AL – AFAQ
Jurnal Ilmu Falak dan Astronomi
Fakultas Syariah Universitas Islam Negeri (UIN) Mataram
P-ISSN: 2685-0176. E-ISSN: 2722-0176 Vol. 7, No. 2 Desember 2025

The Gregorian and Hijri Calenders: Historical Development and the 'Urfi Month's Age

Didin Hidayat[1] , Tyas Azzahra[2], Ai Anisa[3], Fairana Sekarini[4], Ina Nurasifah[5]
[a]STAI Al-Azhary Cianjur, Jl. K.H Abdullah Bin Nuh, Kota Cianjur 43211, Indonesia.
[1]santriabah6886@gmail.com ; [2]azzahratyas4@gmail.com ; [3]aiannisa653@gmail.com; [4]rinifayra@gmail.com ; [5]inanurasifah29@gmail.com
*Tyas Azzahra (Corresponding Author): 085722511128

Abstract: Calendar systems play a crucial role in human life as they serve as a reference for organizing time, both in social and religious contexts. This study traces the historical development of two major calendars: the Gregorian calendar, which is based on the solar cycle, and the Hijri calendar, which follows the lunar cycle. It also introduces the concept of the *'urfī* lunar month, a conventional calculation that fixes the length of a month at thirty days, which has particular relevance in Islamic law, especially regarding worship schedules and legal provisions such as the period of *'iddah*. The Gregorian calendar emerged as a reform of the Julian calendar, while the Hijri calendar was first instituted during the caliphate of ʿUmar ibn al-Khaṭṭāb. This research employs a qualitative descriptive approach through library study to examine these calendar systems from both historical and normative Islamic perspectives. The findings reveal that although the *'urfī* calculation offers administrative practicality, it diverges from actual astronomical observations and therefore cannot serve as the sole reference for determining acts of worship. This study contributes by providing a comparative perspective on calendar systems and highlights the relevance of adopting the *imkān al-ru'yah* criterion as a means of harmonizing astronomical computation (*hisāb*) and moon sighting (*ru'yah*) in Islamic legal practice.
Keywords: *Islamic calendar, Gregorian calendar, Hijri calendar, 'urfi month, reckoning*

Abstrak: Kalender sistem memegang peran penting dalam kehidupan manusia Karena menjadi acuan dalam mengatur waktu, baik Untuk kebutuhan sosial dan agama. Artikel ini menelusuri sejarah perkembangan dua kalender utama, yaitu Kalender Gregorian yang menggunakan tata surya dan kalender Hijriah berbasis bulan. Selain itu, konsep usia bulan *urfi* yaitu perhitungan standar usia bulan sebanyak 30 hari yang memiliki relevansi dalam praktik hukum Islam, khususnya terkait waktu ibadah dan ketentuan syariah seperti *periode 'iddah* '. Kalender Gregorian adalah hasil dari reformasi dari Kalender Julian ke Kalender Gregorian, sedangkan Kalender Hijriah mulai digunakan pada masa pemerintahan Khalifah Umar bin Khattab. Penelitian ini menerapkan metode studi perpustakaan dengan pendekatan deskriptif kualitatif Untuk menganalisis sistem kalender dengan cara historis dan normatif dalam kerangka Islam. Hasil penelitian menunjukkan bahwa meskipun perhitungan usia bulan *Urfi* praktis dengan cara administrasi, ia Tidak sepenuhnya sesuai dengan realitas astronomi sehingga Tidak dapat dibuat menjadi Dasar Tunggal dalam menentukan waktu ibadah. Penelitian ini berkontribusi dalam memberikan pemahaman komparatif tentang kalender serta menawarkan relevansi kriteria implementasi *imkanur rukyat* sebagai upaya harmonisasi antara hisab dan rukyat dalam praktik hukum Islam.

Kata Kunci: *Kalender Gregorian, Kalender Hijriah, Bulan Urfi, Riwayat Kalender*

A. Introduction

The calendar is a crucial system in human life, serving as a reference for managing time, planning activities, and recording historical events. As civilization progressed, various calendar systems emerged based on astronomical observations of the movements of celestial bodies, particularly the sun and moon. Of the many systems that developed, two calendars that have had a significant influence on the present day are the Gregorian and Hijri calendars.[1]

[1]Asrifa, L.A. (2019). *Analisis Sistem Kalender Hijriah dalam Perspektif Astronomi Islam Modern*. Jurnal Ilmu Falak dan Astronomi Islam, 5(2), 101-114.

The Gregorian calendar, or Gregorian, is based on the sun's orbit and is used almost universally in administration, education, government, and economics. This calendar was born as a result of a reform of the Julian calendar approved by Pope Gregory XIII in 1582. In this system, a year is calculated as 365 days. In the Gregorian calendar, the determination of leap years is not only done by adding one day every four years to maintain astronomical accuracy. The rules applied are more detailed, namely every year that is divisible by four is designated as a leap year, except for century years which are only considered leap years if they are divisible by 400. Thus, the years 1600 and 2000 are leap years, while the years 1700, 1800, and 1900 are not included in leap years. This system is what distinguishes the Gregorian calendar from the Julian calendar which only designates every four years as a leap year without exception.

The synodic revolution system of the Hijri calendar uses the period between two new moons as one lunar cycle and 12 of these cycles form one Hijri calendar year, making this calendar a lunar calendar based on the moon's orbit around the earth. This calendar was officially used in the 17th year of the Hijri calendar at the initiative of Caliph Umar bin Khattab by using the event of the Prophet Muhammad's migration from Mecca to Medina as the starting point of calculation. The Hijri calendar serves as the basis for determining the time of religious activities, such as fasting Ramadan, paying zakat fitrah, the Hajj pilgrimage, and the commemoration of Islamic holidays such as Eid al-Fitr and Eid al-Adha.

Furthermore, in Islamic legal practice, the concept of the *'urfi lunar age is also known,* which is the standard calculation of a month as 30 days without waiting for the sighting of the new moon. This concept is used for various sharia purposes, such as determining the waiting period *('iddah),* the menstrual period, pregnancy, and the age limit for puberty. This standardization developed to meet the practical needs of Muslims, especially when observing the new moon is difficult.

Several researchers have studied calendars, both from a historical perspective, from a calculation system perspective, and from an application within Islamic law. For example, Muhammad Sholehuddin and Siti Tatmainul Qulub examined the relationship between the Javanese Islamic calendar and the Hijri calendar system through the application of hisab *'urfi.* Meanwhile, Anisah Budiwati emphasized the importance of a historical astronomical approach to re-verifying the dates of important events in Islamic history.

However, fundamental problems remain in determining the beginning of the Hijri month. The tension between *the hisab* and *rukyat methods* often gives rise to differences in determining Islamic holidays, including in Indonesia. This difference is reflected in the attitudes of large organizations such as Nahdlatul Ulama, which prioritizes *rukyat* , and Muhammadiyah, which uses hisab. As a result, communities often differ in how they celebrate religious holidays, potentially leading to social disintegration and a diminished sense of togetherness.

Based on this background, this study aims to explain the historical development of the Gregorian and Hijri calendars and to outline the position of the concept of *'urfi lunar age* in Islamic legal practice. Furthermore, this study also highlights the problematic gap between astronomical and normative aspects that underlie the differences between hisab and rukyat, and offers a synthesis that can bridge religious practice with scientific reality.

B. Method

This research is library research, with approach qualitative-descriptive. All data obtained from various source relevant written materials, both primary and secondary secondary. Primary sources include works classic and text normative Islam which discusses system calendar as well as law sharia related, whereas source secondary covering book academic, articles journal, accompanied by, and report research that reviews development calendar Hijriah, Gregorian Calendar, and draft age month *' urfi.*

In the data collection process, the author uses literature selection criteria based on three aspects: (1) relevance to the research topic, especially history and calendar systems, (2) academic validity, as indicated by the credibility of the publisher or scientific institution, and (3) recency, especially for contemporary research on the debates over *hisab* and *rukyat.* Overall, this research refers to more than 30 sources, consisting of classical and modern literature.

The analysis steps were carried out using content analysis and historical comparison techniques . First, the author identified the main issues in the literature, then categorized the data according to themes, namely the history of the Gregorian Calendar, the history of the Hijri Calendar, and the concept of the *'urfi month* in Islamic law. Second, the author compared historical and normative information from various sources to identify similarities and differences. Third, the comparative results were analyzed within an Islamic framework to examine their implications for contemporary religious practices, particularly regarding the problematic differences between the hisab and *rukyat methods* . From this process, conclusions were drawn that synthesize the research objectives.

C. Results and Discussion

1. History of the Development of the Gregorian Calendar

The history of the Gregorian calendar begins with the ancient Roman calendar, which was originally lunar-based with 10 months, but was inaccurate relative to the tropical year. In 47 BC, Julius Caesar reformed it to the Julian calendar, with a solar system of 365.25 days and the addition of a leap year every four years. Although more accurate, the Julian calendar still had inaccuracies until it was finally refined into the Gregorian calendar in the 16th century. become base before birth Julian calendar and Gregorian reform.

Gregorian calendar, or what is known as formally as the Gregorian calendar is system global calendar used in a way wide in modern life, including in administration Government, Education, to connection diplomatic. System this is designed based on cycle sun (solar calendar) and make year born Jesus Christ (Isa al-Masih). As the initial reference for the calculation. Before system This implemented, nation Roman use calendar Roman ancient, which combines lunar and solar elements but often experience mismatch with season Because under - calculation precision[2]. The solar calendar of the Roman Empire was originally a lunisolar calendar, or a calendar based on observations of the lunar cycle and seasons. The early Roman calendar is believed to have consisted of 10 months and a total of 304 days, with the winter period not included in the calendar.

[2]Rahmatillah, "Dualisme Kriteria Awal Bulan Hijriah di Indonesia: Telah antara Hisab dan Rukyat."

Later, during the reign of King Numa Pompilius, two months (January and February) were added, making the calendar year approximately 354 days long, similar to the lunar calendar. This calendar suffered from numerous inaccuracies due to irregular seasonal shifts. The solar calendar had 12 months in a year. The solar calendar system is based on the Earth's revolution around the Sun in approximately 365.24 days. In modern solar calendars, such as the widely used Gregorian calendar, a year consists of 12 months with months lasting between 28 and 31 days, depending on the month itself. In this system, a year is set to be 365.25 days long, with one day added every four years for leap years. The names of the months in the Julian calendar are largely derived from Latin numerals and important Roman figures, such as the changing of the name of the month Quintilis to July in honor of Julius Caesar, and Sextilis to Augustus in honor of Emperor Augustus. Additionally, several months are named after Roman gods, such as January, named after Janus (god of doors and beginnings), March, named after Mars (god of war), and June, named after Juno (goddess of marriage). July, named after Julius Caesar, and August, named after Augustus.

Although more accurate compared to calendar Previously, the Julian calendar had difference about 11 minutes 14 seconds per year from year tropical, which results in deviation One day every 128 years. Inaccuracy This make times religion and seasons in a way gradually shift from position originally. In the 16th century, it was known that there is shift about 10 days from Julian calendar against fact astronomical. For overcome matter This, Pope Gregory XIII carried out further reforms with introduce Gregorian calendar on October 15, 1582. Together with scientists like Aloysius Lilius and Christopher Clavius, he sparks system new where year leap year only applied to the year that expires divided by 4, In the system this one year have 365 days, and repair done with add One day every four years leap year. However, for guard accuracy astronomical long term, there are exceptions in the year century, only year the century is over divided by the set 400 as year leap year in Gregorian system. In addition, 10 days removed from Julian calendar and early year moved from March 25 to January 1[3].

The Gregorian calendar then adopted in a way gradually by various countries, starting from the Catholic region such as Italy, Spain, and Portugal. England and its colonies, including the United States, were new adopt system this was in 1752. The spread Gregorian calendar to the whole world is also affected by the expansion colonialism and needs will standardization system global calendar, especially in field trade and communication international. Even non-Christian countries like Saudi Arabia eventually start use Gregorian calendar for needs administration since October 1, 2016.

In terms of arrangement, calendar AD consists of of 12 months each of which has amount different days is quite consistent, namely 365 days in a regular year and 366 days in a leap year. Accuracy and stability system This make it as references main in system modern global calendar.

[3]R. Ningsih, "Perbandingan Kriteria Imkan Rukyat dan Wujudul Hilal: Studi pada Kalender Hijriah Kontemporer," *Jurnal Astronomi Islam Indonesia* 10, No. 1 (2024): 40–53

2. History of the Formation of the Hijri Calendar

The history of the Hijri Calendar is not as well as immediately started during the Caliphate of Umar bin Khattab, because Far before the pre -Islamic Arab Society already use system lunar calendar. Various ethnic group has apply calendar based on circulation month, even set days celebration certain in accordance each tradition. However, the practice the often not regular, for example with add month leap year every number of the year for calendar in harmony with season, or forward and backward month for the sake of certain, including for to make permissible war in the sacred months. Numbering year and time That based on events important things that happen in one period. As Allah says in *QS. At -Taubah verses 36-37* as following:

اِنَّ عِدَّةَ الشُّهُوْرِ عِنْدَ اللّٰهِ اثْنَا عَشَرَ شَهْرًا فِيْ كِتٰبِ اللّٰهِ يَوْمَ خَلَقَ السَّمٰوٰتِ وَالْاَرْضَ مِنْهَآ اَرْبَعَةٌ حُرُمٌۗ ذٰلِكَ الدِّيْنُ الْقَيِّمُ ۙ فَلَا تَظْلِمُوْا فِيْهِنَّ اَنْفُسَكُمْ وَقَاتِلُوا الْمُشْرِكِيْنَ كَاۤفَّةً كَمَا يُقَاتِلُوْنَكُمْ كَاۤفَّةً ۗ وَاعْلَمُوْٓا اَنَّ اللّٰهَ مَعَ الْمُتَّقِيْنَ

Indeed, the number of months with Allah is twelve months, (as) Allah decreed (in *Lauh Mahfuz*) when He created the heavens and the earth, of which there are four haram months. That is the (decree of) the straight religion, so do not wrong yourselves against it (those four months), and fight all the polytheists as they also fight all of you. Know that indeed Allah is with those who are pious. (*QS. At-Taubah 36*)

اِنَّمَا النَّسِيْۤءُ زِيَادَةٌ فِى الْكُفْرِ يُضَلُّ بِهِ الَّذِيْنَ كَفَرُوْا يُحِلُّوْنَهٗ عَامًا وَّيُحَرِّمُوْنَهٗ عَامًا لِّيُوَاطِـُٔوْا عِدَّةَ مَا حَرَّمَ اللّٰهُ فَيُحِلُّوْا مَا حَرَّمَ اللّٰهُ ۗ زُيِّنَ لَهُمْ سُوْۤءُ اَعْمَالِهِمْ ۗ وَاللّٰهُ لَا يَهْدِى الْقَوْمَ الْكٰفِرِيْنَ

In fact, delaying (the haram month) only increases disbelief. Those who are disbelievers are misled by this (postponement), they make it halal in one year and make it haram in another year so that they can adjust to the number that Allah has forbidden, so that they make lawful what Allah has forbidden. (By Satan) their bad deeds have been made to seem beautiful to them. Allah does not guide people who disbelieve. (*QS. At-Taubah 37*)

Hijri Calendar rooted from Islamic reform to practice calendar pre - Islamic lunisolar with system *rice'* that is addition or shifting month for adapt cycle time with season so that the forbidden months can manipulated in accordance interest. The Koran refuses practice the through *QS. At-Taubah:36-37* with affirmation that amount month in a year just twelve, temporary *rice'* called as form misleading addition. Prophet Muhammad SAW later delete system it was on Haji Wada' and stipulated calendar based pure lunar cycle, where each month started with it looks like crescent moon. The determination This furthermore strengthened by Caliph Umar bin Khattab with make incident migration as beginning calculation years, so that calendar Hijri become calendar consistent, free qamariyah from manipulation, and pure follow circulation month.[4]

[4]Z. Nadhifah, "Penentuan Awal Bulan Hijriah (Studi Hadis tentang Hilal dan Rukyatul Hilal," *ELFALAKY: Jurnal Ilmu Falak* 4, no. 2 (2022), https://journal.uin alauddin.ac.id/index.php/elfalaky/article/view/17768.

Finally, Ali bin Abi Thalib's suggestion was accepted. as base in set system Islamic calendar, namely make incident migration Muslims from Mecca to Medina in 622 AD as beginning Year One of Hijriah. Ali bin Abi Thalib relied on three reason main in his choice. First, the Qur'an often give respect and praise to those who do migration. Second, the formation of an independent and sovereign Islamic community in a way comprehensive new fully implemented after incident migration to Medina. Third, the values migration expected always become source inspiration for Muslims throughout the ages, as motivation For Keep going move, transform, and improve self going to more direction good.

Caliph Umar bin Khattab later determine incident the migration of the Prophet Muhammad from Mecca to Medina as beginning start system Islamic calendar, which is called calendar Hijriah. The beginning of the Hijri year is set on the 1st of Muharram, which coincides with with July 16, 622 AD. Determination This was carried out in 638 AD which was when That has enter 17th year of Hijriah. One of the script the oldest one listed calendar Hijriah and mentions "Sanah 17" is Charter Freedom Religion and Security that Caliph Umar gave to citizens of Aelia (Jerusalem) after conquest city That from power Roman. With its implementation system this, the calendar Hijri counted step back as many as 17 years from year moment decision the made.

The Islamic calendar, also called calendar Hijri is system complete calendar determined by the cycle movement month surround earth (lunar calendar). In the Western tradition, the calendar This normal abbreviated as AH, which is acronym from The Latin phrase *Anno Hegirae*, meaning “Year of the Hijra.” The term refers to a significant event in Islamic history, namely the migration of the Prophet Muhammad (peace be upon him) from Mecca to Medina, which marked the beginning of this calendar era. The Hijri Calendar consists of from 12 months sickle with the duration of each is approximately 29 to 30 days, for a total of one year Hijri about 354 or 355 days. The Hijri calendar begins with the month of Muharram as the first month and ends with the month of Dzulhijah as the twelfth month. The complete sequence of the twelve months in this system is Muharram, Safar, Rabiul Awal, Rabiul Akhir, Jumadil Awal, Jumadil Akhir, Rajab, Sha'ban, Ramadan, Shawwal, Dzulqa'dah, and Dhul-Hijjah. Because its calculations are purely lunar, the Hijri calendar has a leap year system to adjust the number of days in a year to align with the lunar cycle. The leap year system in the Hijri calendar occurs in a 30-year cycle, consisting of 19 common years with 354 days and 11 leap years with 355 days.

A day is added to a leap year, typically in the month of Dhul-Hijjah, so this month can have either 29 or 30 days. Leap years in this 30-year cycle occur in years 2, 5, 7, 10, 13, 16, 18, 21, 24, 26, and 29 , so the months in this calendar are not fixed to a specific season and shift annually.[5] The complete sequence of the twelve months can be seen in Table 1 below:

[5]L.A. Asrifa, “Analisis Sistem Kalender Hijriah dalam Perspektif Astronomi Islam Modern,” *Jurnal Ilmu Falak dan Astronomi Islam* 5, no. 2 (2019): 101–14.

AL – AFAQ
Jurnal Ilmu Falak dan Astronomi
Fakultas Syariah Universitas Islam Negeri (UIN) Mataram
P-ISSN: 2685-0176. E-ISSN: 2722-0176 Vol. 7, No. 2 Desember 2025

Table 1. Names of Months in the Hijri Calendar

No	Name Month	Information Short
1	Sacred 30 day	From the word *haram* (holy/forbidden): the first month that is glorified
2	Safar 29 day	From the word *shifr* (empty): in this month Arab houses are often empty because they are left to go to war or trade.
3	Rabi'ul Beginning 30 day	*Rabi'* means spring/autumn, Awwal means first (*first spring*)
4	Rabi'ul End 29 day	*Rabi'* means spring/autumn, Akhir means second (*second spring*)
5	Jumadil Beginning 30 day	From the word *jamad* (dry/frozen), Awwal means first (*first dry/frozen season*)
6	Jumadil End 29 day	From the word *jamad* (dry/frozen), Akhir means second (*second dry/frozen season*)
7	Rajab 30 day	From the word *tarjib* (glorify): the sacred month that is glorified
8	Sha'ban 29 day	From the word *Sya'b* (group/scatter): the Arab tribes scattered in search of water
9	Ramadan 30 day	From the word *ramda* (hot/scorching): marking a scorching summer
10	Shawwal 29 day	From the word *scarf* (raise/lower): female camels are usually thin after giving birth
11	Dzulqa'dah 30 day	From the word *qa'ada* (sit/stop): the sacred month where people stop fighting.
12	Dhul-Hijjah 29 or 30 day	From the word *hajj* (pilgrimage): the month of performing the Hajj pilgrimage and Eid al-Adha

The Hijri calendar not only serves to determine the timing of Muslim religious observances, such as fasting, prayer, and the Hajj, but also plays a significant role in reconstructing the chronology of Islamic history. Its function includes tracing various important events that occurred before this calendar system was officially established by Caliph Umar ibn Khattab, including the birth of the Prophet Muhammad. understand system calendar This in a way comprehensive, there is a number of draft main thing that is needed studied, including age lunar month and the beginning day in calendar Hijri as following:

a. Lunar Month Age

The lunar month uses the synodic month system as its basis for calculation. The synodic month is the period of time between one new moon phase (hilal) and the next, and lasts an average of 29.53 days (29 days, 12 hours, 44 minutes, and 3 seconds).

The age of the lunar month in the Islamic calendar is determined based on the position of the crescent moon as observed or calculated astronomically. Because the possibility of

seeing the crescent moon is influenced by atmospheric conditions and the geometric position of the moon relative to the sun and earth, amount day inside a month on the calendar Hijri can vary between 29 to 30 days.[6]

The hadith which states that the month is sometimes 29 days and sometimes 30 days is a hadith narrated by Ibn Umar radhiyallahu 'anhuma. The wording reads as follows:

إِنَّا أُمَّةٌ أُمِّيَّةٌ لاَ نَكْتُبُ وَلاَ نَحْسُبُ الشَّهْرُ هَكَذَا وَهَكَذَا يَعْنِي مَرَّةً تِسْعَةً وَعِشْرِينَ وَمَرَّةً ثَلاَثِينَ

"We are an Ummi people who cannot write and cannot count (reckoning). The month is like that (with hand signals showing sometimes 29 days and sometimes 30 days)." (HR. Bukhari and Muslim).

This is different with method calculation fixed and established urfi month odd always 30 days as well as month even always 29 days. Although practical, the urfi system is considered not to reflect astronomical reality and cannot be used as a basis for determining prayer times according to the majority of scholars.[7]

b. Early Day

The day in the Hijri calendar begins at sunset (Maghrib time), not midnight as in the Gregorian calendar. The date changes at sunset, in accordance with Islamic tradition and law. This concept has important implications for calculating prayer times and demonstrates a fundamental difference between the Islamic lunar calendar and the Western solar calendar.[8]

c. Crescent Moon

The crescent moon (hilal) is the first crescent moon phase that appears after the *ijtimak (convergence* of the sun) and is visible on the western horizon just as the sun has set. This phenomenon is the main indicator for determining the start of the Hijri month. In modern developments, crescent moon observations are not only performed manually but are also supported by optical devices such as telescopes, CCD cameras, and digital imaging systems. Determination crescent moon depends on various complex astronomical parameters, such as height crescent above the horizon, elongation or distance corner month to sun, difference time sunk both (*lag time*), and percentage illumination month. If these parameters meet the requirements set out in the criteria for *imkanur rukyat* (the possibility of seeing the crescent moon), then the start of a new month can be legally determined, both according to Islamic law and astronomically. It should be emphasized that a new month does not always have to be perfected to 30 days. If the crescent moon meets the minimum criteria, then the month is sufficient with 29 days and can be

[6]A. Hafidz, "Perbandingan Hisab Hakiki dan Hisab Urfi dalam Penentuan Awal Bulan Hijriah," *Jurnal Falak dan Astronomi Islam* 7, no. 1 (2021): 23–35.

[7]R. Maulana, "Kajian Kritis Sistem Kalender Urfi dalam Perspektif Astronomi Modern," *Jurnal Studi Islam dan Ilmu Falak* 8, no. 2 (2022): 88–97.

[8]I. Rahmah, "Awal Hari dalam Kalender Hijriah: Tinjauan Astronomi dan Syariah," *Al-Marshad: Jurnal Astronomi Islam dan Ilmu Falak* 5, no. 1 (2023): 14–25.

immediately designated as the start of a new month.[9]

d. New Month

In a way astronomical, early the lunar month begins with incident conjunction or *ijtima'*, namely when longitude ecliptic moon and sun parallel in one line. However, *ijtima '* just No Enough as a basis for determination beginning month, because crescent moon must Already seen above horizon moment sun immersed in order to be able to observed through method rukyat. If conjunction happen after sun sink, then crescent moon will is below the horizon line and is not can visible. On the other hand, if *ijtima '* happen before sun set, then There are three possibilities that can happened, namely:

- The crescent moon is above the horizon and can be observed directly with the naked eye.
- The crescent moon appears on the horizon, however No can seen visually because obstacle technical, such as weather overcast or obstructed cloud.
- The crescent moon is still below the horizon, so it is impossible to see.

In determining the beginning of the lunar month, there are various approaches among astronomers and modern scholars, each highlighting different considerations and methods according to their scientific background and understanding of sharia. One group follows the principle of *ijtima'* qablal ghurub, which means that if the *ijtima'* (meeting between the moon and the sun) occurs before sunset, then that day is declared the beginning of a new month, without considering the possibility of seeing the crescent moon. This approach assumes that the occurrence of *ijtima'* before sunset is considered to fulfill the requirements to determine the start of a new month, without requiring the visibility of the crescent moon.[10]

In contrast, a more stringent approach establishes two main conditions in determining the beginning of the month: first, *ijtima'* need ongoing before sun sinking; and second, the crescent moon must seen above horizon moment sun sunk when light sun lost. This means that the beginning of the Hijri month is only determined if these two conditions are met, although the crescent moon does not have to be visually visible. This approach later developed into two main schools of thought: Wujudul Hilal and Imkan Rukyat.[11]

User method existence crescent moon determine beginning month Hijri when crescent moon in a way geometric Already be on top horizon moment sun immersed, without consider height crescent moon or possibility see it visually. Existence crescent moon above horizon, although in a way technical No can observed or viewed has fulfil criteria entry month new.[12]

[9]N. Sari, "Modernisasi Pengamatan Hilal: Integrasi Teknologi dalam Penentuan Kalender Hijriah," *Jurnal Ilmu Falak dan Syariah* 9, no. 1 (2023): 12–27.

[10]M. Mustofa, "Analisis Pendekatan Ijtimak dalam Penentuan Awal Bulan Hijriah," *Jurnal Studi Ilmu Falak* 6, no. 1 (2020): 21–32.

[11]L. Rahmatillah, "Dualisme Kriteria Awal Bulan Hijriah di Indonesia: Telaah antara Hisab dan Rukyat," *Jurnal Falak Nusantara* 7, no. 2 (2021): 70–85.

[12]D. Fitriyani, "Wujudul Hilal dan Relevansinya dalam Penentuan Awal Bulan Hijriah di Indonesia," *Jurnal Ilmu Falak dan Syariah* 9, no. 1 (2023): 18–29.

Meanwhile, the Imkanu Rukyat group proposed additional conditions in the form of the possibility of seeing the crescent moon (*visibility* criteria). This covers a number of astronomical parameters like tall minimal crescent (generally ≥ 2°), elongation or corner between moon and sun, illumination (percentage light month), and hose time between sunset sun and moon (*lag time*). Approach this considered more balanced because integrate principle hisab and rukyat based on possibility objective crescent moon visible to the eye man.[13]

Thus, the main difference between the two methods lies in the minimum visibility threshold. The Wujudul Hilal approach only requires the crescent to be visible on the horizon, while Imkanu Rukyat requires a minimum visibility requirement for the crescent to be used as a signal for the start of the new month.

3. Difference And Equality Gregorian Calendar with Hijri Calendar

Difference

Aspect	Calendar Hijri	Calendar AD
Calculation Basis	Based on synodic period of revolution of the moon around the Earth *(lunar calendar)*	This calendar is based on the earth's orbit around the sun or known as *the (solar calendar)*
Amount Day in A month	29–30 days, depending on the appearance of the new moon	28–31 days, depending on the month
Number of Days in One year	354 to 355 days	365 days, or 366 days in a leap year
Marker Beginning of the month	By looking at the new moon (crescent moon)	A fixed date on the calendar, without any special astronomical markers
Beginning Year	Year 1 AH = Hijrah of the Prophet Muhammad SAW (622 AD)	Year 1 AD = Birth of Prophet Isa AS
Beginning Day	It starts at sunset	Started o'clock 00.00 early day
Amount Month	12 months: Muharram, Safar, Rabi'ul Awal, etc.	12 months: January, February, March, etc.
Use of Numbers	Arabic numerals (١, ٢, ٣ ...) or Arabic script	Number Latin (1, 2, 3 ...)

[13]A. Hamid, "Kriteria Visibilitas Hilal dalam Perspektif Astronomi dan Fikih," *Al-Marshad: Jurnal Ilmu Falak dan Aplikasi Islam* 8, no. 2 (2022): 45–58.

Equality

Aspect Equality	Explanation
Amount Month	You're welcome own 12 month in a year.
Time Measurement Function	Used to regulate time, social, cultural and religious life.
System Leap year	The Gregorian calendar uses a leap year system (every four years, with the exception of century years that are not divisible by 400), while the Hijri calendar does not have the concept of astronomical leap years. However, adjustments to the number of days are made based on crescent moon sightings (rukyat).
Function Religious	Becomes a reference for determining holidays and religious celebrations according to each religion.

Both calendars have 12 months and recognize the concept of leap years. However, the fundamental difference lies in their astronomical basis: the Hijri calendar is lunar-based, making it approximately 11 days shorter than the Hijri calendar. in the Gregorian Calendar. Consequently, the Islamic months do not coincide with specific seasons. This difference often creates problems in religious practices across countries, such as the Ramadan fast or Eid al-Adha, which fall on different days due to inconsistent methods for determining the beginning of the month. The case of Eid al-Fitr 2023 in Indonesia, where Nahdlatul Ulama (NU) and Muhammadiyah observed the month one day apart, demonstrates that differences in methods (rukyat and hisab) directly impact the socio-religious unity of the community.

The clear similarity is that both calendars are systems that regulate the division of time into a year and a month, each with 12 (twelve) months, although the number of days in each month and the total number of days in a year differ. These calendars serve as guidelines for daily life and serve as official calendars for the Islamic organizations that use them.

4. Hisab 'Urfi Critical Analysis and Legal Implications

a. Definition Hisab 'Urfi

The term *hisab* (حساب) in Arabic means calculation, whereas *'urfi* (عرفي) refers to habits or tradition general. Thus, *hisab 'urfi* is a conventional dating method and does not depend on actual astronomical data. In the system this, long month determined in a way fixed, namely 30 days for month odd and 29 days for month even in lunar calendar, without take into account condition the actual crescent, while in system Syamsiyah (circulation sun), long month varies between 28 to 31 days with amount day in a year as many as 365 or 366 days for year leap year.[14]

One of the main characteristics of *hisab 'urfi* is the determination of time which is fixed and accepted from generation to generation, without considering the actual position of the crescent moon in the sky. Therefore that, the way this more in accordance for needs

[14]Hamid, "Kriteria Visibilitas Hilal dalam Perspektif Astronomi dan Fikih."

administrative, such as compiling a calendar or determining the time of zakat, but it is less suitable for determining worship times that depend on crescent moon observations, such as the start of Ramadan and Eid al-Fitr. This differs from *hisab hakiki*, which uses an approach based on actual astronomical data, including lunar conjunctions, the altitude of the crescent moon at sunset, and the elongation between the moon and the sun. Meanwhile, *hisab 'urfi* relies solely on average figures that are fixed and repeat annually.[15]

b. Evidence Hisab 'Urfi

In the context of Islamic jurisprudence, scholars differ on the permissibility of using *'urfi hisab* as the legal basis for determining the beginning and end of Ramadan. Some scholars permit the use of this method, arguing that the hisab system has been used for generations even before the development of the hisab *haqiqi method*. They argue that as long as the system facilitates social life, its use is permissible according to Islamic law. However, this group does not consider it the primary basis for worship, but rather merely an administrative guide.

In contrast, the majority of scholars reject the use of the *'urfi hisab method* to determine the beginning of Ramadan, as this method does not take into account the actual position and movement of the moon. This inaccuracy can result in a difference of one to two days from the actual astronomical conditions, potentially preventing the implementation of fasting or Eid celebrations from being at the proper times. This is in line with the hadith narrated by Ibn Umar (ra), in which the Prophet Muhammad (peace be upon him) said:

لَا تَصُومُوا حَتَّى تَرَوْا الْهِلَالَ وَلَا تُفْطِرُوا حَتَّى تَرَوْهُ وَإِنْ غُمَّ عَلَيْكُمْ فَاقْدُرُوهُ

"Don't fast before you see the new moon, and don't break your fast before you see it. If the sky is covered with clouds, then expect it." (HR. Bukhari and Muslim).

This hadith is used as evidence by the majority of scholars to emphasize the importance of rukyat hilal in worship related to the beginning of the month.

Hisab *'urfi* stipulates that odd months always have 30 days and even months have 29 days. Its nature is practical and useful for the purposes of compiling calendars, haul zakat, but it does not comply with astronomical conditions. In contrast, hisab *haqiqi* or astronomical considers the positions of the moon, sun, and earth, and is used to determine worship. From a fiqh perspective, the majority of scholars reject hisab *'urfi* as a basis for determining worship. Contemporary scholars, such as Yusuf al-Qaradawi acknowledge the accuracy of modern astronomical hisab, but emphasize the importance of rukyat as validation *of sharia*. This indicates an epistemological tension between tradition and modernity.

The case of the differences in the determination of Eid al-Fitr 2023 in Indonesia demonstrates the practical impact of the differences in the methods of hisab wujudul hilal (crescent sighting) (Muhammadiyah) and *Imkan Rukyat* (Rukyat Imkan) (NU). Legally, this difference remains within the realm of tolerance, but socially, it can lead to fragmentation. Therefore, integrating the hisab and rukyat methods through the Imkan rukyat criteria is crucial

[15]A. Syaifuddin, "Relevansi Hisab Urfi dan Hakiki dalam Penentuan Awal Bulan Qamariyah," *Jurnal Astronomi Islam Nusantara* 6, no. 1 (2021): 22–35.

as a harmonizing solution.

Table 2. Differences Hisab 'Urfi and Hisab True

Aspect	Hisab Urfi	Hisab True
Definition	The method of calculating the Hijri calendar is based on the average lunar cycle conventionally and consistently, without paying attention to the actual position of the crescent moon.	The calculation method is based on the geometric and actual position of celestial bodies (sun, moon, earth) astronomically to determine the beginning of the lunar month.
Calculation Basis	Using the average circulation cycle month (29.5 day per month), does not change from year to year.	Using actual astronomical data such as elongation, crescent height, and *ijtima time* based on specific location and time coordinates.
Amount Moon Day	Fixed: for examples Ramadhan is always 30 days, Sha'ban is always 29 days.	Variable: depending on the condition of the moon, it can be 29 or 30 days depending on whether the crescent moon appears or not.
Determination of the Crescent Moon	Does not take into account the actual position of the crescent; only uses a fixed cycle count.	Using the real position of the crescent moon, calculated using modern astronomical formulas (spherical astronomy).
Time Flexibility	Very consistent and practical; can be used to create calendars for years to come without changing.	Adjusting for astronomical conditions; results may change depending on the calculation results for a particular location and time.
General Use	Used for general administrative and calendar purposes, such as zakat haul, annual activity scheduling, and other needs. non-worship.	This method is used to determine the beginning of months related to the implementation of worship, such as Ramadhan, Shawwal (Eid al-Fitr), and Dzulhijjah (Eid al-Adha).
Accuracy Level	Less accurate for worship purposes because it does not take into account the actual position of the crescent moon.	Astronomically and scientifically accurate, relevant for determining worship times related to the appearance of the crescent moon.
Excess	Practical, easy for the general public to understand, suitable for fixed calendars.	Scientific and in accordance with Islamic law which requires rukyat/hisab; more authentic in determining the time-prayer time.

Lack	Not valid for determining prayer times, it can conflict with the results of rukyat and sky conditions.	Requires high technical skills (astronomy/space science), software, and accurate ephemeris data.

5. Synthesis

Historical and normative analysis shows that the Hijri and Gregorian calendars have similar vital functions, but with different epistemological bases. The Gregorian calendar emphasizes astronomical precision for civil purposes, while the Hijri calendar emphasizes the visibility of the crescent moon for *Islamic compliance* .

'Urfi and *haqiqi* hisab is not merely technical, but also relates to the legitimacy of Islamic law. *'urfi hisab* is still relevant for administrative purposes, but for worship, *haqiqi hisab* combined with rukyat (incantation of the sun). This synthesis is crucial for harmonizing sharia texts, astronomical realities, and the social needs of the Muslim community. With an integrative approach, astronomy can contribute to reducing differences in determining Islamic holidays and maintaining the unity of the Muslim community.

D. Conclusion

This research confirms that the Gregorian and Hijri calendars developed through different historical settings, but both play an important role in human life. The solar-based Gregorian calendar emerged from the reform of the Julian calendar to the Gregorian calendar to maintain astronomical accuracy. The lunar-based Hijri calendar was established during the time of Caliph Umar ibn Khattab, using the Prophet Muhammad's migration as the starting point for calculations. The concept of the *'urfi lunar age* exists as a practical standard in Islamic law, although it is not entirely in line with astronomical reality, making it more suitable for administrative purposes than worship.

The implication for the development of *astronomy* is the importance of an integrative approach between hisab and rukyat (the visible light of the Sun). This ensures that astronomy *does* not stop at the technical aspects of calculations but also contributes to bridging the authority of sharia and the contemporary needs of the community. In this way, astronomy *can* develop as a discipline that is both scientific and normatively relevant.

The practical recommendation offered is the need to harmonize calendar methods in Indonesia using the *imkanur rukyat criteria* as a compromise between *hisab* and *rukyat* . This approach can minimize differences in determining the start of the Hijrah month, especially on major religious holidays, thereby achieving certainty in prayer times while maintaining socio-religious unity among Muslims.

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