Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Does Yadgir population have copper-mediated intrinsic immunity to resist COVID-19 challenge?

The Severe Acute Respiratory Syndrome Virus 2 (SARS-CoV-2), better known as the COVID-19 pandemic, has caused unprecedented havoc, anxiety and panic across the globe [1]. Consequently, a public health emergency of global magnitude and concern has put all health organizations on high alert [2]. Worldwide laboratory-confirmed cases and associated deaths are consistently on the rise. Having said that, India's Covid-19 fatality rate is remarkably lower compared to many countries [3,4]. The latest Covid-19 recovery rate in India has touched 68.32% while the fatality rate has dipped to 2.04% (as per report dated August 09, 2020). Further, India's deaths per million at 30 is significantly lower compared to the global average of 91 deaths per million [3].

It is still unknown why India should have a lower fatality rate despite registering the most cases. Further, there are striking differences in how COVID-19 is behaving even within India, across different regions. Notably, the Yadgir district of Karnataka state in South India seems to have left other districts behind in terms of recovery rate [4]. It is pertinent to note that Yadgir district is identified as a backward district in the Najundappa committee report on regional imbalance [5]. Given its population of low socioeconomic status, the region lacks proper heath education and is only equipped with remote health care facilities [3,6].

According to the State Covid-19 War Room report, the recovery rate of the infected patients in Yadgir is 87.8%. The neighbouring Kalaburagi, a well-developed region compared to Yadgir, has shown a recovery rate of 64%. Out of 1,553 positive cases in Yadgir district, as many as 1,363 patients (87.8%) have recovered [3,6].

Given that India substantially undercounts deaths from tuberculosis, malaria, diarrheal diseases and many such infectious diseases, the diverse behaviour of COVID-19 in different regions within the country merits an in-depth study and analysis [7]. Likewise, it is still not fully understood how most of the Yadgir population is well protected with an inherent immune factor, which seemingly plays a crucial role in increasing recovery rates and controlling death rates.

We present a hypothesis of a possible mechanism by which Yadgir population is combating the disease which may in turn explain the diverse behaviour of COVID-19 elsewhere in the country.

Hypothesis

Though numerous variables could conceivably be attributed to this population-specific immunity towards COVID-19, a key factor worth deliberation is the copper-mediated immunity of the Yadgir population mainly acquired through the consumption of contaminated ground water.

This tenet is supported by some mechanistic studies which substantiate the role of copper in building the innate immune response against viral infections [11].

Recently, it was hypothesized that copper supplementation can help combat COVID-19 and dietary or therapeutic copper supplementations might enhance host immunity and other micronutrients metabolism preventing viral infection severity. Therefore, systemic copper may provide a protective shield for Covid-19 infected individuals [12].

Notably, our previous studies demonstrated the possibility of systemic exposure of Yadgir population to sublethal level of copper through drinking water which was implicated in the pathogenesis of oral submucous fibrosis (OSMF) [8–10]. Chronic ingestion of the sublethal levels of copper through drinking water may alter the normal threshold for the absorption of copper by the gut and may also change the body's resistance to copper [8,9]. The increased gut threshold maintains the sufficient systemic copper absorbed from drinking water which possess an immunomodulatory effect [12–15]. Thus, the systemic copper may have protected the Yadgir population from COVID-19 infections.

Yadgir is marked by a population of low socioeconomic status, which is highly prone to consume contaminated ground water either through borewell or open wells. It is therefore likely that additional contaminants in the drinking water may also be providing cross-immunity. Thus, this hypothesis may be extrapolated to explain the diverse behaviour of COVID-19 across different regions.

Further studies are suggested to elucidate the role of drinking water towards providing cross immunity against Covid-19.

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Declaration of Competing Interest

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Appendix A. Supplementary data

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Shekar Patil[a], Vishal Rao US[b,c], Gururaj Arakeri[b,c,*], Shankargouda Patil[d], Peter A. Brennan[e]

[a] *Department of Medical Oncology, HCG Cancer Centre, Bengaluru, Karnataka, India*
[b] *Department of Head and Neck Surgical Oncology, HCG Cancer Centre, Bengaluru, Karnataka, India*
[c] *COVID Consultative Group, Bengaluru, Karnataka, India*
[d] *Department of Maxillofacial Surgery and Diagnostic Sciences, Division of Oral Pathology, College of Dentistry, Jazan University, Saudi Arabia*
[e] *Department of Oral & Maxillofacial Surgery, Queen Alexandra Hospital, Portsmouth, United Kingdom*

[*] Corresponding author at: Department of Head and Neck Oncology, Centre for Academic Research, HCG Cancer Hospital, Bengaluru, Karnataka, India.
E-mail address: drgururaj.a@hcgel.com (G. Arakeri).