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Uncovering the Medical Implications from Maxims of Prophet Muhammad (S.A.W) on General Hygiene, Health and Diseases: A Case of infectious Diseases

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ABSTRACT

Despite the fact that great effort is being made to reduce the toll of the infectious diseases worldwide, still they are responsible for a largest global burden of disease that affects public health systems and economies, disproportionately impacting vulnerable populations; especially the least developing countries. The objective of this study is to expose the implications of the maxims; in various ahadith, about general hygiene, health and disease given by the prophet Muhammad (S.A.W). It adopted qualitative systematic review study design. The relevant ahadith were collected from famous books of ahadith of *Ahlu's Sunnah wal-Jama'ah*. Data concerning infectious diseases; such as control and preventive measures, were collected from published articles from PubMed databases and news published in the WHO, EMA, CDC, ECDC websites. These maxims were then described in relation to the signs that Allah (S.W.T) has shown health experts in the modern medicine. The results show that each maxim exposes the causative agents or/and control and preventive measures of a relevant infectious disease. This reminds us two things: (1) The whole body of knowledge in modern medicine has its roots from Muslim civilization during the Islamic Golden Age. (2) The whole body of medical knowledge; including the basic one obtained from Muslim scholars, are the signs from Allah (S.W.T) who showed medical experts after revealing their basics to his final messenger, prophet Muhammad (S.A.W). Therefore, this study may help people to get additional knowledge from these maxims which may help to increase faith and the spirit of implementing their directives.

Keywords: *Control, prevention, implications, infectious diseases, prophet Muhammad (S.A.W), sunnah/ahadith, Islam.*

INTRODUCTION

An over view of the infectious diseases

Infectious diseases or communicable diseases are the illnesses that impair the functions of normal tissues. They happen when individual's; hosts, are invaded by specific infectious agents such as bacteria, viruses, fungus, protozoans, viroids, prions, parasites (helminths or protozoa) and arthropods; or their toxic products, whose activities affect the host's cells, and can be transmitted to other people; whether directly through contact or indirectly through contaminated surfaces, blood products, bodily fluids, insect bites, or through hair.[1] There is also possibility for human-originated outbreaks originating from laboratory accidents or intentional biological attacks.[2]

The reservoirs for the infectious diseases are the areas where the infectious agents live. For-example, infected humans are the most significant reservoirs of the majority of the communicable diseases such as measles, smallpox, mumps etc. Non-human animal reservoirs; such as poultry, bats, rodents and dogs, often serve as reservoirs for diseases that infect humans. For-example, the major reservoir for *Yersinia pestis*; the bacteria that causes plague [*at-twaa'un*], is wild rodents.[3] The diseases that are derived from animals; through direct contact, food, water or environment, are called zoonotic diseases (zoonoses), and they contribute about 61% of all infectious disease. There are also environmental or non-living reservoirs that includes plants, water and

[1]Last, J. M. ed. *A dictionary of epidemiology*. 4th ed. New York: Oxford University Press, 1988.

[2]Bloom, D. E & Cadarette, D. (2019). Infectious Disease Threats in the Twenty-First Century: Strengthening the Global Response. Front Immunology, 10:549. Doi: 10.3389/fimmu.2019.00549.

[3]See Nester *et al*., 2007; especially chapter 20, on the reservoirs of infections.

soil that are the reservoirs for many pathogenic fungi as well as some pathogenic bacteria such as *Clostridium tetani*; which causes tetanus, *Clostridium botulinum*; which cause botulinum etc.[45] [67]

The global burden of the infectious diseases

Infectious diseases were responsible for the immense global burden of premature death and disability until the end of the 20th century when that dominance passed to non-communicable diseases. Over the previous centuries, global pandemics of infectious diseases such as plague, cholera, smallpox and influenza, periodically threatened the lives of people all over the world.[89] Humans have suffered also from the more silent killers of chronic infectious diseases such as syphilis and tuberculosis.[10] At least as early as the late 1800s, improved living conditions (such as piped water supplies and improved sanitation); particularly in developed countries, began to drive down the burden of the infectious diseases. By the middle of 20th century, safe, affordable and effective vaccines, improved sanitation, hygiene, medical practices and health systems, the availability of clean water and nutrition, increasing accessibility of antibiotics, as well as income growth had further decreased the burden of infectious diseases in developed countries. Not until the second half of the 20th century did large scale efforts started to better control and prevent infectious diseases in low and middle developed countries, where the infectious disease burden was highest and highly varied. These efforts included a global commitment to decrease the world's children against the major infections for which vaccines are available and global campaigns to control diarrheal and malaria disease.[11]

Despite the fact that great effort is being made to reduce the toll of the infectious diseases worldwide, still the infectious diseases are responsible for a largest global burden of disease that affects public health systems and economies worldwide, disproportionately impacting vulnerable populations; especially the least developing countries. Most of the infectious diseases entering the human population from contact with animals, *zoonotic*, and mostly among children and young adults. Among more than 1,700 known infectious agents (pathogens) that infect people, more than half either originated in or come directly from animals; the rest come from the environment around us, such as soil, water and air. Also, of the 37 new infectious diseases identified in the last three decades, more than two-thirds (2/3) originated from animals.[12] Diarrheal diseases, HIV/AIDS, lower respiratory tract infections (LRTI), malaria and tuberculosis (TB) are among the top aetiology of overall global mortality.[13] LRTI remained the world's most deadly infectious disease, ranked as the 4th aetiology of death. However, due to the mitigating effort being made, at least the numbers of deaths have gone down. In 2019, LRTI caused 2.6 million deaths, 460,000 fewer than in 2000.[14]

Emerging and re-emerging infectious diseases

Infectious diseases also include *emerging* or *re-emerging infectious diseases*; diseases that have newly appeared or have existed but are rapidly increasing in prevalence or geographic range. Over the past three decades, about 30-37 new human pathogens have emerged or re-emerged.[15] This threatens the health and lives of millions of people across the globe.[16] [17] About 12% of the known human pathogens have been recognized as either emerging or re-emerging.[18] World Health Organization (WHO) reports that new infectious diseases are continuing to emerge and old ones are appearing in new regions around the world. About a quarter (1/4) of deaths that occurs worldwide; many of them being children, are caused by infectious organisms.[19]

Through an expert consultation involving both the Delphi Method and Multi-Criteria Decision Analysis, WHO has published a list of epidemic-potential disease priorities requiring urgent R&D attention in May 2016. That list has since been updated twice, most recently in February 2018. The top criteria considered were (in order) of possibilities for human transmission, the availability of medical countermeasures, the severity or case fatality rate, the

[4]World Health Organization (WHO). (2018). Zoonoses. Available online at: http://www.who.int/zoonoses. Accessed on September 22, 2021.
[5]Ryu S., Kim B.I., Lim J.S. (2017). One health perspectives on emerging public health threats. *Journal of Preventive Medicine and Public Health*, 50:411–414.
[6]See Nester et al., 2007; especially chapter 20, on the reservoirs of infections.
[7]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.
[8]Evans, R. J. (1988). Epidemics and revolutions: cholera in nineteenth-century Europe. Past & Present, 120:123-46.DOI: 10.1093/past/120.1.123.
[9]Ziegler, P. (1993). *The Black Death*. Dover: Allan Sutton.
[10]Ahrens, W &Pigeot, I. (2014). Infectious Disease Epidemiology. *Handbook of epidermiology*, 2041-2119. Doi: 10.1007/978-0-387-09834-0_34.
[11]Janeway, C. A., Travers, J. P., Walport, M &Shlomchik, M. J. (2001). *Immunobiology*. New York: Garland Science. ISBN-10:0-8153-3642-X.
[12]Drexler, M. (2011). *What you need to know about infectious disease*. Washington (DC): National Academies Press.
[13]Vos T., Barber R., Bell B. (2013). Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet 2015*, 386:743–800.
[14]World Health Organization (WHO). (2020a). Modes of transmission of virus causing COVID-19: Implications for IPC precaution recommendations. Available at: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations. Accessed on September 22, 2021.
[15]Nester, W.E., Anderson, G. D., Robert, E. C & Nester, T. M. (2007). *Microbiology. A Human perspective*. New York: McGraw-Hill.
[16]Mukherjee, S. (2017). Emerging Infectious Diseases: Epidemiology perspective. *Indian Journal of Dermatology*, 62 (5): 459-467. 10.4103/ijd.IJD_379_17.
[17]Drexler, M. (2011). *What you need to know about infectious disease*. Washington (DC): National Academies Press.
[18]Ibid.
[19]Drexler, M. (2011). *What you need to know about infectious disease*. Washington (DC): National Academies Press.

human/animal interface, other factors (not defined), the public health context of the affected area, potential societal impacts, and the evolutionary potential. The updated list of 2018 consists of Crimean-Congo haemorrhagic fever (CCHF), Ebola virus disease, Marburg virus disease, Lassa fever, middle east respiratory syndrome (MERS), severe acute respiratory syndrome (SARS), nipah and henipaviral diseases, Rift Valley fever, Zika as well as disease x (including pathogens currently unknown to cause human diseases and requiring cross-cutting preparedness measures).[20]

Other researchers have reported some of the above diseases that were reported by WHO and added others such as dengue, extensively drug-resistant tuberculosis (XDR TB), the looming spectre of increasing antimicrobial resistance (AMR) as well as; perennially, chikungunya and influenza infections.[21] Now the world is suffering from Coronavirus disease of 2019 (COVID-19) which is caused by Coronavirus of 2019 (SAR-CoV-2). Generally, infectious disease control and prevention depends on a thorough awareness of the factors determining transmission. This study may provide an in-depth understandings and experiences of these factors that determine transmission of infectious diseases in the light of the maxims given by the prophet Muhammad (S.A.W).

STATEMENT OF THE PROBLEM

For *Ahlu's Sunnah wal-Jama'ah*, the famous books that have reported ahadith of the prophet Muhammad (S.A.W) are six canonical books of ahadith collections such as *sahihayn* [sahih al-Bukhari & sahih al-Muslim] and four (4) sunan [sunan at-Tirmidhi, sunan Ibn Majah, sunan An-Nasai and sunanAbu Dawud]. Others are Al-Muwatta, Musnad Imam Ahmad bin Hanbal etc. In these ahadith; especially those concerning general hygiene, health and diseases; that are exposes the control and preventive measures of various infectious diseases, prophet Muhammad (S.A.W) has given a number of maxims. Prophet Muhammad (S.A.W) himself has been reported to have said:

فُضِّلْتُ عَلَى الأَنْبِيَاءِ بِسِتٍّ أُعْطِيتُ جَوَامِعَ الْكَلِمِ وَنُصِرْتُ بِالرُّعْبِ وَأُحِلَّتْ لِيَ الْغَنَائِمُ وَجُعِلَتْ لِيَ الأَرْضُ طَهُورًا وَمَسْجِدًا وَأُرْسِلْتُ إِلَى الْخَلْقِ كَافَّةً وَخُتِمَ بِيَ النَّبِيُّونَ . "

I have been given superiority over the other prophets in six respects: I have been given words which are concise but comprehensive in meaning; I have been helped by terror (in the hearts of enemies): spoils have been made lawful to me: the earth has been made for me clean and a place of worship; I have been sent to all mankind and the line of prophets is closed with me.[22]

Most people understand these maxims on the basis of their immediate meanings because their deeper meanings are not explicitly stated. There are few studies that have uncovered the maxims in the ahadith about this subject. However, there are some discrepancies in these studies. Some have covered few maxims, some have focused on one infectious disease; such as COVID-19, some have focused on historical exposition of previous pandemics, and most remarkably, the discussions provided in most of these studies are not too microbiological, i.e., they have not given a very detailed microbiological exposition to the level of microbial species that are exposed in the particular maxims. Here are some few examples: Amin *et al*., 2020 have reported the implications of maxims about control and prevention of COVID-19.[23] Mehfooz, 2021 has reported the history of plague pandemic and implications of some maxims concerning its control and preventive measures such as ablution (Surat al-Maida, 5:6), washing hands after awakens from sleep before touching utensils, the use of miswak, quarantine and isolation, running away from the leper, and maxim from the narration of Umar (R.A) on plague pandemic.[24] Musa *et al*., 2020 has also touched the implications of maxims about control and prevention of COVID-19 such as purification during prayer, covering of face during sneezing and coughing, quarantine and isolation and social distancing.[25]

Therefore, the specific focus of this study is to cover at least enough number of these maxims by uncovering their detailed medical implications in the light of what we know today in the modern medicine, particularly medical microbiology. The reasons of using the modern medicine as a tool for uncovering these maxims is because Allah (S.W.T) has promised human beings; through *Qur'an, Surat Fussilat*, 41:53 and *Surat An-Naml*, 27:93, that He will show us His signs in the universe and within our bodies, and insisted that we will know them.

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[20]World Health Organization (WHO). (2016). An R& D Blueprint for Action to Prevent Epidemics: Funding & coordination models for preparedness and response May 2016. Geneva-Switzerland: WHO Library Cataloguing-in-Publication Data. Available online at: https://www.who.int/blueprint/what/improving-coordination/workstream_5_document_on_financing.pdf. Accessible on September 22, 2021.

[21]Bloom, D. E & Cadarette, D. (2019). Infectious Disease Threats in the Twenty-First Century: Strengthening the Global Response. Front Immunology, 10:549. Doi: 10.3389/fimmu.2019.00549.

[22] Al-Hajaj, A. (2007). Sahih Al-Muslim (N. Al-Khattab, Trans). Riyadh. Saud Arabia: Darussalam Global leader in Islamic books. Volume 2. Hadith number 1167.

[23]Amin, J., Siddiqui, A. A., Ilyas, M., Alshammary, F., Alam, M. K & Rathore, H. A. (2020). Quarantine ad Hygienic Practices about Combating Contagious Disease like COVID-19 and Islamic perspective. *Journal of Critical Reviews*, 7(13). ISSN-2394-5125.

[24]Mehfooz, M. (2021). Understanding the Impact of Plague Epidemics on the Muslim Mind during the Early Medieval Period. *Religions*, 12:843. Https://doi.org/ 10.3390/rel12100843.

[25]Musa, H. H., Musa, T. H., Musa, I. H., Musa, I. H. (2020). COVID-19 outbreak controls: Lesson learned from Islam. *The Journal of Infections in Developing Countries*, 14:244-5.

OBJECTIVES

The objectives of this study is to uncover the medical implications of the maxims; in various ahadith, about general hygiene, health and diseases given by the prophet Muhammad (S.A.W).

SIGNIFICANCE OF THE STUDY

This study may offer in-depth insights into understandings and experiences of these maxims. This in-depth understandings and experiences may help to increase the faith and spirit of implementing the directives exposed by these maxims in the physical life.

METHODOLOGY

This study adopted qualitative systematic review study design as described in https://research.library.gsu.edu/PHPH/designs, last accessed on January 12, 2022. The data concerning infectious diseases; such as the control and preventive measures against infectious diseases, were collected from secondary sources of some famous books of ahadith of the prophet Muhammad (S.A.W) [sahih Al-Bukhari, sahih Al-Muslim, sunan Abu Dawud, sunan At-At-Tirmidhi, sunan Ibn Majah and Musnad Imam Ahmad bin Hanbal], glorious *Qur'an* [particularly *Surat Al-Maidah*, 5:6], published articles from PubMed database and news published in the official websites of some public health agencies such as WHO, CDC and ECDC. Published studies included were clinical trials, meta-analyses, randomized controlled trials, systematic reviews. The inclusion criteria for ahadith were if ahadith are authentic as stated in the relevant book. The inclusion criteria for the news published in the official websites of the mentioned public health agenciess was those last updated not more than 3 years back [from 2017 to 2021]. These data were then described by exposing the detailed medical implications of the maxims addressed by the ahadith.

FINDINGS AND DISCUSSIONS

In Islam, glorious Qur'an and authentic ahadith/sunnah are the principal sources of *Maqasid Al-Shari'ah* (goals or objectives or purposes of shariah); which is to protect the five essentials of human wellbeing: *religion, health and life, intellect, lineage (progeny or offspring) and property*.[26] All the maxims in prophet Muhammad (S.A.W) ahadith on the infectious diseases seek to protect one of these Maqasid Al-Shari'ah, which is *health and life*.

There should be neither harming nor reciprocating harm

Above is the first maxim which is the hadith narrated by Ubadah bin Saamit and Ibn 'Abbas (R.A) and reported by Al-Imam Ibn Majah (in his sunan) and Al-Imam Ahmad bin Hanbal (in his Musnad); which Muslim scholars use it as a general rule of avoiding or preventing harming each other. This hadith states that:

لاَ ضَرَرَ وَلاَ ضِرَارَ

There should be neither harming nor reciprocating harm.[27][28]

Specifically, this maxim has laid down the foundation and direction of many public health interventions of controlling and preventing the spread of the infectious organisms that are used nowadays in the modern medicine. These interventions include quarantine and lockdown, isolation, avoiding crowds, strictly adherence to social distancing, wearing protective facemasks or coughing and sneezing into a bent elbow or tissue and frequent hand washing with soap [or using hand sanitizer when you can't get soap]. All these interventions are taught in schools, colleges and universities that offer medical courses, and are emphasized by the health experts and public health agencies in order to control and prevent the spread of various infectious diseases. Good examples are infectious diseases that are transmitted through respiratory droplets or infectious droplets (coughing, sneezing, singing, laughing and talking) and contact routes (direct contactor closeness with infected person or contaminated fomites). These diseases include influenza, measles, plague, tuberculosis, common cold, chickenpox, hepatitis A, B & C, pertussis (whooping cough), respiratory syncytial virus (RSV) as well as the present COVID 19 pandemic.[29] [30] [31]

[26]Saifuddeen, S. M., Abdul Rahman, N. N., Isa, M. N and Baharuddin, A. (2014). Maqasid al-Shariah as a complementary framework to conventional bioethics. *Science and Engineering Ethics*, 20(2):317-27. DOI: 10.1007/s11948-013-9457-0.

[27] Al-Qazwini, M. (2007). Sunan Ibn Majah (N. Al-Khattab, Trans). Riyadh, Saudi Arabia: Darussalam Global Leader in Islamic Books. Hadith number 2340.

[28] Ash-Shaibani, A. (2012). Musnad Imam Ahmad bin Hanbal (A. Nasiruddin, Trans). Rayadh, Saudia Arabia: Darussalam. Hadith number 2865.

[29]Centres for Disease Control and Prevention (CDC). (2020a). How measles spread. Accessed on September 16, 2021.

[30]Edemekong, P. F & Huang, B. (2021). Epidemiology of prevention of communicable diseases. StatPearls [internet]. Last updated: July 23, 2021.

[31]World Health Organization (WHO). (2020a). Modes of transmission of virus causing COVID-19: Implications for IPC precaution recommendations. Available at: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations. Accessed on September 22, 2021.

In the case of COVID-19, WHO, CDC and ECDC have been emphasizing people to wear masks, avoiding crowds, covering coughs and sneezes and social distancing.[32] [33] [34] [35] [36] [37]

When the Messenger of Allah (S.W.T) sneezed, he placed his hand or a garment on his mouth

The prophet Muhammad (S.A.W) was covering his face [mouth and nose] when sneezing and coughing by using his hand or a garment. The evidence of this are the ahadith narrated by Abu Huraira (R.A) that were reported by Al-Imam Abu Dawud and Al-Imam At-Tirmidhi in their sunan. These ahadith are:

كَانَ رَسُولُ اللَّهِ صلى الله عليه وسلم إِذَا عَطَسَ وَضَعَ يَدَهُ أَوْ ثَوْبَهُ عَلَى فِيهِ وَخَفَضَ أَوْ غَضَّ بِهَا صَوْتَهُ . شَكَّ يَحْيَى .

When the Messenger of Allah (S.W.T) sneezed, he placed his hand or a garment on his mouth, and lessened the noise. The transmitter; Yahya, is doubtful about the exact words khafada or ghadda (lessened).[38]

أَنَّ النَّبِيَّ صلى الله عليه وسلم كَانَ إِذَا عَطَسَ غَطَّى وَجْهَهُ بِيَدِهِ أَوْ بِثَوْبِهِ وَغَضَّ بِهَا صَوْتَهُ . قَالَ أَبُو عِيسَى هَذَا حَدِيثٌ حَسَنٌ صَحِيحٌ .

When the Messenger of Allah (S.A.W) would sneeze, he would cover his face with his hand or with his garment, and muffle the sound with it.[39]

As described earlier, this is what Allah (S.W.T) has shown health experts in the modern medicine nowadays as among of the methods of controlling and preventing the infectious diseases that spread through respiratory droplets or contact routes. For-example, for the present outbreak of the COVID-19, to protect yourself and others, it is advised by the health experts and public health agencies; such as WHO, CDC and ECDC, to wear a mask; especially in crowded public places. CDC have added that if someone has not wearing a mask, he should cover the mouth and nose by hand when coughing or sneezing.[40] Likewise, according to WHO, if someone is not wearing a mask, should cough into a bent elbow or tissues;[41]similar to the above ahadith. Therefore, the implication of this maxim is to prevent the spread of the infectious organisms; such as bacteria and viruses, causing infectious diseases that are transmitted through respiratory droplets.

Should not mix the sick with the healthy or affected with un-affected

In order to avoid the spread of infectious diseases; especially when there is an outbreak, prophet Muhammad (S.A.W) has taught that we should not mix the sick with the healthy or affected with un-affected; for both animals and humans. This maxim is the hadith narrated by Abu Huraira (R.A.) which was reported by Al-Imam Al-Bukhari in his sahih.

لاَ يُورِدَنَّ مُمْرِضٌ عَلَى مُصِحٍّ

Livestock (sheep, cattle, camels, etc.) affected by the disease should not be mixed with healthy livestock (or he said: should not be mixed with sick and healthy) (as a precaution).[42]

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[32]World Health Organization (WHO). (2021). The top 10 causes of death. Available online at: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death. Accessed on September 24, 2020.

[33]World Health Organization (WHO). (2020a). Modes of transmission of virus causing COVID-19: Implications for IPC precaution recommendations. Available at: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations. Accessed on September 22, 2021.

[34]European Centre for Disease Control and Prevention (ECDC). (2021). Infection prevention Control and preparedness for COVID-19 in Healthcare settings sixth update. Available at: https://www.ecdc.europa.eu/en/publications-data/infection-prevention-and-control-and-preparedness-covid-19-healthcare-settings. Accessible on September 14, 2021.

[35]Centres for Disease Control and Prevention (CDC). (2021a). How to Protect Yourself & Others. Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html. Accessed on September 14, 2021.

[36]Nester, W.E., Anderson, G. D., Robert, E. C & Nester, T. M. (2007). *Microbiology. A Human perspective*. New York: McGraw-Hill.

[37]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology*. USA: McGrewHill Companies.

[38]Ash'ath, H. (2008). Sunan Abu Dawud (K. Nasiruddin, Trans). Riyadh. Saud Arabia: Darussalam global leader in Islamic books. Volume number 5. Hadith number 5029.

[39] At-Tirmidhi, H. (2007). Sunan At-Tirmidhi (A. Khaliyl, Trans). Riyadh. Saud Arabia: Darussalam global leader in Islamic books. Volume number 5. Hadith number 2745.

[40]Centres for Disease Control and Prevention (CDC). (2021a). How to Protect Yourself & Others. Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html. Accessed on September 14, 2021.

[41]World Health Organization (WHO). (2021). The top 10 causes of death. Available online at: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death. Accessed on September 24, 2020.

[42] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saud Arabia: Darussalam Publishers and Distributers. Volume 7. Hadith number 5771 & 5774.

And one should run away from the leper as one runs away from a lion

Another hadith is that which was narrated by Abu Huraira (R.A) and reported by al-Imam al-Bukhari in his sahih. In this hadith prophet Muhammad (S.A.W) said:

وَفِرَّ مِنَ الْمَجْذُومِ كَمَا تَفِرُّ مِنَ الأَسَدِ

And one should run away from the leper as one runs away from a lion.[43]

It's obvious that, here, the prophet Muhammad (S.A.W) intended to warn us to take appropriate precautions in avoiding the transmission of leprosy (Hansen's disease) from a leper, but he didn't intend that we should exactly run away. The implication of this maxim is clearly seen from the signs that Allah (S.W.T) has shown health experts in the modern medicine. According to Centres for Disease Control and Prevention (CDC), it is not known exactly how Hansen's disease is transmitted between individuals. Currently, health experts think that it may be transmitted when infected individual (patient) coughs or sneezes and a healthy person breathes in the droplets containing the bacteria. Prolonged direct contact with a person having un-treated leprosy over many months is needed to catch the disease (CDC, 2017). This is also the case for tuberculosis.[44] Likewise, Cruz *et al*., 2017 have reported that leprosy is caused by bacteria such as *Mycrobacterium leprae* (*M. leprae*) and *Mycobacterium lepromatosis* (*M. lapromatosis*), and that, in most cases, it is transmitted through respiratory droplets;via nasal discharge, coughing and sneezing, from person to person through direct contact with patients that have a high bacillary index and have not been treated.[45] Likewise, the implication of this maxim is that the respiratory droplets of a leper has got some infectious agents that cause leprosy. According to the above signs, these infectious agents are bacteria. Hence, serious precautions should be taken to avoid their transmission.

During the lifetime of prophet Muhammad (S.A.W), there was a leper in the delegation of Thaqif, but after knowing that in that delegation there is a leper, prophet Muhammad (S.A.W) did not go to meet them; avoiding close contact with him such as shaking hand, body contact etc. Instead he sent them a message that we have accepted your oath of allegiance, so you may go. This hadith was narrated by 'Amr bin Sharid (R.A) and reported to us by Al-Imam Al-Muslim in his sahih:

عَنْ عَمْرِو بْنِ الشَّرِيدِ، عَنْ أَبِيهِ، قَالَ كَانَ فِي وَفْدِ ثَقِيفٍ رَجُلٌ مَجْذُومٌ فَأَرْسَلَ إِلَيْهِ النَّبِيُّ صلى الله عليه وسلم " إِنَّا قَدْ بَايَعْنَاكَ فَارْجِعْ " .

'Amr bin Sharid reported on the authority of his father that there was in the delegation of Thaqif a leper. Allah's Messenger sent word to him saying: We have accepted your oath of allegiance; so you may go.[46]

This is another maxim which has laid down the foundation and showed direction of the methods of controlling and preventing the infectious diseases that are transmitted through respiratory droplets and contact routes. These methods are avoiding crowds, isolation and strictly adherence to social distancing. As described in the previous ahadith, this is also what Allah (S.W.T) has shown medical experts as the methods of controlling and preventing the transmission of leprosy; such as avoiding contact with un-treated leprosy patient, and other infectious diseases mentioned earlier that include tuberculosis, chickenpox, pertussis (whooping cough), respiratory syncytial virus (RSV) as well as the present COVID-19 pandemic.

When you hear that it (plague) has break on out in a certain territory, do not go there. If it breaks out in the territory you are in, do not go out fleeing away from it

In the hadith narrated by Abdul-Rahmaan bin Awf (R.A) which was reported by Al-Imam Abu Dawud in his sunan, prophet Muhammad (S.A.W) said:

إِذَا سَمِعْتُمْ بِهِ بِأَرْضٍ فَلاَ تُقْدِمُوا عَلَيْهِ وَإِذَا وَقَعَ بِأَرْضٍ وَأَنْتُمْ بِهَا فَلاَ تَخْرُجُوا فِرَارًا مِنْهُ

When you hear that it (plague) has break on out in a certain territory, do not go there. If it breaks out in the territory you are in, do not go out fleeing away from it. Al-Imam Abu Dawud commented that: يَعْنِي الطَّاعُونَ, this means, plague (*at-Twauun*).[47]

Likewise, there was a situation that happened during the reign of 'Umar bin Khattab (R.A) when he departed for Sham. When he reached Sargh he made a decision to return to Madina after being told that there was an outbreak of epidemic in Sham. Abu bin Al-Jarrah (R.A) asked him: *"Are you running away from what Allah had ordained?"* 'Umar replied, "Would that someone else had said such a thing, O Abu 'Ubaida! Yes, we are running from what Allah (S.W.T) had ordained to what Allah (S.W.T) has ordained." At that time `Abdur-Rahman bin `Auf (R.A), who had been absent because of some reason came and said, "I have some knowledge about this matter [He mentioned a similar hadith that]: I have heard Allah's Messenger saying, *"If you hear about it (an outbreak of plague) in a land, do not go to it; but if plague breaks out in a country where you are staying, do not run away from it."*Then

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[43] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saud Arabia: Darussalam Publishers and Distributers. Volume 7. Hadith number 5707.
[44]See Brook*et al*., 2013; especially chapter 23, for more information about the spread of tuberculosis.
[45]Cruz, R. C., Buhrer-Sekula, S., Penna, M. L. F., Penna, G. O &Talhari, S. (2017). Leprosy: current situation, clinical and laboratory aspects, treatment history and perspective of the uniform multidrug therapy for all patients.*Anais Brasileiros de Dermatologia*, 92(6): 761–773. Doi: 10.1590/abd1806-4841.20176724.
[46] Al-Hajaj, A. (2007). Sahih Al-Muslim (N. Al-Khattab, Trans). Riyadh. Saud Arabia: Darussalam Global leader in Islamic books. Volume 5. Hadith number 5822.
[47]Ash'ath, Hafidh. (2008). Sunan Abu Dawud (K. Nasiruddin, Trans). Riyadh. Saud Arabia: Darussalam global leader in Islamic books. Volume 4. Hadith number 3103.

'Umar thanked Allah (S.W.T) and returned to Medina. This narration was given by Abdullah ibn Abbas (R.A) and reported to us by Al-Imam Al-Bukhari in his sahih.

Actually, this maxim expose the quarantine of nowadays which is taught in all universities that offers medical courses.[48] Quarantine means that when the outbreak of infectious disease occurs in a certain region, people who live in that particular region should not go out of that region to other regions, and people who are at other regions should not go out to that region which has an outbreak. The implication of this maxim is to prevent further transmission of contagious disease to other people who are not exposed. Health experts and public health authorities are emphasizing this method; together with the travelling restrictions, in the present outbreak of COVID-19. The list of quarantinable infectious diseases provided by the CDC include diphtheria, cholera, infectious tuberculosis, smallpox, plague, viral haemorrhagic fever (Ebola, Marburg and Crimean-Congo), yellow fever and severe acute respiratory syndrome such as SARS, MERS and COVID-19.[49] Following such emphasis, some countries adopted quarantine and lockdown methods; together with travelling restrictions, in the present COVID-19 pandemic.

None (among the believers) remains patient in a land in which plague has broken out and considers that nothing will befall him except what Allah has ordained for him, but that Allah will grant him a reward similar to that of a martyr

Also, there is another hadith narrated by our mother 'Aaisha (R.A) which was reported by Al-Imam Al-Bukhari in his sahih. This hadith includes the above maxim and other important maxims:

" أَنَّهُ كَانَ عَذَابًا يَبْعَثُهُ اللَّهُ عَلَى مَنْ يَشَاءُ، فَجَعَلَهُ اللَّهُ رَحْمَةً لِلْمُؤْمِنِينَ، فَلَيْسَ مِنْ عَبْدٍ يَقَعُ الطَّاعُونُ فَيَمْكُثُ فِي بَلَدِهِ صَابِرًا، يَعْلَمُ أَنَّهُ لَنْ يُصِيبَهُ إِلاَّ مَا كَتَبَ اللَّهُ لَهُ، إِلاَّ كَانَ لَهُ مِثْلُ أَجْرِ الشَّهِيدِ ". تَابَعَهُ النَّضْرُ عَنْ دَاوُدَ.

Plague was a punishment which Allah used to send on whom He wished, but Allah made it a blessing for the believers. None (among the believers) remains patient in a land in which plague has broken out and considers that nothing will befall him except what Allah has ordained for him, but that Allah will grant him a reward similar to that of a martyr.[50]

This hadith shows that prophet Muhammad (S.A.W) was informed by Allah (S.W.T) about many signs of plague disease; and probably other infections. These signs include their epidemiologies that include methods of transmission, its method of control and prevention (quarantine and isolation), its severity and even its causative agents. That's why he laid down two maxims: (1) During quarantine people should be patient; hopping the rewards from Allah (S.W.T) because of their submission by not going out of the infected regions. With that patient, they should bear in mind that they will not be infected without the permission from Allah (S.W.T) through His decree. This is in-line with the hadith of Abu Huraira (R.A) which was reported by Al-Imam Al-Bukhari in his sahih. This hadith state that there is no *'adwa* (disease or contagion) which is conveyed from the sick to the healthy without Allah's permission. (2) When it happens that someone is infected and dies; after fulfilling all these conditions, he dies as a martyr.

According to the signs in the modern medicine, the implication of the first maxim is to avoid further transmission of the infections, the implication of the second maxim is to avoid anxiety; which is among of the factors that may contribute to the weakening of the immune system, making someone highly susceptible to the severity of the disease if will be infected. This is what we see nowadays when there is an outbreak of infectious diseases, especially for the present COVID-19 pandemic. During the first wave of this pandemic, most of the health experts, public health authorities and various Governments emphasized the borders to be closed, restricting the movement of people and goods from one country to another; which is quarantine, and avoiding anxiety. However, as said before, some of the countries went further by enforcing lockdown policies which restricted people not going out of their houses. Through these approaches, at least they have managed to contain the pandemic. The countries that adopted quarantine and lockdown include Denmark, Netherlands, Germany, Hungary, Latvia, Romania, Slovakia, Finland, Lithuania, Ukraine, Russia, Albania, Kosovo, Czechia, Serbia, Croatia, Romania, Bosnia-Herzegovina (early lockdown), Australia, France, Portugal, Greece, Moldova, Poland (medium late lockdown), Ireland, Italy, Spain, Switzerland, Luxemburg, Belgium, Germany, Netherlands, UK, Cyprus, Ireland, Estonia, Russia (late lockdown).[51]

Purification is half the faith

The practice of frequent hand washing; a fairly simple routine that physically removes microorganisms, is emphasized much in the modern medicine in order to control and prevent the transmission of various infectious diseases that can be transmitted when a person touches contaminated fomites or when one person physically touches another.[52] [53]All public health agencies mentioned earlier emphasize this practice, especially in the present COVID-19

[48]Brooks *et al*., 2013 have reported this method in their Microbiology text book taught in all medical school.

[49]Centres for disease control and prevention (CDC). (2021b). When and how to wash your hands. Available at https://www.cdc.gov/handwashing/when-how-handwashing.html. Accessed on September 16, 2021.

[50] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saud Arabia: Darussalam Publishers and Distributers. Volume 7. Hadith number 5734.

[51]Plumper, T & Neumayer, E. (2020). Lockdown policies and dynamics of the first wave of the SAR-CoV-2 pandemic in Europe. *Journal of European Public policy*, https://doi.org/10.1080/13501763.2020.1847170.

[52]Nester, W.E., Anderson, G. D., Robert, E. C & Nester, T. M. (2007). *Microbiology. A Human perspective*. New York: McGraw-Hill.

[53]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.

pandemic. CDC put much emphasis on washing hands with flowing water and soap for not less than 20 seconds in order to prevent the infection of coronavirus.[54][55]

But for Muslims, as in other methods of controlling and preventing the infectious diseases, this practice is not new to them. There is another maxim given by the Prophet Muhammad (S.A.W) which has laid down the foundation and showed direction of this method. It says, the cleanliness; which includes frequent handwashing and others such as bathing etc, is half of faith. This is according to the hadith narrated by Abu Malik Al-Ash'ari (R.A) which was reported by Al-Imam Muslim in his sahih:

الطُّهُورُ شَطْرُ الإِيمَانِ

Purification is half the faith.[56]

Maxims in steps of ablution

The above hadith is strongly supported by the glorious *Qur'an*, *Surat Al-Maaida*, 5:6 which command the believers to take ablution before each prayer; whether optional (*sunnah*) or compulsory (*fardh*) prayer. It says:

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قُمْتُمْ إِلَى الصَّلَاةِ فَاغْسِلُوا وُجُوهَكُمْ وَأَيْدِيَكُمْ إِلَى الْمَرَافِقِ وَامْسَحُوا بِرُءُوسِكُمْ وَأَرْجُلَكُمْ إِلَى الْكَعْبَيْنِ ۚ وَإِن كُنتُمْ جُنُبًا فَاطَّهَّرُوا ۚ وَإِن كُنتُم مَّرْضَىٰ أَوْ عَلَىٰ سَفَرٍ أَوْ جَاءَ أَحَدٌ مِّنكُم مِّنَ الْغَائِطِ أَوْ لَامَسْتُمُ النِّسَاءَ فَلَمْ تَجِدُوا مَاءً فَتَيَمَّمُوا صَعِيدًا طَيِّبًا فَامْسَحُوا بِوُجُوهِكُمْ وَأَيْدِيكُم مِّنْهُ ۚ مَا يُرِيدُ اللَّهُ لِيَجْعَلَ عَلَيْكُم مِّنْ حَرَجٍ وَلَٰكِن يُرِيدُ لِيُطَهِّرَكُمْ وَلِيُتِمَّ نِعْمَتَهُ عَلَيْكُمْ لَعَلَّكُمْ تَشْكُرُونَ

Oyou who have believed, when you rise to [perform] prayer, wash your faces and your forearms to the elbows and wipe over your heads and wash your feet to the ankles. And if you are in a state of janābah, then purify yourselves. But if you are ill or on a journey or one of you comes from the place of relieving himself or you have contacted women and do not find water, then seek clean earth and wipe over your faces and hands with it. God does not intend to make difficulty for you, but He intends to purify you and complete His favor upon you that you may be grateful (Surat Al-Maaidah, 5:6) (Saheeh International Translation).

According to the above verse and its description in the *sunnah*, Muslims take ablution 5 times or more per day. In each ablution they wash their hands 3 times, they take water into their mouth and blowing it out 3 times, they take water into their nose and blowing it out; as stated in the above hadith, 3 times, they wash their faces 3 times, they wash their hands up to the ankle 3 times, they rub their wet hand on their head and ears 1 time, and they wash their legs [up to the ankle].

Whoever performs ablution should clean his nose with water by putting the water in it and then blowing it out

On the side of ahadith, among of the ahadith that describe the steps of taking ablution is that which was narrated by Abu Huraira (R.A) and reported by Al-Imam Al-Bukhari in his sahih:

مَنْ تَوَضَّأَ فَلْيَسْتَنْثِرْ، وَمَنِ اسْتَجْمَرَ فَلْيُوتِرْ

Whoever performs ablution should clean his nose with water by putting the water in it and then blowing it out, and whoever cleans his private parts with stones should do it with odd number of stones.[57]

In the modern medicine, all these parts of the body that Muslims washes and rub during ablution; such as mouth, nose, ear and skin, are among of the body parts called portal of entries, where pathogens reside and use them to enter the body cells. For-example, among of the methods of transmission of some infectious diseases; especially COVID-19, is through aerosols [the mixture of air, water and dusts].[58] But by the decree of Allah (S.W.T), usually these aerosols are trapped by the nasal hairs and mucus present in the nose. Zou *et al*., 2020 analysed viral load in nasal and throat swabs obtained from 17 symptomatic patients in relation to day of onset of any symptoms. Higher viral loads were detected soon after symptom onset, with higher viral loads detected in the nose than in the throat.[59]Hence, as explained in the above hadith, if a person is performing ablution5 times a day or more; by taking water in the nose and blowing it out 3 times, the viral load will be reduced or expelled out all. Therefore, this maxim has laid the foundation and showed direction of controlling and preventing the transmission of the infectious diseases that are transmitted through inhaling aerosols. However, this method is not mentioned in the modern medicine as the method of control and preventing the spread of COVID-19.

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[54]Centres for Disease Control and Prevention (CDC). (2020b). History of the Quarantine. Available at: https://www.cdc.gov/quarantine/historyquarantine.html. Accessible on September 14, 2021.

[55]Centres for Disease Control and Prevention (CDC). (2021a). How to Protect Yourself & Others. Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html. Accessed on September 14, 2021.

[56] Al-Hajaj, A. (2007). Sahih Al-Muslim (N. Al-Khattab, Trans). Riyadh. Saud Arabia: Darussalam Global leader in Islamic books. Volume number 7. Hadith number 534.

[57] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saudi Arabia: Darussalam Publishers and Distributers. Volume 1. Hadith number 161.

[58]Nester, W.E., Anderson, G. D., Robert, E. C & Nester, T. M. (2007). *Microbiology. A Human perspective*. New York: McGraw-Hill.

[59]Zou, L. Z., Ruan, F., Huang, M., Liang, L., Huang, H., Hong, Z., *et al*., (2020). SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *The New English Journal of Medicine*, 382:12.

If it were not that it would be difficult on my nation, then I would have ordered them to use the Siwak for each prayer

Prophet Muhammad (S.A.W) wished to command his *umma* to cleans their mouth every time they perform ablution (every time of prayer). This shows that there is something wrong if someone is not cleansing the mouth regularly. It shows clearly that either he was informed or shown by Allah (S.W.T); through Jibril or *ilham*, that in the mouth there are millions of normal microbiota [such as bacteria and fungus], or he was only informed about the effects of not cleansing the mouth regularly. This is according to the maxim which was narrated by Abu Huraira (R.A) and reported by Al-Imam Muslim in his sahih:

لَوْلَا أَنْ أَشُقَّ عَلَى أُمَّتِي لَأَمَرْتُهُمْ بِالسِّوَاكِ مَعَ كُلِّ وُضُوءٍ

If it were not that it would be difficult on my nation, then I would have ordered them to use the Siwak for each prayer.[60]

It is also stated that this maxim was also narrated by Jabir and Zaid bin Khalid (R.A.) from the prophet Muhammad (S.A.W), but they did not distinguish between a person who is fasting and the one who is not fasting in this matter (of using *siwak*).

As in all other signs, Allah (S.W.T) has already shown health experts the medical implications of this maxim. According to WHO, about half of the world's population suffer from dental caries, making it the most prevalent problem of all medical problems.[61]The mouth is the second most diverse microbial community in the body, housing over 700 species of bacteria that colonise the hard surfaces of the teeth (front and back), tongue, saliva, gingival sulcus, mucus on inner walls of the cheeks, attached gingiva, soft palate, hard palate and lips.[62]According to Khoruts, 2010, it harbour about 500-1000 species of bacteria. But you will not find all of them in the mouth of one person at all time. At any given time, the human mouth contains about 100-200 species.[63] One milliliter of saliva contains about 100 million bacteria[64], while less than 100 milliliter of saliva contains about 9 billion bacteria.[65] One tooth can harbour about 1,000-100,000 bacteria for a person who clean the mouth regularly, and 100 to 1 billion for a person who does not clean the mouth regularly.[66]

Brooks *et al*., 2013 have reported that with the help of transferase enzymes present on the surface of their cells, these bacteria use sucrose to produce extracellular polyglycans (dextransandlevans). Production of these polyglycans helps them to attach, assemble and compact [eachother]on the surface of the teeth or gums. As in the surfaces of other objects, during their attachement, they form a joint collection called biofilms (dentalplaque). This accumulation is usually stuck between tooth and tooth, on the tooth (in-front of the tooth, behind the tooth and the cavities of the jaws), and on the gums of the tooth (on the border of the gums, where the teeth meet). In this adhesion, this concentration is usually covered with a polysaccharide matrix (glycocalyx). In most cases, the bacteria that begins to attach is *Streptococcus mutans*, followed by others such as *Streptococci* spp (*S. salivarius*, *S. Sanguis*and*S. sobrinus*), *Lactobacilli* (*L. Acidophilus*and*L. casei*) and *Actinomycetes* (*A. Viscosis* and *A . naeslundii*). In number, a single biofilm or a mature plaque can contain approximately 300-400 species of bacteria.[67]

They reproduce faster because they undergo glycolysisprocess, which uses there mains of free sugar of monosaccharides (eg., glucoseandfructose) and dissaccharides (e.g., sucrose,lactose and maltose) that we eat in foods such as sugary refreshments (sweet drinks of milk and fruit, and 100% fruitjuices), cakes, biscuits, sugary grains etc. This process produce lactic acid.[68] [69] About 20 minutes or longer after eating; especially when someone has not cleanse the mouth, this acid starts to digest the hard outer layer of the teeth called enamel.[70]Then, protein digestion of the following layers follows: the lower layer (dentin) and the hard membranes around the root of the tooth (cementum). This may lead to demineralization, a process whereby the teeth loose their minerals such as calcium and phosphateions. This condition causes the teeth to loose their color and varies from green to black.[71] Then, dental decay

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[60] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saudi Arabia: Darussalam Publishers and Distributers. Volume 3. Hadith number 1933.

[61]World Health Organization (WHO). (2017). Sugars and dental caries. Available at: https://apps.who.int/iris/bitstream/handle/10665/259413/WHO-NMH-NHD-17.12-eng.pdf. Accessed on September 16, 2021.

[62]Kilian, M., Chapple, I. L. C., Marsh, P. D., Pedersen, A. M., Tonetti, M. S., Wade, W. G &Zura, E. (2016). The oral microbiome: An update for oral healthcare professionals. British Dental Journal, 221:657-666.

[63]Khoruts, A. (2010). How Microbes Defend and Define Us which was published by the New York Times. Availableat: https://www.nytimes.com/2010/07/13/science/13micro.html. Accessed on September 16, 2021.

[64]Curtis, M. A., Zenobia, C & Darveau, R. P. (2011). The relationship of the oral microbiota to periodontal health and disease. *Cell host microbe*, 10 (4): 302-306. Doi: 10.1016/j.chom.2011.09.008.

[65]Sender, R., Fuchs, S & Milo, R. (2016). Revised Estimates for the Number of Human and Bacteria Cells in the Body. *PLoS Biology* 14(8): e1002533. https://doi:10.1371/journal.pbio.1002533.

[66] Oral ecology. Available online at: https://en.wikipedia.org/wiki/Oral_ecology. Accessed on September 28, 2021.

[67]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology*. USA: McGrewHill Companies.

[68]World Health Organization (WHO). (2017). Sugars and dental caries. Available at: https://apps.who.int/iris/bitstream/handle/10665/259413/WHO-NMH-NHD-17.12-eng.pdf. Accessed on September 16, 2021.

[69]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.

[70] An article The best and worst foods for your teeth. Available online at: https://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=4062. Accessed on September 28, 2021.

[71]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.

(dental caries or dental cavity) and other dental diseases such as gingivitis[72] and periodontitis[73] follows. Periodontitis condition can lead to the loss of the teeth, and there is also a risk of secondary infection. These bacteria can enter the blood stream where they can cause blood infection (sepsis) which may lead to systemic infection.[74][75]

In addition, the metabolic activities of these bacteria stated above involves the breakdown of sulfur-containing amino acids such as methionine, cystine and cysteine. This process leads to the production of volatile sulfur compounds (VSCs) that include hydrogen sulfied (H2S) and methyl mercaptan (CH_3SH) that are major cause for intra-oral halitosis, bad mouth breath.[76]

Generally, the number of bacteria in the mouth reaches about 20 billion, and during their reproduction they double their number 5 times in 24 hours.[77] In order to reduce their rate of reproduction and their effects, modern medicine recommend to reduce eating the foods containg much sucrose and eating balanced diet with enough protein, to reduce oral acid production by reducing carbohydrate intake, and brushing teeth thoroughly twice a day and floss daily between the teeth to remove dental plaque.[78] [79] [80] Also, these recommendations are not new to the Muslim world. As stated earlier, the prophet Muhammad (S.A.W) has given the maxim that laid the foundation and showed direction on the medical implication of cleaning the mouth regularly by using *siwak* (*miswak*). Likewise, Allah (S.W.T) has already enable the medical experts to uncover that *siwak* is loaded with natural chemicals that help to slow down the reproduction rate of these bacteria or to kill them completely without any sidee ffects; compared to the modern oral medicine (toothpaste).[81] Hence, for the rate of reproduction of these bacteria, the number of oral hygiene recommended in the modern medicine is not enough to reduce and completely avoid their effects. The only sufficient number is many times per day as prophet Muhammad (S.A.W) wished to command us to do.

Hence, Muslims have been clean since the 7thcentury. On the other side, for the non-Muslims; especially the developed countries, they began to be civillized and put an emphasis on oral hygiene towards the end of the 19th century, after Allah (S.W.T) to enable Prof. Dr. Willoughby D. Miller to write a book Micro-organisms of the Human Mouth: The Local and General Diseases which are caused by them.[82] It's first edition was published in German in 1889, but it did not gain much popularity. One year later (1890), it was translated into English. It was by this time that Europe started to get light, as it was the first book of Western Medicine to describe the presence of various microbes in the human mouth, its effects, methods of oral hygiene and the importance of oral hygiene. Therefore, Westerners began to appreciate the importance of cleansing the mouth in the late 19th century, 12 centuries later after Muslims to know and starting implementing this matter.

When the dog licks a utensil, wash it seven times, and rub it with earth the eighth time

The foundation and direction of Microbiology and Bacteriology were also laid down by prophet Muhammad (S.A.W) through *Qur'an*, *Surat Saba*, 34:3 and various ahadith reported by Al-Imam Al-Bukhari, Al-Imam Muslim, Al-Imam Abu Dawud etc. For-example, a hadith narrated by Ibn Al-Mughafali (R.A) and reported by Al-Imam Al-Muslim in his sahih says:

أَمَرَ رَسُولُ اللَّهِ صلى الله عليه وسلم بِقَتْلِ الْكِلاَبِ ثُمَّ قَالَ " مَا بَالُهُمْ وَبَالُ الْكِلاَبِ " . ثُمَّ رَخَّصَ فِي كَلْبِ الصَّيْدِ وَكَلْبِ الْغَنَمِ وَقَالَ " إِذَا وَلَغَ الْكَلْبُ فِي الإِنَاءِ فَاغْسِلُوهُ سَبْعَ مَرَّاتٍ وَعَفِّرُوهُ الثَّامِنَةَ فِي التُّرَابِ

The Messenger of Allah (S.A.W) ordered killing of the dogs, and then said: What about them, i.e. about other dogs? and then granted concession (to keep) the dog for hunting and the dog for (the security) of the herd, and said: When the dog licks the utensil, wash it seven times, and rub it with earth the eighth time.

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[72]Irritation, redness and swelling (inflammation) of gingiva (the part of your gum around the base of your teeth).

[73]The late stage of gingivitis characterized by swelling of the tissues surrounding the teeth, pulling up of the gum from the teeth, damage to the ligaments tha thold the teeth and supportive tissues of alveolar, and the formation of hard tissues around the teeth.

[74]Kilian, M., Chapple, I. L. C., Marsh, P. D., Pedersen, A. M., Tonetti, M. S., Wade, W. G &Zura, E. (2016). The oral microbiome: An update for oral healthcare professionals. British Dental Journal, 221:657-666.

[75]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.

[76]Kilian, M., Chapple, I. L. C., Marsh, P. D., Pedersen, A. M., Tonetti, M. S., Wade, W. G &Zura, E. (2016). The oral microbiome: An update for oral healthcare professionals. British Dental Journal, 221:657-666.

[77] Dr Walter Loesche as reported in the article *Oral bacteria: how many? How fast?* Written by Bill Landers. Available online at: https://www.rdhmag.com/infection-control/water-safety/article/16404976/oral-bacteria-how-many-how-fast. Accessed on September 28, 2021.

[78]Centre for Disease Control and Prevention (CDC). (2021c). Oral health tips. Available at: https://www.cdc.gov/oralhealth/basics/adult-oral-health/tips.html. Accessible on September 27, 2021.

[79]World Health Organization (WHO). (2017). Sugars and dental caries. Available at: https://apps.who.int/iris/bitstream/handle/10665/259413/WHO-NMH-NHD-17.12-eng.pdf. Accessed on September 16, 2021.

[80]Kilian, M., Chapple, I. L. C., Marsh, P. D., Pedersen, A. M., Tonetti, M. S., Wade, W. G &Zura, E. (2016). The oral microbiome: An update for oral healthcare professionals. British Dental Journal, 221:657-666.

[81]Haque, M. M &Alsareii, S. A. (2015). A review of the therapeutic effects of using miswak (Salvadora persica) on oral health. *Saudi Medical Journal*, 36 (5).

[82]Kilian, M., Chapple, I. L. C., Marsh, P. D., Pedersen, A. M., Tonetti, M. S., Wade, W. G & Zura, E. (2016). The oral microbiome: An update from oral healthcare professionals. British Dental Journal, 221:657-666.

Al-Imam Abu Dawud in his sunan has reported another hadith that was narrated by Abu Huraira (R.A). This hadith states that:

طُهُورُ إِنَاءِ أَحَدِكُمْ إِذَا وَلَغَ فِيهِ الْكَلْبُ أَنْ يُغْسَلَ سَبْعَ مِرَارٍ أُولاَهُنَّ بِتُرَابٍ

The purification of the utensil belonging to any one of you, after it has been licked by a dog, consists of washing it seven times, using sand in the first instance.[83]

He added that, a hadith like this has also been narrated by Ayyub and Habib bin Ash-Shahid (R.A) from prophet Muhammad (S.A.W). In hadith number 73 it is stated that, "*...the seventh of them being with sand."* Al-Imam Abu Dawud also said that some narrators have narrated this hadith without mentioning the soil. In the hadith number 72, Al-Imam Abu Dawud reported that, in other narrations, other narrators have narrated similar meanings (to hadith number 71) from Abu Huraira (RA) without relating their narrations to the prophet Muhammad (S.A.W), *marfu'u*, with the addition: *"...and if a cat lick a vessel, it should be washed once."*

In these ahadith, prophet Muhammad (S.A.W) said, when dogs lick avessel it should be washed with water '7' times, and the 8th time should be washed with clay; or one of them should be with soil. And when a cat licks a vessel it should be washed once by water. In his translation of sunan Abu Dawud, a translator (Dr. Nassiruddin Al-Khattab) has interpreted that, the 8th time is to rub by mud. According to the signs in the modern medicine, the implications of this maxim is that, in the saliva of dogs; and even cats, there are 'contents' that; apart from being 'invisible' without being magnified under the microscope, are also a serious threat to human health, to the extent that in the beginning, the prophet Muhammad (S.A.W) wanted the dogs to be killed.

These ahadith clearly shows that either the prophet Muhammad (S.A.W) was informed by Allah (S.W.T) (through Jibril) about the contents of the dog and cats's saliva or may have been shown the bacteria themselves. We have ahadith of our mother 'Aaisha (R.A) which gives us a picture of this suggestion. Al-Imam Al-Bukhari has reported a hadith narrated by Abu Salama ibn 'Abdul-Rahmaan (R.A) who said, indeed 'Aisha (R.A); the wife of the Prophet (S.A.W), said:

يَا عَائِشَ هَذَا جِبْرِيلُ يُقْرِئُكِ السَّلاَمَ ". قُلْتُ وَعَلَيْهِ السَّلاَمُ وَرَحْمَةُ اللَّهِ. قَالَتْ وَهْوَ يَرَى مَا لاَ نَرَى.

O 'Aisha, thisisJibrilgreetingyou. I said: anduponhimbethepeaceandmercyof Allah (S.W.T). AndreferringtotheProphet (S.A.W) he said: Youseewhat I do notsee [mytranslation].[84]

Recently, the same Allah (SWT)] who informed His final Messenger [Muhammad (S.A.W)] about the danger of the contents of dog and cat's saliva without the use of any kind of tools, equipements, reagents/chemicals and laboratory techniques, is the same who informed and showed the modern medical microbiologists through various tools, equipements, reagents/chemicals and laboratory techniques that, in the dog and cat's saliva there are many bacteria that are dangerous to our health, that in any case, should be avoided. The following are references from some studies that shows the level of biofilms in the mouths of dogs and cats, and the risk of its transmission to humans.

Talan *et al*., 1999 conducted a study of 50 human wounds caused by dog bites and 57 human wounds caused by cat bites.[85] In this study, pasteurella species were found to be the most common cause of wounds caused by both dog bites (50%) and cat bites (75%). *Pasteurella canis* was the most common cause of dog-bite wounds, and *Pasteurell amultocida subspecies multocida* and *septica* were the most common cause of cat-bite wounds. Generally, the most important aerobic bacteria included *streptococci*, *staphylococci*, *moraxella* and *neisseria*. Anaerobic bacteria that appeared in large numbers included *fusobacterium*, *bacteroides*, *porphyromonas* and *prevotella*. Bacteria that in the past were not known to be harmful to humans (pathogens) included *Reimerella anatipestifer* from two cat-borne wounds, and *Bacteroidestectum*, *Prevotella heparinolytica* and many porphyromonas species from fungal wounds for all dogs and cats. *Erysipelothrixrhusio-pathiae* were found in two wounds caused by cat bite.

Bailie *et al*., 1978 examined the fluid in the mouths and noses of 50 dogs.[86] The most common identified bacteria were IIj, EF-4, *Pasteurella multocida*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, group D streptococci, Corynebacterium sp., *Enterobacteria*, Neisseria sp., Moraxellasp and Bacillus sp. Thepresence of IIj, EF-4, *Pasteurella multocida*; that are pathogens to human, may be considered as contamination, that they entered the dog's mouths and nostrils through dirt or dust.

In their study, Zambori *et al*., 2013 stated that, on a regular basis, microbiology of dog-borne pathogens involves a combination of microbes.[87] These microbes include Staphylococcus species, alpha-hemolytic streptococci, *Pasteurella multocida*, *Eikenella corrodens* and *Capnocytophaga canimorsus* (formerly known as DF-2). The danger of *Capnocytophaga canimorsus* will be discussed in the next section.

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[83]Ash'ath, H. (2008). Sunan Abu Dawud (K. Nasiruddin, Trans). Riyadh. Saud Arabia: Darussalam global leader in Islamic books. Volume number 1. Hadith number 71.

[84] Ismail, A. (1997). Sahih Al-Bukhari (M. Khan, Trans). Riyadh. Saud Arabia: Darussalam Publishers and Distributors. Volume number 5. Hadith number 3768.

[85]Talan, D. A., Citron, D. M., Abrahamian, F. M. Goldstein, E. J. (1999). Bacteriololologic analysis of infected dog and cat bites. The new England Journal of Medicine, 340, 85-92. https://www.nejm.org/doi/pdf/10.1056/NEJM199901143400202?articleTools=true.

[86]Bailie, W. E., Stowe, E. C., & Schmitt, A. M. (1978). Aerobic bacterial flora of oral and nasal fluids of canines with reference to bacteria associated with bites. *Journal of Clinical Microbiology*, 7 (2): 223-31. https://jcm.asm.org/content/jcm/7/2/223.full.pdf.

[87]Zambori, C., Cumpanasoiu, C., Bianca, M &Tirziut, E. (2003). Biofilms in Oral Cavity of Dogs and Implication in Zoonotic Infections. *Animal Science and Biotechnology*, 46 (1). http://spasb.ro/index.php/spasb/article/view/105.

Also, Krauss *et al*., 2003 showed that, strains of *Staphylococcus* bacteria found in large amount of plaque on the supragingival (surface of the gum) and sub-gingival (on the surface of the area where the gums and teeth meet) in the dog's mouth were *S. epidermidis, S. Aureus, S. Intermedius* and *S. warneri*. Those identified from the wounds of those who were having dog-bites were *S. aureus, S. intermedius, S. epidermidis, S. warneri, andatleast, S. auricularis, S. hominis, S. cohnii* and *S.xylosus.*[88]

Similarly, Holmes *etal*., 1993 and Carlson *etal*., 1997 reported that, the most common species of neisseria bacteria that were identified in dog's mouths were *Neisseria weaver* (14%) (formerly called CDC group M-5), *Neisseria zoodegmatis* (10%) (formerly known as EF-4b), *Neisseria animaloris* (6%) (formerly known as EF-4a), *Neisseria subflava* (2%) as well as *Neisseria canis.*[89] *Neisseria weaver* is a normal microbiota that lives in the dog's mouth. The source of the infection is through a dog bite.

Also, in a study by Elliot *et al*., 2005, Allah (SWT) enabled them to use 16S rRNA gene sequencing technology to detect plaque in the mouths of 9 dogs and saliva of 5 dogs.[90] Their results showed that, the most common bacteria in the saliva were *Actinomyces* (26%), *Streptococcus* (18%) and *Granulicatella* (17%). The groups of bacteria that were most abundant in the plaque were *Porphyromonas* (20%), *Actinomyces* (12%) and *Neisseria* (10%).

It is important to note that, each group in these groups of bacteria consists of the milions of bacteria. Generally, the bacteria identified in these studies are very different from the normal microbiota that resides in side our bodies. This shows that, most of these bacteria are pathogens to the human. Thus, they are very dangerous to our health. This danger is confirmed through a case of Gred Mauntafel [described after the following section].

What happen when a dog or cat lick a vessel?

As usual, Allah (S.W.T) first informed the final messenger of this umma; prophet Muhammad (S.A.W), about everything that is important in this World and hereafter, and then later on showed part of their signs to other, including medical experts. What He showed the medical experts today about the maxims of the prophet Muhammad (S.A.W) concerning washing a vessel that has been licked by dog or cat is that, washing 6 or 7 times with water means using a plenty amount of water in removing bacteria that the dog has left in its saliva on the surface of a vessel. This is because, when these bacteria are placed on the surface of an object or organ, they reproduce at a rapid rate, and in the form of doubling growth as the statement of Allah (SWT) in the glorious *Qur'an, Surat Ad-Dhaariyat*, 51:49 reveals: *He has created everything in pairs*. One divides into two, and each of these two divides again into two, and the division continues. This is called binary fission. So, in a very short span of time, they have already forma collection (accumulation) made up of millions of bacteria. These collections are called biofilms.

This collection can be made up by one type of microbes or different types of microbes. It can be a collection of bacteria, fungi or even some protozoa. According to the signs that Allah (S.W.T) has shown the health experts via microbiological procedures, biofilm from dog saliva is formed by bacteria in the dog's saliva after the dog has bite or licked an object or organ or vessel and transferred the bacteria; that are contained in the saliva, to the surface of these things. After moving to the surface of these things, these bacteria arrange themselves in layers of cells on the particular surface. According to Reffuveille*et al*., 2017,[91] this process go through 4 main stages before they spread and infect:

1. Attachment on the particular surface, primary attachment. It is accomplished by Van der Waals forces, followed by the molecules that join these bacteria together on that surface, irreversible linkage. These molecules are called Microbial Surface Components Recognizing Adhesive Matrix Molecules (MSCRAMMs).
2. The bacteria that have already accumulated on the particular surface forms into small groups. These small groups are called microcolony or cellular accumulation.
3. Then, these bacteria; that are in the form of such collection of small groups, starts to reproduce in the form of many layers that are joined together. The joining of these bacteria is because they produce molecules that hold them together. These molecules are called polysaccharide intracellular adhesion (PIA).
4. Later on, these adhesive layers begin to separate, and bacteria from these layers begin to spread, ready to attack or infect.

Similar condition occurs in catheters used for the passage of urine, food etc.; to the patients having some diseases such as some kidney diseases and some systemic diseases, in devices that are installed as alternatives for teeth, eye, facial bones, hips, knees (or other joints), legs and arms (prosthesis), and in valves that are introduced as the replacement of the heart valves for patients with valvular heart diseases etc. As a result, it will aggravate the problem by causing certain bacterial infections; such as Coagulase Negative Staphylococcus (CoNS), that causes secondary infection in these patients. Therefore, washing 7 or 8 times; one of them being with sand, in cleansing a vessel that has been licked by dog, shows clearly that its purpose is to eliminate such

[88]Krauss, H.G, nawenzake. (2003). *Zoonoses: Infectious Diseases Transmissible from Animals to Humans.* UK: Amer Society for Microbiology.

[89] Holmes et al., (1993). Neisseria weaver sp. nov. (formaerly DCD group M-5), from dog bite wounds of humans. International Journal of Systematic Bcteriology, 43(4):687-93. doi: 10.1099/00207713-43-4-687.

[90]Elliot, R.D., Wilson, M., Buckley, F.M.C, and Speatt, A.D. (2005). Cultivable Oral Microbiota of Domestic Dogs. *Journal of Clinical Microbiology*, 43 (11): 5470–5476. https://doi.org/10.1128/JCM.43.11.5470-5476.2005.

[91]Reffuveille, F., Josse, J., Valle, C. M and Gangloff, C. S. (2017). Staphylococcus aureus Biofilms and their Impact on the Medical Field. *Open access peer review chapter.* DOI: 10.5772/66380.

collections of biofilms. Moreover, unlike modern medical experts; who recommend using plenty of water with soap as reported by Nester *et al*., 2007, prophet Muhammad (S.A.W) has described this approach more clearly and broadly. He has mentioned even how many times the vessel should be washed, 7 or 8 times. Also, because he was receiving the message directly from the source [who is Allah (S.W.T)], he offered a soap substitute, which is clay.

Allah (S.W.T) has already shown the medical experts two signs concerning the maxim of including mud in one of the stages of washing. Firstly, bacteria have fimbriae that are primary structures they use to attach themselves on any surface; and then follows those secondary factors (forces and molecules) that enable them to clump together in the groups. Thus, it is clear that the prophet Muhammad (S.A.W) was informed or shown the presence of these bacteria in the saliva of dogs and cats, how they form such collection of biofilm and procedures of removing them as narrated in those ahadith. Secondly, an article by Williams *et al*., 2011which was published in the Journal of Environmental Science and Technology reports that, natural antibacterial clays contain nanoscale (<200 nm), illite-smectite and reduced iron phases. The role of clay minerals in the bactericidal process is to buffer the aqueous pH and oxidation state to conditions that promote Fe^{2+}solubility; through fenton reaction which occurs when Iron (II) (Fe^{2+}) and hydrogen peroxide (H_2O_2) reacts to form hydroxide (OH^-) and hydroxyl radical. These products can degrade cell components; including the DNA. During this reaction, Fe^{2+}overwhelms outer membrane regulatory proteins and is oxidized when it enters the cell, precipitating $Fe^{3+}$and producing lethal hydroxyl radicals. The production of intracellular hydroxyl radicals is also a common underlying mechanism for cellular death by synthetic antibiotics used in the modern medicine.[92]

A case of Greg Manteufel

On July 31, 2018, Kristine Phillips published an article in The Washington Post, entitled *The shocking reason that this man's legs and hands were amputated: a dog's saliva.* Also, on September 27, 2018, Kasey Chronis published an article on Fox6Now.Com, titled *Man who lost limbs due to bacteria in dog's saliva says He couldn't wait 'to see His dog Ellie*. In these articles, the case of Greg Manteufel (48); a resident of Wisconsin, USA, is reported.

"I felt like a fever and when I tried to go to the bathroom in the middle of the night, my legs failed. "Greg Manteufel explained. This was June 26, 2018.

His disease began with symptoms of flu, fever and vomiting. But, in the next morning his condition changed; his temperature elevated, and He became ill. His wife rushed him to a nearby hospital from Wisconsin. His wife says, when they arrived, he began to see his face has changed its colour to black and blue; symptoms he did not have 5 minutes ago when they left their home. Doctors at that hospital did not recognize anything. So, they gave him a referral to Froedtert Hospital, Milwaukee. When he was taken there, he underwent blood tests and identified to have been infected by the bacteria called *Capnocytophaga canimorsus*. He contracted this bacterium when his dog licked his nose, and enter the blood stream, where it caused the blood infection or blood poisoning (sepsis). Although doctors at that referral hospital did their best to treat him, but it was too late, the blood clots had already clogged the arteries and restricted blood circulation to the extremities of his body (hands and feet) and cause death of the tissue and muscles. So, in order to save his life, doctors had to amputate his legs, arms and nose, leaving him a cripple.

According to the signs that Allah (S.W.T) has shown health experts; especially the CDC, most people who have contact with a dog or cat do not become sick. Immunocompromised individuals such as people with cancer or those taking certain medications like steroids are at greater risk of becoming severely ill. They are found only in the mouths of dogs and cats, but are more common in the mouths of dogs compared to the mouths of cats. Can spread to people through a bite or after close contact with dogs or cats.[93] [94] This is in line with what the maxim in the hadith reveals: *a vessel licked by dogs should be washed 7 or 8 times; one of them being by clay, and a vessel licked by cat should be washed only once with water.* In fact, this cannot be a coincidence, rather what was shown to the CDC and other health experts is a sign from Allah (S.W.T) which had informed his final messenger; Muhammad (S.A.W), since 7th century, 14 centuries ago.

Ten things are connected to the fitrah

According to the hadith narrated by our mother 'Aaisha (R.A) and 'Ammar bin Yaasir (R.A) that were reported by Al-Imam ibn Majah in his sunan[95], prophet Muhammad (S.A.W) taught that, ten (10) things are connected to the *fitrah*.[96] These things are: (1) Trimming the moustache, (2) Letting the beard grow, (3) Using the tooth stick (*siwak*), (4) Rinsing out the nostrils with water, (5) Clipping the nails, (6) Washing the joints, (7) Plucking the armpit hairs, (8) Shaving the pubic hairs, (9) Washing the private parts with water and (10) Circumcision.

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[92]Williams, L. B., Matge, D. W., Eberl, D. D., Harvey, R. W., Tumer, A. G., Prapaipong, P andPeterson, A. T. (2011). Whatmakes a naturalclayantimicrobial? *EnvironmentalScienceandTechnology*, 45(8):3768-3773. doi:10.1021/es1040688.

[93]Centres for disease control and prevention (CDC). (2018a). Capnocytophagus. Available at https://www.cdc.gov/capnocytophaga/index.html. Accessed on September 17, 2021.

[94]Centres for disease control and prevention (CDC). (2018b). How do people get infected with Capnocytophagus? Available at https://www.cdc.gov/capnocytophaga/transmission/index.html. Accessed on September 17, 2021.

[95] Al-Qazwini, M. (2007). Sunan Ibn Majah (N. Al-Khattab, Trans). Riyadh, Saudi Arabia: Darussalam Global Leader in Islamic Books. Volume 1. Hadith number 293 & 294.

[96]*Fitrah* means the things that are part of a religion which are in perfect harmony with the demands of nature and, therefore, part of the *Sunnah* and Shari'ah of all the prophets of Allah (S.W.T).

Today, Allah (S.W.T) has shown health experts the implications of the above maxims. As said earlier, most of these parts of the body are the parts where mucous membranes meet the skin, i.e., portal of entries and portal of exits; where normal microbiota or pathogens resides and enter or get out of the body.[97] Hence, either they are removed or washed with water to avoid contamination which may lead to various infectious diseases.

(1) Trimming the moustache removes the microbes that might be contamination from nose or aerosols.(3) Using the *siwak*; botanically called *Salvadora persica*, reduce the oral microbiota that could lead to dental caries and other oral diseases and conditions; including intra-oral halitosis.[98] [99] [100] (4) Rinsing out the nostril with water blowout dust and microbes that might have been trapped in mucous membrane and cilia of the nose.[101] [102] (5) Clipping the nails avoid the effects of the microbes; that may be residents or transients, and parasites residing underneath the nails.[103] [104] (7) Plucking the armpit prevent trichomycosis axillaris disease characterized by odorous mucoid sheaths that are formed when bacteria colonize the hair shafts surrounded by dried apocrine sweat, and subsequently produce a cementing material that encases the hair.[105] (8) Shaving the pubic hairs also prevent trichomycosis axillaris disease.[106](9)Washing the private parts with water removes the microbes that causes odours and may cause infection after contamination.[107] (10) Circumcision decreases the risk of acquisition of sexual transmitted diseases such as HIV/AIDS, herpes simplex virus type 2and human papillomavirus to both male and female during sexual intercourse, acquisition of bacterial vaginosis and trichomonas vaginalis to the female partners of the circumcised men, and acquisition of genital ulcers to both men and their female partners.[108] It also reduce the risk of acquisition of the urinary tract infections, mastitis, balanitis, phimosisand sexual transmitted diseases to the infants.[109]

Other maxims on general hygienic practices

There are other maxims that are in other ahadith reported in the various books of ahadith. For-example, about more than 95% of the ahadith reported in a book of *twahara* (purification) of Sahih Al-Muslim contain or have used the maxims that are basically microbiological in nature. Some of these maxims with their implications are summarized in table 1.

Table 1: Other maxims about other general hygienic practices.

S/N	MAXIMS [bolded]	IMPLICATIONS	MEDICAL REFERENCES
1	**When anyone among you wakes up from sleep, he must not put his hand in the utensil till he has washed it three times, for he does not know where his hand was during the night.**	When someone is sleeping he/she might touch the private parts. According to the signs in the modern medicine, private parts harbour a number of microbes such as normal microbiota like bacteria, fungus and viruses. They may also harbour some pathogens if someone has been infected. In other words, they are among of the portal of entries and portal of exit.	Brook *et al*., 2013; Nester *et al*., 2007.
2	**When the Messenger of Allah (S.W.T) performed *ghusl* [bathing]in the case of *Janâbah,* he would start by washing his hands.**	The sexual activities involve touching many parts of the body of a partner, there are many possibilities of having contamination of normal microbiota or pathogens; if someone is infected, on the hands. Normal microbiota might lead to the infection when	Brook *et al*., 2013; Nester *et al*., 2007.

[97]See Brooks *et al*., 2013 and Nester *et al*., 2007; especially chapter 9 and 20 respectively, for more information about portal of entries and portal of exits.
[98]Niaz, F., Naseem, M., Khurshid, Z., Zafar, S.M & Almas, K. (2016). Role of Salvadora persica chewing stick (miswak): A natural toothbrush for holistic oral health. *European Journal of Dentistry*, 10 (2): 301-308. Doi: 10.4103/1305-7456.178297.
[99]Haque, M. M & Alsareii, S. A. (2015). A review of the therapeutic effects of using miswak (Salvadora persica) on oral health. *Saudi Medical Journal*, 36 (5).
[100]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.
[101]Centres for Disease Control and Prevention (CDC). (2020a). How measles spread. Accessed on September 16, 2021.
[102]Nester, W.E., Anderson, G. D., Robert, E. C & Nester, T. M. (2007). *Microbiology. A Human perspective*. New York: McGraw-Hill.
[103]Mengist, A., Aschale, Y & Reta, A. (2018). Bacterial and Parasitic Assessment from fingernails in Debre Markos, Northwest Ethiopia. *Canadian Journal of Infectious diseases and Medical Microbiology*, ID 6532014. https://doi.org/10.1155/2018/6532014.
[104]Rayan, G. M & Flournoy, D. J. (1987). Microbiologic flora of human fingernails. *The journal of hand surgery*, 12(4):605-7. Doi: 10.1016/s0363-5023(87)80217-4.
[105]Cervantes, J., Johr, R. J &Tostis, A. (2018). Dermoscopy of Yellow Concretions on Axillary Hair. *Skin appendage Disorders*, 4 (2): 86–89. doi: 10.1159/000477941.
[106]Ibid.
[107]Brook, G. F., Carrol, K. C., Butel, J. S., Morse, S. A., Mietzner, T. A. (2010). *Jewertz, Menelick & Adelberg's Medical Microbiology.* USA: McGrewHill Companies.
[108]Tobian, A. A & Gray, R. H. (2011). The medical benefits of male circumcision. *Journal of the American Medical Association*, 306(13): 1479–1480. Doi: 10.1001/jama.2011.1431.
[109]Ibid.

		they are shifted to other parts of the body. Pathogens may lead to infection. Likewise, they are among of the portal of entries.	
3	**When the Messenger of Allah (S.A.W) takes ablution he would wash his hands first.**	Hands are always in touch with different fomites. Hence, the chance of being contaminated with pathogens is very high. Likewise, they are among of portal of entries.	Brook *et al*., 2013; Nester *et al*., 2007.
4	**None of you should urinate into standing water and then wash himself with it.** **None of you should perform *ghusl* in standing water.**	To prevent contamination of water by the normal microbiota or pathogens if someone is infected. Also, to prevent contamination of parasites. Common global water-related diseases caused by parasites include Guinea worm, schistosomiasis, amebiasis, cryptosporidiosis (Crypto)and giardiasis. These might lead into the transmission of the infections or parasitic diseases.	Brook *et al*., 2013; Nester *et al*., 2007, CDC, 2021d.
5	**Messenger of Allah used to go out to relieve himself, and I would bring him water with which he would wash himself.**	To wash out all the traces of faecal matter. 1gram of faeces is estimated to contain: 10 million viruses,1 million bacteria, 1,000 parasite cyst and 100 parasite eggs. These organisms may lead to the various diseases if there will be contamination.	UNICEF, 2000
6	**Prophet forbade breathing into the vessel (while drinking).**	To prevent contamination of drinking water from the exhaled air. Exhaled air has been identified to harbour normal microbiota; such as *Sphingomonas paucimobilis* and *Kocuria*, that when are shifted to other parts of the body may cause infections. Exhaled air has been also identified to harbour pathogens; such as Influenza A subtype H3N2, that might lead to the infections if they will be ingested into gastrointestinal tract.	Xu, et al., 2012; Nester *et al*., 2007.
7	**Prophet forbade touching the private part with the right hand.**	The private parts have been identified to harbour normal microbiota. And may harbour pathogenic organisms if someone has been infected. All these conditions may lead to serious illnesses if these microbes will be transferred to another parts of the body, especially in the buccal cavity, eyes, ears and gastrointestinal tracts. In addition to that, the private parts may be portal of entries or portal of exits.	Brooks *et al*., 2013; Nester *et al*., 2007
8	The Messenger of Allah passed by two graves, and he said: 'They are being punished, but they are not being punished for anything grave (i.e., it was not difficult to avoid). One of them used to walk around spreading malicious gossip, **and the other did not protect himself from his urine.**	The anterior urethras of both sexes contain small numbers of the same types of organisms found on the skin and perineum. These organisms regularly appear in normal voided urine in numbers of 102–104/mL. These microorganisms may lead to diseases when they are translocated to other parts of the body.	Brooks *et al*., 2013.

CONCLUSION

The description provided in this study shows that, through modern medicine Allah (S.W.T) has shown health experts the implications of the maxims; in various ahadith, about general hygiene, health and diseases given by the prophet Muhammad (S.A.W). These maxims have exposed the causative agents and/or the control and preventive measures of the relevant infectious diseases. Also, it implies that, the modern medicine has its roots from the Islamic Goldarn Age which flourished from7-17th century. This great civilization traversed all fields of knowledge, including medicine. Fore-example, Al-Qanun fi-Tibb (Code of Laws in Medicine); a Canon of Medicine by Ibn Sina (980-1037)which comprised of the five volumes that traversed a multitude of medical knowledge from medical principle, medicine, disease of various body parts, general disease to the trauma, was in use in Europe until the early 1800s.[110] (Al-Hassan,2012). According to Turner, 1995, is the knowledge from ahadith that enabled Muslim scholars; including Ibn Sina, to be devoted

[110]Al-Hassan, S. T. (2012). 1001 inventions: The enduring legacy of Muslim Civilization. National Geographic Society.

in collecting, translating and improving different knowledge; such as natural and social sciences, from other civilizations. It further implies that, all the knowledge of the medicine; including the basic one obtained from the Muslim civilization, are the signs from Allah (S.W.T) who showed health experts after revealing their basics to prophet Muhammad (S.A.W) through the glorious Qur'an and sunnah/ahadith.

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