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Association of COVID-19 with 5G Electromagnetic Radiation: Bursting the World Web Conspiracy Theorists

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It has been highly contentious amongst citizens and some experts voicing alarm on the possibility of COVID-19 linkages to mainstream rollout of 5G-next generation of mobile internet connections in many countries. There are various reports and counter-claims on social media that 5G is responsible for the origin or spread of COVID-19 (caused by SARS-CoV-2), which has claimed many lives in Nigeria and overseas. One version of the theory falsely attributed the symptoms of Coronavirus to 5G electromagnetic radiations. Another claim suggests that SARS-CoV-2 is a neutral infection but was worsened by 5G interactions with humans. Yet, some claimed that the entire pandemic is a hoax designed to distract people from 5G installation across different countries. On this note, it became imperative to conduct an empirical research investigating varying arguments and counter opinions enabling us to create the most rational advices from science and technology-based views. This article intends to correct some perceived opinions from web theorists who continuously misguide internet users that there are no realities surrounding COVID-19 pandemic. Literatures suggest that 5G advantages far outweigh the disadvantages as there are few reports mainly on heat generation instead of the perceived dangerous health implications tied to COVID-19. Also, histopathology of rat's tissue in a study did not reveal any signs or symptoms relating to COVID-19. We strongly suggest there is no correlation between COVID-19 and radiation from 5G substantiated by science and technology-based views. Therefore, COVID-19 is a separate entity and has no connection with 5G electromagnetic radiations.

Keywords: COVID-19, Conspiracy Theories, 5G Electromagnetic Radiation, SARS-CoV-2.

1. Introduction

Recently researchers have found "Severe Acute Respiratory Syndrome Coronavirus Type-2 (SARS-CoV-2)" as the etiology of Coronavirus disease 2019; popularly known as COVID-19, which is the illness that results from the novel Coronavirus infection called SARS-CoV-2 (Ananya-Mandal, 2020). Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is a new strain of Coronavirus that causes respiratory infections: Severe Acute Respiratory Syndrome (SARS), and Middle East Respiratory Syndrome (MERS) (Adhikari *et al.*, 2020). An outbreak of the infectious respiratory disease was first observed in Wuhan, Hubei province; China on 31 December 2019 but was first mentioned to World Health Organization (W.H.O) on 30 January 2020, and thus announced its global outbreak status (WHO, 2020; Chen *et al.*, 2020). COVID-19, which is fast becoming a potentially life-threatening disease of a significant threat to public health

was considered and declared a global pandemic on 11th March 2020 (JHU, 2020a). Coronaviruses are a large viral family, and about 7 of these groups are claimed to induce human pathogenesis (WHO, 2020). Many of the Coronaviruses that typically infect animals have now been found to infect humans (Chen *et al.*, 2020). COVID-19 mean incubation time was observed to be 5.1 days while 97.5 percent of those who showed symptoms did so after an average of 11.5 day infection; based on a mixture of 181 researched cases outside China (Cennimo, 2020). The symptoms may surface within 48 hours or an extended period of 2 weeks after exposure ranging from asymptomatic to moderate and sporadic death (Cennimo, 2020). A droplet resulting from breathing, sneezing, and coughing, which is typical of other respiratory system pathogens, is believed to trigger or enhance the transmission rate (van-Doremalen *et al.*, 2020). A respiratory

droplet that may travel over 6feet becomes an effective medium for the release of the virus, which may infect by a direct contact and maintains a varying degree of infectivity on surfaces (Chin *et al.*, 2020). A study showed that SARS-CoV-2 viability on some surfaces can extend to about 72 hours (van-Doremalen *et al.* 2020); it also confirmed that no viable virus was found on cardboard and copper after 24 hours and in another scenario - 4 hours (van-Doremalen *et al.* 2020; Chin *et al.*, 2020). It has been highly contentious in many ways, with many institutions, citizens, organizations, and some experts who are keen on voicing alarm on the possible health consequences of the Coronavirus associating with the recent mainstream rollout of 5G networks, which is the latest technology of cellular and internet connections. There are various reports and counter-claims in the press and social media about the 5G being responsible for the origin and spread of the COVID-19 pandemic. One version of the theory falsely claims that the symptoms of Coronavirus are caused by radiation from the 5G network; another suggests that the virus is a natural infection that has been worsened by interactions with 5G installation and connectivity. Hitherto, others voiced their displeasure on the entire pandemic being a deception designed primarily to distract people from rolling out the 5G network (Vergin, 2020). It therefore took the views that it was highly necessary to carry out an empirical research to investigate the trio-arguments and to create the most rational opinions basing our argument on etiology of COVID-19, medical, science and technological point of view. It is against this backdrop that the present study was instigated to empirically investigate possible association of COVID-19 to the 5G electromagnetic radiation, which will aid in bursting the various frame-ups by conspiracy theorists on the global web. We also wish to correct some perceived opinions from web theorists who continuously misguide internet users particularly from the developing world that there are no realities about COVID-19 pandemic.

2. Understanding Related Terminologies

2.1 Role of SARS-COV-2 in COVID-19

COVID-19 is an acute disease of public health concern, with a typical respiratory illness like every other coronavirus infection in history. It is caused by SARS-CoV-2, a member of Coronaviruses; an enveloped single-strand RNA virus with worldwide recognition for severe health challenges. In 1930, several Coronaviruses that cause diseases such as

neurologic, intestinal, respiratory, and liver diseases in animals were discovered (Wu *et al.*, 2020). Of the numerous Coronaviruses discovered, seven were implicated in causing human diseases (Tesini, 2020). Four (4) of the seven Coronaviruses in human, 229E, OC43, NL63, and HUK1 have a usual symptom of common cold, severe lower respiratory condition and pneumonia rarely manifest in infants, immunosuppressed and elderly people; while, other three: SARS-CoV-2, MERS-CoV and SARS-CoV have caused global outbreaks with severe to somewhat deadly respiratory diseases than the previous four that were earlier mentioned (Wu *et al.*, 2020). Preliminary reports on COVID-19 indicated the emergence of the infection in the animal market in China, which indicated a zoonotic phenomenon (Chin *et al.*, 2020). The major route of spread is via respiratory droplets that may often result from sneezing, coughing, and breathing, including aerial and surface contact droplets recently added as additional transmission routes (Tesini, 2020). Transmission via asymptomatic cases is still considered a possibility, however, knowledge of the transmission of this disease is yet to be completely established (Chen *et al.*, 2020). As at the time of writing this article, far above 164,000 cases in Nigeria, 3,214,868 in Africa and 59,294,109 in the Americas has been documented (WHO, 2020a). However, United States of America has been tagged the epicenter of the pandemic haven recorded more than 31, 176, 938 cases and over 566,000 deaths (JHU, 2020b; WHO, 2020b). Also, about 216 countries have reported over 139,501,934 confirmed cases and far more than 2,992,193 deaths have been documented across the globe (WHO, 2020a). An infected SARS-CoV-2 individual may be asymptomatic and symptoms range from mild to moderate, extreme to a fatal condition (Tesini, 2020). Wide spectrum of clinical manifestations has been recorded, to name a few: Fever, Cough, Shortness of breath or difficulty in breathing, chills or repeated shaking with chills, muscle pains, new loss of smell or taste, nausea, vomiting, and diarrhea" (Wu *et al.* 2020). Fever is considered as usual symptoms of SARS-CoV-2 infected patient; the parameter has since been used as preliminary for the consideration of other symptoms before laboratory diagnosis (WHO, 2020b; Wu *et al.* 2020). Nasopharyngeal and oropharyngeal specimen are the predominant testing samples for diagnostics via "Real-time reverse transcriptase-polymerase chain reaction (RT-PCR)" in various public health laboratories (WHO, 2020b). At the moment, the major treatment for COVID-19 patients is supportive, there is currently no therapeutic cure approved for the treatment of the disease by World Health

Organization. The currently available pipeline clinical management is the treatment of symptoms and intensive treatment for very severe cases (Wu et al. 2020; Khan et al., 2020). Nonetheless, several drugs and vaccines are currently going through clinical trials in different continents.

2.2 Fifth Generation (5G) Electromagnetic Spectrum

Fifth-generation cellular network termed '5G' is the newly rolled out cellular network, it has the advantage of higher connecting and internet speed more than fourth-generation (4G/ LTE) cellular network, which for sometimes has to belittle ones celebrated 3G network. The first wave of mobile networks (retroactively named 1G) appeared in 1979 particularly in Japan (Miao et al., 2016). This was a completely analog system before 2G (second-generation networks) was introduced allowing the switch to digital when it debuted in 1991, and 2G also added cellular data in GPRS and EDGE forms (Chaim, 2017). Around 10 years back, 3G networks debuted, providing far higher data speeds than 2G. Then about 10 years on, our new LTE networks - what we call 4G. Historically, this happens every decade to a new wave with networking technologies. 5G networks presumably offer similar leaps forward with regards to data speed (Chaim, 2017). 5G cellular network shall exist in a different range of frequency as well as frequencies already used for 4G LTE networks, and expand to much higher frequency bands not previously considered for mobile communication; the millimetre Wave (mmwave) portion of the radio frequency (RF) continuum from its lowest (30 GHz) to its peak (300 GHz). Though this range of spectrum has been used for other purposes such as airport security scanner, automobile anti-collision radar, and the linking of the established cellular-based station, its usefulness for network communication has never been reported (Foster, 2019; Kreps and Kriner, 2020). The 30GHz to 300 GHz mmwave spectrum has a range of wavelengths between 1 to 10 mm which has been used in several countries in Europe in the treatment of several pathological lesions such as ulcers of the gastrointestinal system, respiratory, traumatic, and coronary illness. The spectrum used for these therapeutic applications ranges between 35GHz to 78GHz (Ramundo-Orlando, 2010).

2.3 World Web Conspiracy Theories

2.3.1 Electromagnetic Radiation Claims

The apprehension around 5G can be dated well beyond internet creation, beyond its inception. 5G's anxiety stems from our deep and

fundamental misconception of radiation, specifically the non-ionizing electromagnetic radiation. "Several studies have been initiated as early as 1960 on the implication of radiofrequency exposure. The studies were motivated out of concern for the employee who is exposed daily to radiofrequency and other network communication gadgets". With the available large research sources, there has been lack of exact frequency size of the 5G spectrum to use to ascertain reported significant effects which are reproducible to void any statistical noise (Vergin, 2020; Rob, 2020). There are convincing experimental reports suggesting that exposure to RF radiation induces cellular trans-membrane structures and metabolism changes, including triggering stress protein and mutations in gene at the frequency output below present regulatory limits. Chromosomal abnormalities and abnormal changes to DNA structure may result from the reactive oxygen species generated from the exposure to RF radiation. "Several nervous system changes resulting from the effect of mmwave exposure have been documented, such as non-neoplastic changes in the brain which include memory loss, slow learning, motor dysfunction, increased fatigue, and sleep disorder" (Sage and Carpenter, 2009). The anticipated findings of a US\$ 25 million National Health Institute researches on the impact of radiofrequency radiation implication on animals are out and the outcomes are mixed. They showed the incidence of tumors, DNA or tissue injury, and lower body weight in certain rat classifications, yet no obvious negative impact in others and no particular lesion is seen in human results. The National Toxicology System research included 3,000 laboratory animals and is viewed as the most thorough evaluation of the radiation's safety impact on rats and mice (Eunjung, 2018). The latest National Institute of Health (NIH) research has shown neoplastic lesions in rat and mice, these neoplastic changes were seen in the brain, breast, liver, and pancreas; however, it was not obvious whether the tumours were radiation-associated. The researches were done utilizing radiation level that imitates 2G and 3G cellular network radiations; putting the experimental animal in separate chambers for nine hours radiation exposure per day to radiation. Critics have accentuated that the least frequency exposure utilized in the researches was a lot higher than the maximum exposure cellphone users are predisposed to (Eunjung, 2018). There are several published literatures on the impact of millimetre radiation proceeding biological systems. Diverse effects on cultured cells, animal and human organs have been observed. The observed changes at the cellular level were seen on the plasma membrane, trans-membrane ion channel, molecular complexes, excitable

structure, and others. Surprisingly these effects result from emission that penetrates less than 1mm into biological tissue. Be that it may, none of the outcomes stated in the above reviews were reproduced in an independent laboratory and therefore cannot be regarded as proven biological effects (Ramundo-Orlando, 2010).

2.4 Association of 5G Electromagnetic Radiation with COVID-19

2.4.1 Fifth Generation (5G) Correlations to COVID-19 Outbreaks

Many scholars believed that for each network deployment in history, there is always a trending disease epidemic, maintaining that the same happened to other generations of networks ranging from the first to fourth generation cellular networks. A Facebook analyst has tried to explain the correlation between historical disease outages and different generations of mobile networks including radio waves (Arthur, 2018). From the previous, social media correlation of new communication technology roll-out with virus outbreak were reported (Arthur, 2018).

- a. Emergence of Radio waves in 1916, and Spanish Flu Outbreak in 1918
- b. 3G was launched to the world in 2003, and SARS outbreak in 2003
- c. Introduction of 4G to the world in 2009, and Swine Flu outbreak in 2009
- d. Arrival of 5G in 2019/2020, and Coronavirus outbreak in 2019/2020

Summarily, the turnout of different types of communication upgrades is connected to the emergence of viral outbreaks according to propagandas. However, looking at the matched dates of this widely distributed social media post; it showed a mismatching in the acclaimed dates. Around 1895 and 1896 Guglielmo Marconi invented the first commercial radio transmitters and receivers that were broadly utilized globally. This invention was in operation before the 1918 Spanish flu pandemic, which lasted until 1920" (Arthur, 2018). The generation, propagation, and utilization of the radio waves innovation range over an extensive stretch over the different countries of the world. Radio waves utilization commenced its commercial radio communication usage at about 1900 earlier before the Spanish flu pandemic erupted. The wave of the flu and spread across all the continents was happening almost simultaneously. The flu which killed about 50 million of the world population and about 5% of Africans has already frittered away by 1920

when the radio wave application commenced in Africa (Puckett and Spry, 2020; AFPP, 2020). In another scenario, the link between 4G network and novel influenza caused by H1N1 virus holds no scientific proof. The first 4G network service was launch in the US in 2010 after the H1N1 viral outbreak has already been reported in the spring of 2009. The launch of the 4G innovation may range all through the length of the spreading of the flu episode across countries, however, the time of 4G dispatch and the initiation of the flu flare-up did not correlate. The H1N1 viral infection outbreak was reported in over 30 countries in Africa by December 2009 without the existence of a 4G network. The 4G technology was not launched until 2012 in Angola, which happened to be the first deployment in Africa. World Health Organization (WHO) has reported a seasonal influenza A and B viruses among others to be in circulation annually with yearly infection cases of 3-5 million people and averagely 300,000 deaths. Hence, many of the flu outbreaks that were linked to telecommunication network upgrade fall within this seasonal influenza A and B epidemic (Wood, 2019; AFPP, 2020). As in the case of 4G and swine flu respectively, COVID-19 has been reported in several countries where 5G has not been deployed mostly in African countries.

3. Results and Discussions

3.1 Proofing Conspiracy Theorists Wrong

The list of proofs by conspiracy theorists showed approximately a century until 2003's of the supposed 3G launch; associated with the SARS outbreak. Asian and Hong Kong flu surfaced during this interval that the theorists' did not account for (Rezza, 2004). The account of these pandemics was overlooked because it did correlate with the launch of any telecommunication breakthroughs. 3G operation and its global spread took a while as it was first launched in Europe in 2003, but until 2006 it was not deplored in Asia. SARS outbreak was first discovered in China in the year 2002, which is about four years before the introduction of 3G in Asia. The period of the launch of 4G happens within the space of two years (2008 - 2010). This showed some kind of correlation with the swine flu outbreak which started in Mexico in the year 2009 and ended in August 2010 than assertion made on the association between 3G and SARS (Rob, 2020). Qualcomm claims 5G had been launched in 33 countries, while COVID-19 had been reported by John Hopkins University of Medicine in 184 countries on April 09, 2020 (AAPF, 2020). Alex Castro however rejected this view, saying that 5G frequencies do not cause

any harm to the body, as the virus is in countries where 5G has not been launched. Therefore, the assertion of 5G-COVID-19 association cannot be considered relevant. The two world phenomena occur roughly at the same time, but the correlation falls apart when the incident was examined in countries (Chaim, 2017). There are several pieces of research on hazardous implication of mmwave radiation on the immune system, all experiment performed on rats and mice showed a non-monotonous (immunostimulatory and immunosuppressive) result on exposure to weak millimeter-wave radiations. The immunomodulatory effect of mmwave radiations had been reported to have caused, increased delayed-type sensitivity reaction, "phagocytic activity of macrophages, enhanced proliferation, and normalization of the ratio of CD4+/CD8+ T-lymphocytes and increased B-lymphocytes level, and normalized production of immunoglobulins" (Rojavin, 1998). With known fact from various sources, very weak 5G within the range of 4G and those of higher spectrum at mmwave spectrum level could not have been responsible for COVID-19 cases or enhance the virulence of the causative agent (SARS-CoV-2) (Vyacheslav and Elena, 2003; Ahmed *et al.*, 2020). The incidence of COVID-19 disease in the countries where 5G network is not available also suggests that there is no connection between the virus and 5G electromagnetic radiations. Coronavirus has already reached nearly every country in the world; ironically, in Africa, Lesotho pioneered the commercial 5th generation cellular network operation (Oluniyi, 2019); but was about the last country to record COVID-19 cases in Africa (Reuters, 2020). Many publications showed effects of mmwave radiation, which is a higher non-ionizing spectrum in which higher 5G spectra belong. The published electromagnetic radiation health concerns were not among the clinical manifestation of the people suffering from COVID-19. Also, histopathology examination of rat's tissue did not reveal any of the signs or symptoms relating to COVID-19. On the other hand, a study suggests that reduced body weights were observed in rat's kittens and mothers exposed to high levels of RFR during pregnancy and lactation but grew to normal sizes afterward (Eunjung, 2018). However, it was emphasized that the least frequency exposure utilize in researches are a lot higher than the maximum exposures predisposed to by cell phone users, which thus casts doubt on the integrity of the dose rates (Eunjung, 2018). In our opinion, if every published adverse effect of mmwave radiation is confirmed and not statistical noise, then several health implications resulting from such radiation are completely different from COVID-19 clinical manifestations. Other scientific reports of the weak mmwave

radiation were term to be non-monotonous as it showed both positive and negative immune influences that is of medical relevance. It is also noteworthy to say that majority of the published effect of weak or mmwave radiations are not reproducible.

4. Conclusion

From reports, COVID-19 emerged from infection with SARS-CoV-2, which is one of the varying Coronaviruses; and transmission is via respiratory droplets from coughing, sneezing, and exhalation by an infected person. The potential correlation of COVID-19 to 5G or other technologies are open-end investigation, which is without a clear-cut stopping point. With recent declaration by W.H.O that the decimation of COVID-19 is not in view and is not going to end anytime soon couple with the fact that the world is in the early phase of launching the 5G, many facts will be published, which will result from both experimental and non-experimental studies. Therefore, we conclude that COVID-19 is a separate entity, which has no connection with 5G electromagnetic radiations. 5G advantages far outweigh the disadvantages as there are few reports mainly on thermal effects instead of the perceived dangerous health implications being propagated according to our investigation. 5G technologies will transform the health sector through interconnectivity amongst sophisticated diagnostic equipment, and will assist healthcare deliveries for quick diagnosis of infectious diseases including COVID-19 and others yet to arise. It will improve: security, governance, agricultural throughput, societal efficiency, and economy of the country to mention a few.

Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this article.

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