Vaccination: Influencing Factors and View from an Islamic Perspective.

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ABSTRACT

Vaccine refusing and hesitant among parents has created a delicate issue for the health care providers because of its sensitivity in cultural differences, educational backgrounds and to a certain extent, politically motivated. Vaccination, which is an important intervention, correlates well with the priorities of Islamic jurisprudence (*Maqasid al-Shariah*); that states the preservation of life comes second after the preservation of *Deen* (religion). From the Islamic point of view, life is a gift from Allah *Subhanahu wa Ta'ala* (SWT; the Most Glorified, the Most High) and its protection and continuation is of greatest value and need. Aims: This brief article has the objective to firstly, investigate factors that influence vaccination, and secondly, understand the Islamic perspective on vaccination. Methodology: Relevant literatures were reviewed based on a combination of one or more of the following keywords: vaccine, vaccination decision, vaccine hesitancy, factors influencing vaccine, vaccine impact, Islamic perspective and Muslims practice. An Islamic perspective on vaccination was extracted using the primary sources (related Qur'anic verses and Hadith) as well as secondary sources (*fatwa;* Islamic jurisprudence, made by Islamic scholars). Lastly, the current available *Shariah* rulings on vaccination and the related principles involved were analyzed. Conclusion: The main outcome of this review would allow various parties. i.e. the community, health scientists, medical practitioners and vaccine manufacturers, to be cognizant in both earlier and recent *Shariah* rulings pertaining vaccination.

KEYWORDS: Islamic perspective, immunisation, factors influencing vaccination, vaccination decision, vaccine hesitancy, vaccine refusal, Islamic jurisprudence

INTRODUCTION

Pneumonia and diarrhea are diseases associated with major complications and are collectively responsible for an estimated 40 per cent of all childhood deaths around the world each year[1,2]. Thus, there are lessons to be erudite from past experience. Vaccination is an effective method to prevent the disease and reduce mortality rates. Vaccine is a biological preparation of an agent that has qualities or features in common with a disease-causing microorganism. This agent can provide active acquired immunity to a particular disease. Generally, the agents are derived from attenuated or killed forms of the microorganism, its toxins or one of its surface proteins through a systematic manufacturing development process. A procedure whereby a person is made protected or resistant to an infectious disease, typically by the administration of a vaccine is called immunization. During an exposure of the immune system with the disease-causing microorganism, the vaccine itself performs rapidly and effectively by stimulating the production of antibodies resulting in immunity. When an adequate number of antibodies has been produced by the body, immunity endows protection against the disease for many months, for years or even for a lifetime.

Vaccines work by creating *anamnestic response* towards pathogens to which it has been exposed to. There is occurrence when a closely related antigen may produce a secondary response; nevertheless, this is an unusual exception. Basically, this means that our immune system will be able to quickly produce the same type of antibodies if a person comes in contact with that same pathogen again. The result is that vaccination can prevent a disease from developing, or decline the severity of the disease. Ultimately, the removal of the pathogen from the body is achieved. It is anticipated that the immune system can recognize and successfully combat a great variety of different organisms through the "immunological memory" (Figure 1). Thus, vaccination involves the introduction of a limited quantity of a specific disease antigen into the human body by stimulating the immune system just enough to produce the amount of *antibodies* needed.

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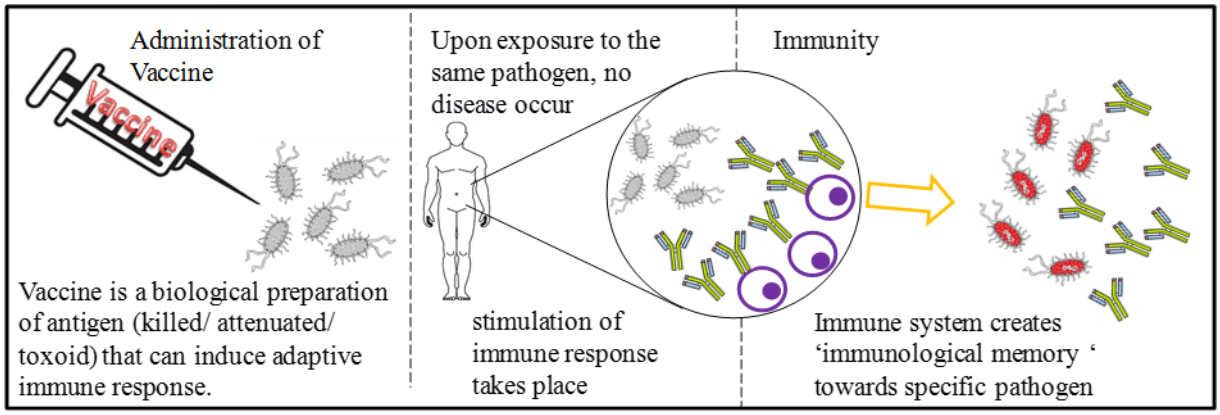

Figure 1: Simplified mechanism of vaccine.

History on vaccination

Notably, the earliest documentation on vaccine was perhaps in late 18th century, when Edward Jenner inoculated infected fluid derived from people infected with cowpox with the intention to prevent the more serious human disease of smallpox.[3] It was reported that Jenner was not aware that the infected fluid used contained live cowpox virus, which later was found to be less virulent, even though both smallpox and cowpox viruses share similar antigenic components. Individuals vaccinated with cowpox virus appeared to develop immunity against smallpox and were presented with mild and non-fatal outcomes. In the 19th century, several investigations reported that less virulent strains and killed pathogens can be exploited as vaccine agents. This innovation led to the development of attenuated and inactivated whole-pathogen vaccines, which were the work of Louis Pasteur and Robert Koch. Subsequently in the late 19th and early 20th centuries, with the progression in science and biochemistry, vaccines manufacturers took a turn for the better by introducing bacterial toxins, or their inactivated derivatives, the *toxoids, as the vaccine agents*. Since then, extensive researches had been carried out to study the host-pathogen interactions including the mechanisms of the immune response when stimulated by an antigen. Today, immunization programme is one of the most efficient and valuable approaches in terms of cost and benefits, which has saved countless lives from infectious diseases.

Vaccination Policy in Malaysia

Malaysia is one of the countries that provide free immunization program for major childhood diseases. The introduction of Malaysian National Immunization Program (NIP) in the early 1950's was an initiative planned by the Malaysian government based on the World Health Organization (WHO) Expanded Program on Immunization (EPI). Later in 1989, the Malaysian Expanded Program for Immunization (EPI) was materialized by the Ministry of Health (MOH), with a sole purpose to improve the quality of life in children[4]. This was a key milestone that propelled Malaysia to achieve the developed nation status in line with Vision 2020. Earlier, the WHO had proposed for an immunization program for six childhood diseases. To date, the Malaysian National Immunization Program (NIP) has expanded protection against 10 major childhood diseases.

Vaccine Issue and Various Factors Influencing Vaccination

Vaccination has become a victim of its own victory. Vaccination programs face the obstacle of public judgment of the relative adverse effects and benefits regardless of their public health advantages. The immunization schedule has been vastly successful in decreasing the emergence of infectious diseases. The elimination of once used-to-be debilitating and fatal diseases have taken a toll – some individuals became complacent with disease-free environment that they mindlessly decided to ignore vaccination. Slowly, the number of people rejecting and hesitating vaccines increases, and with the social media advancement, anti-vaccination (anti-vax) groups found convenience in promoting their agenda.[5,6] It is fairly straightforward to understand that vaccination programs may differ culturally. This is because human adjusted to their environment, and it is only natural that people can be influenced by social and cultural factors.[7] Factors that may hamper the vaccination coverage may include complexity in getting medical treatment, high medical costs, unavailability in transportation, status of education, parental awareness and knowledge, attitude and low family income.[9,10] While many groups of investigators explored various socio-cultural factors and their influence on vaccination[11-14], not much work has been done in Malaysia. On a positive note, various factors are also involved in making vaccination programs successful; such as the convenient sites for vaccine delivery, and reliable sources of information about vaccines, e.g. health clinic personnel and community health volunteers.[8] The following sections will look into several major factors affecting vaccination in the current context whereby the internet search engines become the quick and convenient reference for people at large and overwhelming information and tips from the social media (Figure 2).

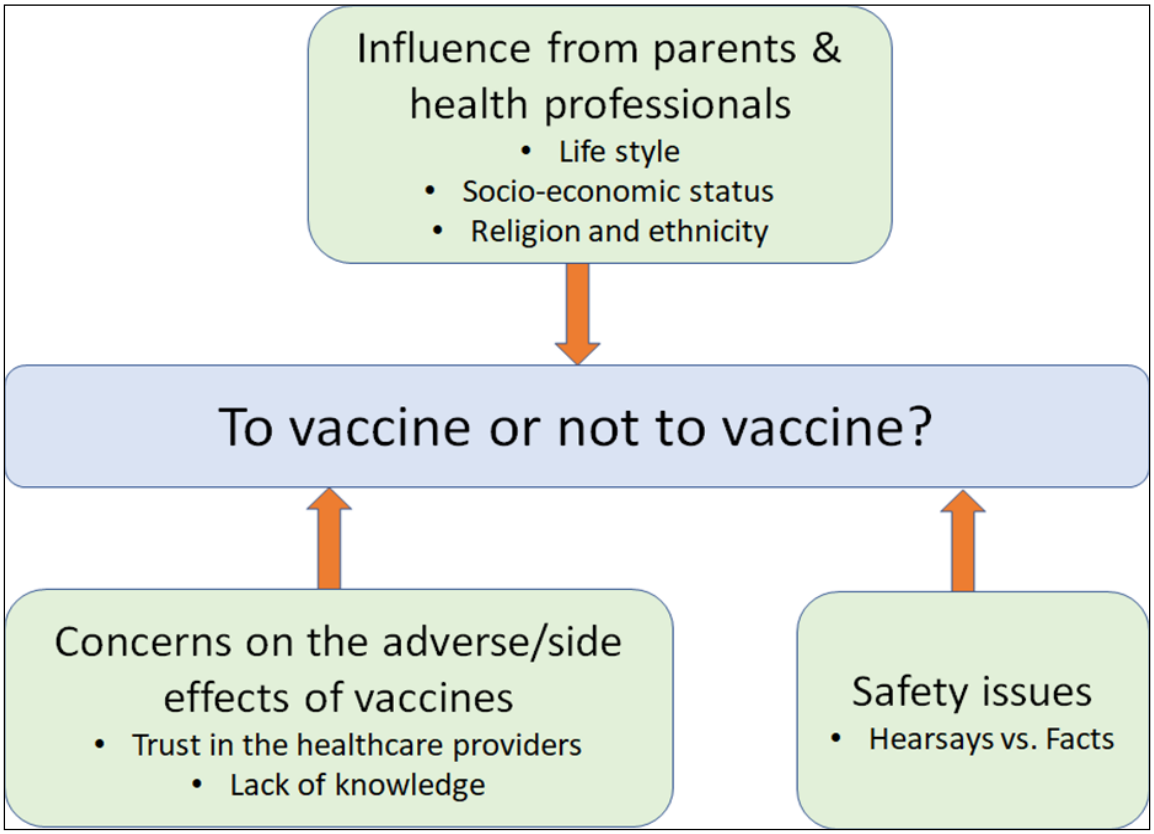

Figure 2: Various factors that influence vaccination, as people opt for the internet search engines and the social media for information.

Parental and health professional effects

In addition to the socio-economic reasons, Lorenz and Khalid (2012) reported that parental awareness, attitude and impacts of public vaccine controversies on parents are contributing factors that lead to encouraging or unfavorable choice for vaccination.[15] Parental enthusiasm to keep the children and the society healthy and sheltered them from diseases is a regular idea that influence people to have their children vaccinated.[16] Parents' attitudes on vaccination were highly influenced by having the view that vaccination is the excellent approach to protect the children against infectious diseases and the belief in the safety and integrity of the vaccines.[17] Motivation by health care professionals is another important factor that affects parents' insight in vaccinating their children. Fredrickson *et al*. (2004) found that in fact, the most prominent reasons that motivate parents to get vaccination for their children were suggestions made by their doctors, followed by school requirement.[18] Lau, Mo, and Cai (2013) also found that children were more likely to take up immunization due to recommendation by the health care professionals.[19]

Safety issues

Another study by Zimet et al. (2005) discovered that majority of the parents agreed to vaccinate their children if the vaccines for preventing sexually-transmitted diseases such as gonorrhea, genital herpes and HIV/AIDS are proven to be safe, effective and available.[21] Between July 2001 to December 2002, Centre for Disease Control (CDC) conducted 'The Parental Knowledge and Experiences' module to probe parental attitudes toward vaccine safety and side effects, simultaneous vaccine administration, and acceptance of new vaccines. This group determined that parental safety belief was significantly associated with the child's vaccination status. The results stated that parents who believed vaccines are safe were more likely to get their children vaccinated, compared to those who were neutral and those who thought that vaccines were unsafe.[22] Children whose parents were neutral about the safety of vaccines had vaccination coverage similar to children whose parents believed vaccines are unsafe. Additionally, the decision to accept vaccine among parents who considered that vaccines were safe, were associated with the advice given by the health care provider when compared to the parents who think that vaccines are risky.[23] Addressing mothers' concerns about immunization is important to ensure that they are fully informed of the risks and benefits of immunizations. One qualitative study on 53 African American mothers reported that one fifth of parents raised high-level of concern with the safety of childhood immunizations, but still had their children immunized.[24] The analysis from this study conclude various reasons that lead to the doubts among the mothers about the safety of vaccines including: i) whether there is a need of vaccinations; ii) mistrust of the medical community; and iii) lack of communication to address the concerns from the mothers regarding vaccination (despite more than

half (i.e. 51%) of the respondents had a college education or higher level of tertiary education). It was also a major subject among mothers who indicate that they did not consider their healthcare providers as partners in the wellbeing of their children. The mothers also consider that the healthcare providers did not always act in their best interests. Poor communication and mistrust are often associated and have been reported to have an effect on the use of preventive measures among black women[24,25] and may prevent some parents from asking questions about their concerns.

Side effects

Another important concern regarding vaccination is the side effects of vaccination. In general, any medical intervention usually has more advantages than flaws. Adverse effect can be defined as a symptom produced by a drug or therapy that is injurious to the patient. In vaccination, this term is recognized as adverse effect following immunization. The side effects following immunization may be lay-person defined and professionally denied, or agreed between both constituencies.[26] Notably, most of the side effects of vaccines are mild compared to the severe illnesses they prevent. Different vaccines may cause temporary fussiness, swelling, prolonged crying and other effects. As example, some babies may get mild vomiting and diarrhea after the combined diphtheria, tetanus, and pertussis (DTaP) and rotavirus vaccines.[27] Allergic reactions may occur within hours of getting a shot. In a very rare incidence, kids may be severely allergic to a vaccine.[28] The reaction may be bad enough that a child would not be able to get the rest of the shots in that series, which means he or she will have to rely on other children being vaccinated to protect him from that disease. This scenario is termed 'herd immunity'.[29]

Regardless of the reasonably low risk of vaccine compared to its advantages, parental fear is the main barrier in optimal uptake of vaccines by the children.[30,31] One case control study on parental attitude towards vaccination reported that parents were more likely not to get their children vaccinated because of the fear about side-effects.[9] Similarly, another study conducted in the United States shared a parallel result regarding vaccine safety. The latter group agreed that parents' hesitancy towards vaccination was mainly due to safety or side effect concerns as the main reason.[32] It is greatly acknowledged that the occurrence of vaccine preventable diseases is decreasing with the increase in vaccine coverage. This phenomenon can be observed especially in well-developed countries and vaccines have become prey to their own success. This has immense negative impact on public uptake of vaccination programme and emerging concern on potential side effects. One good example for this scenario is Measles-Mumps-Rubella (MMR) vaccination. The speculation linking MMR vaccine with autism stimulates parents' anxiety and has caused a decline in vaccine uptake[33,34] even though much clarification has been made regarding this issue. This ambiguous (MMR-autism) association contributes a negative effect on public uptake of measles prevention programs in the UK and elsewhere, resulting in higher morbidity and mortality rates due to measles.[35] This was supported by another study in the United States which reported the same concern where parents knowledge of side effects of the vaccines like autism association with vaccination, led to significant difference in vaccination acceptance.[36] This issue still remains a main concern to many parents specially residing in developed countries albeit scientific investigation and expert review committees have disproved the association of autism with vaccination.

Additionally, a systematic review by Tickner et al. (2006), who investigated the rationale for sub-optimal immunization reported the decline trend in the uptake of MMR in countries like England and Sweden following the controversy of triple vaccination MMR with bowel disease and autism. This led to the outbreak of measles in the United Kingdom, Germany, Ireland, Denmark and the Netherlands.[30] Following this, several groups of researchers revealed such speculation to be groundless[37-39]. However their efforts to clarify the matter were not successful in tackling the concerns of some parents satisfactorily. Whilst scientists know that chronological association between vaccine exposure and a subsequent adverse event does not verify that the vaccine caused the event, recognition of such temporally associated events could however raise public concern in this case.

Despite all the factors mentioned above, the authors of this paper strongly agreed that vaccination is an effective way to control infection. Furthermore, In the next section, we attempted to review vaccination from Islamic perspective and several issues related to it.

Islamic Perception and Issue In Vaccination

Majority of the Muslim scholars would agree that vaccination is an act to *islah* (reform) the ummah for the betterment of well-being which correlates with the Islamic concept, *al maqasid shariah*. Unfortunately, in the last few years, vaccine refusal in the Muslim community in Malaysia has become an alarming issue. This is said to be indirectly motivated by accepting phony religious arguments about the status of vaccines by a few groups and individuals that do not have any proficiency in health sciences or medicine. This action not only harms their children but also, they are exposing the communities towards vaccine-preventable diseases. In Malaysia, The Islamic Medical Association of Malaysia (IMAM) takes a serious view of the resurgence of infectious diseases such as diphtheria, which had virtually disappeared, in our country. However in 2016, there were 11 new cases of diphtheria (3 confirmed and 8 suspected), two of which resulted in fatality. The re-emerging of this disease was likely due to the reluctance of some parents to comply with the policy and advice of the

Ministry of Health to vaccinate their children according to the national immunization programme. The community should be educated about the importance of vaccination and should realize that vaccination was consonant with the higher objectives of the *Shariah* (i.e. the Al-*Maqasid al-Shariah*) as declared by the Muslim religious scholars and the fatwa councils in Malaysia.

Goals of the Islamic divine law

The basic aims of the Islamic Divine Law are to preserve life, intellect, religion, honor and property.[40] Indeed, the first goal of the Shariah is to look after the existence and the preservation of every human life, which is concurrently the goal of worldwide vaccination program. According to Ebrahim (2014) in his detailed article addressing this issue, vaccination fulfils all objectives of *Al-Maqasid Al-Shariah*. When linking vaccination with the preservation of religion (*hifz ad-din*), he mentioned that this can be achieved since vaccination acts as a preventive measure that promotes the wellbeing of a Muslim. Hence, when the physical and health aspects of a Muslim is taken care of, he can successfully perform his daily obligatory act of worship. Over the decade, vaccine has been proven to eradicate severe disease like smallpox and control infections. This is in consonant with the fact that vaccine also successfully preserved millions of life (*hifz al-nasf*) around the world by reducing mortality. Next, it was direct to infer that parents who comply in vaccinating their children fulfilled the objective of preserving the progeny *(hifz al-nasl)* by protecting them against vaccine preventable diseases. Moreover, *Islam promotes* peace, respect, *justice,* mercy and all other qualities that fall in domain of *serenity*. Thus through vaccination programme, the community is expected to be happy and less anxious which correlate with the preservation of intellect *(hifz al-aql)* by knowing that their families and community are protected from severe diseases. Lastly, preservation of wealth *(hifz al- mal)* can be achieved via vaccination. This is due to the reason that vaccination provides exceptionally cost effective measure in preventing the occurrence of the disease rather than curing the notorious complications. It is important as a Muslim scientist to be able to inculcate the *Al-Maqasid Al-Shariah* principle as our guideline for the scientific studies and development.[41]

Prophetic sayings related to vaccination

There are several Hadith mentioning the importance of preventive measure towards disease and seeking medical treatments in the Islamic literature. In the book Sunan Abu- Dawud, Usamah ibn Sharik narrated:

"I came to the Prophet (Peace Be Upon Him) and his Companions were sitting as if they had birds on their heads. I saluted and sat down. The desert Arabs then came from here and there. They asked: 'Apostle of Allah, should we make use of medical treatment?' He replied: 'Make use of medical treatment, for Allah has not made a disease without appointing a remedy for it, with the exception of one disease, namely old age" (Sunan Abu-Dawud, no. 3855).

In another Hadith narrated by the companion of the Prophet, Abu Hurairah *radiaAllahu anhu*. The Prophet (peace and blessings be upon him) was reported to have said:

"There is no disease that Allah has created, except that He also has created its treatment" (Sahih al Bukhari, no. 5678).

Prophet Muhammad (peace and blessings be upon him) was reported to have said:

"A strong believer is better and dearer to Allah than a weak one, and both are good."

In the above *Hadith*, honor is accredited to both the weak *mu'min* (believer) as well as the strong one because *iman* (faith) is a general feature in both of them. However, the above *Hadith* emphasized that Allah values the one who is stronger more than the weak one. In this context, a strong believer, who is physically fit and healthy would be more valuable in engaging righteous deeds and the *fara'id* (obligatory acts of worship), than a sick believer.

Additionally, it can be highlighted that seeking treatment and medication is highly recommended in Islam as shown from various Hadith stated above. Thus, vaccine as a method of prevention is acceptable and recommended in Islam. The permissibility of being vaccinated before the onset of an outbreak is conformed to an Islamic principle that encourages one to maintain a good health by taking supplements, such as mentioned in a Hadith that stated: "Whoever eats seven Madinah dates in the morning will not be harmed by witchcraft or poison".[41] In fact, it was documented in 1992 that the Islamic Council in Cairo has agreed that the immunization is necessary as it was consistent with Islamic commandment in order to preserve the life of children and enable them to endure a valuable livelihood.[42]

Issues on forbidden ingredients in vaccine

However, there are some concerns on the permissibility to use *haram* ingredients in vaccination. For example, the permissibility of two rotavirus vaccines namely Rotateq and Rotarix were raised due to the use of enzyme trypsin, which is derived from pigs during the manufacturing process. Swine and its derivatives are forbidden to be consumed, as stated in the Qur'an:

> *"Say, "I do not find within that which was revealed to me [anything] forbidden to one who would eat it unless it be a dead animal or blood spilled out or the flesh of swine - for indeed, it is impure - or it be [that slaughtered in] disobedience, dedicated to other than Allah . But whoever is forced [by necessity], neither desiring [it] nor transgressing [its limit], then indeed, your Lord is Forgiving and Merciful."* [Qur'an 6:145].

However, when there is necessity, such that in a desperate and emergency situation whereby life is at stake, it is permissible to consume swine, as long as the amount of consumption is just enough to prevent death in that person. Inferring to this, forbidden materials, such as pork and alcohol are not permissible except in certain emergency situations whereby no alternative medicine is available, and these materials are the only ones recommended by a competent physician. The gist to this exception is that necessity knows no law.

Wan Ismail et al. (2016) stated that *istihalah* is one of the principle that should be considered in deciding legal status of a medicine that is mixed with non halal substance.[43] In an article titled 'Advances in Environmental Biology Gelatin as an ingredient in Food and Pharmaceutical Products□: An Islamic Perspective', Yusof and Shah (2014) described gelatine as an ingredient in food;

> *''The major elements of istihalah are the raw materials, conversion process and finished product. The mechanism of this process can be explained on the basis of an interaction between the raw materials and the conversion methods that can either be natural or synthetic. Thus, the finished product formed as a result of different conversion process differs both physically and chemically from the original and starting material."* [44].

Istihalah and darurah

Grabenstein (2012) wrote an article titled 'The issues of what the World's religions teach, with regard to vaccines and immunoglobulins' that vaccine containing swine derivative is allowable for Muslims in time of *darurah* as the swine compounds has undergone extensive process of transformation and processing that turned the unclean original product into something new.[45]

Moreover, according to Shaykh al-Qaradawi who heads the European Council for Fatwa and Research, there are three requirements which—must be satisfied in advance before using porcine product in medical treatment. Firstly, the medicine must be vital in the life of the individual who is taking it. Secondly the product must be recommended by a knowledgeable and trustworthy Muslim physician. Lastly, no source from permissible product is available as alternative medicine.[46]

This concept of *istihalah* had been used worldwide especially in food industry, medical and health sciences fields. In February 2013, the Islamic Religious Council of Singapore applied this concept in determining the use of rotavirus vaccine.[47] The fatwa committee decided that the percentage of the pig-derived enzyme in the trypsin solution during the process of manufacturing rotavirus vaccine is very insignificant which is 0.0001% in comparison to the amount and percentage of pure element in the preparation. The trypsin solution is considered 'pure' as it has undergone the processes of dilution and the addition of other pure elements. In addition, the fatwa committee also received reports from the Health Science Authority of Singapore that the end-product of the rotavirus vaccine has no porcine enzyme found in the trypsin solution. This was the fact since the vaccine product had undergone multiple processes of filtration, purification and sterilization, until there are no longer traces of porcine enzyme detectable in the end-product. Therefore, the fatwa committee concludes that the rotavirus vaccine is halal and pure, as the impure elements have been removed from the final product.

In the 81st Conference of the Malaysian Fatwa Committee National Council of Islamic Religious Affairs held on March 2006, there was a discussion on the use of Biothrax (anthrax vaccine) and Rotateq (rotavirus vaccine) which use porcine in the making process. The committee stated that the use of Biothrax and Rotateq vaccines are forbidden because of several reasons. Firstly, the situation of these two diseases in the country is not *darurah* (necessities) and secondly, there are alternatives other than the use of porcine. However, the Islamic law on this issue can be changed if there is a *'darurah'* situation but with a condition that the vaccine is only used as needed.[48,49]

Similarly, the Oral Poliovirus Vaccine use similar manufacturing process in its development. WHO (2003) highlighted that, at the 11th Regular Session of the European Council of Fatwa and Research in 2003, argued that trypsin has nothing to do with pork and that it was the consumption of the meat (of pork) which was forbidden (as stated literally in the chapter 6, verse 145 of the Qur'an). Secondly, the amount of trypsin used in the vaccine is negligible and the rule of "when the amount of water exceeds 2 *qulla* (approximately 343 litres), impurities no longer affect it" is applied even if the forbidden material, such as trypsin, is used. Thirdly, no trace of trypsin was left–in the final product as it was thoroughly filtered. Lastly, the Council argued that in the case of necessity, the *haram* is made permissible in case all the three arguments stated before are inadequate.

CONCLUSION

The Qur'an and the Hadith are the two major sources of reference for Muslim adherents when making jurisdictions and fatwa regarding contemporary issues. In addition, opinions and jurisdictions made by renowned Muslim scholars are also referred to. In this current context, Muslim medical practitioners and health scientists must exercise critical analysis and demarcate the good from undesirables when it comes to advancement in the technology. It is critical that the epistemological integrity of a technology and its axiological significance are warranted in order to contribute pragmatic benefits to not only the Muslims, but the whole mankind. Overall, fear of side effects, ethnic and cultural factors, family and community

influence, socio-economic status are all underlying reasons behind the acceptance of vaccine programme. The important factors that should be looked upon are the parental knowledge about the advantages of getting the children vaccinated and the decline in the prevalence of vaccine preventable diseases in the community.

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