physicians, in healthcare facilities in Georgia suspect a patient may have CCHF and report it to the Georgian National Centre for Disease Control and Public Health through EIDSS, a part of the surveillance system for reporting diseases.

II. METHODS

To study, CCHF information was collected from news media and health publications between 2014 and 2023. Additionally, a cross-sectional survey was conducted to assess peoples' understanding of CCHF and autoimmunity. The survey consisted of twenty multiple-choice questions covering transmission, symptoms, prevention, and basic autoimmune concepts. The sample of 500 participants ensured representation. Descriptive statistics were utilized to analyze the data for awareness levels and common beliefs.

- *Overview of CCHF in Georgia:*

Information on outbreaks and historical context:

Since the first case was identified in 2009 Georgia has experienced outbreaks of CCHF emphasizing the importance of public health surveillance. Key details about the outbreaks include:

Table 1: Clinical Features And Modes Of Transmission:

Symptoms such as fever, muscle pain (myalgia) confusion, stiffness in the neck or back headache, eye inflammation, and sensitivity, to light (photophobia) manifest rapidly. Other potential symptoms include pain, sore throat, vomiting, diarrhea, sudden mood changes, and confusion.

Other symptoms that may appear include a heartbeat, a pulse, swollen lymph nodes, and a rash, on the skin and mucous membranes like the mouth and throat due to bleeding. Hepatitis often shows symptoms and ill patients may experience liver or lung failure as well as a sharp drop in kidney function after the fifth day of illness. The CCHF virus, with a fatality rate ranging from 10% to 40% is responsible for outbreaks of hemorrhagic fever.

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III. UNDERSTANDING AUTOIMMUNITY IN THE CONTEXT OF CRIMEAN-CONGO HEMORRHAGIC FEVER:

Autoimmune disorders occur when the immune system mistakenly attacks the body's tissues believing them to be foreign. This can lead to tissue damage and ongoing inflammation in organs. The relationship, between responses and infectious diseases like Crimean Congo Hemorrhagic Fever (CCHF) is complex and multi-faceted. To address the disease effectively and develop treatment approaches it is crucial to grasp how the immune system responds to infection concerning autoimmunity.

The system's response to antigens, such as the nucleoprotein (NP) of the Crimean Congo Hemorrhagic Fever Virus (CCHFV) plays a significant role in determining the likelihood of autoimmune reactions and combating the virus through various mechanisms. NP as a component involved in replication and assembly serves as a target for both humoral and cellular immune responses. However, while these responses are essential for fighting off the virus they may also inadvertently trigger reactions by disrupting self-tolerance mechanisms and leading to conditions.

Therefore it is vital to elucidate the processes associated with CCHFV infection and their potential impact, on autoimmunity. Our knowledge of how viral antigens interact with the system of the body and potentially lead to reactions is crucial, for nhancing strategies in vaccine development and therapeutic approaches. By delving into understanding diseases and their root causes we can explore the intricate connections between viral infections, immune responses, and autoimmunity.

When CCHFV NP triggers a Th1 mediated response it elevates the levels of cytokines like IFN γ and IL 2 which play a role in protecting cells against intracellular infections. The balance between Th1 and Th2 responses is influenced by Th2-related cytokines such as IL 4 which could impact the response to NP. The presence of delayed-type hypersensitivity (DTH) indicates a Th1-type reaction that leads to inflammation and activation of CD4+T cells.

Analysis of levels following NP stimulation shows increases in Th1-associated cytokines supporting the dominance of a Th1-mediated response. Notably, there is also a rise in Th2 cytokines underscoring the nature of the immune response. Furthermore, an elevation in levels suggests an influence on Th17 cells associated with inflammation and autoimmune conditions. This activation of the Th17 pathway hints at NP involvement, in pathways linked to autoimmunity.

The way the body reacts to CCHFV NP and its role, in conditions could be significantly influenced by the balance between Th1, Th2, and Th17 responses. Delving deep into studying how the adaptive immune system responds to CCHFV can provide insights into the mechanisms behind these responses, particularly focusing on cellular immunity. Understanding the role of proteins such as NP in triggering these immune responses and potential autoimmune reactions is crucial for developing effective strategies, for managing illness and creating vaccines.

Studying how NP primes T cell subsets, including memory cells can provide insights into the pathophysiology of CCHFV and protective immunity. Addressing issues related to CCHFV requires understanding how NP influences both potentially harmful responses to develop effective therapeutic and preventive measures.

The immune response to CCHFV NP involves pathways like Th1, Th2, and Th17 which help balance the risk of reactions while also aiding in controlling infection. This underscores the importance of targeting components in vaccine development to reduce autoimmune risks and promote strong protective immunity.

IV. EMERGING OPPORTUNITIES IN CCHF RESEARCH

In 2019 researchers, at the University of Georgia (UGA) developed a vaccination approach that displayed potential in safeguarding mice against Crimean Congo Hemorrhagic Fever (CCHF) with one dose. This vaccine effectively imitates the structure of the virus using a modified replicon particle designed to restrict replication to a cycle ensuring safety. This advancement is significant as it introduces a measure against CCHF, which currently lacks a protective vaccine and relies on supportive care due to the ineffectiveness of the antiviral drug ribavirin.

➢ *Findings from Surveys:*

Insights from survey responses collected from individuals in Georgia unveiled intriguing aspects of their awareness and attitudes toward autoimmunity and CCHF. While most participants (60%) were familiar with CCHF it was concerning that 40% could accurately identify the disease transmission methods.

- *Figure 1*

This indicates there is still much to learn about how the virus spreads, leading to outbreaks. Furthermore, the survey indicated that 70% of students expressed worries regarding autoimmunity. However, there seems to be a gap between awareness and understanding of conditions as half of respondents admitted knowing, about them.

- *Figure 2*
- *Figure 3*

The difference, in outcomes, demonstrates the impact of campaigns and awareness programs in enhancing students understanding and correcting misconceptions. It underscores the importance of public health strategies that focus on educating people about disorders alongside managing infectious diseases like CCHF. Collaboration among health authorities, schools, and community groups is crucial for bridging knowledge gaps and promoting understanding among students.

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➢ *Public Health Significance:*

The survey results underscore the need for public health interventions to address knowledge disparities and dispel misconceptions. Public health initiatives such as awareness campaigns educational programs and workshops play a role, in increasing awareness and improving understanding of diseases and CCHF. By engaging children through targeted education health officials can empower them to make choices about their well-being and mitigate these health threats.

➢ *Future Perspectives:*

To address identified knowledge gaps it is essential to prioritize health education efforts aimed at adults. Utilizing platforms and peer networks can enhance awareness initiatives and facilitate informed decision-making. Integrating education on CCHF and autoimmunity into school curricula could nurture a proactive population.

V. CONCLUSION

The comprehensive examination of CCHF, in Georgia, enhanced by a study involving adults offers perspectives on existing awareness levels and misunderstandings. Closing these knowledge disparities through focused public health efforts and educational programs is crucial, for empowering individuals to safeguard themselves and their communities from autoimmune conditions.

Table 1: Disease Outbreak Trends and Control Efforts (2014-2023)

YEAR	OUTBREAK
2014	15 confirmed cases, with 12 in Khashuri, and 3 deaths. The majority of those individuals were those in contact with cattle. The National Center for Disease Control (NCDC) undertook extensive measures to control the situation.
2015	22 cases were detected between January and September, indicating either a change in disease epidemiology or improved surveillance sensitivity.
2022	42 cases resulting in 2 deaths, with the majority in Samtskhe-Javakheti and Shida Kartli regions.
2023	There are eight confirmed cases, with a high emphasis on early treatment to prevent severe outcomes.

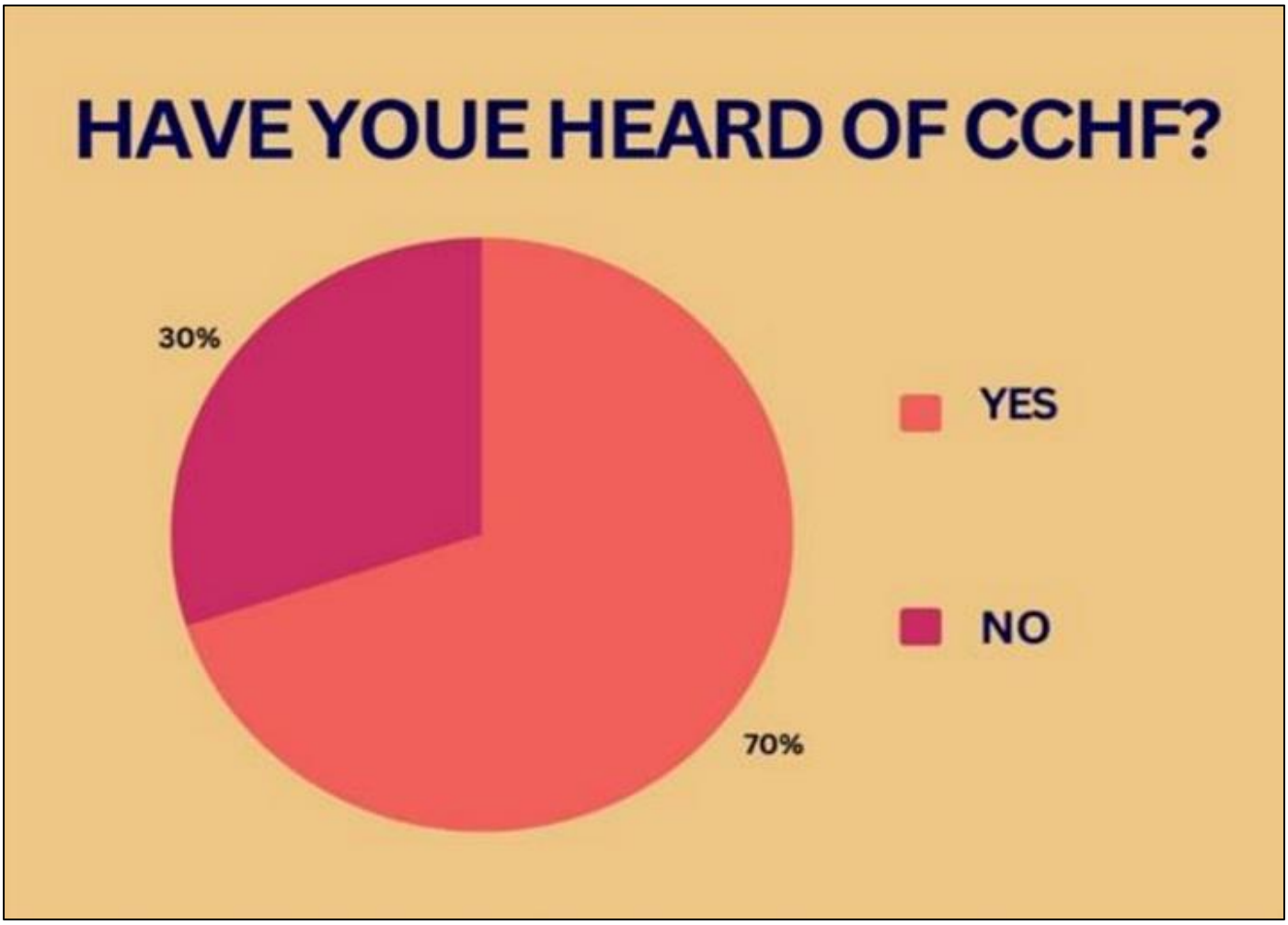

Fig 1: Public Knowledge of CCHF

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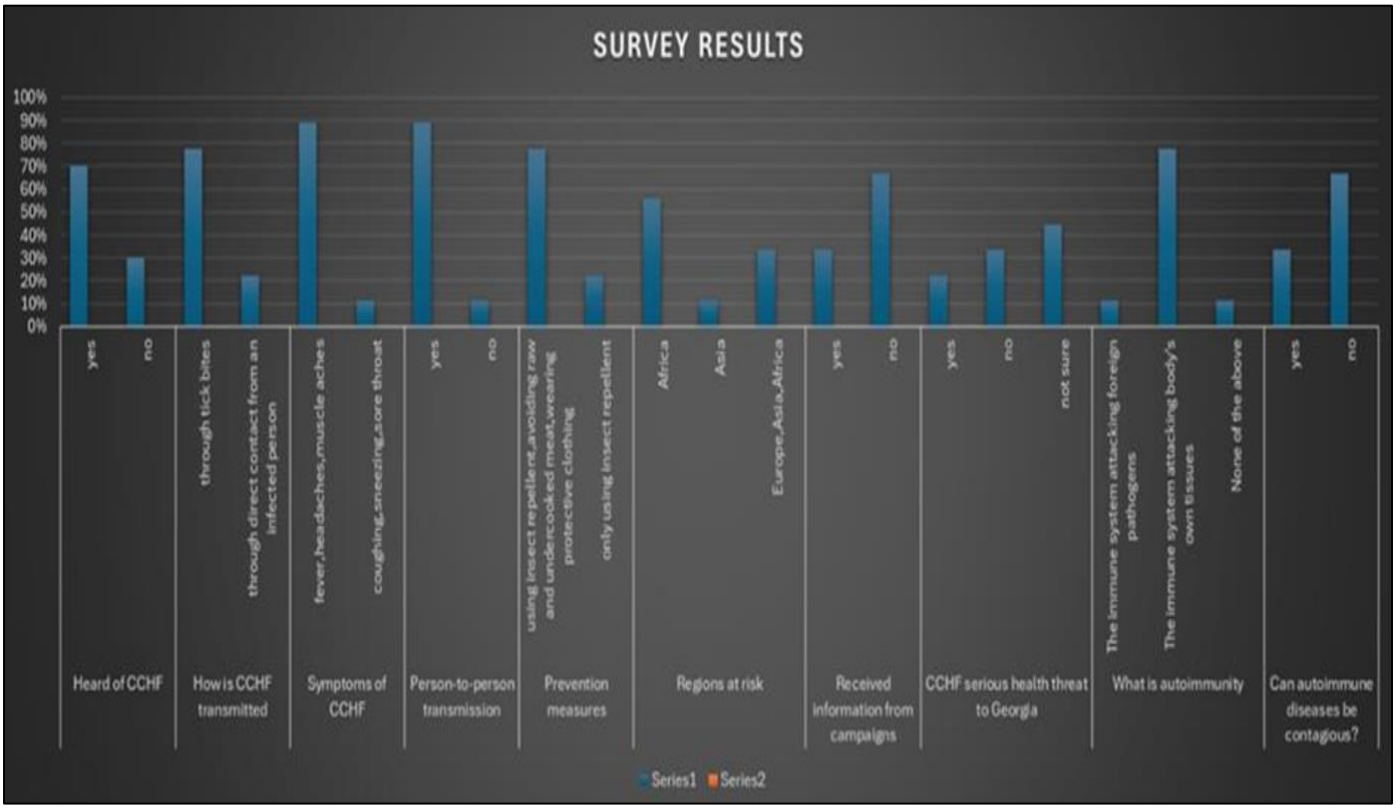

Fig 2: Public Perception of CCHF

Fig 3: Public Perception of CCHF

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REFERENCES

[1]. Greiner AL, Mamuchishvili N, Kakutia N, Stauffer K, Geleishvili M, Chitadze N, et al. Crimean-Congo Hemorrhagic Fever Knowledge, Attitudes, Practices, Risk Factors, and Seroprevalence in Rural Georgian Villages with Known Transmission in 2014. PLoS One. 2016 Jun 23;11(6). doi: 10.1371/journal.pone.0158049.

[2]. Georgian health authorities confirm first 2023 cases of Crimean–Congo hemorrhagic fever. [Internet]. Available from: https://agenda.ge/en/news/2023/2023#gsc.tab=0

[3]. Tbilisi, Georgia: Three people being treated for Crimean-Congo hemorrhagic fever - Outbreak News Today. Outbreak News Today. 2022 Apr 30. Available from: https://outbreaknewstoday.com/tbilisi-georgia-three-people-being-treated-for-crimean-congo-hemorrhagic-fever-26445/

[4]. Three women die from Crimean–Congo hemorrhagic fever in Georgia. [Internet]. Available from: https://agenda.ge/en/news/2014/1924#gsc.tab=0

[5]. Georgia reports 42 cases of Crimean-Congo virus this year, an upward trend. [Internet]. Available from: https://frontnews.ge/en/news/details/28755

[6]. Greiner AL, Mamuchishvili N, Salyer SJ, Stauffer K, Geleishvili M, Zakhashvili K, et al. Increase in Reported Crimean-Congo Hemorrhagic Fever Cases — Country of Georgia, 2014. Centers for Disease Control and Prevention. 2015 Mar 6. Available from: https://stacks.cdc.gov/view/cdc/53180

[7]. Prine J. College of Pharmacy, CDC develop vaccine for virus. UGA Today. 2019 Jul 1. Available from: https://news.uga.edu/college-of-pharmacy-cdc-develop-vaccine-for-virus/

[8]. Karaaslan E, Çetin NS, Kalkan-Yazıcı M, Hasanoğlu S, Karakeçili F, Özdarendeli A, et al. Immune responses in multiple hosts to Nucleocapsid Protein (NP) of Crimean-Congo Hemorrhagic Fever Virus (CCHFV). PLoS Negl Trop Dis. 2021 Dec 1;15(12). doi: 10.1371/journal.pntd.0009973.