

Islamic Perspectives

Islamic Guidelines for Healthful Living

Mohammad Tariqur Rahman, PhD
 Jesmin Banu Abdul Kareem, MSc
 Department of Biomedical Science
 Kulliyyah of Science
 International Islamic University
 Kuala Lumpur, Malaysia

Abstract

This paper highlights the scientific advancements in immunology and other fields that have given deeper insights into healthful living by advocating guidelines similar to the ones revealed to mankind in the 7th century of the common era (CE) in the Qur'an and Hadith. Discussions are made linking published scientific evidence and recent discoveries in the field of immunology and related sciences with the related Islamic guidelines on various aspects of life. Scientific evidence is consistent with the benefits of the guidelines in Islam for cleanliness (e.g. bathing, ablution, *miswāk*), eating and drinking habits (e.g. giving importance for honey and olive oil, abstinence from alcohol, avoidance of excessive eating), lifestyle (e.g. managing stress, sex habits), breast feeding, and excretion of body waste in public places.

Key words: Qur'an, Hadith, immune system, Islamic teachings, hygiene.

Introduction

Islam as a complete way of life provides guidelines not only for belief and worship but also for all other aspects of human existence, including health and hygiene. These guidelines are revealed in the Qur'an, as Allah ﷻ says:

وَنُنزِّلُ مِنَ الْقُرْآنِ مَا هُوَ شِفَاءٌ وَرَحْمَةٌ لِّلْمُؤْمِنِينَ

We send down (stage by stage) of the Qur'an that which is healing and mercy to those who believe.¹

The Qur'an and the Hadith, which describe the Prophet's way of life ﷺ and sayings, provide com-

prehensive guidelines relating to preventive, curative, and restorative aspects of health. The Prophet ﷺ said:

إِنَّ اللَّهَ تَعَالَى أَنْزَلَ الدَّاءَ وَالدَّوَاءَ وَجَعَلَ لِكُلِّ دَاءٍ دَوَاءً فَتَدَاوُوا وَلَا تَدَاوُوا بِحَرَامٍ

Allah ﷻ created disease and treatment, and He made for each disease a treatment. So seek treatment but do not use *ḥarām* (forbidden things).²

The immune system is highly complex and ensures good health by responding to internal and external challenges with constant self-monitoring and self-regulation. This body defense mechanism protects the body from the harmful agents, some of which are commonly known as pathogens and allergens, and then keeps the memory of such encounters

Correspondence should be directed to

Mohammad Tariqur Rahman, PhD
 Email: tarique@iiu.edu.my

to prevent further attack. Our immune system is divided into two major groups: the innate immune system and the acquired immune system. All these immune system tools assist in the maintenance of good health, in the development of resistance to various diseases, and in the prevention, control and cure of diseases. Loss or inactivation of the immune system allows the pathogens and allergens to gain a foothold and overpower the individual; hyperactivation of immune mechanisms may result in autoimmune diseases. This article highlights some of the Islamic guidelines related to the proper functioning of the immune mechanism in maintaining a healthful life.

Methods

This paper compares the guidelines available from the Qur'anic verses and authentic Hadith with published scientific evidence and recent discoveries in immunology and related sciences. English translations of the Qur'anic verses and Hadith are taken from the Web site (<http://al-islam.com/eng/>) provided by the Ministry of Islamic Affairs, Endowments, Da'wah and Guidance, Kingdom of Saudi Arabia, and from the University of Southern California-MSA Compendium of Muslim Texts (<http://www.usc.edu/dept/MSA>).

Results and Discussion

Cleanliness and Hygiene of the Body Surfaces

Cleanliness and hygiene are not only requirements for the performance of worship, but they are part of a Muslim's very faith. The Qur'an gives comprehensive guidelines for cleanliness and hygiene. For example, in preparation for prayers, Muslims are told:

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قُمْتُمْ إِلَى الصَّلَاةِ فَاغْسِلُوا
وُجُوهَكُمْ وَأَيْدِيَكُمْ إِلَى الْمَرَافِقِ وَامْسَحُوا
بُرُوسِكُمْ وَأَرْجُلَكُمْ إِلَى الْكَعْبَيْنِ وَإِنْ كُنْتُمْ جُنُبًا
فَاطَهَّرُوا

O ye who believe! when ye prepare for prayer, wash your faces, and your hands (and arms) to the elbows; rub your heads (with

water); and (wash) your feet to the ankles. If ye are in a state of ceremonial impurity, bathe your whole body...³

`Uthmān ibn `Affān, a leading companion of the Messenger Muhammad ﷺ, demonstrated to his contemporaries how to do *wuḍū'*. He washed his hands and mouth and cleaned his nose with water three times. He then washed his face and his arms up to the elbows three times. Finally, he wiped his head and washed his feet up to the ankles three times.⁴

Washing helps remove dust, microbes, and sweat from the skin surface. It also cleans the skin of the fatty substance that skin glands secrete, making it incompatible for the proliferation and sustenance of pathogenic microorganisms. Increased face washing among children has resulted in a significant reduction of the risk of trachoma, a form of blindness caused by highly contagious *Chlamydia trachomatis*.⁵ Notably, trachoma has been a major public health concern in most underdeveloped countries and was found to be associated with unclean faces.⁶ Islam has taught the act of hand washing up to the elbows as a part of *wuḍū'* prior to performing prayers.³ Guidelines for hand washing before eating and after awakening also have been given. The Prophet ﷺ woke up at night, relieved himself, then washed his face and hands, and then returned to sleep.⁷ Prophet Mohammed ﷺ said:

إذا استيقظ أحدكم من نومه فلا يغمس يده
في الإناء حتى يغسلها ثلاثاً فإنه لا يدري أين
باتت يده

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.

Hand washing provides the first line of defense against infectious diseases, including gastrointestinal disorders and respiratory infections, and has been proven by a number of studies. Personal hygiene, especially hand washing, is at the top of the list of possible interventions to prevent the diarrheal

diseases responsible for the deaths of at least 2 million children yearly.⁹ Feco-oral transmission of enteric diseases in the Indian subcontinent is due to inadequate hand washing after defecation and anal cleaning practices.¹⁰ The American College of Obstetricians and Gynecologists recommends that pregnant women wash their hands to reduce the risk of congenital cytomegalovirus acquisition and thereby reduce the chances of permanent disabilities such as hearing, vision loss, and mental retardation.¹¹ Hand washing, along with the use of masks, was found to provide significant protection against nosocomial outbreak of severe acute respiratory syndrome (SARS).¹² The implementation of hand washing in young adults was associated with the marked reduction in outpatient visits for respiratory illness.¹³ Reduced risk for shigellosis has been attributed to regular hand washing and other hygienic behaviors such as a clean environment surrounding the household and the availability of water to flush the toilet.¹⁴ A significant decrease of respiratory infections in senior day care centers was obtained through education on viral transmission and the value of hand washing.¹⁵

Oral and Dental Hygiene

Oral hygiene through ablution should be routine to the Muslim.⁴ Whenever the Prophet ﷺ got up at night, he used to clean his mouth with *miswāk* (*Salvadora persica*).¹⁶ To emphasize this practice, Prophet Mohammed ﷺ also said:

لولا أن أشقَّ على أمتي لأمرتهم بالسواك

If I did not fear to cause hardship to my nation, I would have ordered them to use the *miswāk* with every *wuḍū'*.¹⁷

The use of *miswāk* significantly reduced the amount of *Actinobacillus actinomycetemcomitans* (a pathogen associated with certain forms of periodontal disease) in subgingival plaque.¹⁸ *Miswāk* mouth-washing resulted in improved gingival health and a reduction in cariogenic bacteria.¹⁹ Again, *Streptococcus mutans* was found to be susceptible to *miswāk*.²⁰

Maintaining a healthy dentition and periodontium by observing daily oral hygiene practices and

regular professional care is the most effective way of preventing systemic diseases from oral infections. Negligence in oral and dental hygiene may result in periodontal disease, which destroys the teeth and the gums and is the source of many other diseases including heart disease.²¹ Poor oral hygiene, determined by the extent of dental debris and calculus, is associated with an increased incidence of coronary heart disease.²²⁻²⁴ A positive correlation has been established between the incidence of heart disease and poor oral health.^{25,26} Reviewing the cumulative evidence, Slots has concluded that periodontal disease can be an important cause of morbidity and mortality of various systemic diseases, especially in individuals exhibiting compromised host defenses.²⁷

Rinsing the Nostrils

Istinshāq (cleaning the nostrils by sniffing water in and out three times) during *wuḍū'* is sunna (Prophetic action).⁴ Microorganisms, dust, and other harmful particles enter the body while breathing. The germs thus trapped in the mucosa of nasal traps need to be washed out. Nasal cleansing with salt water significantly improved the experienced discomfort of 211 patients suffering different inflammatory conditions in the nose, including allergies.²⁸ Thus nasal irrigation has enormous potential to improve the quality of life of millions of patients in a very cost-effective way. Moreover, nasal irrigation has been recognized as an effective treatment, rather than merely an adjunctive measure, in managing sinonasal conditions.²⁹

Breast Feeding

Breast feeding has been mentioned in the Qur'an:

وَالْوَالِدَاتُ يُرْضِعْنَ أَوْلَادَهُنَّ حَوْلَيْنِ كَامِلَيْنِ

The mothers shall give suck to their offspring for two whole years ...³⁰

The World Health Organization (WHO resolution 54.2) urges member states to support exclusive breastfeeding for the first 6 months as a global public health recommendation and to provide safe and appropriate complementary foods, with continued breastfeeding for up to 2 years or more.³¹ It has been

concluded through a series of research that exclusive breast feeding for 6 months and prolonged breast feeding help to maintain children's and women health.³²

Immunologically naive neonates lack acquired immunological memory because of limited exposure to various antigens and pathogens. During this phase of development, maternal milk provides an appropriate immunological response.³³⁻³⁴ Maternal milk containing cytokines provides protection against many infections, for example, enteric infections. Also, it stimulates appropriate immune responses (tolerance) to food antigens. Infant formulas deficient in the cytokines found in maternal milk are associated with the increased potential for aberrant immune development in neonates.³⁵ Again, the increased incidence of atopic diseases in Western countries was correlated with the increased prevalence of formula feeding.

Postnatal expansion and maturation of the immune system in newborns takes time, during which the prenatally acquired maternal transplacental antibodies (IgG) play an important role in the protection of the infant. Lactoferrin and oligosaccharide present in the milk can prevent mucosal attachment of microorganisms, the initial step of most infections, thus reduce the risk of neonatal septicemia, respiratory tract infections, diarrhea, urinary tract infections, infection-induced wheezing, and necrotizing enterocolitis.³⁶⁻³⁸ In southern Brazilian cities, babies who are not breastfed are 14.2 times more likely to die from diarrhea than breastfed babies.³⁹ Furthermore, breast feeding decreases the risk of celiac disease⁴⁰ and allergic diseases.⁴¹ Studies from Bangladesh suggest that breast feeding substantially shifts the spectrum of severity in *Shigella* infections from severe to nonsevere illnesses.⁴²

Eating Habits

Islam has provided comprehensive guidelines regarding food and drinks, not only by prohibiting unclean and injurious food but also by introducing proper eating habits in different verses of Qur'an.⁴³⁻⁴⁵ Prophet Mohammed ﷺ described the medicinal importance of many food items.⁴⁶ His eating habits included honey, olive oil, salt, and vinegar as his favorite condiments. A growing number of scientific studies detailing the benefits of honey, olive oil, and vinegar confirms that the favorite condiments of the

Prophet ﷺ promote the proper functioning of immune mechanisms.

Honey

The Qur'an describes honey as a source of healing for many diseases:

يَخْرُجُ مِنْ بُطُونِهَا شَرَابٌ مُخْتَلِفٌ أَلْوَانُهُ فِيهِ شِفَاءٌ لِلنَّاسِ

... there issues from within the [bees'] bodies a drink of varying colors, wherein is healing for men.⁴⁷

Honey significantly increased the release of TNF- α , IL-1 β and IL-6 from MM6 cells and human monocytes and reduced reactive oxygen intermediates.⁴⁸⁻⁵⁰ The effect of honey on wound healing thus was found to be related to the stimulation of inflammatory cytokines from monocytic cells. Honey stimulated antibody production during primary and secondary immune responses against thymus-dependent and thymus-independent antigens in mice.⁵¹ Daily consumption of honey dissolved in water results in a 50% increased monocyte count.⁵² Studies on mice have shown that substituting sugar with honey in processed food can inhibit the harmful and genotoxic effects of mycotoxins and improve the gut microflora.⁵³ Furthermore, the role of honey as a hematinic and as an immunomodulator in experimental rodents has also been confirmed.⁵⁴

Olive Oil

Olive oil intake has been shown to modulate the inflammatory processes associated with the immune system. Olive oil is nonoxidative. Thus, it attenuates the inflammatory process, which may explain its beneficial response in preventing oxidative and inflammatory stresses and related diseases.⁵⁵ The antioxidant effects of olive oil are probably due to a high oleic acid content (low oxidation potential compared with linoleic acid) together with a variety of plant antioxidants, particularly oleuropein, hydroxytyrosol, and tyrosol.⁵⁶ Olive oil-based lipid emulsion selectively modulated the immune response, maintaining protective immunity and reducing inflam-

matory responses.⁵⁷ Phenolic compounds derived from extra virgin olive oil decreased inflammatory mediator production by human whole blood cultures, which may contribute to its antiatherogenic properties.⁵⁸ Fish oil omega-3 fatty acids relieved several clinical parameters of rheumatoid arthritis with greater improvement achieved when combined with olive oil.⁵⁹ Oleuropein, a novel immunomodulator derived from the olive tree, was found to prolong survival in experimental sepsis, probably by promoting phagocytosis or inhibiting biosynthesis of proinflammatory cytokines.⁶⁰

During atherogenesis, a pathological accumulation of lipids occurs within aortic intimal macrophage through uptake of oxidized LDL via scavenger receptors. The protective effect of olive oil against atherosclerosis was suggested to be due to the reduced macrophage uptake of oxidized LDL.⁶¹ Olive oil's protective effect against vascular risk was suggested because of down regulation of adhesion molecules involved in early atherogenesis.⁶² Diets rich in olive oil are associated with a high percentage of gastric ulcer healing and a higher resistance against nonsteroidal antiinflammatory drug-induced gastric ulcerogenesis.⁶³

Vinegar and Salt

Vinegar has been used for hand washing as well as to treat many ailments including stomachaches, diabetes, and wounds.⁶⁴ Vinegar increases the flow of saliva, which makes it easier to consume food and prevents microbial growth.⁶⁵ The combined use of vinegar and salt (sodium chloride) was markedly effective in preventing bacterial food poisoning.⁶⁶ Vinegar administered orally increased cytotoxic activity against K562 cells and suppressed tumor growth in mouse model.⁶⁷

Alcohol Consumption

Alcohol consumption is forbidden in Islam.⁶⁸⁻⁷⁰ Recent scientific research showed that immunity disturbance in humans depends on alcohol consumption intensity.⁷¹ Detailed studies on the effect on immune modulation of chronic and acute alcohol consumption were presented in the 37th Annual Meeting of the Society for Leukocyte Biology.⁷²

Stress and Anxiety

Opposing the stressful life of mankind, believers

experience tranquility, as stated in Qur'an:

وَتَطْمَئِنُّ قُلُوبُهُمْ بِذِكْرِ اللَّهِ أَلَا بِذِكْرِ اللَّهِ تَطْمَئِنُّ الْقُلُوبُ

[Allah guides those who repent and believe] and find satisfaction in the remembrance of Allah: for without doubt in the remembrance of Allah do hearts find satisfaction.⁷³

Controlling anger, a state of psychological excitation, has been encouraged in Islam. Allah ﷻ says:

وَالْكَاطِمِينَ الْغَيْظَ وَالْعَافِينَ عَنِ النَّاسِ

[the God-fearing] who restrain anger, and pardon (all) men.⁷⁴

Stress and anxiety have become synonymous with modern life. Both patience to control stress and to decrease anxiety are important for healthful living. Much evidence links stress and anxiety with disease, particularly to the major causes of morbidity and mortality, including cardiovascular disease, depression, and cancer.⁷⁵⁻⁷⁷ Reiche et al reviewed results from experimental animal models, human studies, and clinical evidence and confirmed compromised cellular and molecular immunological parameters were due to chronic stress and depression.⁷⁸ Exposure to acute or chronic stress evokes changes in behavior, the neuroendocrine system and the activity of the immune system and may thereby contribute to susceptibility to infection and to immune-mediated disease including autoimmune diseases and asthma.⁷⁹

Control of stress and anxiety through patience and prayer are given utmost importance in Islam.⁸⁰⁻⁸⁴

Prevention of the Spread of Communicable Disease

Long before the discovery of the germ theory of disease, mankind had been provided with guidelines to control the spread of communicable or infectious diseases, both at the societal and individual level. The Prophet ﷺ recommended voluntary quarantine in times of plague.^{85,a} In modern times, we have observed similar practices of isolation of sus-

pected infectious cases, most recently in response to severe acute respiratory syndrome (SARS).^{86,87}

The Prophet ﷺ warned against excretion in water sources, in shady (wet) areas, and on the road side and in public places.^{88,89} This concept of sanitation practice also helps to control spreading many deadly infectious diseases of fecal origin. Presence of the fecal coliform group of infectious bacteria (*Escherichia coli*, *Salmonella*, *Enterobacter*, and others), coliform bacteriophages, and reoviruses (the Norwalk virus) has been a major concern for the quality of drinking water, recreational water, and for the natural water bodies for a healthful environment of flora and fauna therein.^{90,91} Seasonal outbreaks of *Vibrio cholerae*, enterotoxigenic *E. coli*, *Shigella*, and *Salmonella*, the causative agents of diarrheal diseases, have caused thousands of deaths in Bangladesh.⁹² Strains of *E. coli*, an important etiological agent of infantile diarrhea in Bangladesh, have been identified in aquatic environments of 13 districts.⁹³ The spread of infectious fecal coliform organisms can also increase significantly by rainfall through surface runoff.⁹⁴

Sexual involvement during menstruation may cause harm to both the man and woman. Some scientific evidence might exemplify this notion. Redox potential, pH, oxygen, and carbon dioxide tension were found to be in the nonphysiological range in menstrual blood (MB). In addition, several infectious bacteria and viruses were present in MB. A higher incidence *Staphylococcus aureus*⁹⁵ and human papilloma virus were found in MB of women having koilocytosis, cervical intraepithelial neoplasia, and squamous carcinoma.⁹⁶ The menstrual blood of healthy females was also found exceptionally rich in hemocidins-hemoglobin (Hb) fragments having bactericidal properties.⁹⁷ The presence of an increased amount of such proteins having bactericidal properties in MB might be linked to the presence of a higher number of infectious agents therein that needed to be killed or eradicated. In Islam, sexual involvement during the menstruation cycle has been prohibited.⁹⁸

Unlawful sex habits have been strictly prohibited for mankind.⁹⁹ Sexually transmitted diseases including AIDS, hepatitis B virus, *Neisseria gonorrhoea*, and *Treponema pallidum* were found prevalent among the clients of brothels, both heterosexuals and homosexuals. Hanenberg and Rojanapithayakorn

pointed out that the HIV and AIDS epidemic that broke out in Thailand was mainly caused by the widespread patronage of prostitutes.¹⁰⁰ A high prevalence of sexually transmitted diseases was found among men who have sex with men.¹⁰¹⁻¹⁰²

Conclusion

Islam is a complete and divine way of human life, as Allah ﷻ says:

الْيَوْمَ أَكْمَلْتُ لَكُمْ دِينَكُمْ وَأَتَمَمْتُ عَلَيْكُمْ
نِعْمَتِي وَرَضِيْتُ لَكُمُ الْإِسْلَامَ دِينًا

This day have I perfected your religion for you, completed My favor upon you, and have chosen for you Islam as your religion.¹⁰³

Islam provides guidelines for healthful living as well as life's spiritual, economical, social, and political aspects. The guidelines from the Qur'an and Hadith, some of which are discussed above, are consistent with much recent scientific research. Indeed, Islamic guidelines for cleanliness and hygiene, breast feeding, eating habits, stress control, excretion, and sexual relations can provide solutions to many major public health concerns worldwide.

Acknowledgements

The authors wish to acknowledge ASM Shahabuddin, ISTAC, and Dr. Abdullah Al-Mamun, BTE, IIUM for the guidance needed to complete this manuscript with authentic information and interpretation on Islamic resources. Our special thanks to Dr. Lindsay Brown and Mr. Reeza Nazeer, The University of Queensland, Australia, and Ms. Naomi, University of Fukui, Japan, for their valuable remarks and suggestions that helped us to make the manuscript comprehensible to those having minimum or no knowledge of Islam.

References

1. Glorious Qur'an, Chapter 17, Verse 82.
2. Sunan Abī Dāwūd. Kitāb al-ṭibb (27). Bāb fī al-adwiyā al-makrūha (11). Hadith 3870. Available from <http://www.muhammadith.org>.
3. Glorious Qur'an, Chapter 5, Verse 6.

4. Ṣaḥīḥ Muslim. Kitāb al-ṭahāra (2). Bāb ṣifa al-wuḍū' wa kamālih (3). 226. Available from <http://www.muhammadith.org>.
5. How to prevent trachoma and blindness. *Glob Child Health New Rev.* 1995;3:23.
6. Bailey R, Downes B, Downes R, et al. Trachoma and water use; a case control study in a Gambian village. *Trans R Soc Trop Med Hyg.* 1991;85:824-28.
7. Ṣaḥīḥ Muslim. Kitāb al-ḥayḍ (3). Bāb ghusl al-wajh wa al-yadayn idhā istayqadha min al-nawm (5). 304. Available from <http://www.muhammadith.org>.
8. Ṣaḥīḥ Muslim. Kitāb al-ṭahāra (2). Bāb kirāha ghams al-mutawaḍḍi' wa ghayrihi yadāh (26), 278. Available from <http://www.muhammadith.org>.
9. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *Lancet Infect Dis.* 2003;3:275-81.
10. Hoque BA, Mahalanabis D, Alam MJ, et al. Post-defecation hand washing in Bangladesh: practice and efficiency perspectives. *Public Health.* 1995;109:15-24.
11. Cannon MJ, Davis KF. Washing our hands of the congenital cytomegalovirus disease epidemic. *BMC Public Health.* 2005;5:70.
12. Telean MD, Boudville IC, Heng BH, et al. Factors associated with transmission of severe acute respiratory syndrome among health-care workers in Singapore. *Epidemiol Infect.* 2004;132:797-803.
13. Ryan MA, Christian RS, Wohlrabe J. Handwashing and respiratory illness among young adults in military training. *Am J Prev Med.* 2001;21(2):79-83.
14. Chompook P, Todd J, Wheeler JG, et al. Risk factors for shigellosis in Thailand. *Int J Infect Dis.* 2006;10:425-33.
15. Falsey AR, Criddle MM, Kolassa JE, et al. Evaluation of a handwashing intervention to reduce respiratory illness rates in senior day-care centers. *Infect Control Hosp Epidemiol.* 1999;20:200-2.
16. Ṣaḥīḥ al-Bukhārī. Kitāb al-wuḍū' (4). Bāb al-siwāk (73). 242. Available from <http://www.muhammadith.org>.
17. Ṣaḥīḥ al-Bukhārī. Kitāb al-tamannī (98). Bāb mā yajūz min al-law (9). 6813. Available from <http://www.muhammadith.org>.
18. Al-Otaibi M, Al-Harthy M, Gustafsson A, et al. Subgingival plaque microbiota in Saudi Arabians after use of miswak chewing stick and toothbrush. *Clin Periodontol.* 2004;31:1948-53.
19. Khalessi AM, Pack AR, Thomson WM, et al. An in vivo study of the plaque control efficacy of Persica: a commercially available herbal mouthwash containing extracts of *Salvadora persica*. *Int Dent J.* 2004;54:279-83.
20. Almas K, Al-Zeid Z. The immediate antimicrobial effect of a toothbrush and miswak on cariogenic bacteria: a clinical study. *J Contemp Dent Pract.* 2004;15:105-14.
21. Pihlstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. *Lancet.* 2005;366:1809-20.
22. DeStefano F, Anda RF, Kahn HS, et al. Dental disease and risk of coronary heart disease and mortality. *BMJ.* 1993;306:688-91.
23. Mattila KJ. Dental infections as a risk factor for acute myocardial infarction. *Eur Heart J.* 1993;14(Suppl K):51-3.
24. Slavkin HC. Does the mouth put the heart at risk? *J Am Dent Assoc.* 1999;130:109-13.
25. Mattila KJ, Pussinen PJ, Paju S. Dental infections and cardiovascular diseases: a review. *J Periodontol.* 2005;76 (11 Suppl):2085-8.
26. Maas S. A healthy mouth for a healthy heart? *Minn Med.* 2005;88(8):11-2.
27. Slots J. Update on general health risk of periodontal disease. *Int Dent J.* 2003;53:200-7.
28. Tomooka LT, Murphy C, Davidson TM. Clinical study and literature review of nasal irrigation. *Laryngoscope.* 2000;110:1189-93.
29. Brown CL, Graham SM. Nasal irrigations: good or bad? *Curr Opin Otolaryngol Head Neck Surg.* 2004;12:9-13.
30. Glorious Qur'an, Chapter 2, Verse 233.
31. Gupta A, Mathur GP, Sobti JC. World Health Assembly recommends exclusive breastfeeding for first six months. *J Indian Med Assoc.* 2002;100:510-1,515.
32. Wolf JH. Low breastfeeding rates and public health in the United States. *Am J Public Health.* 2003;93:2000-10.
33. Jackson KM, Nazar AM. Breastfeeding, the immune response, and long-term health. *J Am Osteopath Assoc.* 2006;106:203-7.
34. Kelly D, Coutts AG. Early nutrition and the development of immune function in the neonate. *Proc Nutr Soc.* 2000;59:177-85.
35. Penttila IA. Maternal milk cytokines and infant immune development. *Aus J Dairy Technol.* 2005;60:104-5.
36. Ashraf RN, Jalil F, Zaman S, et al. Breast feeding

and protection against neonatal sepsis in a high risk population. *Arch Dis Child*. 1991;66:488-90.

37. Wilczynski J, Torbicka E, Brzozowska-Binda A, et al. [Breast feeding for prevention of viral acute respiratory diseases in infants] [in Polish]. *Med Dosw Mikrobiol*. 1997;49:199-206.

38. Hanson LA, Korotkova M. The role of breastfeeding in prevention of neonatal infection. *Semin Neonatol*. 2002;7:275-81.

39. Rees DG, Henry CJ, Diskett P, et al. Measures of nutritional status. Survey of young children in north-east Brazil. *Lancet*. 1987;1:87-9.

40. Hanson LA, Korotkova M, Haversen L, et al. Breast-feeding, a complex support system for the offspring. *Pediatr Int*. 2002;44:347-52.

41. Chandra RK. Five-year follow-up of high risk infants with family history of allergy who were exclusively breastfed or fed partial whey hydrolysate, soy, and conventional cow's milk formulas. *J Ped Gastroenterol Nutr*. 1997;24:380-8.

42. Clemens JD, Stanton B, Stoll B, et al. Breast feeding as a determinant of severity in shigellosis. Evidence for protection throughout the first three years of life in Bangladeshi children. *Am J Epidemiol*. 1986;123:710-20.

43. Glorious Qur'an, Chapter 2, Verse 168.

44. Glorious Qur'an, Chapter 20, Verse 81.

45. Glorious Qur'an, Chapter 7, Verse 31.

46. Ibn Qayyim Al-Jawziyya. *Medicine of the Prophet*. Johnstone, P (translator). The Islamic Texts Society: Cambridge, UK;1998.

47. Glorious Qur'an, Chapter 16, Verse 69.

48. Tonks A, Cooper RA, Price AJ, et al. Stimulation of TNF-alpha release in monocytes by honey. *Cytokine*. 2001;14:240-2.

49. Tonks AJ, Cooper RA, Jones KP, et al. Honey stimulates inflammatory cytokine production from monocytes. *Cytokine*. 2003;21:242-7.

50. Schramm DD, Karim M, Schrader HR, et al. Honey with high levels of antioxidants can provide protection to healthy human subjects. *J Agri Food Chem*. 2003;51:1732-35.

51. Al-Waili NS, Haq A. Effect of honey on antibody production against thymus-dependent and thymus-independent antigens in primary and secondary immune responses. *J Med Food*. 2004;7:491-4. 52. Al-Waili NS. Effects of daily consumption of honey solution on hematological indices and blood levels of minerals and enzymes in normal individuals. *J Med*

Food. 2003;6:135-40.

53. Ezz El-Arab AM, Girgis SM, Hegazy EM, et al. Effect of dietary honey on intestinal microflora and toxicity of mycotoxins in mice. *BMC Complement. Altern Med*. 2006;6:6.

54. Karmakar S, Biswas AK, Dasgupta SC, et al. Haematinic and immunomodulatory effects of honey on immunocompetent, immunodeficient and splenectomised experimental rodents. *Phytomedica*. 2004;5:107-10.

55. Wahle KWJ, Caruso D, Ochoa JJ, et al. Olive oil and modulation of cell signaling in disease prevention. *Lipids*. 2004;39:1223-31.

56. Andreadou I, Iliodromitis EK, Mikros E, et al. The olive constituent oleuropein exhibits anti-ischemic, antioxidative, and hypolipidemic effects in anesthetized rabbits. *J Nutr*. 2006;136:2213-9.

57. Granato D, Blum S, Rössle C, et al. Effects of parenteral lipid emulsions with different fatty acid composition on immune cell functions in vitro. *JPEN J Parenter Enteral Nutr*. 2000;24:113-18.

58. Miles EA, Zoubouli P, Calder PC. Differential anti-inflammatory effects of phenolic compounds from extra virgin olive oil identified in human whole blood cultures. *Nutrition*. 2005. 21:389-394.

59. Berbert AA, Kondo CRM, Almendra CL, et al. Supplementation of fish oil and olive oil in patients with rheumatoid arthritis. *Nutrition*. 2005. 21:131-6.

60. Giamarellos-Bourboulis EJ, Geladopoulos T, Chrisofos M, et al. Oleuropein: a novel immunomodulator conferring prolonged survival in experimental sepsis by *Pseudomonas aeruginosa*. *Shock*. 2006; 26:410-6.

61. Miles EA, Wallace FA, Calder PC. An olive oil-rich diet reduces scavenger receptor mRNA in murine macrophages. *Br J Nutr*. 2001;85:185-91.

62. Dell'Agli M, Fagnani R, Mitro N, et al. Minor components of olive oil modulate proatherogenic adhesion molecules involved in endothelial activation. *J Agri Food Chem*. 2006;54:3259-64.

63. Alarcón de la Lastra C, Barranco MD, Motilva V, et al. Mediterranean diet and health: biological importance of olive oil. *Curr Pharm Des*. 2001;7:933-50.

64. Johnston CS, Gaas CA. Vinegar: medicinal uses and antiglycemic effect. *MedGenMed*. 2006;8:61.

65. Baggs C. Vinegar adds SAS to any product. *Food Technol*. 2004;58(8):22.

66. Entani E, Asai M, Tsujihata S, et al. Antibacterial action of vinegar against food-borne pathogenic bac-

- teria including *Escherichia coli* O157:H7. *J Food Prot.* 1998;61:953-59.
67. Seki T, Morimura S, Shigematsu T, et al. Antitumor activity of rice-shochu post-distillation slurry and vinegar produced from the post-distillation slurry via oral administration in a mouse model. *Biofactors.* 2004;22:103-5.
68. Glorious Qur'an, Chapter 5, Verse 91.
69. Saḥīḥ Muslim. Kitāb al-Ashriba. Bāb bayān anna kulla muskir khamr wa anna kulla khamr ḥarām. Hadith no. 2001 (67). Available from www.muhammadith.org.
70. Saḥīḥ Muslim. Kitāb al-Ashriba. Bāb bayān anna kulla muskir khamr wa anna kulla khamr ḥarām. Hadith no. 2003 (73). Available from www.muhammadith.org.
71. Kazbariene B, Krikstaponiene A, Moncevičiute-Eringiene E. Disturbance of human immunohomeostasis by environmental pollution and alcohol consumption. *Acta Microbiol Immunol Hung.* 2006;53:209-18.
72. Brown LA, Cook RT, Jerrells TR, et al. Acute and chronic alcohol abuse modulate immunity. *Alcohol Clin Exp Res.* 2006;30:1624-31.
73. Glorious Qur'an, Chapter 13, Verse 28.
74. Glorious Qur'an, Chapter 3, Verse 134.
75. McEwen BS. Protective and damaging effects of stress mediators. *New Eng J Med.* 1998;338:171-9.
76. Maddock C, Pariante CM. How does stress affect you? An overview of stress, immunity, depression and disease. *Epidemiol Psychiatr Soc.* 2001;10:153-62.
77. Marx J. Cancer research. Inflammation and cancer: the link grows stronger. *Science.* 2004;306:966-8.
78. Reiche EM, Morimoto HK, Nunes SM. Stress and depression-induced immune dysfunction: Implications for the development and progression of cancer. *Int Rev Psychiatry.* 2005;17:515-27.
79. Kavelaars A, Heijnen CJ. Stress, genetics, and immunity. *Brain Behav Immun.* 2006;20:313-6.
80. Glorious Qur'an, 2:153.
81. Glorious Qur'an, 103:2-3.
82. Saḥīḥ al-Bukhārī. Kitāb al-riqāq. Bāb mā jā' fī al-ṣiḥḥa wa al-farāgh wa an lā 'aysh illā 'aysh al-'ākhirā. Hadith no. 6049. Available from www.muhammadith.org.
83. Glorious Qur'an, Chapter 6, Verse 79.
84. Saḥīḥ al-Bukhārī. Kitāb mawāqīt al-ṣalā. Bāb al-ṣalawāt al-khams kaffāra. Hadith no. 667. Available from www.muhammadith.org.
85. Saḥīḥ Muslim. Kitāb al-salām. (39) Bāb al-ṭā'ūn wa al-ṭiyara wa al-kahāna wa naḥwihā. (32). Available from www.muhammadith.org.
86. Centers for Disease Control and Prevention (CDC). Use of quarantine to prevent transmission of severe acute respiratory syndrome-Taiwan, 2003. *MMWR Morb Mortal Wkly Rep.* 2003;52:680-3.
87. Hughes JM. SARS: an emerging global microbial threat. *Trans Am Clin Climatol Assoc.* 2004;115:361-74.
88. Sunan Ibn Mājah. Kitāb al-ṭahāra wa sunanihā. Bāb al-nahy 'an al-khalā' lā qāri'a al-ṭarīq. Hadith no. 328. Available from www.muhammadith.org.
89. Sunan Abī Dāwūd. Kitāb al-ṭahāra. Bāb al-mawāḍi' allatī nuhiya 'an al-bawl fihā. Hadith no. 26. Available from www.muhammadith.org.
90. Shiaris MP, Rex AC, Pettibone GW, et al. Distribution of indicator bacteria and *Vibrio parahaemolyticus* in sewage-polluted intertidal sediments. *Appl Environ Microbiol.* 1987;53(8):1756-61.
91. Mallin MA, Cahoon LB, Toothman BR, et al. Impacts of a raw sewage spill on water and sediment quality in an urbanized estuary. *Mar Pollut Bull.* 2007;54:81-8.
92. Schwartz BS, Harris JB, Khan AI, et al. Diarrheal epidemics in Dhaka, Bangladesh, during three consecutive floods: 1988, 1998, and 2004. *Am J Trop Med Hyg.* 2006;74:1067-73.
93. Alam M, Nur-A-Hasan, Ahsan S, et al. Phenotypic and molecular characteristics of *Escherichia coli* isolated from aquatic environment of Bangladesh. *Microbiol Immunol.* 2006;50:359-70.
94. Hill DD, Owens WE, Tchounwou PB. The impact of rainfall on fecal coliform bacteria in bayou dorcheat (north Louisiana). *Int J Environ Res Public Health.* 2006;3:114-7.
95. Wagner G, Ottesen B. Vaginal physiology during menstruation. *Ann Intern Med.* 1982;96:921-3.
96. Tong TR, Chan OW, Chow TC, et al. Detection of human papillomavirus in sanitary napkins: a new paradigm in cervical cancer screening. *Diagn Cytopathol.* 2003;28:140-1.
97. Mak P, Wójcik K, Wicherek L, et al. Antibacterial hemoglobin peptides in human menstrual blood. *Peptides.* 2004;25:1839-47.
98. Glorious Qur'an, Chapter 2, Verse 222.
99. Glorious Qur'an, Chapter 2, Verse 268.
100. Hanenberg R, Rojanapithayakorn W. Changes in prostitution and the AIDS epidemic in Thailand. *AIDS*

Care. 1998;10:69-79.

101. Jiang J, Cao N, Zhang J, et al. High prevalence of sexually transmitted diseases among men who have sex with men in Jiangsu Province, China. *Sex Transm Dis.* 2006;33:118-23.

102. Sanchez T, Finlayson T, Drake A, et al. Human

Immunodeficiency Virus (HIV) risk, prevention, and testing behaviors-United States, National HIV Behavioral Surveillance System: men who have sex with men, November 2003-April 2005. *MMWR Surveill Summ.* 2006;55:1-16.

103. Glorious Qur'an, Chapter 5, Verse 3.