

Review

The Hygiene Hypothesis: Understanding the Low Rate of Spread and Virulence of the SARS-CoV2 Virus in Africa

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Abstract

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Since the early period of the pandemic, the regions most affected by the pandemic, apart from China were the United States, Spain, Italy, Germany and France. However, early scientific analytical reports predicted that Africa was going to have the worse hit. The aim of the study was to explain the reason for the low rate of spread and virulence of the SARS-CoV2 Virus in Africa. The result showed that the more hygienic world worries more about Non-Communicable diseases, Africa still has a high burden of communicable diseases. Due to the nature of our hygiene and prevalent communicable diseases, we have been exposed to a lot of microbes, some of which have low virulence, but due to antigenicity, it confers some type of amnestic immunity. The Indigenous African immune system, especially the innate immunity has been modified above that of the western countries and this can be attributed to the nature of the hygiene and vaccines practiced in most African countries

Keywords: Africa, COVID-19, Hygiene, Immune, Pandemic

INTRODUCTION

To prevent the mortalities and morbidities associated with the nCOVID-19 virus measures such as social distancing and hand hygiene were implemented by WHO. This is following knowledge on the three main modes of transmission, which are by contact, droplets and airborne transmissions (Priyanka et al., 2020). However, over 220 countries and territories around the world have been hit with the coronavirus, reporting a total of more than 160 million confirmed cases and 3.3 million deaths as at 20:21 GMT on the 12th of May, 2021 (Worldometer, 2021).

Since early period of the pandemic, the countries most affected by the pandemic, apart from China were the United States, Spain, Italy, Germany and France. However, early scientific analytical reports predicted that Africa was going to have the worse hit. This was not so (Table 1a and 1b)

This narrative has also not changed in recent times (Tables 2a and 2b). The slow spread of this disease has marveled epidemiologist's world over.

The African Narrative

Moreover, the Hygiene Hypothesis proposed by the British Professor of epidemiology; David P. Strachan holds the most probable answers (Strachan, 2000). The hygiene hypothesis states that people who are exposed to certain microbes early in childhood development are protected from those diseases. These microbes, which might include viruses, bacteria or fungi protozoa, and even parasitic worms. Are agents that coevolve with us. Helping shape our immune system and that are still highly prevalent in the developing world

Table 1a. Table showing the case: Fatality statistics of the countries with the highest Covid hit as at 10:00 CET on the 7th of April, 2020. From the WHO-corona virus disease situation reports

S/N	Countries	Total Confirmed Cases	Total Recovered Cases	Total Confirmed Deaths	Percentage Recovered	Percentage Fatality
1.	United States of America	367,650	19,810	10,943	5.39%	2.98%
2.	Spain	140,510	43,208	13,798	30.75%	9.82%
3.	Italy	132,547	22,837	16,523	17.23%	12.47%
4.	Germany	103,375	36,081	1,810	34.90%	1.75%
5.	France	98,010	17,250	8,911	17.60%	9.09%

Table 1b. Table showing the Case: Fatality statistics of Africa as at 10:00 CET on the 7th of April, 2020. From the WHO regional office Africa Daily Update on COVID19

S/N	African Region	Total Confirmed Cases	Total Recovered Cases	Total Death Cases	Percentage Recovered	Percentage Fatality
1.	Africa	10,117	993	487	9.82%	4.81%

Table 2a. Showing the top 10 most infected countries in the world with no African country making the list as at 20:21 GMT on the 12th May, 2021. From Worldometer <https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/>

S/N	Country	Confirmed Cases	Deaths
1	United States	33, 574, 418	597, 463
2	India	23, 697, 175	258, 280
3	Brazil	15, 285, 048	425, 711
4	France	5, 821, 668	107, 119
5	Turkey	5, 072, 462	43, 821
6	Russia	4, 905, 059	114, 331
7	United Kingdom	4, 441, 975	127, 640
8	Italy	4, 131, 078	123, 544
9	Spain	3, 592, 751	79, 208
10	Germany	3, 551, 550	85, 921

Table 2b. Showing the African case and fatality prevalence from the COVID-19 infection as at 01: 00 AM GMT on the 12th of May, 2021. From WHO Africa.

S/N	Continent	Confirmed Cases	Deaths
1	AFRICA	3, 329, 895	83, 955

(Warren et al., 2018).

As the more hygienic world worries more about Non-Communicable diseases, Africa still has a high burden of Communicable diseases. due to the nature of our hygiene and prevalent communicable diseases, we have been exposed to a lot of microbes, some of which have low virulence, but due to antigenicity, confers some type of amnesic immunity.

Furthermore, applying the hygiene Hypothesis outside just atopic diseases, we would look at the immune advantage of Africans over the westerners as shown in the corona prevalence and rate of spread so far.

- Vaccination (BGG and INFLUENZA)
- Advanced Innate Immunity

- Herds Immunity

Vaccination

These vaccines increase the physiological pool of the activated defense cells of the body against respiratory infections. Countries with high Covid-19 fatality like Italy and Spain were said to have abandoned BCG vaccination since the 1950s and those with low fatalities like Japan are said to have maintained BCG vaccination all through the years (Cutts et al., 2005; Levine et al., 1999).

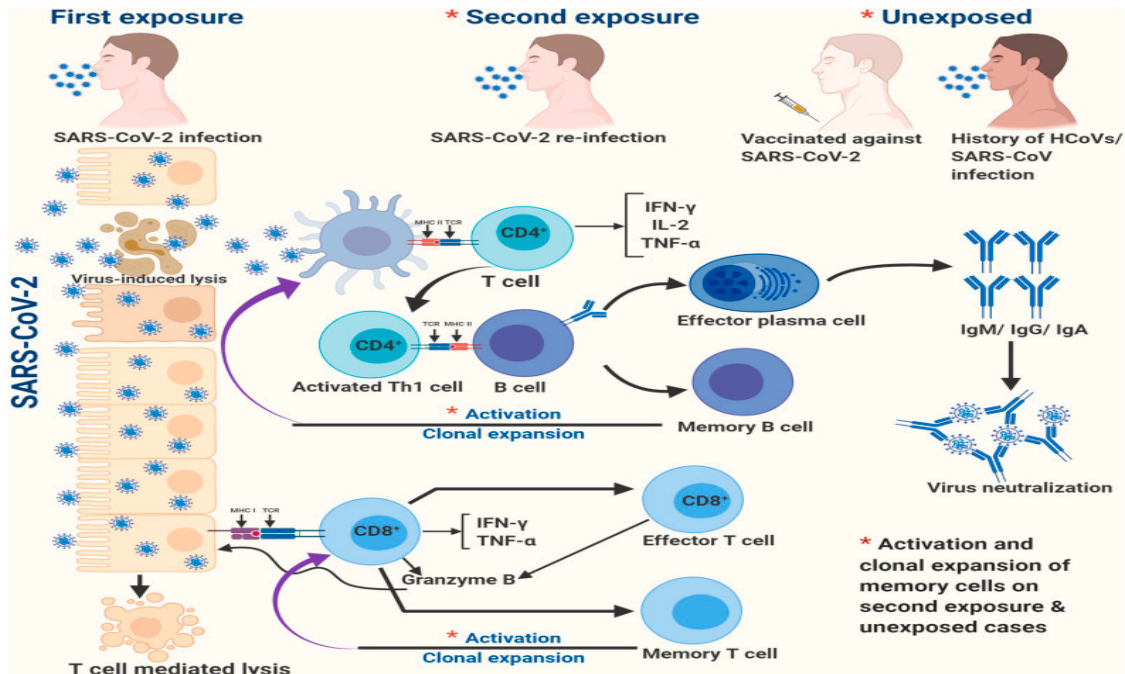


Figure 1. A hypothetical illustration of protective immunity against COVID-19 (Priyanka et al., 2021)

Advanced Innate Immunity

Africans are exposed to millions of tropical pathogens daily. This has improved amnestic immunity in the average indigenous African immune system. Thus, we have more advanced Interferons, Natural Killer cells, Alpha Defensins and better mucociliary clearance (Warren et al., 2018; Kumar et al., 2018).

Herd immunity

The fact that most people in Africa have body systems fortified enough against infectivity and symptomatology breaks the transmission chain. Thus, creates the Herd Immunity (Warren et al., 2018).

These factors above confer better protective immunity on the persons within the regions of Africa. With a more advanced cellular and humoral immunity following exposure to the pathogen or one of a similar antigen (Figure 1). Also, susceptibility or immunity to the virus may also be related to the genetic makeups. The Human Leucocyte Antigen (HLA) having a haplotype with a better epitope for the SARS-CoV2 molecule could pose as a genetic advantage to the individual (Priyanka et al., 2021).

CONCLUSION

In Conclusion, the Indigenous African immune system, especially the innate immunity has been modified above

that of the western countries and this can be attributed to the nature of the hygiene and vaccines practiced in most African countries. Although this narrative holds on as long as the SARS-CoV2 antigen resembles the structure of a known antigen against which the body is now immune, it may fail and lead to definite morbidity and/or mortality if there is a compromise in the Host's immunity or mutation in the antigen.

Conflict of Interest

Authors declares no conflict of interest.

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