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Observations of the New Moon using Optical Telescopes and Radio Telescope from the Perspective of Islam

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Abstract

Observations of the moon were done by Islamic scholars since hundreds of years ago. It has been studied many researchers in various fields such as planetary motion, circumference of the earth, moon, eclipse and new moon (*hilal*). This study is proven by history that shows a variety of equipment to help process the observation of the new moon as astrophysic using scientific tools such as optical telescope. Technological advancements today have transformed in many area. Including in astronomy, various techniques are employed as possible to facilitate a way to see the new moon. However, it must be consistent with the requirements of Islam. The objective of this study is to investigate and identify appropriate alternative methods to overcome the problems weather (cloudy, rainy and fog) in *hilal* observation. In this study, the comparison method based on Optical Telescope and Radio Telescope has been use to point raised in its assessment of current observations and alternative technique are proposed to the Islamic astronomer in Malaysia. Base on this study, the use of optical telescopes and radio telescopes are very helpful to researchers in observing the moon with more accurate and more reliable and conform to Islamic rules'. The technology optical telescopes, radio telescopes and religion should be in line in every action.

Keywords: : New moon (*hilal*), Islamic astronomy, astronomical observations

Introduction

Based on history during the time of Babylon, the observation of the new moon has been used in the determination of the calendar. For example in the Hindu calendar, Jews and Muslims, it is based on the visual of new moon that has occurred after *ijtimak* at the beginning of each month (Bruin 1977). Today most of the lunar calendar or the use cycle of 29.35 days solar of a month synod. However most of lunar calendar observations for religious purposes, Muslims are particularly used it as visual observation for observing the moon.

New moon or *hilal* is defined as the crescent of moon after the founding of first *ijtimak* or possibly is visible after sunset (Ilyas, 1997). The appearance of the new moon is very important in matters of worship, especially fasting. Method perception of new moon is one of the mechanisms for establishing the beginning of *Hijri* especially to determine the beginning and end of Ramadan. Along with the development of modern times, astronomers have many tools to help the process of these observation methods other than the fulfilment of the previous month to 30 days or based on astronomical calculations. Optical telescopes are among the equipment used for the sighting of the moon. Society is now common to hear about observations using optical telescopes at the moon, but the moon observations using radio telescopes is something new for them. Islam requires that to begin fasting is obligatory upon the entry of Ramadan. But is the use of a telescope as equipment using radio telescopes are outlined in Islam? To understand the Muslim perspective on the observation of the new moon using optical telescopes and radio telescopes, it is important to know in advance about the definition and usage manual optical telescopes and radio telescopes and the difference between them and the observation of the new moon, legislation of shariah arguments and a ruling thereon. In the discussion, stated that there will be a requirement in Islam to observe the moon using optical telescopes and radio telescopes.

Observations of the moon using the naked eye upon the occurrence *ijtimak* between the sun and the moon (new moon) and it depends on the distance between the moon and the sun at sunset. Typically, 24 hours after *ijtimak*, moon will move ~ 12 ° (unit RA). Thus, the reflection of light from the sun is to provide lighting at this point one percent. In this month will go down about 40 minutes after sunset (depending on geographical latitude observers). At this point the sky is the necessary condition is quite clear, this factor (sheen sky low and increase lighting) joined forces to make sure the moon is visible for a few minutes with the naked eye vision before it went down. If sunset occurs less than 24 hours after *ijtimak* angular separation between the moon and the sun is not enough for the moon to be seen.

Showed strong frequency changes compared to the moon which is relatively less. The authors suggest using radio methods to observe the moon. This method does not depend on weather problems and it has high accuracy compared to visual methods. In visual conditions (optical), the moon 4 x 105 is much dimmer than the sun. In the radio range of this factor is reduced from 100 to 500. However, the challenge is to detect the signal frequency of the sun and moon as the occurrence of reflection and scattering in the atmosphere. Both objects have features with different brightness. Changes in the sun with a 27-day solar rotation and 11.3-year cycle of sunspots. Moon also changes according to the lunar cycle of 29.3 days (Ilyas, 1997). Furthermore, solar project is the selection of optimum frequency which is very important.

Radio telescope was used to observe the moon at the Jodrell Bank Observatory, United Kingdom. The telescope function is to examine celestial objects, the sun and moon. Reflections diameter radio telescope is 3.7 meters (Hafez et al, 2014). To study the moon in radio waves, the ideal frequency is between 5 to 10 GHz. This frequency is a frequency that is often used in a satellite communication system such as All-Asian Satellite Television and Radio Operator (ASTRO). For this project, the possible frequency which cover frequency about 10 GHz. According to Phuong, by using VATLY radio telescope, moon can be observed by using parabolic dish, 2.6 meters in diameter at frequencies of 1420.4 MHz and 1417.6 MHz (Phuong et al, 2015).

Base on the literature, the observation of moon can be done in Malaysia to help Islamic community in order to enhance the observation due to monsoon season in Malaysia. For the future, we propose an alternative method (radio method) for the determination of the time of the. This technique independent of the weather as well and the most important it can be used to establish the exact time of the new moon with much greater accuracy than the traditional visual method (Hafez et al, 2014).

Methodology

The qualitative method of philosophical analysis is employed for the purpose of this study.

Historical Telescope

The telescope is an instrument that is widely used to view objects in the sky closely and clearly. The telescope is also very widely used in astronomy, especially observing the moon. It was first introduced in 1609 by the Italian physicist and astronomer named Galileo Galilei. Telescope or binoculars is an instrument known as a function of collecting light waves. Thus forming the object of the object focused. The telescope is an optical instrument that is designed to collect light more than can be done by eye. Lenses used in telescopes are of a convex lens, while the mirror is also of the type of concave mirror. In the design of a telescope, lens or mirror is called the primary objective. The telescope is the most important tool in the study of astronomy world. It serves to enlarge the size of the object as well as its brightness (Muda, 2012).

Galileo is the first Western scientists who used the telescope to observe celestial bodies. He has studied the occurrence of sunspots and discovered four of Jupiter's natural satellites. He is the first to show the telescope skyward. Even a small telescope and a blurred image, Galileo was able to make out the mountains and craters on the moon and see ribbons of light that penetrates the arch in the sky which will then be seen in the Milky Way galaxy. After Galileo, another West astronomical figure of Sir Isaac Newton has developed and created a larger telescope and complex. With increasingly sophisticated technology and advanced, astronomers found many stars in the sky and distance calculation effort. In the 19th century, using a new instrument called the spectroscope; astronomers have collected information on the chemical composition and motions of celestial bodies (Telescope History, 2003).

Apart from Western leaders, Muslim scholars also made a big contribution in the creation of the telescope. Among the Islamic scholars who contributed greatly to the creation of the telescope is Ibn Al-Haitami. He is Ali al-Hasan Ibn al-Haitham, better known by the name Alhazen in the West. He is a scholar of Islam who is experts in the fields of science, astronomy,

mathematics, geometry, medicine and philosophy. He was the person who first introduced the principle of loop. Magnifier or magnifying glass found a little late to do various studies and research on light. The result of careful research to loop it gives a great influence on Western scholars such as Bacon, Bogger and Kepler. The basic principle is to loop found by Alhazen was used also in the invention of the microscope and the telescope. There are several types of telescopes. Among them, the optical telescopes, radio telescopes and X-ray telescope (Muda, 2012).

Optical Telescope

Optical Telescope is one of the telescopes which are often used to study space and used to collect and focus light, particularly a part of the electromagnetic spectrum that can be seen to create the enlarged image to display live images, or collect data through image sensor electronics. It includes transit, monocular, binocular and camera lens. There are two types of optical telescopes, ie the type of refraction and reflection.

Refraction Telescope

Refraction telescope uses a lens as the primary objective. The lens is placed on the front end of the telescope tube. Light enters the room through the front of the telescope lens and refracts the image behind the lens. This light will be focused to a focal point, while the image magnification will be made by the other components of the eye lens (Zainal, 2004).

Reflection Telescope

Reflection telescope using a mirror is the primary objective. Light enters the front of the telescope and fell on the mirror, which is the main objective of reflecting telescope. This light is then reflected to the second mirror before reaching the eyepiece (Zainal, 2004). Telescopes and binoculars are used for activities such as astronomical observation, bird study, seamanship and review and watch sports or performing arts.

Optical Telescope Functions

Optical telescope is an instrument designed to collect light more than can be done by eye and focus. The larger the diameter, the more light can be collected. Lenses used in telescopes are of a convex lens, while the mirror is also of the type of concave mirror. In the design of a telescope, the lens or primary mirror is called the main objective (Zainal, 2004). The telescope is an optical instrument used to see objects that are very much like the moon, the stars, the sun, mountains and so on in order to look more closely and clearly (Mousir, 2013). In addition, it can also amplify and magnify an object being viewed.

Radio Telescope

Radio telescope is a device used to capture the radio signal emitted from celestial objects. It is capable of capturing electromagnetic waves in the form of radio signals (Nasrulloh, t.th). Radio telescope is a form of a radio antenna directional used in radio astronomy. It is the same type of antenna used in determining and collecting data from satellites and spacecraft. Usually radio telescope is dish-shaped antenna and used singly or in arrays (Bador, t.th).

Radio telescope is a parabola antenna can be moved on the rail line to place them on the desired composition. Each antenna has a very strong receptivity so that it can capture weak signals from the stars. The antenna arrays are interconnected to form the composition of the

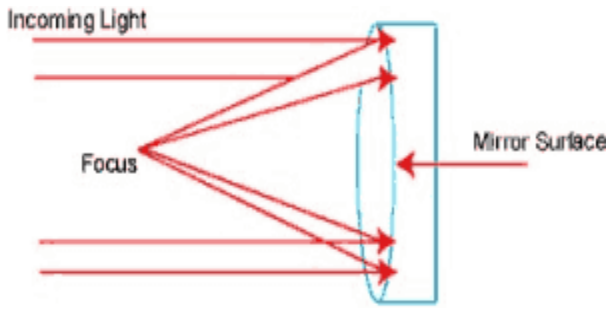
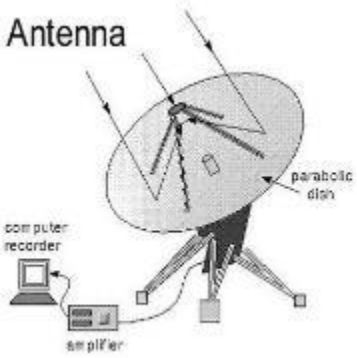
letter "Y" with nine antennas on each side arm "Y". The composition that stretches along 22 miles (36 km) has the same sensitivity with a large antenna diameter of 130 m (422 ft.) (Joseph, 2002). Each antenna has a diameter of 25 meters and weighing 230 tons. The telescope also receives radio waves from the electromagnetic spectrum to another. The signal from each antenna is processed and combined in a computer to form an image of the pattern. In addition, these telescopes can be used to observe distant objects such as quasars and Extragalactic (Joseph, 2002).

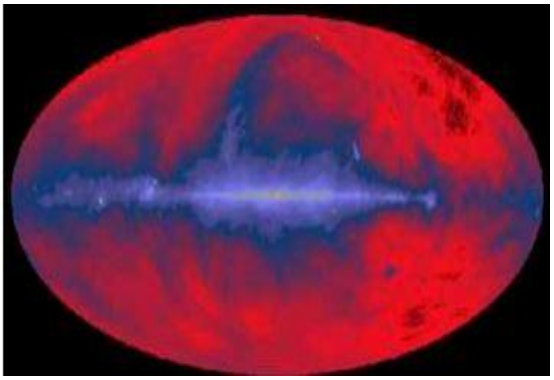
Results And Discussion

Differences Optical Telescope and Radio Telescope

There are many differences between optical telescopes and radio telescopes from the aspect of usage in determining the new moon. The difference between of them as shown in Table 1:-

Table 1:
Differences between optical telescopes and radio telescopes

Optical Telescope	**Radio Telescope**
1) Used to study space. Only used to see distant objects in the sky like the moon, the stars, the sun and so to appear more clear and close.	1) Used in radio astronomy and is a tool used to capture the radio signal emitted from celestial objects. Radio telescope dish-shaped large (plate).
2) Telescopes that use mirrors to focus the light beam. Introduced in the 17th century as a replacement for refractor telescopes (Space, 2015).	2) To record and measure the radio frequency emissions from objects in outer space, is also used in tracking and collecting data from satellites and spacecraft via radio frequency (Space, 2015).
3) The basic elements of radio telescopes, namely: reflector, sub-reflector, online filing and shipping and receiving.	3) The basic elements of radio telescopes, namely: reflector, sub-reflector, online filing and shipping and receiving.
4) Wavelength: 400nm (violet) to 700nm (red)	4) Wavelength: 1mm to 1m
5) Size is smaller with a mirror as a medium emitter	5) Size is larger with a metal disc (plate) as a medium emitter
6) Figure: 	6) Figure: 

7) The image of the object taken by the Optical Telescope (Source: NASA)	7) The image of the object taken by Radio Telescope (Source NASA)
	

New Moon Observation from Perception of Islam

Definition of New moon

The moon is derived from the Arabic language word hilal (Nizam and Nawawi, 2014). Therefore, a new moon is defined as the new moon after the first ijtimak looks or possibly be visible after sunset (Zainal, 2004). According to al-Barghuthi, Abu Samrah, Ifanah and al-Na'im (2004: 226), the moon will be named as al-Hilal in the last two or three days of the beginning and end of each Arabic month. In terms of the physical phase, the moon is small, and is close to the position of the sun. Hence the effort to see it is something complicated. Observers or experts on rukyah not only requires knowledge of astronomy, but also need to be proficient on Islamic law, optical physics, mathematics and meteorology.

Dalil on The Determination of New moon

Determining the beginning of the *Hijri* used by Muslims is based on the movements of the moon and the earth around the sun. It became the basis of calculation of early months and years that have a close relationship with fasting, *Aidilfitri* and *Aidiladha* (al-Barghuthi, Abu Samrah, Ifanah and al-Na'im, 2004: 225). Al-Quran and *Hadith* have states concerning guidance on the beginning of the month or the times, especially in the performance of worship (al-Harrani, Ahmad bin 'Abd al-Halim, t.th; (Falak Syar'ie, 2014). Among the dalil on Al-Quran and Hadith mentioned in the preliminary determination is:

Allah Taala in Surah Al-Baqarah: 189

۞يَسۡـَٔلُونَكَ عَنِ ٱلۡأَهِلَّةِۖ قُلۡ هِيَ مَوَٰقِيتُ لِلنَّاسِ وَٱلۡحَجِّۗ وَلَيۡسَ ٱلۡبِرُّ بِأَن تَأۡتُواْ ٱلۡبُيُوتَ مِن ظُهُورِهَا وَلَٰكِنَّ ٱلۡبِرَّ مَنِ ٱتَّقَىٰۗ وَأۡتُواْ ٱلۡبُيُوتَ مِنۡ أَبۡوَٰبِهَاۚ وَٱتَّقُواْ ٱللَّهَ لَعَلَّكُمۡ تُفۡلِحُونَ ١٨٩

They ask you (O Muhammad) about (circulation) in the moon. Say: "(circulation) the new moon marked the times (the affairs of) men, especially Hajj. and is not righteousness that you enter the house from the back (when you are on pilgrimage) but that virtue is the act of those who fear; and went into the house (you) by their doors, and fear Allah that you may be successful.

Tadabbur Al-Quran, Surah Al-Baqarah: 189

In Tafsir of Imam Shafi'i, he states that "God explained that the crescent of the moon is determined and the days specified. He did not make any information for the Muslims except

him. He explains the otherwise mean he explains with something that is not used by him (Al-Farran, 2006).

Allah Taala in Surah Al-Baqarah;
۞ يَسۡـَٔلُونَكَ عَنِ ٱلۡأَهِلَّةِۖ قُلۡ هِيَ مَوَٰقِيتُ لِلنَّاسِ وَٱلۡحَجِّۗ
"They ask thee concerning the circulation of new moon say, the passage of the new moon marked the times and practice of human affairs, especially the pilgrimage"

Al-Baghawi (1993) explains this verse was revealed to show the difference between the moon and sun statically. This is because the Arabs when they wonder about why the new moon was created in varying circumstances. Prophet Muhammad explained the reason the moon is created as a determinant of fasting and breaking time, the obligation of Hajj, iddah woman and debt payments (Ibn Kathir, 2000).

Tafsir Tabari, Al-Mutsanna told me, he said: Ishak told us, he said: Ibn Abi Ja'far narrated from his father of Rabi 'he said, we heard that they asked the Prophet: what is the purpose created the so? Then Allah revealed the words of verse 189 of surah al-Baqarah, it was created by God as a time of fasting for Muslims, iftar, the pilgrimage, worship time, the waiting period for women and the payment of their debts (Ahmad Abd al-Raziq al-Bakri, 2008).

In Tafsir Al-Tabari also, Al-Hasan bin Yahya told us, he said: Abdurrazaq told us, he said: Ma'mar tell us from Qatadah about God's word surah al-Baqarah verse 189, he said that the Signs of the human pilgrimage, fasting, breaking and other worship (Ahmad Abd al-Raziq al-Bakri, 2008).

The *Hadith* the Prophet narrated by Imam Muslim and Bukhari:
صُومُوا لِرُؤْيَتِهِ وَأَفْطِرُوا لِرُؤْيَتِهِ فَإِنْ غُبِّيَ عَلَيْكُمْ فَأَكْمِلُوا عِدَّةَ شَعْبَانَ ثَلَاثِينَ
Meaning: "Fast as you see Hilal and eat you because you see the Hilal. When Hilal closed to you, then complete the month of Sha'ban thirty".

Ibn 'Abd al-Bar (1968: 350) in commenting on this hadith explains that the majority of jurists put two ways in the beginning of the beginning of the first sighting of the moon and the second, completed 30 days of each month if they do not look at the moon.

Although this *Hadith* refers directly to the determination of the month of Ramadan, but scholars bersepakar it is a method which is also used in the determination of the months-Muslim.

Fatwa related to New moon.
Fatwa Committee Conference of the National Council for Islamic Religious Affairs Malaysia Ke-14, which met on July 14, 1977 discussed the New moon of Ramadan and Syawal. The conference has decided that:

"The month of Ramadan and Syawal would not appear as a cloud (ghaim) Rather, according to the count of members' astronomy syariah moon is still there and can be seen, and then count the members' astronomy syariah may be used. But if the weather is good and moon not appears then to be executed the number of days of the month was 30 days "(Malaysia, 2015).

Visibility Conditions of New moon

Sighting of is of practical religious important among several communities especially Muslim (Ilyas, 1978). *Rukyah* method is the method used to sight the new moon (the moon) at sunset on the 29th day of the month of Hijra with the naked eye or with the help of tools such as the telescope and theodolite. This method is used for the purpose of determining the beginning of Ramadan, Shawwal and Dhu al-Hijjah in our country before the use of *rukyah* and reckoning. According to the method of reckoning essentials, the new moon begins when *ijtimak* occur before sundown irrespective of whether the moon exists or not.

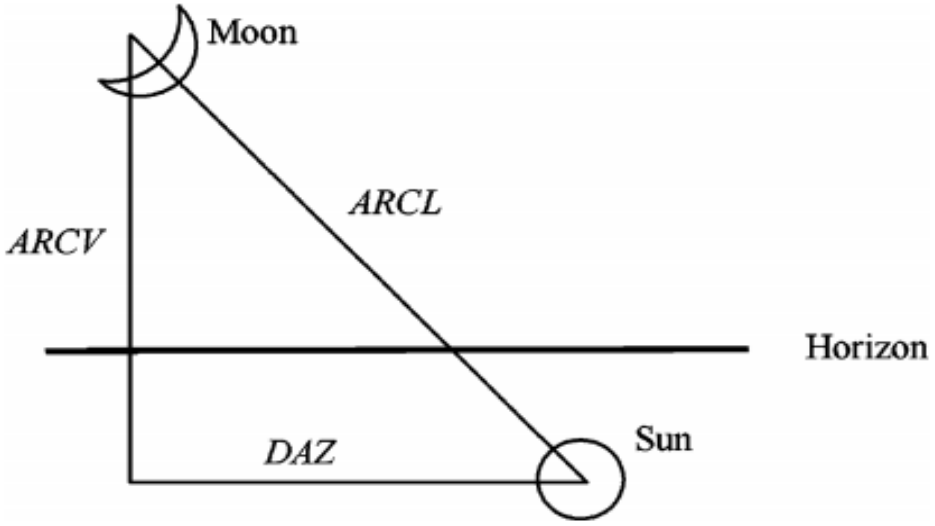


Figure 1: Important variables for crescent visibility during observation (Odeh, 2004)

Below are listed of the most frequent observing parameters which have been used during the observation of the visibility of the lunar crescent. The three most basic parameters are shown in Table2(Odeh,2004):

Table 2:

Most frequent observing parameters used during the observation

Moon's age (Age):	The interval time between conjunction and the time of observation.
Moon's lag time (Lag):	The interval time between sunset and moonset or moonrise and sunrise.
Moon's altitude:	The angular distance of the Moon above the horizon.
Arc of vision (ARCV):	The angular difference in altitude between the Sun and the Moon.
Relative azimuth (DAZ):	The angular difference in azimuth between the Sun and the Moon. Arc of light (ARCL): The angular separation (elongation) between the Sun and the Moon.
Crescent width (W):	The width of the lit area of the Moon measured along the Moon's diameter.

In Malaysia, *Rukyah* methods and computation based on the criteria *Imkanur-rukyah* (visibilities) is the determination of the initial entry of the new moon, when the position of the moon at sunset in a state that allows their appearance for (Malaysia J. K., 2015).

Starting in 1992, the terms of the appearance of the new moon, which is used has changed with the new conditions, the moon can be seen when one of the following conditions on day 29 (Zainal, 2004).
(A) When the sun goes down:
• Height (altitude) is not less than 2 degree (*ARCV*).
• The distance the arc of the sun to not less than 3 degree (*ARCL*). or;
(B) When the moon sets, the age of not less than 8 hours.

Observation of New Moon Using Optical Telescope and Non-Optical Telescope
Based on evidences, fasting and Eid was determined through moon sighting. These hadith's have become a reference since the age of the Prophet Muhammad (Rasulullah s.a.w). Basically, rukyah method has been adopted by the Muslim community based on the practice of the Prophet Muhammad s.a.w. If the sky is in cloudy conditions, then early Hijri set to complete the number of days to 30 days (Ahmad, 2001). In that condition, the appearance of the new moon is convicted only by using the naked eye (eye vision). However, the Muslim community life scenario has now changed with the advancement of science, which led to a variety of technologies used in religious affairs, especially in the method of moon sighting. The method is calling as hisab (the calculation/computation) and accompanied with the use of modern instruments. Theory and scientific fact has been proved beyond doubt to the achievement of astronomers in viewing and obtain the image of the moon. Despite that, the instruments used must meet and fulfil the Islamic justification. Consequently, there are several conditions that are required by legislation on the use of astronomical instruments.

The most important condition is the instrument used must meet the specifications set by the verses of the Qur'an, the hadith and the consensus of the scholars. By al Umar (2002), the instruments used for the purpose of worship should be conducted by an individual that is fair and free from fraud (false). Through zat (basis essence), instruments used must not contradict the belief and trust of Muslim or contain elements of superstition. Thus, instruments used in the context of moon observation were used to help obtain the image of the new moon or detect the position of the moon. This instrument has seen major qualify. This is because all of these instruments were controlled by Muslim astronomers, who have the skills and expertise to the specification for each instrument used. In addition, the use of these instruments is seen not distort the faith and trust someone or containing superstitious elements. Therefore, Muslim just acknowledges the use of instruments and as a medium or tool that can help the observer to look at the moon.

The astronomy equipment is an instrument that has the potential and has high ability in helping the human eye sight in magnify and bring objects that have a very minimum the contrast of light like a moon. In addition, the state of the sky that was always covered by thick clouds and atmospheric effect caused hardship and difficulty, if only relies on rough eye solely. Nowadays, the uses of these instruments have become a necessity in observation of moon. Those who interpret the hadith literally, they do not agree in using equipment astronomy as a tool. This is because they adhere only to *rukyah* implementation, which is

carried by the Prophet Muhammad s.a.w that only uses naked eye (eye vision) in observation of new moon. By adheres to that principle, they object the use of an astronomical instrument in moon observation.

Yet so, when viewed from the context of understanding the hadith, observation of moon with astronomy equipment also determine as using eye view. This act still based on demand of origin using the eye vision for observation of moon. Therefore, the use of astronomy equipment is still in the concept range of rukyah which is using the naked eye (eye vision). According to Yusuf Qaradawi, the hadiths regarding the preliminary determination for the implementation of the Hijri month of fasting shows the ends and means (medium). The goal of the hadith is clear that the implementation of the fasting in month of Ramadan rather than the other month. Medium for determining the beginning of the Hijri month has been set by the Prophet Muhammad as the medium that shall not cause troublesome to the Muslims of that time (Qaradawi, 2005).

Accordingly, the reason or the god ruler rukyah the naked eye is solely due to the difficulties of Muslims in the days of the Prophet Muhammad who could not read or write. Based on the hadith narrated by Muslim,

لَا أُمَّيَّةٌ أُمَّةٌ إِنَّا قَالَ أَنَّهُ وَسَلَّمَ عَلَيْهِ اللَّهُ صَلَّى النَّبِيِّ عَنْهُمَاعَنْ اللَّهُ رَضِيَ عُمَرَ ابْنَ عَنْ
ثَلَاثِينَ وَمَرَّةً وَعِشْرِينَ تِسْعَةً مَرَّةً يَعْنِي وَهَكَذَا هَكَذَا الشَّهْرُ نَحْسُبُ وَلَا نَكْتُبُ

Translation: *From Ibn 'Umar, the Prophet actually said; those people who are illiterate, do not know how to write and knew how to count, the moon is so and so. Month was occasional in 29 days and another 30 days once in a while.*

Therefore, the appropriate medium for observation of moon at that time was by using naked eyes. However, keep in mind that the medium is constantly changing with time and the passing of time. The purpose of an implementation is never changed but remained the same. If there is a better medium, the medium can be applied it uses. *Rukyah* implementation of the conviction moon at the beginning of Islam makes it easy as it is because they are illiterate, which does not know how to write and read. Then over time this medium was changed to execution of arithmetic rules and by the use of instrument astronomy. The use of this type of measure will certainly be clean from any element of fraud, assumptions and errors in the conviction of moon in principle of Islam.

Optical objects are objects that use optical lenses that function in helping certain activities. Optical lenses are usually made of glass, plastic and fiber. Observation of new moon in religious activity is carried out every year by Muslims for more than 1000 years. Due to this activity, Muslims may have made and use the telescope since about 500 years ago (Zakaria, 2002).

According to Yahya (2005: 66), the history of Islam drew three clauses in the observation of the new moon. Which one of them is the use of the telescope? If studied at the corner of astronomy and space science, observation of the new moon could grow as scientific activities besides religious activities. Many of the conditions stipulated in the observation of the new moon and it is characterized by the terms of the research and development of science.

A condition set for the activities of this observation is the size of the moon, i.e. the size of the smallest. Age of the moon at this point is a day, the first day of the moon. The position of the moon is close to the horizon, where usually there are clouds. In addition, the observation of the new moon was dusk, when there is sunlight. All of these are conditions set conditions to make observations of the most difficult to do. Difficulty observation of the new moon is not a factor that imposes Muslims because of religious activities in Islam cannot be regarded as a troublesome burden (Zakaria, 2002).

Therefore, due to the difficulty of obtaining an image of the moon using conventional telescopes, the scientists have created a system of more advanced optical telescope for observations of the moon. Advanced telescope is equipped with filters objectives, tracking systems and image processing systems. Moon objectives filter can be installed on the telescope objective lens or mirror. These filters are made of optical materials that can filter light other than the light reflected by the moon. This filter only allows light from the moon to the objective lens or mirror telescope. This filter can be produced if the frequency of the main wave of the new moon can be identified. While the tracking system is its moon, mechanical and electronic tracking systems that move the telescope automatically when the process of tracking the movement of the moon. This system uses a computer-controlled and can track even the crescent moon was blocked by clouds and invisible optically (Zakaria, 2002).

Moon image processing system is a computer system that can produce images that are clearly the result of manipulation of data collected by the telescope optics. This advanced optical telescope can also be used for other astronomical observations, especially observations of astronomical objects near the horizon like planets Mercury and Venus. The telescope is also suitable for the study of the atmosphere near the horizon as the study of the atmosphere optical observations (Zakaria, 2002). Here we can see how great the contribution of Islamic scientists invented telescope equipment with equipment which can help simplify the process of observation of the new moon.

Besides using optical telescopes, moon observation activities can also be done with more creative and scientifically using optical telescopes rather than the type of radio telescope. Radio telescope is not similar as optical telescope that can detect radio waves emitted by the radio wave and converts data obtained from visual images. Thus, the visual image of the moon from radio waves can be generated. The advantage of using the radio telescope observations of the moon is that it can observe the crescent moon even blocked by clouds, because radio waves can penetrate the clouds while optical waves blocked by clouds. The observations of moon using scientific method by using radio telescope is not to say that the conventional techniques used by Muslims today are no longer suitable, but it is a form of development that can contribute to the advancement of the Muslim mind. After all, the scientific activities carried out it are not contrary to the law or the rules of Islam (Zakaria, 2012).

Generally, the observation of the new moon using optical telescopes and non-optical telescopes were very helpful in the process of observation of the new moon. While observing the moon using optical telescopes more widely used but if the radio telescope could also help in its observation activities this moon why not use this opportunity wisely. There are several advantages of radio observation, for example we can observe celestial object in day light, during rainy weather and moonlight is not annoying. This will help to further facilitate the

observation of the new moon in Malaysia due we have two monsoons season every year. This shows the enormity of the sacrifice of scientists in creating a variety of equipment that can be used by the public to look at the moon. The observation of the new moon using a radio telescope using new methods is introduced. Along with the more developed a country's slogan increasingly advanced technologies that country.

For the summary, the observation of the new moon can be done using radio telescopes, and this equipment would assist the Islamic community instead of using optical telescope individually. Therefore, if we have informed decisions and be absolutely sure that the combined use of optical telescopes and radio telescopes are highly encouraged in Islam. According with the teachings of the *Shari'a* being careful in setting a same law, because the early entry included in determining an example of determining the start of Ramadan. Furthermore, Islam strongly encourages its followers to constantly improve themselves. Thus, although the use of radio telescopes is not a requirement in Islam but it is very helpful in the ease of observation of the new moon and Islam very much appreciate the efforts of astronomers who invented the radio telescope.

Conclusion

The use of optical telescopes and radio telescopes are very helpful to researchers in observing the moon with more accurate and more reliable and conform to Islamic rules for the use of science and technology is an amplifier to a science, it is also a place that is very important to take into account in modern times. But it is also the development of humanity and nature through religious reference.

Thus, technology optical telescopes, radio telescopes and religion should be in line in every action so that all the activities of research, observations, theories concerning the creation of which is run according to a set of religious rules. Religion demands that its adherents to reflect and think about the greatness of his creator through every incident that happens in the universe and find solution and unlock any natural substance that people would become grateful for the perfection of nature is supposed to be the starting point to the truth.

Through this truth having faith in the Creator according to the nature of the omniscient and organize an unlimited nature with forms so neat, complex, structured and can be studied by his people in line with the provision of the human mind.

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