AYYĀM AL-BĪḌ SYAR'I AND ASTRONOMY PERSPECTIVE (BETWEEN FASTING MOMENTUM AND SCIENTIFIC CALCULATION)

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Abstract

Ayy*ām al-Bīd*is a group of days in the hijri calendar system. Ayy term*ām al-Bīd*obtained from the hadith of the Prophet which contains the command to fast for three days in each hijri month, which is sunnah. Ayy understanding*ām al-Bīd*from the hadith of the Prophet is the date / day of the 13th, 14th, and 15th of the Hijri month. However, at a practical level, scholars differed when they mentioned the implementation of Ayy's fast*ām al-Bīd*. There are 9 versions of this opinion. Here the writer wants to examine more deeply ayy*ām al-Bīd*This is seen from a shar'i and astronomical perspective. The writer studies it with the research library method using the scientific-cum-doctriner approach. The data collected came from the books of hadith and fiqh, then analyzed with an astronomical approach. From this research, it was found that the meaning of the term Ayy*ām al-Bīd*In the view of syar'i, it is the best time to observe the sunnah fast for three days every month. Matan hadith of the Prophet SAW regarding Ayy*ām al-Bīd* which stipulates on the 13th, 14th and 15th of the Hijri month because that is the time when the full moon and lunar eclipses occur. From the review of astronomy Ayy*ām al-Bīd*is the time when at night the Moon shines brighter than the other nights. Astronomically this can occur 4-5 days in the middle of the Hijri month.
Keywords: Ayy*ām al-Bīd*, syar'i, astronomy

Abstrak

Ayyām al-Bīd merupakan kelompok hari dalam sistem kalender hijriah. Istilah *Ayyām al-Bīd* diperoleh dari hadis Nabi yang berisikan perintah puasa tiga hari dalam setiap bulan hijriah yang hukumnya sunnah. Pemahaman *Ayyām al-Bīd* dari hadis Nabi merupakan tanggal/hari ke-13, 14, dan 15 bulan hijriah. Namun, dalam tataran praktisnya, ulama berbeda pendapat ketika menyebutkan pelaksanaan puasa *Ayyām*

al-Bīd. Ada 9 versi pendapat terkait ini. Di sini penulis hendak mengkaji lebih dalam *ayyām al-Bīd* ini dilihat dari prespektif syar'i dan astronomi. Penulis mengkajinya dengan metode *library research* dengan menggunakan pendekatan *scientific-cum-doctriner*. Data-data yang dikumpulkan berasal dari kitab-kitab hadist maupun fiqih, kemudian dianalisis dengan pendekatan ilmu astronomi. Dari penelitian ini didapatkan bahwa pemaknaan istilah *Ayyām al-Bīd* dalam pandangan syar'i adalah merupakan waktu terbaik untuk melaksanakan puasa sunnah tiga hari dalam setiap bulan. Matan hadis Nabi SAW terkait *Ayyām al-Bīd* yang menetapkan pada tanggal 13, 14 dan 15 bulan hijriah dikarenakan pada saat itulah kebiasaan terjadinya Bulan purnama dan gerhana Bulan. Dari tinjauan ilmu astronomi *Ayyām al-Bīd* merupakan waktu ketika malam harinya Bulan bersinar lebih terang dari malam-malam lainnya. Secara astronomis hal ini dapat terjadi 4-5 hari di pertengahan bulan hijriah.
Kata kunci: *Ayyām al-Bīd*, syar'i, astronomi

A. Introduction

Some Muslim worship practices are associated with the name of the day, date and month. Some examples include the Sunnah fast every Monday and Thursday and the three-day sunnah fast in the middle of the month[1] which is called fasting ayy*ām al-bīḍ*.[2] More specifically, the sunnah ayy fast*ām al-bīḍ* held in the middle of the month, namely on the 13th, 14th and 15th of Hijriah.

Term ayy*ām al-bīḍ* along with the fasting of three days in the middle of the month can be detected from several traditions of the Prophet, including in the hadith observations narrated by al-Nasa'i.

أَخْبَرَنَا مُحَمَّدُ بْنُ عَبْدِ الْعَزِيزِ، قَالَ: أَنْبَأَنَا الْفَضْلُ بْنُ مُوسَى، عَنْ فِطْرٍ، عَنْ يَحْيَى بْنِ سَامٍ، عَنْ مُوسَى بْنِ طَلْحَةَ، عَنْ أَبِي ذَرٍّ، قَالَ: " أَمَرَنَا رَسُولُ اللَّهِ أَنْ نَصُومَ مِنَ الشَّهْرِ ثَلَاثَةَ أَيَّامٍ البيض: ثَلَاثَ عَشْرَةَ، وَأَرْبَعَ عَشْرَةَ، وَخَمْسَ عَشْرَةَ.[3]

"Muhammad bin Abdul Aziz reported to us, he said al-Fadhl bin Musa told us, from Fithr, from Yahya bin Sam from Musa bin Talha, from Abi Dhar said: Rasulullah SAW has ordered us to fast three days a month. , namely on white days on the 13th, 14th, and 15th of Hijriah. "

[1] Zainuddin bin Abdul 'Aziz al-Malibari, *Fath al-Mu'in bi Syarhi Qurroh al-'Ain*, (Surabaya: Nur al-Huda, tt), p. 59. See Sayyid Sabiq, *Fiqh al-Sunnah*, (Beirut: Dar al-Fikr, 1983), p. 383.

[2]Naming the fasting ayyam al-bid in this thesis follows imam al-Bukhari in his shahih kitab..

[3]Abi Abdurrahman Ahmad bin Syuaib bin Ali al-Nasa'i, Sunan an-Nasa'i, hadis no. 2422, (Riyadh: Bait al-Afkar al-Daulah, tt), page. 261. See, Abi Daud Sulaiman bin al-Asy'ati Al-Sijistani, Sunan Abi Daud, , hadis no. 2449, 2450 (Riyadh: Bait al-Afkar al-Daulah, tt), page. 278. See Muhammad bin Ali al-Syaukani, Nail al-Autar min Asrari Muntaqa al-Akhbar, (Riyadh: Dar Ibnu Jauzi, cet. 1 1427 H), page. 432.

In Islamic literature, understanding term ayy*ā*m *al-bīḍ*indicated by the hadith limiting it to three nights (nights 13, 14, and 15 hijriah). From here at least we can understand that understanding ayy*ā*m *al-bīḍ* doctrinaire. On a practical level, the appearance of the most round and bright Moon (full moon) can occur on the 13th, 14th, 15th, and even the 16th.

Meanwhile, Agus Purwanto gave an understanding that ayy*ā*m *al-bīḍ*are days that are bright continuously without (pause) darkness, even when there is a change of day and night. That is, a day of this nature must include the 13th, 14th, and 15th of Hijriah.[4]

Some literature in Islamic scholarship (mainly books of hadith and fiqh)[5] when mentioning the term ayy*ā*m *al-bīḍ* only expresses sunnah[6]to fast without mentioning astronomical reasons, such as the concept of early prayer times and the beginning of the lunar month. On the other hand, if it's ayy*ā*m *al-bīḍ* It falls at the same time it is forbidden to do fasting (such as the 13th of Zulhijah), some scholars replace the fasting of ayyam al-bid on the 16th of Hijriah.[7] In fact, some scholars also mention starting the ayyam al-bid fast from the 12th of Hijriah as a means of being careful in worship.[8]

Basically ayy*ā*m *al-bīḍ*is one of the concepts of time in Islam which is based on the movement of celestial bodies, especially the positions of the Sun and Moon. Therefore, it should be astronomically term ayy*ā*m *al-bīḍ* can also be seen taking into account the rising and setting times of the Moon and Sun.

In astronomy, the fall of ayy*ā*m *al-bīḍ*can be related to the appearance of the Moon which is called the Moon phase. There are at least four phases of the Moon that are defined by experts, namely the dead Moon / new Moon, the first quarter, the full

[4]Agus Purwanto, *Nalar Ayat-Ayat Semesta*, (Bandung: Mizan, 2012), page. 332.

[5]One of the kitab fikih from madzhab Syafi'i whoexplainethat the sunnah of fasting three days in the middle of the month kitab al-Lubab dan al-Iqna'. See Abi Hasan Ahmad bin Muhammad bin Ahmad al-Dhibbi al-Mahalli, Al-Lubab fi Fiqhi al-Syafi'I, (Madinah: Dar al-Bukhari, 1416 H), 190. See Abi Hasan Ali bin Muhammad bin Habib al-Mawardi, Al-Iqna' fi Fiqhi al-Syafi'I, (Teheran: Dar Ihsan, 2000),page. 80.

[6]Wahbah Zuhaili, *Al-Fiqh al-Islami wa Adillatuhu*, (Beirut: Dar al-Kutub al-'Ilmiyyah, 2001), page. 588. See Abdurrahman al-Jaziri, *Kitab al-Fiqh 'ala al-Madzahib al-'Arba'ah*, (Beirut: Dar al-Kutub al-'Ilmiyyah, 2003), page. 505.

[7]Abi Abdul Mu'thi Muhammad bin Umar bin Ali Nawawi, *Nihayah al-Zain fi Irsyad al-Mursyidin*, (Semarang: Toha Putera, 1994), page. 97.

[8]Ibnu al-Qasim al-Ghazzi, *Hasyiyah al-Syaikh Ibrahim al-Baijuri*, (Beirut: Dar al-Kutub al-'Ilmiyyah, 1999), juz 1, cet. 2, page. 79.

moon and the last quarter.[9] In astronomical calculations ayy*ām al-bīḍ*which is the 13th, 14th, and 15th of Hijriah is the time around the full moon phase. So in this study, the full moon phase is of particular concern to determine the position of the Moon on the nights ayy*ām al-bīḍ*.[10]In the hijri calendar system, one month sometimes consists of 29 days and sometimes it consists of 30 days. So ideally, the middle of the month can occur on the 14.5th day or the 15th day. But in reality, the observations of the hadith of the prophet that show the term ayy*ām al-bīḍ* only mentions the 13th, 14th and 15 which should be the 16th can be said to be ayy*ām al-bīḍ*.

From the description above there are at least two strong reasons for doing this study. First, so far in Islamic literature ayy*ām al-bīḍ* limited to the recommendation to fast by the majority of the schools. Second, literature in Islamic scholarship has not explained why ayy*ām al-bīḍ* limited to the 13th, 14th, and 15th of hijriah.[11] This is where the author is interested in further examining the concept of ayy*ām al-bīḍ* in an Islamic perspective to then be interconnected[12] with modern astronomical theories so that it can be seen the reasons for the Prophet's hadith related to ayy*ām al-bīḍ*.

The study of ayy*ām al-bīḍ* those raised in this study are still hard to find. As far as tracing, previous studies pertaining to the Moon-based concept of time are still focused on the Islamic calendar system, especially regarding the concept of the beginning of the month. Likewise, the concept of time that many previous researchers have raised has yet to discuss the concept of ayy*ām al-bīḍ* specifically. Among these previous studies are:

Ahmad Fuad al-Anshary's thesis entitled "The Views of Nahdhatul Ulama and Muhammadiyah Figures on Dr. Agus Purwanto regarding Purnama as a New Parameter

[9]Jean Meeus, *Astronomical Algoritm*, (Virginia: Willmann Bell-inc, 1991),page. 307.

[10]Information about the phases of the moon, including in QS. Yasin:39 (and we have assigned it to the month of manzilah-manzilah, so that (after he gets the last manzilah) return him as an old bunch). In this verse, Allah reveals the manzilah-manzilah of the month to the position of al-urjunil qadim.

[11]The literatures only state that al-ayyam bid is three days in the middle of the month, that are 13th, 14th, and 15th hijri month.

[12]Interconnection, can be seen from two words, inter and connect. Inter is a form of prefix, which means betweenor among (a group). while connect can mean to join, unite atau link, from here comes the understanding “to think of as related”, “ to tie or fasten together”, “to establish a relation between”, or“ to associate in the mind”. From here comes the noun, that is connection and adjective connected (maybe more precise than connective because connected is definetely an adjective, where as connective can be both an adjective and also a verb). See Akh. Minhaji, *Masa Depan Perguruan Tinggi Islam di Indonesia: Perspektif Sejarah-Sosial, jurnal Tadris*, Vo. 2. No. 2. Th. 2007, page. 165.

for Determining the Beginning of the Lunar Month ". The conclusion of this study is that astronomers in Jombang district are divided in accepting the offer of the full moon as a parameter to determine the beginning of the lunar month.[13] Fuad's research does not use astronomical analysis to test the validity of Agus Purwanto's ideas, so there are still many opportunities to study it.

The thesis entitled "The Concept of Day and Night in the Qur'an" by Ibnu Sutopo (2014). This research is a study of the terms al-lail and al-nahar in the perspective of the Koran and astronomy. By using the maudh method*ū'i bi al-muqārin*Ibn Sutopo found that the term al-lail and its derivatives are mentioned in the Koran 92 times, while the term al-nahar is mentioned 57 times. The results of these studies reveal that day and night can be divided into 5, namely day and night haqiqi, taqribi, syar'i, 'urfi, and istiwa' ..[14] In this research (research to be conducted by the author), Ibnu Sutopo's conclusion in his research can be used as a reference in building the concept of ayy*ām al-bīḍ* which is a variant of the day in the Islamic perspective time system.

M. Ma'rifat Iman's dissertation entitled "International Islamic Calendar (Analysis of System Differences)". This research basically wants to strengthen one of the offers of the concept of the international hijriah calendar, namely the unified hijriah calendar initiated by Jamaluddin Abdurraziq. This dissertation states that Jamaluddin Abdurraziq's thoughts in al-Taqw*īm al-Qamari al-Islāmi al-Muwahhad* and in al-Taqw*īm al-Islāmi: al-Muqārabah al-Syumūliyyah*, where the start of the day is set at midnight (00:00) and on the international date line with a system called the unification calendar will be able to unify the calendar in the Islamic world.[15] This work can broaden the analysis to be carried out by the author, because it is basically ayy*ām al-bīḍ*are days in the Islamic calendar system. Nachum Dershowitz said that the idea / idea of the day (including the

[13]Ahmad Fuad al-Anshari, *Pandangan Tokoh Nahdhatul Ulama dan Muhammadiyah terhadap Gagasan Dr. Agus Purwanto mengenai Purnama sebagai Parameter Baru Penentuan Awal Bulan Kamariah*, Thesis department of Akhwal As-Syakhshiyah, Faculty of Sharia UIN Maulana Malik Ibrahim, Malang, 2012.

[14]Ibnu Sutopo, *Konsep Siang dan Malam dalam Al-Qur'an,*thesis of the UIN Walisongo graduate astronomy study program, Semarang, 2014.

[15]M. Ma'rifat Iman, *Kalender Islam Internasional (Analisis terhadap Perbedaan Sistem)*, UIN Syarif Hidayatullah graduate school dissertation research report, Jakarta, 2009.

month and year) was originally based on observations of astronomical phenomena.[16] In this case, the ideas / ideas of the day on the concept of ayy*ām al-bīḍ* of course based on the movement of the Moon.

As for the studies that have been carried out on studies in the field of fiqh related to astronomical phenomena, there are several works by astronomers and Islamic law experts. Among them are the book Initiating Astronomical Fiqh: Study of Hisab-Rukyat and Finding Solutions for Differences in Holidays.[17]Basically, this book is a collection of some of T. Djamaluddin's writings, both in print and electronic media, which tend to raise the issue of differences in the beginning of the lunar month. The writing in this book is not a methodological study of Islamic law. Although it doesn't address the ayy phenomenon*ām al-bīḍ*This book seeks to use the interconnection paradigm of fiqh and astronomical studies in explaining the problems of hisab-rukyat in Indonesia. This paradigm has inspired the author to undertake a similar approach to study in this study.

Book Interconnection of Hadith and Astronomy Studies. This book discusses observations of hadith that are interconnected with astronomy. For the Indonesian context, this study is relatively new in the observational hadith research. Some of the research cases discussed in this book are able to prove that through an astronomical approach it can be found whether or not the hadiths may be mistaken, especially those related to the date of events. The hadiths used as the object of this research are the hadiths of hisab-rukyat in the matter of the beginning of the lunar month.[18]The research that the author will conduct is different from the research in this book. The object of the author's study focuses on the information available in Islamic literature that is used in understanding ayy*ām al-bīḍ*.

Other studies on the phases of the Moon as far as the author's search have nothing to say about the concept of ayy*ām al-bīḍ*. Some works only directly link the cycles of the Moon (including the phases of the Moon) with human behavior on Earth, such as research

[16]Nachum Dershowitz dan Edward M. Reinghold, *Calenderical Calculation*, (Cambridge: Cambridge University Press, 1997), page. 7.

[17]T. Djamaludiin, *Menggagas Fiqih Astronomi: Telaah Hisab-Rukyat dan Pencarian Solusi Perbedaan hari Raya*, (Bandung: Kaki Langit, 2005).

[18]Syamsul Anwar, *Interkoneksi Studi hadis dan Astronomi*, (Yogyakarta: Suara Muhammadiyah, 2011).

on the effect of the Moon phase on heart attacks.[19], mental illnesses[20], to crime.[21] Several more studies on the phases of the Moon are used to determine their effect on natural phenomena on Earth.[22] In this study, the authors used the Meeus algorithm in the data analysis process, the same as the last research that the author mentioned in this literature review.

None of the previous studies raised the theme Ayy*ā*m *al-bīḍ*in his study. Research that is almost close to this study is Agus Purwanto's research as outlined in his writing "Purnama as a New Parameter for the Beginning of the Lunar Month". This research attempts to make the full moon to test the validity of the beginning of the month in the hijri calendar system. In his conclusion, Agus Purwanto said that the observations of the full moon of Shawwal 1428 H confirmed the criteria for wuju d al-hila l (not imka n al-ru'yah) as the initial criterion for the hijri month.

This conclusion is based on his observation that on the 15th of Shawwal (based on the criteria wuju d al-hila l) the Moon is above the horizon, so it can be concluded that the criteria for wuju d al-hila l start the beginning of the month a day earlier than the criteria for imka n al-ru'yah are considered more valid. In reality, Agus Purwanto's research also refutes the criteria of wuju d al-hila l and imka n al-ru'yah because on the 15th of several other months the Moon is under the horizon. Agus Purwanto's assumption in this research is that the 15th of Hijriah in each Hijri month coincides when the Moon is above the horizon the last time at sunset. This assumption is based on the argument about ayy*ā*m *al-bīḍ* who said that ayy*ā*m *al-bīḍ* are days that are everlasting light, without any interruption (darkness) when the Sun sets.[23] Agus Purwanto's failure has defined the concept of ayy*ā*m *al-bīḍ* becomes blurred again, so the

[19]Rajan Kanth, dkk, *"Impact of Lunar Phase on the Incident of Cardiac Events."* World Journal of Cardiovascular, 2 (2012) : 124-128, accessed 28 Februari 2017. doi: 10.423/wjcd.2012.23020.

[20]One of them is article wrote by Vance, D. E. *"Beliefe on Lunar Effects on Human Behavior"*.Psichological Reports, 76 (1995): 32-34, accessedon 28 Februari 2017. doi: 10.2466/pr0.1995.76.1.32.

[21]Thakur, C.P. and Sharma, D. "*Full Moon and Crime.*" British Medical Juornal (Clinic Research Ed), 289 (1978). doi: 10.1136/bmj.289.6460.1789.

[22]Agus Minanur Rohman, *Visualisasi Gerak Semu Bulan dan Matahari serta Pengaruhnya terhadap Pasang Surut Air Laut Menggunakan Algoritma Jean Meeus*, thesis ofthe faculty of Scienceand Technology UIN Maulana Malik Ibrahim, Malang, 2016.

[23]Agus Purwanto, *Purnama sebagai Parameter Penentuan Awal Bulan*, prosiding hilal 2009, Lembang.

study in this thesis will reformulate the concept of ayy*ām al-bīḍ* according to the arguments in the Islamic literature.

The study in this thesis is also different from Agus Purwanto's research in terms of an Islamic perspective on ayy*ām al-bīḍ*. More specifically, this study reads the term ayy*ām al-bīḍ* that is more precise in the aspect of astronomy based on the theories of calculating the position of the Moon and the Sun, so that an astronomically correct formulation is produced to call the times which are called ayy*ām al-bīḍ*.

B. Method

The research method used is library research (library research)[24] by using the scientific-cum-doctriner approach.[25]This approach is intended so that in this study the scientific (philosophical) approach of the natural sciences (astronomy) is used without forgetting the doctrinal aspects contained in the literature of Islamic studies (fiqh). Data collection is carried out using the documentation method,[26] namely by observing and collecting data from books or books related to the concept of ayy*ām al-bīḍ*Then the analysis was carried out using content analysis through deductive, inductive and abductive descriptive techniques. The deductive method is used in order to obtain an overview of the arguments used by fiqh scholars, so as to be able to state that the ayy phenomenon*ām al-bīḍ*occurs on the 13th, 14th and 15th of each month. The inductive method is used to see the concept of ayy*ām al-bīḍ*in astronomical studies. Meanwhile,

[24]Library research belongs to the type of qualitative research. For example : scripture research (al-Qur'an or hadith), scientific books, thoughts of figuresandlaws and regulations. Formulation team, guidelines for writing scientific papers, (Semarang: Pascasarjana UIN Walisongo, 2016), page. 22-23.

[25]Approach is a way of looking at an object or problem. The scientific approach requires the use of certain methods or steps in order to achieve correct knowledge. Nanang Martono, *Metode Penelitian Kualitatif: Analisis Isi dan Analisis Data Sekunder*, (Jakarta: PT RajaGeafindo Persada, cet. ke-1, 2010), 11. See Sumadi Suryabrata, *Metodologi Penelitian*, (Jakarta: PT RajaGrafindo Persada, cet. ke-24, 2013), page. 3. Mukti Ali said, categorically there are three kinds of elements that must be known in understanding Islam. There are God, nature and humans. Ali Mukti's idea from his criticism of Islamic education in Indonesia which seems compartmentalized, so it is necessary to integrate Islamic Knowledge. Mukti Ali, *Metode Memahami Agama Islam*, (Jakarta: Bulan Bintang, 1991), 32. See Mukti Ali, "*Metodologi Ilmu Agama*", including in Taufik Abdullah and Rusli Karim (ed), *Metodologi Penelitian Agama: Sebuah Pengantar,* (Yogyakarta: Tiara Wacana, 1989), page. 46

Approach of scientific-cum-doctriner is scientific approach (filosofis, historis, sosiologis) without forgetting the doctrine. Mukti Ali, Metode *Memahami Agama Islam*, (Jakarta: Bulan Bintang, 1991), page. 32

[26]Documentation method is a methodto find data about things or variable in the form of notes, transcripts, books, newspapers, magazines, inscriptions, meeting minutes, etc. Suharsimi Arikunto, *Prosedur Penelitian : Suatu Pendekatan Praktik*, (Jakarta : Rineka Cipta, 2010), page. 274.

the abductive method is used to conclude the ayy concept*ām al-bīḍ* based on syar'i propositions that are interconnected with astronomical studies.[27]

C. Discuss and Result

1. *Ayyām al-bīḍ* in Islam

he term yaum which is the mufrad of the word ayyam[28]in Indonesian it is called a day.[29] In the Big Indonesian Dictionary, day means the time from morning to morning again.[30]Sometimes the day also means the time during which the sun illuminates our place (the time from sunrise to sunset). Days can also be interpreted as the time during work hours and conditions (air, nature, etc.) that last for 24 hours.[31]

In this study, the term day or day of concern is time with the meaning of a certain number. In other words, what is meant is the phenomenon of daily time. In language a day consists of day and night. The phenomenon of daily time is often expressed in the Koran in various terms, such as al-nahar, al-lail, and al-bayat.[32]

Meanwhile al-b*īḍ* is the plural form of the word al-baya*ḍ* which means (nature) white.[33] So that in ayy language*ām al-bīḍ*can be interpreted as white days. In this study, ayy*ām* means a group of daily time in a certain number which can be known by humans because of the term ayy*ām al-bīḍ* is basically part of the daily time phenomenon.

In Islamic terms the term ayy is designated*ām al-bīḍ*we can find from the guidance of the Prophet's hadith. Some editors of the Prophet's hadith explicitly

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[27]Full description see Amin Abdillah, *Kajian Ilmu Kalam di IAIN Menyongsong Perguliran Paradigma Keilmuan KeIslaman PAda Era Milenium ketiga*, contained in Journal of Islamic Studies Al-Jami'ah, No. 65/VI/2000, page. 78-101.

[28]Louais Ma'luf dan Bernard Tottel, *Kamus al-Munjud*, (Beirut: dar al-masyriq, 1986), page. 345.

[29]Tim Penyusun Kamus Pusat Bahasa, *Kamus Besar Bahasa Indonesia*, Jakarta : Pusat Bahasa, 2008, page. 298.

[30]Tim Penyusun Kamus Pusat Bahasa, *Kamus Besar Bahasa Indonesia*, Jakarta : Pusat Bahasa, 2008, page. 298.

[31]Tim Penyusun Kamus Pusat Bahasa, *Kamus Besar Bahasa Indonesia*, Jakarta : Pusat Bahasa, 2008, page. 298.

[32]Lajnah pentashih mushaf al-Qur'an. *Mengenal Ayat-Ayat Sains: Waktu dalam Perspektif al-Qur'an dan Sains*,(Jakarta: Widya Cahaya, 2015), page. 27.

[33]Louais Ma'luf dan Bernard Tottel, *Kamus al-Munjud*, (Beirut:dar al-masyriq, 1986, cet. 28) page.56, see*Majma' al-lughah li arabiyyah, Mu'jam al-Wasith*, (kairo: mathobi' ad dar al hindisiyyah, 1985), p. 81.

mention the term ayy*ām al-bīḍ*. Among the hadiths are the hadiths narrated by al-Nasa'i from Abu Dhar:

أَخْبَرَنَا مُحَمَّدُ بْنُ عَبْدِ الْعَزِيزِ، قَالَ: أَنْبَأَنَا الْفَضْلُ بْنُ مُوسَى، عَنْ فِطْرٍ، عَنْ يَحْيَى بْنِ سَامٍ، عَنْ مُوسَى بْنِ طَلْحَةَ، عَنْ أَبِي ذَرٍّ، قَالَ: " أَمَرَنَا رَسُولُ اللَّهِ أَنْ نَصُومَ مِنَ الشَّهْرِ ثَلَاثَةَ أَيَّامٍ البيض: ثَلَاثَ عَشْرَةَ، وَأَرْبَعَ عَشْرَةَ، وَخَمْسَ عَشْرَةَ ".[34]

"Muhammad bin Abdul Aziz reported to us, he said al-Fadhl bin Musa told us, from Fithr, from Yahya bin Sam from Musa bin Talha, from Abi Dhar said: Rasulullah SAW has ordered us to fast three days a month. , namely on white days on the 13th, 14th, and 15th of Hijriah. "

The hadith narrated by Abu Daud comes from Abdul Malik bin Qudamah bin Milhan:

حَدَّثَنَا مُحَمَّدُ بْنُ كَثِيرٍ، حَدَّثَنَا هَمَّامٌ، عَنْ أَنَسٍ أَخِي مُحَمَّدٍ، عَنِ ابْنِ مِلْحَانَ الْقَيْسِيِّ، عَنْ أَبِيهِ، قَالَ: كَانَ رَسُولُ اللَّهِ " يَأْمُرُنَا أَنْ نَصُوم البيض: ثَلَاثَ عَشْرَةَ وَأَرْبَعَ عَشْرَةَ وَخَمْسَ عَشْرَةَ ". قَالَ: وَقَالَ: هُنَّ كَهَيْئَةِ الدَّهْرِ.[35]

"Muhammad bin Kathir told us, Hamam told us, from Anas the brother of Muhammad, from Ibn Milhan al-Qaisi, from his father the Prophet Muhammad ordered us to fast on white days, namely the thirteenth, fourteenth and fifteenth. . He said, he said: it's like a year of fasting. "[36]

Then another hadith which explicitly mentions the term ayy*ām al-bīḍ*, like the hadith narrated by An-Nasa'i from the path of Muhammad bin Abdul A'la,[37] and the Makhlad bin Hasan route.[38]

[34]Abi Abdurrahman Ahmad bin Syuaib bin Ali al-Nasa'i, Sunan an-Nasa'i, hadis no. 2422, (Riyadh: Bait al-Afkar al-Daulah, tt), p. 261.

[35]Abi Daud Sulaiman bin al-Asy'at al-Sijistani, Sunan Abi Daud, (Riyadh, Bait al-Afkar al-Daulah, tt), Hadis no. 2449, p. 278.

[36]Muhammad Nasiruddin al-Albani, *Shahih at-Targhib wa at-Tarhib*, translated by Izzuddin Karimi, dkk, (Jakarta: Pustaka Sahifa, 2012, cet. 4), page. 89.

[37]Abi Abdurrahman Ahmad bin Syu'aib bin Ali al-Nasa'I, Sunan al-Nasa'I, (Riyadh: Bait al-Afkar al-Daulah, tt), Hadis no. 2430, p. 262. The term of ayyām al-bīḍmentioned in hadis narrated by al-Nasa'I, diantaranya hadis no. 2345, 2428, 2432, 2429, and 2431.

[38]Abi Abdurrahman Ahmad bin Syu'aib bin Ali al-Nasa'I, Sunan al-Nasa'I, (Riyadh: Bait al-Afkar al-Daulah, tt), Hadis no. 2420, page. 261.

In accordance with the information in several traditions of the Prophet above, ayy*ām al-bīḍ*are the days on the 13th, 14th and 15th in the hijri calendar system. Ayy*ām al-bīḍ*is the day of the full moon night and the day before and after. Al-Qusthalani said that on these nights the Moon is visible from the beginning to the end of the night.[39]

Mahfudz al-Tarmasyi said that al-b*īḍ* in ayy terms*ām al-bīḍ* which means the white nature is the majaz of the whiteness of the nights because of the scattering of light (Moon) on those nights.[40] The appearance of the Moon throughout the night on the 13th, 14th and 15th causes the night sky to be brighter than the other nights.

Another understanding of the term ayy*ām al-bīḍ*is on those nights the Moon has risen when the night comes. In other words, the Moon is at an altitude above 0 degrees from the horizon since the setting of the Sun on ayy nights*ām al-bīḍ*. Agus Purwanto, for example, said that the reason they are called white days is because they are not dark like other nights because the Earth is brightly lit by the moon.[41]

From the theological point of view, al-Ijli said that reason is called ayy*ām al-bīḍ*that Prophet Adam (as) came down from heaven to Earth, his whole body turned black because of the hot sun. Then Jibril came and ordered Prophet Adam (as) to fast. On the first day when fasting changed one third of Prophet Adam's body to white, then on the second day of fasting two thirds of Prophet Adam's body changed, until his whole body turned white again on the third day of fasting.[42]

There are differences among scholars regarding the use of the term ayy*ām al-bīḍ*. First, the scholars call it al-ayy*ām al-bīḍ*. Second, some people call it ayy*ām al-layāli al-bīḍ*. Ibn Atsir said that the expression أيام البيض is to throw away mudaf and that which is meant is أيام الليالى البيض.[43] Al-Jawaliqi, as quoted by Ibn Hajar al-Asqalani,

[39]Syihabbuddin Abi al-Abbas Ahmad bin Muhammad al-Syafi'I al-Qasthalani, *Irsyad al-Sari li Syarhi Shahih al-Bukhari*, (Beirut: Dar al-Kutub al-'Ilmiyyah, 1996), page. 549.

[40]Muhammad Mahfud bin Abdullah al-Tarmasyi, Hasyiyah al-Tarmasyi, (Beirut: Dar al-Minhaj, tt), page. 795.

[41]Purwanto, Agus, *Nalar Ayat-Ayat Semesta*, (Bandung: Mizan, 2012), page. 96.

[42]Al-Ijli said that this story comes from ahli kitab. See Sulaiman bin Umar bin Manshur al-Ajili al-Mishri al-Syafi'I, Hasyiyah al-Jamal ala Syarh al-Minhaj, (Beirut: Dar al-Kutub al-'Ilmiyyah, 1996), juz. 3, cet. 1, page. 469.

[43]Ibnu Atsir, *Al-Nihayah fi Gharib al-Hadis wa al-Asa*r, (Beirut: Maktabah al-Ilmiyyah, tt), Juz. 1. p. 173.

said, "Whoever says ayy*ām al-bīḍ*, where he puts the word al-b*īḍ* as the nature of the day, he was mistaken. " However, according to Ibn Hajar al-Asqalani this statement is not quite right, because one day is perfectly day and night. There is no day in the month that is entirely bright except these three days, because the night and the day appear bright so it is right to say ayy*ām al-bīḍ* (white days), namely the word white is the nature of the day.[44]

From the explanation above it can be seen that ayy*ām al-bīḍ*are the days that are located around the middle of the hijri month, precisely on the 13th, 14th, and 15th of Hijriah. At night on that date the sky was brighter than the previous nights from the start.

As for the quality of the hadith which mentions the term ayyām al-bīḍ, al-Tirmidhi said that the hadith is of hasan quality.[45]In addition, some scholars have classified these traditions into authentic traditions. Among them is Ibn Hibban in his sahih when discussing fasting ayyām al-bīḍ.[46]

2. *Ayyām al-Bīḍ* as Islamic prayer time

Among the monthly prayers in Islam is the observance of fasting. Some statements explain that the Prophet Muhammad always observed fasting, so there is a history that says that the Prophet always fasted to the point that the companions said that the Prophet never broke the fast.[47] Some narrations say that the Holy Prophet

[44]Ibnu Hajar al-Asqalani, *Fath al-Bari*, (Jakarta: Pustaka Azzam, 2014)), p. 403-404. Mahfud al-Tarmasyi said thatthe expression al-ayy*ām al-bīḍ*is the correct expression by placing al-bid as a characteristic pf al-ayyam, some scholars, as in kitab al-I'ab, state that the expression of al-ayyam al-bid is not quite right.See Muhammad Mahfud bin Abdullah al-Tarmasyi, *Hasyiyah al-Tarmasyi*, (Beirut: Dar al-Minhaj, 2011), p. 795.

[45]Abi Isa Muhammad bin Isa bin Saurah al-Tirmid}i, Jami' al-Tirmidzi, (Riyadh: Bait al-Afkar al-Daulah, tt) p. 144-145. see Abdul Adim bin Abdul Qawi al-Mundiri, Al-Targib wa al-Tarhib min al-Hadis\ al-Syarif, (Beirut: Mansyurat Dar Maktabah al-hayah, tt), juz. 1, p. 35.

[46]Al-Amir 'Ala al-Din Ali bin Balban al-Farisi, Al-Ihsan bi Tartib Sahih} Ibnu Hibban, (Beirut: Dar al-Kutub al-Ilmiyyah, 1996), jil. 5, cet. 2, p. 264. see, Muhammad Nashiruddin al-Albani, Silsilah al-Ahadis\ al-Sahihah}, (Kuwait: al-Dar al-Salafiyyah, cet.2, 1404 H), jilid. 4, p. 93-94. see, Ibn Qayyim al-Jauziyyah, Zad al-Ma'ad fi Hady Khair al-'Ibad, (Beirut: Dar al-Fikr, 1995), juz 2, p. 57.

[47]There is also a saying that the prophet often did not fast until it was said that the prophet let his people to fast or not according to the will of his people. Some of information can be seen from several hadith narrated by al-Nasai pada hadis no. 2345-2347. Among the hadith narrated by al-Nasa'i is:
كان رسول الله صلى الله عليه وسلم يصوم حتى نقول لا يفطر ويفطر حتى نقول ما يريد أن يصوم وما صام شهرا متتابعا غير رمضان منذ قدم المدينة

See, Jalaluddin al-Suyuthi dan al-Sindi, Sunan al-Nasa'i bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 198-199.

ordered fasting for one day[48] in each month, two days of each month,[49] three days in every month,[50] four days,[51] five days,[52] seven days,[53] nine days,[54] eleven days,[55] up to a day of fasting and a day of breaking the fast.

In the context of Islamic worship, ayy*ām al-bīḍ*associated with the implementation of fasting three days in each month. The history of fasting for three days in each month is often mentioned in the Sahih or Sunan books.[56] In connection with the implementation of fasting three days in each month, ayy*ām al-bīḍ*is a term about the times in the middle of the hijri month. Regarding the implementation of the ayy fast*ām al-bīḍ* some narrations clearly call it the 13th, 14th, and 15th day of the Hijri month.

Al-Bukhari in his saheeh when discussing ayy fasting*ām al-bīḍ* refers to the hadith which contains the Prophet's will to Abu Hurairah.[57] The hadith mentioned by Imam Bukhari in the chapter on fasting three days every month does not have any information in accordance with the chapter title (fasting ayy*ām al-bīḍ*). In the discussion about ayy fasting*ām al-bīḍ* Al-Bukhari uses the absolute hadith on three days each month.

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[48]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'i bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 225.

[49]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'i bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 225.

[50]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 217-220.

[51]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 217.

[52]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 215-216.

[53]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 215-216.

[54]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 215-216.

[55]Jalaluddin al-Suyutidan al-Sindi, Sunan al-Nasa'I bi Syarh al-Hafid\\ Jalaluddin al-Suyuthi wa Hasyiyah al-Imam al-Sindi, p. 215-216.

[56]Among the kitab shahih that mention the implemantation of the tree days fast and it is interpreted as fasting ayyam al-bid are sahih Bukhari, hadis no. 1178 dan 1981; sahih Muslim hadis no. 1159. While among thekitab sunan which containe about it, are Sunan al-Nasai hadis no. 2345; al-Tirmidzi hadis no. 742; Abu Daud hadis no. 2449;and Ibnu Majah hadis no. 1707.
The sound of the hadith is, that Abu Hurairah said:
أوصاني خليلي بثلاث لاأدعهن حتى أموت: صوم ثلاثة أيام من كل شهر وصلاة الضحى ونوم على وتر

"my lover has testified to me about three things that I will not leave behind until I die, fasting three days every month, dhuha prayer and witr prayer". See, Abu Abdullah Muhammad bin Ismail al-Bukhari, Shahih al-Bukhari, (Riyadh: Bait al-Afkar al-Daulah, 1998), hadis no. 1178, p. 231.

Textually there is a difference in the hadith which mentions fasting for three days in each month and the hadith which mentions fasting ayy*ām al-bīḍ*. Because of ayy determination*ām al-bīḍ*basically related to what is mentioned in the hadith, namely the 13th, 14th, and 15th of Hijriah. Meanwhile, fasting for three days every month is not certain on the 13th, 14th, and 15th of Hijriah.

The advantages of fasting ayy*ām al-bīḍ* increasingly supported by its existence in the middle of the moon, and mid something is the best. Eclipses (lunar) generally occur at these times, while the commandment to increase worship during an eclipse has been quoted. So if someone accustomed to doing fasting ayy*ām al-bīḍ*It is very possible that when an eclipse occurs he is in a state of fasting, thus giving the opportunity to offer various types of worship, such as fasting, prayer and alms. This is different from those who are not fasting ayy*ām al-bīḍ* who cannot offer fasting during an eclipse.

In istinbath al-ahkam ayy fast*ām al-bīḍ*, the majority of scholars' quoted the narration from Abu Dhar. Lafadz amara أمر in this history shows the order to carry out the ayy fast*ām al-bīḍ* in every month.[58] The Prophet's commands regarding fasting ayy*ām al-bīḍ* (on white days) is condemned by the majority of scholars[59] by looking at several qarinahs found in other hadiths, one of which is the hadith narrated by Ayesha regarding the permissibility of fasting three days every month and not being certain on what day.[60]The narration tells that sometimes the Prophet fasted three days on Saturdays, Sundays and Mondays; sometimes the Apostle fasted on Monday,

[58]Lafadz a ma ra in linguistic principles shows orders. In the rules oof ushul fiqh the word amar basically shows an order to do an action. Amar is conveyed in various styles or editors, including firm order with the word amara and those with it; an order in the form of notification that this action is obligatory on a person by using the word kutiba; orders with the verb mudhari' accompanied by lam al-amr; command with the word farada; an order in the form of an assesment that the action is good; and orders in the form promise a great deal of good to the doer..

As for the rules related to amar is, الأصل في الأمر للوجوب (basically amar shows an obligation). Although an order can show various meanings, basically an order shows that the law is obligatory unless there is an indication or dalil that reverses the law.

[59]Abdurrahman al-Jaziri, *Kitab 'ala Madzahib al-'Arba'ah*, (Beirut: Dar al-Kutub al-'Ilmiyyah, 2002), juz. 1, p. 339.

[60]See hadith no. Abi Abd al-Rahman Ahmad bin Syuaib bi Ali al-Nasa'I, Sunan al-Nasa'I, (Riyadh: Bait al-Afkar al-Daulah, tt), p. 452

Tuesday and Wednesday; sometimes on Monday Thursday and the following Monday.

In contrast to the jumhur of scholars who punish the sunnah of fasting ayy*ām al-bīḍ*, Malikiyyah said that fasting is ayy*ām al-bīḍ* the law is makruh,[61]because the hadith that is quoted states that the Prophet Muhammad recommended fasting three days in every month without specifying three days in the middle of the month. So it is feared that someone will think fasting on the days of his bid is obligatory.

There are also those who say that the fast is done on the 12th, 13th and 14th.[62]The scholars say, "It is possible that the Prophet did not do it continuously on certain three days so that it would not be thought that these three days were a statute. Meanwhile, Imam Nawawi in the book Niha yah al-Zain revealed the implementation of the ayy fast*ām al-bīḍ* This can be done on the 16th of Hijriah instead of the 13th of Hijriah, namely in the month of Zulhijah because of the prohibition of fasting on that day (13th of Zulhijah).[63]

Al-Qadhi Iyadh continued, “The scholars differ in their opinion regarding the three days which are sunk-downs of fasting each month. The companions and tabi'in interpreted it by the days of bid (white), namely the 13th, 14th and 15th. Those with this view were Umar bin al-Khattab, Ibn Mas'ud, and Abu Dhar, also said by friends Imam Shafi'i. Meanwhile al-Nakha'I and finally said at the end of the month. There are also those who argue that three days are at the beginning of the month, as expressed by al-Hasan.[64]

Then Ayesha and others narrated the hadith of fasting three days in each month which was carried out on Saturday, Sunday and Monday in one month, then on Tuesday, Wednesday and Thursday in the following month. In Ibn Umar's

[61]Abu al-Walid Muhammad bin Ahmad bin Muhammad bin Ahmad bin Rusyd al-Qurthubi, *Bidayah al-Mujtahid fi Nihayah al-Muqtashid*, (Dar al-Kutub al-Islamiyyah,), p. 225.

[62]Sulaiman bin Umar bin Manshur al-‘Ajili, *Hasyiyah al-Jamal ala Syarh al-Minhaj*, (Beirut: Dar al-Kutub al-Ilmiyyah, tt), juz. 3, p. 429

[63]Abi Abdul Mu’ti Muhammad bin Umar bin Ali Nawawi, *Nihayah al-Zain fi Irsyad al-Mursyidin*, (Semarang: Toha Putera, 1994), p. 97.

[64]Imam al-Nawawi, *al-Minhaj Syarhu Sahih Muslim bin al-Hajjaj*, translated by Agus Ma’mun dkk, (Jakarta: Darus Sunnah, cet kedua, 2012), p. 777.

history, it is mentioned, the first Monday of each month and the two Thursdays of the following week.

While the hadith narrated from Umm Salamah, fasting is done on the first Thursday of each month, the Monday the following week, and the Monday the third week. There are also those who say, the first day of each month, the tenth day, and the twentieth day. Some say that it is the fasting by Malik bin Anas, and it is narrated from him about the lawfulness of fasting on bid days. Ibn Sya'ban al-Maliki said, "The first day of every month, the eleventh day, and the twenty-first day.[65]

In the book Syarah al-Tirmidzi, it is stated that the conclusion about differences of opinion in determining Ayy*ām al-bīḍ* there are nine opinions, namely:[66]First, there are no provisions, it is even makruh to determine them. This opinion was quoted from Imam Malik; Second, the first three days of each month, this opinion was expressed by Hasan al-Basri; Third, the first day is the 12th; Fourth, the first day is the 13th; Fifth, the first day is the first Saturday of the current month, then the first Tuesday of the following month, and so on. This opinion was quoted from Aisyah ra; Sixth, the first Thursday, then the following Monday and Thursday; Seventh, the first Monday, then the following Thursday and Monday; Eighth, first day, 10th day and 20th day of each month. This opinion was quoted from Abu Darda '; Ninth, the first day of every 10 days. This opinion was quoted from Ibn Sya'ban al-Maliki. According to Ibn Hajar, there is one more opinion, namely the three days at the end of the month which is the opinion of al-Nakha'I. Thus, there are 10 opinions regarding the procedures for implementing the three-day fast every month.

From the explanation above, it is clear that there is a variation in understanding fasting three days in each month. Relation to the 13th, 14th and 15th of Hijri which is called ayy*ām al-bīḍ* can be drawn a red thread of the virtue in placing ayy*ām al-bīḍ*in carrying out the sacredness of the fast. Fasting three days in each month does not have to be done at ayy*ām al-bīḍ*. Nonetheless, observing a three-day

[65]Ibnu Hajar al-Asqalani, *Fath al-Bari*, (Jakarta: Pustaka Azzam, 2014), p. 406.

[66]Al-Mubarakfuri, *Tuhfah al-Ahwadi bi Syarh Jami' al-Tirmidi*, (Beirut: Dar al-Kutub al-Ilmiyyah, 1990), p. 393.

fast every month on days is called the ayy fast*ām al-bīḍ* (makes ayy*ām al-bīḍ* as the time to carry out the three-day sunnah fast) is a sunnah based on the istinbat of the majority of scholars.

3. *Ayyām Al-Bīd* in an Astronomic Review

Time[67]it will be difficult to understand unless it is cut into limited mass units. Therefore we need a good time organizing system. In the Koran Allah also provides basic instructions on how to organize time. Through the Koran, Allah instructs us to use the movements of celestial bodies, especially the Moon and the Sun, as the basis for organizing time. Time decapitation or grouping is done by humans based on the regular and exact cycles of movement of the Earth, Moon and Sun. The motion of the Sun and Moon can be calculated to determine the number of years and other fractions / units of time. The apparent motion of the Sun can be used to determine time in days, while the Moon's motion is used to determine the units of the month.

*Ayyām al-bīḍ*as explained in the previous chapter is a group of time units called days. It is known in several traditions of the Prophet that ayy*ām al-bīḍ* or white days are the days on the 13th, 14th, and 15th of the Hijri month. Some scholars say that at night on these days the Moon appears from the beginning to the end of the night. So it can be said that ayy*ām al-bīḍ*is a 'different' time in the view of astronomy. In this context ayy*ām al-bīḍ* is a part of time that is based on the cycle of movement of the Sun, Earth and Moon.

In an astronomical review, the concept of ayy*ām al-bīḍ* related to several things, including the concept of days on Earth and several astronomical phenomena related to the movement of the Sun and the Moon, such as the rising and setting of the Sun and the Moon, the concept of day and night, and some conditions of the Moon such as the illumination of the Moon when it coincides with ayy*ām al-bīḍ*.

a. A*yyām al-bīḍ* in the Concept of the Day from an Astronomy perspective

[67]Time is an endless stretch of time. Time organizing is the main function of the calendar which is very important in human life and Islam. Organizing time is closely related to the implementation of various form of worship. Al-Quran empasize the importance of organizing the overall tim that must be done carefully, because if it is ignored it will result in losses, as Allah says in Q.S. Al-Ashr:1-2.

As discussed earlier, ayy*ām al-bīḍ*is part of the number of days in the hijri calendar. Calendar as a time organizing system is calculated carefully based on certain principles. In astronomy, the calendar which embodies the concept of time in the world is organized based on the movement of celestial bodies, including the hijri calendar.

For practical purposes in making calendars, experts make references to classifying time by using the movement of celestial bodies. Among the movements of celestial bodies that are used as references in the organization of time is the phenomenon of Earth's rotation. The rotation of the Earth on its axis and its relatively spherical shape results in the regular transit / culmination of celestial bodies phenomenon.[68]

In the context of time on Earth, the repetition of the Sun's transit phenomenon is in tune with the repeating phenomena of day and night which are the result of the Earth's rotation. In the context of time on Earth, the phenomenon of day and night are two inseparable phenomena because they occur simultaneously without interruption in all places on Earth. The combination of the simultaneous phenomena of day and night is called a day.

For the purposes of organizing the daily time (calendar), the experts chose the regularity of the Sun's transit time as a reference for the use of one day. This choice is more due to the role of the Sun in changing the shape of the contrasting atmosphere of day and night, life patterns, work patterns and rest patterns. So, astronomically, one day in Earth's time-organizing system is a period for the Sun to transit twice in a row on the same celestial meridian.[69]

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[68]Celestial bodies undergoing a transit or top culmination means that these celestial bodies are in certain celestial meridians, at the time of transit or the culmination of a celestial body has a maximum height, when observed by observers on earth, such as transits of the sun, moon, planets, or stars.

[69]In practical level of time organizing with the solar calendar used is the concept of a fictitious solar movement, namely the average movement of the sun. If the celestial body used as the reference is the real sun then one solar day is actually called apparent solar dayas used in sundials.where one apparent solar day veries from day to day. So that in the system of organizing the time on earth, on day is meant to be one average day or the average solar transit time interval across the same celestial meridian is twice consecutive.

One sidereal day which is a sidereal period of the earth's rotation for 23 hours 56 minutes 4 seconds shorter than the average solar periode. An average solar day consist of 24 hours or 86400 seconds, while a sidereal day consists of 86164,0906 seconds. The difference between the transit time of the real sun and the apparent sun is given in the equation of time which is called the equation of time..

In the discourse of the Islamic calendar system, determining the alternation of days is also based on the pseudo daily movement of the Sun. So even though Islamic jurists say ayy*ām al-bīḍ* are the days where the Moon appears from the beginning of the night to the end of the night it is incomprehensible that ayy*ām al-bīḍ* It is based on the movement of the Moon when it transits in the sky.

Ayy*ām al-bīḍ*which means white days are a group of days in the middle of the hijri month. One white day can be understood as a period in which the Sun transits twice in a row on the same celestial meridian at which time the Moon is in its position which causes the Earth to be bright all night.

b. Ayyām al-bīḍ in the Day and Night Concept

Earth's rotation on its axis causes the phenomenon of day and night. Day and night are two inseparable phenomena in the cycle of one day. In other words, under normal circumstances the time of the day includes the time of day and night. The concept of day and night and their limits in one day are at least related to astronomical phenomena, including the apparent motion of the Sun, sunrise and sunset, and the phenomenon of twilight.

First, pseudo motion of the Sun and the rising and setting of the Sun. This pseudo motion of the Sun is also termed the pseudo circulation of the Sun, which is not actual motion associated with the observer's perception on Earth.[70]Within a year, the position of the Sun is seen to shift north-south every day. In astronomical terms this is called declination. The following is a graph of the shift in the Sun's declination for one year in one day increments:

One tropical solar year (from the vernal equuinox back to the vernal equinox) consists of 365,2422 average solar days or in one traveled 360°/365,2422 = 0°, 9856473 per day average sun. if 1° is equivalent to 4 minutes of time. Then 0°,9856473 is equivalent to 3 minutes 56,56 seconds. So 24 hours of sun on average equals 24 hours 3 minutes 56,56 sidereal seconds or 24,06571 sidereal hours. One sidereal day = 24 sidereal day, so 24,06571 sidereal day is 24,06571/24 = 1,002738 sidereal day = 1/1,002738 sidereal day = 0,99727 solar day. Time interval 365,2422 solar day equivalent to 365,2422/1,002738 sidereal days = 0,99727 solar days. An interval of 365,2422 solar days is equivalent to 365,2422 x 1,002738 sidereal days = 366,24 sidereal days. Moedji Raharto, *Dasar-Dasar Sistem Kalender Bulan dan Kalender Matahari*, (Bandung: Penerbit ITB, 2013), p. 94-95.

[70]Apparent motion is the opposite of intrinsic motion and is the result of the earth's rotation from west to east. This apparent motion of the sun causes us to see the sun other calestial bodies moving from east to west..

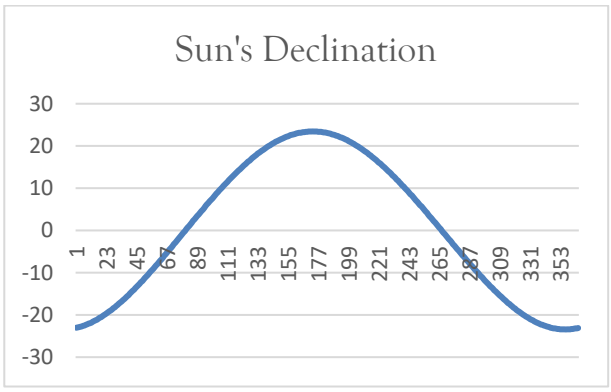

Figure 4.1 Graph of Mathari's declination shift during one year

From the graph above, it can be seen that there is a change in the value of the Sun's declination in 2000. Within one day, the average change in the Sun's declination is 0.26 °. The Sun's declination reached its maximum value, 23.44 ° on June 21, and reached its minimum value of 23.44 ° on December 22. Meanwhile, a declination of 0 ° occurs on March 21 and September 23. The hourly change in the Sun's declination is 11.88 ".

The change in the Sun's declination also results in a change in the ratio between the length of the day arc and the night arc. Therefore the daylight hours are not the same length for one tenpat one year; sometimes the day was a bit long, and sometimes it was a little short. Only for places right on the equator the length of the day is always the same. For places that are not located right on the equator, the length of the day is always different for one year. The farther a place is from the equator, the greater the difference. Sometimes even the length of day becomes 24 hours, so that the night does not exist at all. On the other hand, there are also nights that are 24 hours long so that the sun is not visible on a daily basis.

The concept of ayyām al-bīḍ astronomically when understood as the time when the Moon has risen since the setting of the Sun is no longer valid. This is because on certain dates regions that are located at high latitudes cannot see the phenomenon of day and night normally, even sometimes for several days there are areas that do not experience night at all. By knowing the arc of the day, the length of the night can be found, namely the length of night = 24 - the length of the day (in

hours). From this it can be understood that in fact the concept of ayyām al-bīḍ cannot be seen from the time of the rising and setting of the Sun and Moon.

In general, the day begins when the sun rises on the eastern horizon and ends when the sun sets in the west. Furthermore, the night begins when the sun sets in the west and ends when the sun rises in the east. In the time system used on Earth, a day that includes the time of day and night is 24 hours.

The term ayyām al-bīḍ which is mentioned in most of the Prophet's hadiths is the recommended time for fasting. The previous chapter shows that the majority of scholars agree on the sacredness of fasting days on the day of the bid, namely on the 13th, 14th, and 15th of the Hijri month. So, in relation to the concept of night, syar'i night is the reference used to analyze the position of the Moon on the 13th, 14th and 15th of the Hijri month. This is because in relation to worship, the concept of day and night used as a reference is day and night syar'i. So it can be understood that on the 13th, 14th, and 15th of Hijriah (at the time of ayyām al-bīḍ) The ideal moon on that night shines brighter than the usual days.

c. State of the Moon at the Time of Ayyām al-bīḍ

*Ayyām al-bīḍ*which is the terminology on the 13th, 14th, and 15th of the Hijri month. When viewed from the phases of the Moon, it certainly has a form that can be recognized by the naked eye by ordinary people. On the other hand, some Islamic literature states that ayyām al-bīḍ is a brightly lit night because at that time the Moon appears in the sky from the beginning to the end of the night. In addition, ayyām al-bīḍ which is the day when the Moon has risen at the time of sunset can also be associated with several things, including the rising and setting of the Moon and the Sun, the dawn and the illumination of the Moon.

a) The rising and setting of the Moon at Ayyam al-Bid

Some scholars say that ayyām al-bīḍ are bright days without any dark breaks in the sky. That is, the Earth on days called ayyām al-bīḍ is illuminated by the sun's rays during the day, then bright by the moonlight at night. Both, the Sun and the Moon, alternately become lights for the Earth so that on days called ayyām al-bīḍ the Earth is always bright, both during the day and at night. Thus, the nature of a day

like this must be filled with three nights with the appearance of the circular Moon, namely the 13th, 14th and 15th night of the Hijri month.

In the previous discussion, it has been explained that in syar'i the night starts when the sun sets in the west and ends when dawn sadiq rises. The brightness of the night on ayyām al-bīḍ which is due to the Moon's light from the beginning of the night (sunset) to the end of the night (the rising of dawn sadiq) indicates that on these nights the Moon is above the horizon on the 13th, 14th, and 15th nights of hijriah. So it can be understood that also on nights known as ayyām al-bīḍ, ideally:

- The moon has risen from the eastern horizon even though the sun has not set in the west. Thus when the sun sets on the western horizon, the Earth is already bright because it gets light from the Moon.

  It could also be that the Moon rises exactly when the sun sets, so there is no lag between sunset and the rising of the Moon. This situation can occur since the moon's light gets brighter after passing through the crescent phase until the moon is in a phase around the full moon.
- The moon had not yet set into the western horizon when the dawn of sadiq broke over the eastern horizon. It could also be that the Moon sets in the western horizon just as Sadiq dawn appears, so there is no lag between the setting of the Moon and the rising of Sadiq dawn. The state of the Moon above the horizon when dawn sadiq rises can occur since the Moon has passed the Full Moon phase until it is around the old crescent phase.

In the hijri calendar system, one month is 29 and 30 days. This is because one synodic month has a time span of approximately 29.53 days. It takes the Moon 29.53 days to circle the Earth to form the same appearance in the sky.[71]Therefore Agus Purwanto said that in a day the Moon moves 12.19 °, so that when entering the 13th, 14th and 15th of the Month it has moved as far as 146.28 °, 158.47 °, and 170.66 ° from the position of the end of the previous month . For example, if the beginning of the month is on the western horizon and we take it as the zero position

[71]The position of the moon is meant here is the state of the moon so that it forms the same phase angle when viewed from the earth which is usually called the synodic cycle of the moon. This is different from some other lunar cycles such as sidereal cycles, anomalistic cycles, an cycles.

and it is the night or the first day, at the beginning of the night 13, 14 and 15 the Moon is at an altitude of 33.72 °, 21.53 °, and 9, 34 ° above the eastern horizon.

The altitude of the Moon above can be understood that on the 13th, 14th, and 15th of the Moon is above the eastern horizon when maghrib or the sun sets in the western horizon. Therefore, at the time of the change of day to night on these three dates it does not happen dark. So that in Islamic terms the 13th, 14th, and 15th Hijriah is said to be ayyām al-bīḍ (white days). The role of the Sun as the luminary of the Earth on nights called ayyām al-bīḍ is replaced by the Moon which is in a phase around the full moon which looks round and bright.

On the 16th and 17th night the Moon still looks round and bright, but it is different from the condition of the Moon on the 13th and 14th at maghrib. On the 16th and 17th, the moon is below the horizon / horizon when the sun sets in the western horizon. This means that when maghrib, the Earth becomes dark because the Sun has set, while the Moon has not yet appeared / rises and is still under the eastern horizon. After a few minutes of darkness, the new Moon appears in the eastern horizon and continues to rise to illuminate the Earth. It is perhaps this dark pause that keeps the two dates from being referred to as ayyām al-bīḍ.

Based on the MABIMS al-ru'yah imkan criteria, the time for setting the Sun, rising Moon, Dawn and setting of the Moon on the 15th of Hijri are as follows:

Month	Sunset	Dawn	Sunrise	Moonrise	Moonset
Muharram	17:34	04:07	5:15 am	16:47	5:14
Safar	17:37	03:56	05:08	17:25	5:43
Rabiul Awal	17:50	04:00	5:14	18:10	06:23
Rabiul Akhir	18:04	4:16	5:29 am	18:47	7:02 am
JumadilAwal	6:05 p.m.	04:30	5:40 am	18:18	6:35 am
JumadilAkhir	17:55	4:34	5:41 am	18:28	06:54
Rajab	17:41	04:30	5:38 am	17:49	6:21 am
Sya'ban	17:31	4:28	5:38 am	17:12	5:50 am
Ramadhan	17:31	4:31 a.m.	5:43	17:23	6:10 am
Syawwal	17:37	4:37	5:49	16:54	5:43
Zulkaidah	17:41	4:37	5:47	17:18	06:02
Zulhijah	17:39	4:28	5:36 am	16:51	5:29 am

Table 4.12 Setting of the Sun and Moon, rising of the Moon and Dawn on the 15th based on the criteria of Imkan al-ru'yah MABIMS

In the table on the 15th Hijriah it is also seen that when the sun sets and the day enters the 15th Hijriah the position of the Moon is not always above the horizon. On the 15th the new Moon rises after a few minutes of sunset. On the other hand, the three calendars above indicate that the time for setting the Moon occurred after dawn. This shows that in fact the concept of ayyām al-bīḍ in the view of astronomy is not related to the rising and setting times of the Moon and Sun. So, this fact refutes the opinion of some scholars who say that it is said ayyām al-bīḍ because the Moon shines from the beginning to the end of the night.

From some of the tables above, it can be seen that the Moon has its own variations related to the time of rising and setting. Within one day, the difference in the time the Moon rises appears to vary. The difference in time difference between the rising of the Moon every day is also influenced by the position of the Moon which is moving rapidly.

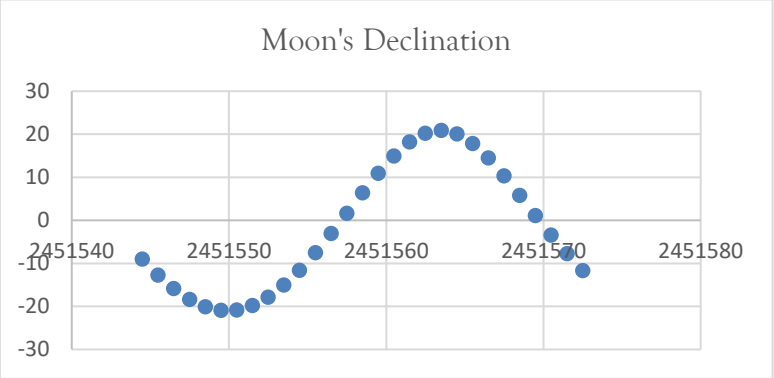

Figure 4.4 Change in the Moon's declination in one month

The chart above shows the change in the Moon's declination in one month. The rate at which the Moon's declination changes is not the same as the Sun's. The sun takes longer to reach the same declination angle in succession. Meanwhile, the Moon only takes 1 month to reach the same declination value.

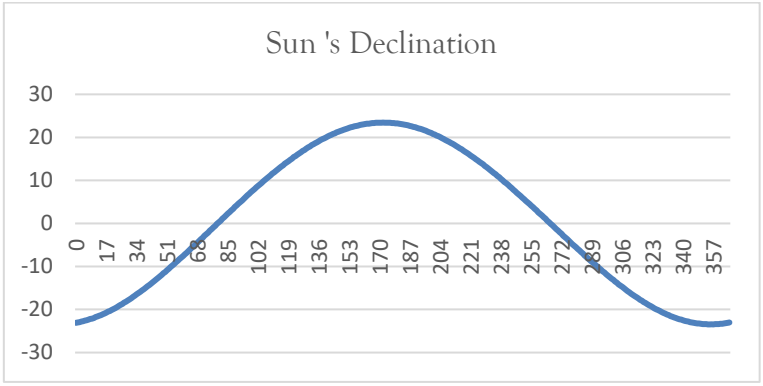

Figure 4.5 graph of changes in the daily declination value of the Sun for 1 year

In the chart above, you can see that the change in the daily declination of the Sun is slower than that of the Moon.

b) Phases of the Moon at the time of Ayyām al-bīḍ

As Meeus said, in general there are four main phases, namely a new Moon, first quarter, full Moon, and last quarter.[72]It takes about 7 days to reach its main phase of the Moon from between the previous main phases. In general, the phases of the Moon experience regular periodicity, where the mean time interval for the occurrence of the new Moon phase and the first quarter is 7.38 days. Likewise, the average time interval for the first quarter and full moon phases is 7.38 days.

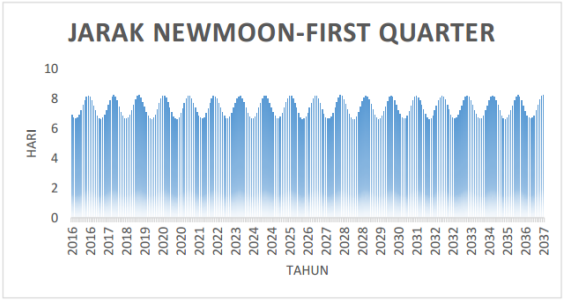

Figure 4.2 Graph of the time distance between the new Moon and the first quarter

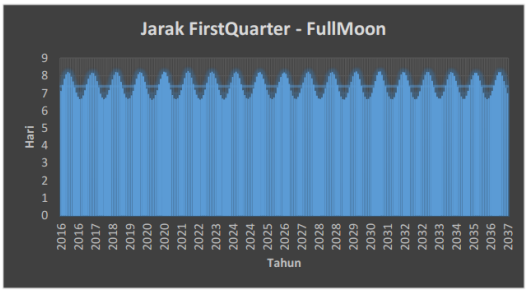

Figure 4.3 Graph of the time distance between the first quarter and the full moon

[72]Jean Meeus, *Astronomical Algorithm*, (Virginia: Willman Bell, 1993), p. 134

The two graphs above show that the time interval between the new Moon and the first quarter and the first quarter with the full Moon forms a regular sinusoidal chart. The lowest value of the two graphs above is 6.58 days, while the largest value is 8.23 days.

From the two graphs above, it is also found that the average time interval for the occurrence of the New Moon and the Full Moon is 14.76 days.

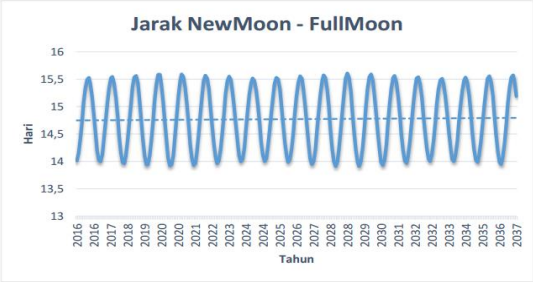

Figure 4.4 Graph of the time interval between the new Moon and the full Moon

The chart above, just like the two previous charts, also shows the pattern of the time interval between the New Moon and the regular full Moon by forming a sinusoidal chart. The lowest value of the graph is 13.90 days, while the largest value is 15.61 days. So that the smallest and largest distance between the New Moon and the Full Moon is 1.71 days.

The average value of the time interval between the New Moon and the Full Moon when included in one synodic cycle of the Moon is 29.53 days. This means that the Moon will experience the same state / phase every 29.53 days. Thus, the Moon phase that is occurring on the night of ayyām al-bīḍ will repeat itself every 29.53 days. For example, if during the night of the 13th hijri month the Moon is experiencing a first gibbous phase with a percentage of the Moon disc that can be observed from Earth, then the state of the Moon disc with the same percentage will be observed from Earth after 29.53 days.

Graph 3 also illustrates that the phase of the Full Moon (full Moon) is not at the midpoint between the two phases of the New Moon (New Moon). Sometimes the Full Moon phase occurs earlier than the midpoint between the two phases of the New Moon. On the other hand, there are times when the full Moon phase occurs later than the midpoint between the two phases of the New Moon. In order to know

the minimum or maximum limits of times known as Ayyām al-bīḍ, the main reference / reference is the time of the full moon, where the lower and upper limits are 1.71 days before and after the full moon phenomenon. This means that if a night is included in the full moon value of ± 1.71 days astronomically it can be said to be days called Ayyām al-bīḍ, provided that the day starts after the setting of the sun in accordance with the beginning of the day in the hijri calendar.

Tme of the Full Moon 1438 H

Hijri month	Full Moon Time (WIB)
Muharram	Sunday, 16 October 2016 11:23:08
Safar	Monday, 14 November 2016 20:52:05
Rabiul Awal	Wednesday, 14 December 2016 07:05:31
Rabiul Akhir	Thursday, 12 January 2017 18:33:55
Jumadil awal	Saturday, 11 February 2017 07:32:52
Jumadil akhir	Sunday, 12 March 2017 21:53:47
Rajab	Tuesday, 11 April 2017 13:08:10
Syaban	Thursday, 11 May 2017 04:42:36
Ramadhan	Friday, 09 June 2017 20:09:43
Shawwal	Sunday, July 9 2017 11:06:41
Zulkaidah	Tuesday, 08 August 2017 01:10:40
Zulhijah	Wednesday, 06 September 2017 14:02:49

Table 4.14 Full moon in 1438 AH

The Full Moon data above is a reference / top reference for the occurrence of Ayyām al-bīḍ. Taking into account the astronomical aspect that the difference between the fastest and the late fullmoon is 1.71 days, the beginning and end of the Ayyām al-bīḍ phenomenon can be seen in the following table:

Hijri month	**Early Ayyam Al-Bid**	**End Ayyam Al-Bid**
Muharram	Friday, October 14 2016 18:20:44	Tuesday, 18 October 2016 04:25:32
Safar	Sunday, November 13 2016 03:49:41	Wednesday, 16 November 2016 13:54:29
Rabiul Awal	Monday, 12 December 2016 14:03:07	Friday, 16 December 2016 00:07:55
Rabiul Akhir	Wednesday, 11 January 2017 01:31:31	Saturday, 14 January 2017 11:36:19
Jumadil Awal	Thursday, 09 February 2017 14:30:28	Monday, February 13 2017 00:35:16

Jumadil Akhit	Saturday, 11 March 2017 04:51:23	Tuesday, 14 March 2017 14:56:11
Rajab	Sunday, April 9 2017 20:05:46	Thursday, April 13 2017 06:10:34
Sya'ban	Tuesday, 09 May 2017 11:40:12	Friday, 12 May 2017 21:45:00
Ramadhan	Thursday, 08 June 2017 03:07:19	Sunday, 11 June 2017 13:12:07
Syawwal	Friday, July 07 2017 18:04:17	Tuesday, 11 July 2017 04:09:05
Zulkaidah	Sunday, August 6 2017 08:08:16	Wednesday, 09 August 2017 18:13:04
Zulhijah	Monday, September 4 2017 21:00:25	Friday, September 08 2017 07:05:13

Table 4.15 Beginning and End of Ayyām al-bīḍ based on the Full Moon phenomenon

The table above shows that using the upper and lower limits astronomically the ayyām al-bīḍ phenomenon can occur for five days. This fact confirms some of the opinions of scholars in the previous chapter who carried out the ayyām al-bīḍ fast on the 12th Hijriah until the 16th Hijriah. As for the hadith observations of the Prophet which stipulated that the fasting of ayyām al-bīḍ was limited to the 13th, 14th and 15th of Hijriah, it was more due to the certainty of the habit of the occurrence of the full moon / eclipse. It is different from the scholars who in this case try to perform ijtihad to find three days of fasting every month on time.

The previous discussion shows that most likely the friends fasting ayyām al-bīḍ after the emergence of the hadith is in the month of Shafar in 7 H. Ijtimak before the month of Shafar in 7 H falls on Tuesday, June 7, 628 AD at 18:19 local time,[73] while the 1st of Shafar 7 H falls on Thursday, 9 June 628 AD. The peak of the full moon occurs on the day Wednesday, 22 June 628 at 15:29:27 local time (Saudi Arabia). So that was a start*ayyām al-bīḍ* fall on the day Monday, 20 June 628 at 22:27:03 local time (Saudi Arabia), while the end *ayyām al-bīḍ* fall on the day Friday, 24 June 628 at 08:31:51 local time (Saudi Arabia).

[73]Astronomical data for the sun and moon at this time are: sunset are 18:29; moonset at 18:35; moon age 0 hour 10 minutes; Elongation 4º 14'; moon height -0º 03'; sun height -1º 01'; Rukyat arc 01,0º; Hilal width 0.05'; and according to the criteria of imkan al-rukyah and wujud al-hilal, the astronomical position of the hilal at that time was not possible to be seen even though using optical instrument such as telescop.

This data shows that even astronomically it is *ayyām al-bīḍ*can occur up to 5 days. Even so, the editorial of the hadith of the prophet which states that fasting ayyām al-bīḍ is done on 3 days is a text of ghoiru ma'qul al-ma'na. This means, fasting ayyām al-bīḍ is still carried out for 3 days. This is because in its history the origins of fasting ayyām al-bī pu began from the syari'at of Prophet Noah to Prophet Isa which was then carried out by the Prophet before being served by the obligation of fasting Ramadan.

In our opinion, the implementation of the ayyām al-bīḍ fast is carried out on the 13th, 14th and 15th of Hijriah. The days on the 12th and 16th are as alternatives / substitutes if it is impossible or there is a difference in the determination of the beginning of the month. For example, the month of Zulhijah which is prohibited from fasting on tasyriq day (13th) can be replaced with the 16th. Meanwhile, the case of fasting ayyām al-bīḍ on 12 hijriah is due to differences in the Muslim calendar.

*Ayyām al-bīḍ*as mentioned in several hadiths of the Prophet (s) occurred on the 13th night of the hijri month. In accordance with the movement of the Moon which forms several phases, on the 13th night (in the Islamic calendar) the Moon is in the first gibbous phase (convex month). However, the days when entering ayyām al-bīḍ are not the same as the beginning of the first gibbous phase, because basically the Moon phases are instantaneous moments, while ayyām al-bīḍ is a time that can be known from beginning to end.

In connection with the end of the night ayyām al-bīḍ, the Moon must have passed the full Moon phase (full moon) and has entered the second gibbous phase. This is because the same as the other phases, the full moon is a phase that occurs instantaneously. Moreover, if the Islamic calendar system enters the beginning of the Moon based on the appearance of the moon's crescent light, then the end of the night on the 15th of Hijriah must have passed the full moon phase. The reason is that the average time interval between the new Moon phase and the full Moon is 14.76 days. For example, ijtimak which is the new Moon phase in May 2017 (for the beginning of Ramadan 1438 H) occurred on May 26, 2017 at 02:47:24 WIB. In the hijri calendar system (especially in Indonesia which is based on the reckoning system)

the 1st of Ramadan occurs at maghrib on May 26 2017. So that the 13th, 14th, and 15th of Ramadan fall at maghrib on June 7, 8, and 9, respectively. The end of the night of ayyām al-bīḍ in Ramadan 1438 H occurs at dawn on June 10, 2017. While the full Moon on for June 2017 (Ramadan 1438 H) occurred on June 9 2017 at 20:11:16. So that at dawn on June 10, 2017, the Moon is in the second gibbous phase because it has passed the full moon phase.

c) Illumination of the Moon at Ayyām al-bīḍ

Based on the hadith of the Prophet, the days called ayyām al-bīḍ are three days starting from the night of the 13th of the lunar month. There is an interesting thing from the hadiths that mention the term ayyām al-bīḍ. The editorial used in these hadiths is ayyām al-bīḍ, not layal al-bid or al-layal al-bid which if translated means white nights (bright nights). Bright days are defined as the brightest day and the roundest Moon. This understanding is related to the light intensity (reflection) and the degree of roundness of the Moon. This means the nights when the Moon is seen from Earth in a round and brighter shape.

Theoretically, the shape of the Moon observed from Earth is the roundest and brightest on the 14th, 15th and 16th nights.[74] Shifting the 14th, 15th and 16th to 13th, 14th, and 15th can be done by shifting the first or the beginning of the month. However, this understanding is constrained by the limitations given by the hadith, namely nights 13, 14, and 15.

Three nights on ayyām al-bīḍ (the nights of the 13th, 14th, and 15th of the hijri month) the sky looks brighter than usual. On these nights the Moon is brighter than usual because of the fraction of the illumination[75] The moon is around its greatest value.

In basic concept, the lunar illumination fraction (k) is 0% when the Moon is in the new Moon phase. At that time the ecliptic longitude of the Moon is the same as the ecliptic longitude of the Sun. Illumination of the Moon is worth 50% when the Moon is in the first quarter phase and the second quarter phase, which is,

[74]Agus Purwanto, *Nalar Ayat-Ayat Semesta*, (Bandung: Mizan, 2012), p. 68.

[75]The illumination fraction is the part of the lunar disc is the illuminated and facing the earth (visible from the earth) is called the lunar illumination fraction (k).

respectively, when the ecliptic longitude of the Moon is equal to the ecliptic longitude of the Sun plus 90 degrees for the first quarter phase and added 270 degrees for the second quarter phase. Meanwhile, the Moon's illumination is worth 100% when the Moon is in the full Moon phase, which is when the Moon's ecliptic longitude is equal to the Sun's ecliptic longitude plus 180 degrees.[76]

Every time half of the surface of the Moon's ball always gets sunlight and the other half is not exposed to sunlight. for example, when the new moon occurs, half of the moon's surface that is illuminated by the sun is facing the sun, while the half of the moon's surface that is not illuminated by the sun is facing the earth. As a result, there is no part of the moon's disk that is illuminated by the sun facing the earth so that when the new Moon the value of k = 0.

In reality, the lunar fraction does not fit the basic concept. The Moon's illumination formula is more complex than that of the Moon's phases. If the Moon's phase only compares the ecliptic longitude of the Moon and the ecliptic longitude of the Sun, the Moon's illumination is not only the two magnitudes, but also the Moon's ecliptic latitude, Earth-Moon distance and Earth-Sun distance. In other words, the Moon's phase formula only describes a two-dimensional (2D) situation, whereas the Moon's illumination formula describes a three-dimensional (3D) situation.[77]

One result is that even during New Moon, the value of k, although very small, is not equal to zero. For example, when the New Moon comes for the month of Ramadan 1433 H, the k value is around 0.127%. In addition, another reality also shows that when the New Moon the value of k does not reach the minimum. When k reaches the minimum value, its instantaneous time is not the same as the time at which the New Moon occurred. The difference between the two times can be tens of minutes. For example, the new Moon for Ramadan 1433 H occurs on Thursday 19

[76]Rinto Anugraha, *Fase Bulan dan Fraksi Iluminasi Bulan, makalah ditulis dalam seminar nasional* FMIPA UNNES, 2013.

[77]Rinto Anugraha, *Fase Bulan dan Fraksi Iluminasi Bulan, makalah ditulis dalam seminar nasional* FMIPA UNNES, 2013.

July 2012 at 04:24 UT, but the smallest illumination occurs about 29 minutes earlier, which is at 03:55 UT.[78]

The image below provides an illustration of the k value before and after the New Moon. The horizontal axis is the difference between time t and New Moon time in minutes (t = 0 means when New Moon itself, while negative / positive means the time before / after New Moon). The vertical axis gives the Moon's illumination value in percent.

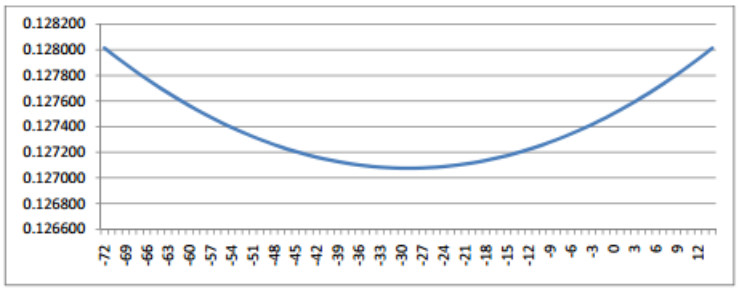

Figure 4.7 Moon illumination value

Source: Rinto Anugraha, 2013

From the picture above, it appears that the smallest illumination does not occur during the New Moon, but (in the case of Ramadan 1433 AH) occurs about 29 minutes before the New Moon. The same situation can also be studied for other phases of the moon. Predictably, when the fullmoon occurred, the k value was not 100% correct and also not the maximum. Likewise, during the first and last quarter phases, the value of k does not exactly equal 50%. So from this it can be seen that basically the concept of ayyām al-bīḍ in Islam cannot be understood as a phenomenon where on these nights the Moon is at the maximum illumination fraction value. Thus, ayyām al-bīḍ is more appropriate when it comes to the habitual occurrence of opposition. This logic is corroborated by several traditions of the Prophet which suggest increasing worship during a lunar eclipse.

In relation to ayyām al-bīḍ, it can also be seen that the value of the lunar illumination fraction is more than 50%. At that time the Moon was in a phase around the full moon. In astronomy, the full moon is a momentary (instant)

[78]Rinto Anugraha, *Fase Bulan dan Fraksi Iluminasi Bulan, makalah ditulis dalam seminar nasional* FMIPA UNNES, 2013.

condition when the Moon occupies an ecliptic longitude which is exactly 180 degrees different from the position of the ecliptic longitude occupied by the Sun in the celestial coordinate system. In the system of rules of celestial bodies, this situation is generally called an oppositional situation (opposites), while the past Muslim astronomers called it a istiqbal situation.

As an instant event, the Full Moon cannot be seen directly just by gazing at the Moon's face at night. Because our eyes are such poor detectors that they are unable to identify small changes in the value of the Moon's phase in situations around the full moon state.

The difficulty of the eyes in directly detecting the occurrence of the Full Moon is also due to the over / excess of Moonlight when the Moon is around the full moon phase accompanied by the bright sky at that time. This reduces the contrast value of the Moon. Whereas in observing an object, the human eye depends on the contrast value of the object. The higher the contrast value of an object, the easier it is for our eyes to detect it, and conversely the lower the contrast value of an object, the more difficult it is to detect. However, we can confirm the occurrence of a full moon during a lunar eclipse, especially partial or total lunar eclipses. This is because the peak of the eclipse always coincides with when the Moon is in its full moon phase.

D. Conclusion

From the discussion in the previous chapters it can be concluded that from the Islamic point of view ayyām al-bīḍ is part of the best time to observe fasting three days a month. The days known as ayyām al-bīḍ include the 13th, 14th and 15th of Hijriah. Emphasizing the implementation of fasting on days known as ayyām al-bīḍ is part of Islam to nurture the souls of its adherents. Matan hadith of the Prophet related to ayyam al-bid which stipulated on the 13th, 14th and 15th of the Hijri month because at that time the custom of the full moon occurred. In addition, choosing a three-day fast on the 13th, 14th, and 15th of Hijriah is the time for a lunar eclipse. so it is in accordance with several hadiths of the Prophet which commanded more worship during an eclipse.

In astronomical review, the concept of ayyām al-bīḍ is the time when the Moon is customarily eclipsed, namely at the time of the full moon or at times of opposition / istiqbal. This shows that the hadith of the Prophet related to ayyām al-bīḍ which stipulates a three-day fast on the 13th, 14th and 15th of Hijriah is in accordance with the rules of astronomy. It is proven that the average time interval between the New Moon (new Moon) and the Full Moon (full Moon). The average distance is 14.76 days, where the closest time is 13.90 days and the longest is 15.61 days. This research denies that on the nights ayyām al-bīḍ the Moon is above the horizon from the beginning to the end of the night. The intensity of the Moonlight around the peak causes the days of ayyām al-bīḍ to be brighter than usual.

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