

Integrating Astronomical Observations and Islamic Law: The Case of Sunrise and the *Ishrāq* Prayer Time

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Abstract

This study discusses determining the initial time for the *Ishrāq* prayer based on a combination of classical Islamic jurisprudence (*fiqh*) and contemporary astronomical approaches. Traditionally, the time for *Ishrāq* is associated with the sun having risen to the height of one spear-length after sunrise, yet no standardized astronomical measurement exists for this term. This research employs a multidisciplinary qualitative method, utilizing library research, analysis of *fiqh*-based evidence, and astronomical calculation simulations (*hisāb*). The findings show that one spear-length can be converted to a solar altitude of approximately 3°30' to 5°, or around 10–20 minutes after *shurūq* (sunrise). A case study conducted in Surakarta indicates that the ideal time for *Ishrāq* prayer on July 20, 2025, is 06:10 AM (GMT +7). In conclusion, determining the time of *Ishrāq* requires an astronomically-based formula aligned with shar'i principles and standardization in digital applications to ensure valid and accurate worship.

Keywords: *Ishrāq* prayer, Islamic law, modern astronomy

Penelitian ini membahas penentuan awal waktu salat *Ishrāq* berdasarkan perpaduan kajian fikih klasik dan pendekatan astronomi kontemporer. Waktu *Ishrāq* secara tradisional dikaitkan dengan posisi matahari yang telah naik setinggi satu tombak setelah terbit, namun tidak terdapat ukuran astronomis yang baku untuk istilah tersebut. Penelitian ini menggunakan metode kualitatif multidisipliner dengan pendekatan studi kepustakaan, analisis dalil-dalil fikih, dan simulasi hisab astronomis. Hasil penelitian menunjukkan bahwa tinggi satu tombak dapat dikonversi ke ketinggian matahari antara 3°30' hingga 5°, atau sekitar 10–20 menit setelah waktu syuruq. Studi kasus di Surakarta menunjukkan waktu ideal salat Isyraq tanggal 20 Juli 2025 jatuh pada pukul 06.10 WIB. Kesimpulannya, penetapan waktu *shurūq* membutuhkan formulasi berbasis data astronomis yang sesuai dengan prinsip-prinsip syar'i serta pembakuan dalam aplikasi digital agar ibadah dapat dilaksanakan secara tepat dan sah.

Kata Kunci: salat *Ishrāq*, fikih, astronomi modern

A. Introduction

The determination of prayer times in Islam is generally based on the sun's daily motion, which is reflected in the changes in its position from sunrise to sunset. In this regard, the science of astronomy (*‘ilm al-falak*) plays a vital role in identifying the boundaries of prayer times based on astronomical phenomena such as dawn (*fajr*), solar noon (*zawāl*), and sunset (*ghurūb*).¹ One of the times that receives special attention in Islamic jurisprudence and astronomy is the time of the *Ishrāq* prayer, a sunnah prayer performed after the sun has risen and ascended to the height of one spear approximately. Although *Ishrāq* is not an obligatory prayer, its spiritual status is highly regarded, as several hadiths mention that its reward is equivalent to a complete *hajj* and *‘umrah*.²

However, determining the time of the *Ishrāq* prayer is not as simple as observing the sunrise. In astronomy, sunrise (*shurūq*) is when the upper edge of the sun's disk becomes visible on the eastern horizon. Yet, from a *shar‘i* perspective, performing any prayer precisely at sunrise is forbidden, as it falls within the *makrūh taḥrīm* (strongly discouraged) time. Thus, establishing the correct time for the *Ishrāq* prayer requires a clear boundary between the forbidden period's end and the permissible (*mubāḥ*) time, which is traditionally marked by the phrase "the sun has risen to the height of one spear."

"One spear" is not an astronomical unit that modern instruments can precisely measure. Classical Islamic astronomy often interprets this height as approximately 10 to 20 minutes after *shurūq*.³ However, this estimation greatly depends on geographic and atmospheric factors, such as elevation above sea level, atmospheric refraction that affects the perception of sunrise, and the geographic latitude of a location. As a result, there are variations in the time of *Ishrāq* prayer between different places, even within a geographically vast country like Indonesia.

In today's context, many Muslims rely on digital prayer schedules and mobile applications that use *ḥisāb* algorithms to calculate prayer times. Unfortunately, not all apps or institutions managing prayer times clarify when the prohibited time ends and when *Ishrāq* begins. This ambiguity can lead some people to perform the *Ishrāq* prayer during the still-prohibited time or skip it altogether to avoid uncertainty. This highlights the need to harmonize astronomical precision with *shar‘i* principles governing worship practices.

¹ Susiknan Azhari, "Tracing the Concept of Fajr in the Islam Mosaic and Modern Science," *Ahkam: Jurnal Ilmu Syariah* 18, no. 1 (2018): 219–32; Abd Karim Faiz, *Waktu Shalat: Kajian Fiqih Dan Astronomi* (Parepare: IAIN Parepare Press, 2021); Iif Riansa dan Darlius, "Formulasi Waktu Shalat Perspektif Empat Imam Mazhab," *INNOVATIVE: Journal Of Social Science Research* 3, no. 6 (2023); Muhammad Rifqi Hasan, "Astronomical Interpretation of Early Prayer Times (Studi of Differences in Determination of Early Prayer Times From The Text and Astronomical Prespective)," *Al-Hilal: Journal of Islamic Astronomy* 2, no. 2 (2020): 194–213, https://journal.walisongo.ac.id/index.php/al-hilal/article/view/6640?utm_source=chatgpt.com; Nur Fajriani Zar'ah dan Fiqhi Ikhsan Anwari, "Analytical Study of Al-Murobba' in Determining the Beginning of Asr Prayer Time," *Elfalaky: Jurnal Ilmu Falak* 7, no. 2 (2023): 231–47, https://journal.uin-alauddin.ac.id/index.php/elfalaky/article/view/41769?utm_source=chatgpt.com.

² Abi Isa Muhammad bin Isa bin Saurah, *Jami' Al-Shahih Wahua Sunan Turmudzi* (Beirut, Libanon: Dar al-Kutub al-Ilmiyah, n.d.), 117.

³ Muhammad Yasin Al-Fadani, *Syarah Samarotul Wasilah* (Mesir: Dar al-Kutub al-Mishriyyah, n.d.), 46.

This challenge becomes more complex when the textual-normative approach of *fiqh* meets astronomy's mathematical and observational approach. Some scholars emphasize caution to avoid the forbidden times of prayer, while others advocate for a falak-based approach to determine *sunnah* times more precisely.⁴ The lack of harmony between these approaches may confuse the public, especially those seeking legal certainty in performing essential *sunnah* practices. Given the spiritual significance of the *Ishrāq* prayer and the growing use of digital religious practices, an in-depth and comprehensive study is needed on the boundaries of *shurūq* and the beginning of *Ishrāq* time. Such research must be not only normative-*fiqh*-oriented but also astronomical-empirical in nature to provide practical solutions that can be widely applied. This aligns with the spirit of *maqāṣid al-sharī'ah*, which aims to ensure ease and clarity in practicing the religion while preserving the values of worship.

Studying the sunrise phenomenon and its *shar'ī* implications for the time of *Ishrāq* is also an essential part of integrating religious knowledge and science. In this context, *ilm al-falak* can bridge normative religious sources and empirical realities, producing prayer time guidelines that are both *shar'ī*-valid and astronomically accurate. This synergy is crucial in reinforcing religious authority, especially in formulating national prayer schedules and promoting *sunnah* prayer times to the broader public.

Several recent studies have significantly contributed to the discourse on determining the time of the *Ishrāq* prayer. Nabilla Pramudyanti affirms that the time of *Ishrāq* begins approximately 10–20 minutes after sunrise, in line with classical interpretations of the sun's elevation at the height of one spear.⁵ Another study by Encep Abdul Rojak and Ramdan Fawzi highlights the need for digital standardization of prayer schedules in Indonesia by integrating normative religious texts with mathematical *ḥisāb* formulations to be widely applied through digital platforms.⁶ Meanwhile, a study published in the *Borneo International Journal of Islamic Studies* (2025) emphasizes the importance of integrating traditional and modern methods, since although astronomical calculations offer high accuracy, many communities still value the spiritual dimension in determining prayer times.⁷ On the other hand, research on the prayer schedule algorithm of TGH Ibrahim Al-Khalidy in Lombok reveals gaps in accuracy due to the absence of astronomical corrections such as atmospheric refraction and site elevation.⁸ In contrast to these studies, this article proposes an interdisciplinary approach combining traditional *fiqh* interpretations, modern astronomical calculations, astronomical corrections, and local field validation. The aim is to produce

⁴ Muhammad bin Umar Nawawi Al-Jawi, *Nihayah Al-Zain* (Surabaya: Al-Haramain, 2005), 103.

⁵ Nabilla Pramudyanti, "The Sun Position in Determining the Beginning of Dhuha and Ishraq Prayers," *Al-Hisab: Journal of Islamic Astronomy* 2, no. 1 (2025): 33–43, <https://jurnal.umsu.ac.id/index.php/alhisab/article/view/21782>.

⁶ Encep Abdul Rojak dan Ramdan Fawzi, "The Normative Basis of Islamic Astronomy for the Transformation of Prayer Schedules to Digital and Its Accuracy," *El-Usrah: Jurnal Hukum Keluarga* 7, no. 2 (2024): 602–22, <https://jurnal.ar-raniry.ac.id/index.php/usrah/article/view/22097>.

⁷ La Ode Musaldin Ibnu Imam Al Ayyubi, Nurhikmah, Eko Prayetno, Firda Noerzanah, "Determination of Prayer Times Through Islamic Astronomy Applications: Repositioning Traditional Authority in the Digital Era," *Borneo International Journal of Islamic Studies* 7, no. 1 (2025): 1–18, <https://journal.uinsi.ac.id/index.php/bijis/article/view/10062>.

⁸ Abdul Kohar, "Spiritual Contributions of TGH. Ibrahim Al-Khalidy's Prayer to SDGs Achievement on Lombok Island," *Profetika: Jurnal Studi Islam* 26, no. 1 (2025): 93–114, <https://journals2.ums.ac.id/index.php/profetika/article/view/10000>.

guidelines for the *Ishrāq* prayer that are valid according to *sharī'ah*, accurate from an astronomical perspective, and practical for both digital applications and the needs of Muslims in Indonesia.

Therefore, this article aims to critically examine the phenomenon of sunrise from the perspective of Islamic astronomy and explore its *shar'ī* consequences, particularly concerning the determination of the *Ishrāq* prayer time. Through a multidisciplinary approach that combines astronomical science, fiqh, and methods of worship time determination, this study is expected to provide an applicable scientific contribution for Muslims to perform sunnah prayers correctly and consistently.

B. Method

This study employs a multidisciplinary qualitative approach that integrates normative fiqh studies with empirical astronomical analysis to deeply explore the boundaries of *shurūq* time and the beginning of the *Ishrāq* prayer time. This approach addresses the complex issues between classical fiqh texts, contemporary scholarly interpretations, and empirical data from astronomical calculations and observations. The research is primarily library-based, but it is supplemented with a comparative study of contemporary *ḥisāb* data to understand sunrise timing and the elevation equivalent to one spear.⁹

Primary data for the *fiqh* study is obtained from the Qur'an, hadiths, and classical and contemporary Islamic legal texts, such as those found in *Sunan al-Tirmidhi*. The astronomical data is sourced from modern *falak* references, *ḥisāb-rukyat* manuals, and scholarly articles about *Ishrāq* prayer. After collecting the data, the analysis was carried out in two stages. First, content analysis was employed to examine *fiqh* sources related to the prohibition of prayer at sunrise and the boundaries of the beginning of *Ishrāq* prayer. Second, a descriptive analysis was applied to the results of astronomical calculations in a single city used as a case study to determine with precision the time of *syurūq* and the estimation of the sun's elevation equivalent to one spear-length. The results of these two approaches were then synthesized to produce a comprehensive understanding that bridges *shar'ī* norms with astronomical accuracy, thereby establishing the boundaries of *Ishrāq* prayer time that are both valid in *fiqh* and scientifically precise.¹⁰

C. Result and Discussion

1. The Delimitation of *Ishrāq* Prayer Time in Islamic Jurisprudence

Linguistically, the term *Ishrāq* is derived from the word *sharaqa*, which means "to rise," "east," or "to illuminate." In terminology, the *Ishrāq* prayer refers to a sunnah prayer performed after the sun has risen and reached a height of approximately one spear's length, astronomically estimated to occur around 10 to 15 minutes after sunrise.¹¹ Al-Ghazālī, in his book *Bidāyat al-Hidāyah*, in the

⁹ Engkus Kuswarno, *Metodologi Penelitian Komunikasi : Fenomenologi, Konsepsi, Pedoman, Dan Contoh Penelitiannya* (Bandung: Widya Padjadjaran, 2009), 22.

¹⁰ Noeng Muhadjir, *Metodologi Penelitian Kualitatif*, IV (Yogyakarta: Rake Sarasin, 2000), 51.

¹¹ Al-Jawi, *Nihayah Al-Zain...*, 103.

chapter *Adāb mā ba'da ṭulū'i al-shams ilā al-zawāl* (The Etiquettes Observed from Sunrise until the Time of *Zawāl*), explains that the *Ishrāq* prayer is a two-*rak'ah* prayer performed after the sun has risen and begun to ascend, specifically for those who perform the *Fajr* prayer in congregation at the mosque and then remain in place to engage in *dhikr* (remembrance of Allah) until the time arrives.¹² Meanwhile, Utsaimin explains that the *Ishrāq* prayer is essentially part of the *Ḍuḥā* prayer. However, if it is performed immediately after the sun rises and ascends to the height of one spear, it is called the *Ishrāq* prayer. If it is performed during the middle or later part of the time before *zawāl* (solar noon), it is called the *Ḍuḥā* prayer. Nonetheless, both are considered part of *Ṣalāt al-Ḍuḥā*, as scholars agree that the time for *Ḍuḥā* begins once the sun has risen a spear's height until just before it starts to decline to the west.¹³

This is based on a hadith of the Prophet Muhammad (peace be upon him) narrated by al-Tirmidhi, al-Nasa'i, and Ibn Majah:

كَانَ إِذَا أَشْرَقَتْ وَارْتَفَعَتْ قَامَ وَصَلَّى رَكْعَتَيْنِ وَإِذَا انْبَسَطَتِ الشَّمْسُ وَكَانَتْ فِي رُبُعِ النَّهَارِ مِنْ جَانِبِ الْمَشْرِقِ صَلَّى أَرْبَعًا (رواه الترمذي والنسائي وابن ماجه من حديث علي)¹⁴

“When the sun had risen and begun to ascend (one or two spear lengths), the Messenger of Allah ﷺ would stand and pray two rak'ahs; and when the sun had risen high in the east at about a quarter of the day, he would pray four rak'ahs.” (Narrated by al-Tirmidhi, al-Nasa'i, and Ibn Majah from the hadith of 'Ali).

The Prophet's ﷺ performance of a two-*rak'ah* prayer as the sun began to rise, as mentioned in the hadith above, serves as the foundational basis for the recommendation (*sunnah*) to perform the *Ishrāq* prayer. The moment when the sun is just rising falls within a time when prayer is forbidden. However, once the sun has ascended to a height of one or two spear lengths, prayer becomes permissible again. This is clarified in the phrase *كَانَ إِذَا أَشْرَقَتْ وَارْتَفَعَتْ* (“when the sun had shone and risen”), referring to the sun having illuminated and ascended. Following this, the Prophet ﷺ also performed four *rak'ahs* when the day had reached a quarter of its length. The prayer performed at this quarter-day mark is what is known as the *Ḍuḥā* prayer. Therefore, many scholars conclude that the most virtuous (*afḍal*) time to perform the *Ḍuḥā* prayer is when the day has reached one-quarter of its duration.¹⁵

Several statements (*ta'bīr*) from *fiqh* scholars provide detailed explanations regarding the timing of the *Ishrāq* prayer. According to their explanations, this prayer is recommended to be performed after the sun has risen and ascended to a height of one spear length, signifying the end of the prohibited time for worship. These *ta'bīr* emphasize that the *Ishrāq* prayer must be performed outside of the *makrūh* (disliked) period, specifically not during the actual sunrise, but rather when the sun has reached a sufficiently elevated position in the sky, both according to *shar'i* and

¹² Abu Hamid Al-Ghazali, *Bidayah Al-Hidayah* (Beirut: Dar al-Shodir, 1998), 61.

¹³ Ainur Rohma, “Praktik Shalat Sunnah Isyraq Di Pondok Pesantren Nur At-Thullab Jepara” (UIN Walisongo Semarang, 2018), 27.

¹⁴ Abdurrahman bin Husain Al-'Iraqi, *Al-Mughni 'an Hamliil Asfar Fi Takhriji Ma Fil Ihya' 'Anil Akhbar Pada Ihya' 'Ulumiddin* (Darul Kutubil Islamiyyah, n.d.), 197.

¹⁵ Shalih bin Fauzan bin Abdillah Al-Fauzan, *Al-Mulakhas Al-Fiqhy* (Riyad: Dar al-'Ashimah, 2001), 179.

astronomical standards. The variations in wording and approach among the scholars' *ta'bīr* reflect the rich heritage of Islamic jurisprudence in understanding the time boundaries of voluntary prayers based on strong *shar'ī* evidence.

al-Ghazali, in his book *Bidayat al-Hidayah*, explains that once the sun has risen to the height of a spear, it becomes recommended to perform two *rak'ahs* of prayer, marking the end of the period in which prayer is prohibited after *Fajr*. The prohibition only extends from the completion of the *Fajr* prayer until the sun's ascent. Later in the morning, when the day has advanced slightly beyond one quarter, it is encouraged to perform four, six, or even eight *rak'ahs*, offered in sets of two, all of which are reported from the practices of the Prophet Muhammad. ¹⁶ He clarifies that the two *rak'ahs* prayer performed after the sun has risen and ascended to the height of one spear is known as the *Ishrāq* prayer. This moment marks the end of the *makrūh* (disliked) time for performing prayers. In authentic hadiths, the Prophet Muhammad ﷺ prohibited praying at the time of sunrise because it resembles the practice of sun worship performed by polytheists. ¹⁷ Once the sun has ascended higher, prayer becomes permissible again, and that is when the *Ishrāq* prayer is performed. In fiqh, the period of *makrūh taḥrīm* (strongly discouraged, even considered haram according to some schools) for performing sunnah prayers begins after the *Fajr* prayer. It lasts until the sun has completely risen and ascended. This ruling is based on hadiths prohibiting prayer during three specific times, one of which is when the sun rises. Therefore, no voluntary prayer, including *Ishrāq*, should be performed until this forbidden time has ended.

In classical fiqh literature, discussions on the *Ishrāq* prayer are rarely found as a separate topic, since most fiqh scholars categorize *Ishrāq* as part of the *Ḍuḥā* prayer. ¹⁸ Nevertheless, the explanation of Imam Ghazālī serves as an essential reference often used as a basis for the practical implementation of the sunnah *Ishrāq* prayer. In *Maraq al-'Ubudiyyah*, Shaykh Nawawi provides clarification regarding the status of the *Ishrāq* prayer, stating that "you should perform two *rak'ahs* of prayer with the intention of *Ṣalāt al-Ishrāq*—based on the opinion that this two-*rak'ahs* prayer is distinct from *Ṣalāt al-Ḍuḥā*. Alternatively, you may intend it as *Ṣalāt al-Ḍuḥā*, following the opinion that this prayer is part of *Ḍuḥā*. And this latter opinion is the *mu'tamad* (preferred) view." This nuanced explanation highlights the scholarly debate on whether *Ishrāq* should be treated as an independent prayer or subsumed under *Ḍuḥā*. ¹⁹

According to this explanation, when the sun has already risen and reached a height of one spear in the sky (approximately 10–15 minutes after sunrise), it is recommended to perform a two-*rak'ah* sunnah prayer. This prayer is referred to as *Ṣalāt al-Ishrāq*. However, scholars have differing views regarding its classification. The first view holds that this two-*rak'ah* prayer is *Ṣalāt al-Ishrāq*, which stands independently and differs from *Ṣalāt al-Ḍuḥā*. The second view states that the two-*rak'ah* prayer is part of *Ḍuḥā* prayer, performed simply at its earliest time, right after the sun has slightly ascended post-sunrise. The second opinion is the *mu'tamad* or preferred view in Islamic

¹⁶ Al-Ghazali, *Bidayah Al-Hidayah...*, 61.

¹⁷ Abdi Wijaya Istiqfar Novegar, Rahmatiah HL, "Analisis Ilmu Falak Tentang Pelarangan Waktu Salat," *Hisabuna: Jurnal Ilmu Falak* 4, no. 2 (2023): 138–57, https://journal.uin-alaudidin.ac.id/index.php/hisabuna/article/view/30052?utm_source=chatgpt.com.

¹⁸ Abdurrohman Al-Jaziri, *Kitab Fiqh Ala Mazhab Al-Arba'ah* (Beirut, Libanon: Dar Kutub al-Ilmiyyah, 1990), 301.

¹⁹ Muhammad bin Umar Nawawi Al-Jawi, *Maraq Al-'Ubudiyyah* (Surabaya: Al-Haramain, 2005), 31–32.

jurisprudence. Accordingly, anyone who performs a two-*rak'ah* sunnah prayer after the sun has risen to a sufficient height may intend it as *Ṣalāt al-Ishrāq*, following the view that distinguishes it from *Duḥā*, or as *Ṣalāt al-Duḥā*, following the *mu'tamad* opinion that considers it part of *Duḥā*.

Furthermore, Yasin al-Fadani explains that the time of *al-duḥwah* (forenoon) is divided into two segments: *al-duḥwah al-ṣuḡhrā* (the lesser forenoon) and *al-duḥwah al-kubrā* (the greater forenoon). *Al-duḥwah* begins when the sun rises, ascends to the height of one spear, and continues until a quarter of the day has passed. Meanwhile, *al-duḥwah al-Kubrā* begins from one-quarter of the day and continues until just before *zawāl* (solar noon). The *Ishrāq* prayer is performed at the beginning of *al-duḥwah al-ṣuḡhrā*.

Referring to several *ta'bīr* (fiqh explanations) that have been presented, it can be understood that if one follows the opinion that considers the *Ishrāq* prayer to be a distinct act of worship (not part of the *Duḥā* prayer). Its time of performance begins when the sun has risen and ascended approximately one spear's length above the horizon. This is the agreed-upon starting point for the *Ishrāq* prayer. However, it is essential to emphasize that the *Ishrāq* prayer cannot be performed arbitrarily, as it comes with specific conditions and requirements. Among them is the necessity to perform the *Fajr* prayer in congregation, followed by remaining in place and engaging in *dhikr* (remembrance of Allah) until the sun has risen to the height of one spear. If this sequence is not fully completed, the virtue and reward of the *Ishrāq* prayer are forfeited. Likewise, if it is performed too late in the day, the prayer no longer falls within its designated time.

On the other hand, if the prayer is performed too early when the sun has just risen and the time still falls within the prohibited period for prayer, then the person is considered to have erred in the timing of the act of worship. Therefore, accurate timing and fulfillment of its conditions are essential to obtain the full reward of the *Ishrāq* prayer. The Prophet Muhammad ﷺ himself promised that whoever performs this prayer correctly will receive a reward equivalent to a complete *Hajj*, as mentioned three times in the hadith: “complete, complete, complete.”

Based on the various *fiqh* opinions presented earlier, if one adopts the view that the *Ishrāq* prayer is not part of the *Duḥā* prayer (as it carries its own unique merit), then the beginning time of *Ishrāq* prayer is when the sun has risen to the height of one spear above the eastern horizon.

Table 1. Differences between the *Ishrāq* and *Duḥā* Prayers

No	<i>Ishrāq</i> Prayer	<i>Duḥā</i> Prayer
1	Performed during <i>Ishrāq</i> time, i.e., at the time of <i>al-duḥwah al-ṣuḡhrā</i> (when the sun has risen to the height of one spear)	Performed after the sun has reached a spear's height until before <i>Zuhr</i> (during <i>al-duḥwah al-kubrā</i>)
2	A continuation of the <i>Fajr</i> prayer and morning <i>dhikr</i>	Not connected to the <i>Fajr</i> prayer
3	Must be preceded by congregational <i>Fajr</i> prayer	May be performed separately from <i>Fajr</i> prayer
4	Performed in a mosque or prayer area (<i>muṣollā</i>)	May be performed outside the mosque or prayer area (<i>muṣollā</i>)

5	After <i>Fajr</i> congregation, no activities are allowed before <i>Ishrāq</i> except <i>dhikr</i>	One may engage in other activities after <i>fajr</i> before performing <i>Ḍuḥā</i>
6	Consists of only two <i>rak'ahs</i>	Consists of 2, 4, 6, 8, 10, or 12 <i>rak'ahs</i>

2. The Role of Solar Elevation in Establishing the Beginning of *Ishrāq* Prayer

In astronomical perspective, sunrise is technically defined as when the solar disc's upper limb (the top edge) becomes visible above the actual horizon, rather than when the center or the entire solar disc appears. This is due to two main factors:²⁰

- Atmospheric refraction: This causes the sun to appear slightly higher than its actual geometric position.
- Solar diameter: The sun's apparent diameter is about 32 arcminutes ($\pm 0.5^\circ$), which means it takes a few minutes for the entire disc to be visible.

Thus, the sun is considered to have fully risen visually only when its entire disc is above the horizon. This typically occurs 2–3 minutes after the official "sunrise" time listed in calendars or prayer schedules. The time of sunrise is a crucial point in determining the beginning of the *Ishrāq* prayer. *Ishrāq* is conceptualized as beginning when the sun ascended approximately one spear's length above the horizon. To this day, there is no fixed or standardized formulation for the exact time of *Ishrāq*. Even *fiqh* scholars have not agreed on interpreting the term "one spear length" as mentioned in relevant hadiths. This ambiguity is understandable, as the term used in the hadith is estimative and does not accurately measure solar elevation. Consequently, to determine the sun's height at the beginning of *Ishrāq* time, the approximation of one spear is often interpreted based on common customary standards accepted by the community.

Imam al-Nawawi, in his work *Raudhat al-Ṭālibīn*, explains that one spear's length (stick) is equivalent to seven *dhirā'* (cubits).²¹ The unit of *dhirā'* used here refers to the *dhirā'* of an average person (*dhirā' insān mu'tadil*), also known as *dhirā' ādami*, which in modern length conversion is approximately 0.48 meters.²² Therefore, when multiplied, one spear length equals 0.48 meters \times 7 *dhirā'*, resulting in 3.36 meters.²³

Fuqahā' and astronomy experts (*ahl al-falak*) have conducted various verifications to estimate at what solar elevation (in degrees) the sun's position on the eastern horizon corresponds to one spear's length, or approximately 3.36 meters. Based on these studies, at least six criteria or

²⁰ Hendri, "Fenomena Fajar Shadiq Penanda Awal Waktu Shalat Subuhm Terbit Matahari, Dan Awal Waktu Dhuha," *Alhurriyah: Jurnal Hukum Islam* 2, no. 2 (2017): 149–168; Annisa Shabirah, "Time Calculation for Prayer: Insights from Ikhtisaru Al-Falaki by Abu Muhammad Isa," *Kulminasi: Journal of Falak and Sharia* 2, no. 2 (2024): 16–27, https://journal.ar-raniry.ac.id/kulminasi/article/view/6082?utm_source=chatgpt.com.

²¹ Imam Abi Zakariyya Yahya bin Syarof an-Nawawi Ad-Dimayqi, *Raudlah Al-Thalibin* (Beirut, Libanon: Dar al-Ulya, n.d.), 302.

²² Muhammad Mahfudz bin Abdillah Al-Tarmasi, *Hasiyah Al-Tarmasy* (Beirut, Libanon: Dar al-Minhaj, n.d.), 247.

²³ Zubair Umar Jailani, *Khulasah Al-Wafiyah* (Kudus: Menara Kudus, n.d.), 200–201.

estimations of the sun's altitude in degrees have emerged, representing the measurement of one spear, as explained by both fiqh scholars and falak practitioners.

Table 2. Opinions of *Fuqahā's* and Astronomy Experts Regarding the Solar Elevation Equivalent to One Spear

No	Experts	Sun altitude
1	Muhyiddin Khazin ²⁴	3° 30'
2	Susiknan Azhari ²⁵	4°
3	Muhammad Yasin bin Isa al-Fadani ²⁶	4° 24'
4	Zubair Umar Jaelani ²⁷ , Slamet Hambali ²⁸ , Ahmad Izzuddin ²⁹ dan Indonesia MoRA ³⁰	4° 30'
5	Muhammad Abdul Karim Nasr ³¹	5°
6	A. Kadir ³² dan A. Jamil ³³	12°

Based on the table above, it is evident that determining the sun's elevation at the beginning of *Ishrāq* time is ultimately based on estimation alone. Nevertheless, everyone is allowed to approximate the beginning of *Ishrāq* time—as long as the estimate does not coincide with the actual time of sunrise. This is to avoid contradicting the hadith narrated by 'Aṭā' ibn Yazīd, which prohibits performing prayer after fajr until the sun has completely risen.³⁴

Another opinion regarding the sun's elevation at the start of the *Ishrāq* prayer can be traced to the absence of a scholarly consensus on the distance between the observer and the one-spear height. Although most scholars use a standard unit—that is, a spear (stick) interpreted as *Dhirā' Ādamī*—in practice, field observations still vary. This inconsistency stems from the lack of a clear and specific measurement regarding that distance in the classical fiqh texts. It is typically referred to only as a "distant height" (*masāfah ba'īdah*) without precise detail, leaving falak practitioners to determine the value based on their interpretations and reasoning.

In fact, the distance between the observer and the "spear" (stick) directly impacts the sun's apparent height. If two observers use the same standard for the spear's height but stand at different distances from it, the solar elevation angle they perceive will be different. The farther an observer

²⁴ Muhyiddin Khazin, *Ilmu Falak Dalam Teori Dan Praktik* (Yogyakarta: Buana Pustaka, 2004), 99.

²⁵ Susiknan Azhari, *Ensiklopedi Hisab Rukyat* (Yogyakarta: Pustaka Pelajar, 2015), 57.

²⁶ Al-Fadani, *Syarah Samarotul Wasilah...*, 46.

²⁷ Jailani, *Khulasah Al-Wafiyah...*, 200.

²⁸ Slamet Hambali, *Ilmu Falak I: Penentuan Awal Waktu Salat Dan Arah Kiblat Seluruh Dunia* (Semarang: Program Pasca Sarjana IAIN Walisongo, 2011), 149.

²⁹ Ahmad Izzuddin, *Ilmu Falak Praktis* (Semarang: Pustaka Rizki Putra, 2012), 93.

³⁰ Direktorat Jenderal Bimbingan Masyarakat Islam Kementerian Agama RI Direktorat Urusan Agama Islam dan Pembinaan Syariah, *Ephemeris Hisab Rukyah 2025* (Jakarta: Kementerian Agama RI, 2025).

³¹ Muhammad Abdul Karim Nasr, *Buhuts Al-Falakiyah* (Kairo: Dar al-Haramain, 2003), 149.

³² A. Kadir, *Formula Baru Ilmu Falak* (Jakarta: Amzah, 2012), 104.

³³ A. Jamil, *Ilmu Falak Teori Dan Aplikasi*, IV (Jakarta: Amzah, 2016), 46.

³⁴ Imam al-Hafidz Abil 'ala Muhammad Abdirrohman bin Abdirrahim, *Tuhfah Al-Ahwadi Bissyarhi Jami'i Turmudzi* (Madinah: Matba'ah al-Madani, 1964), 581.

stands from the spear, the lower the sun appears in their line of sight. Conversely, the closer they are, the higher the sun appears. This difference shows that distance is a crucial factor in determining the accuracy of solar elevation observation for the timing of the *Ishrāq* prayer. In relation to the unit of solar altitude, this value can be used to calculate the duration or time taken for the sun to move across each degree of the sky in its daily path. Assuming that the Earth rotates in approximately 23 hours, 56 minutes, and 4 seconds (commonly rounded to 24 hours) and completes a 360-degree rotation, it can be concluded that it rotates 15 degrees per hour. Therefore, each 1 degree of the sun's movement corresponds to 4 minutes.³⁵

If it is assumed that the height of one spear is equivalent to 4 degrees, then in terms of time, that solar altitude equals 16 minutes. This value is then added to the sunrise time (*Tulū' al-Shams*) to determine the beginning of *Ishrāq* time. This approach aligns with the explanation found in *Syarḥ Samarat al-Wasīlah* when discussing how to calculate the time for *al-ḍuḥwah al-ṣuḡhrā*.³⁶ Thus, the formula for calculating the beginning of *Ishrāq* prayer time is:

$$\text{Ishrāq Time} = \text{Sunrise Time} + \text{Solar Altitude Duration Equivalent to One spear} + \text{Iḥtiyāt (Precautionary Margin)}$$

For instance, the calculation of the *Ishrāq* prayer time for July 20, 2025, was carried out using the Al-Hilal Observatory at the Faculty of Sharia, Universitas Islam Negeri Raden Mas Said Surakarta as the reference point. The process considered the site's geographical coordinates, solar declination, equation of time, and elevation. Based on these parameters, the sunrise was determined to occur at 05:50 (GMT+7). By adopting the interpretation that the height of one spear length corresponds to a solar altitude of 4°30'—equivalent to approximately 18 minutes after sunrise—plus an additional precautionary margin of two minutes (*iḥtiyāth*), the beginning of the *Ishrāq* prayer was calculated at 06:10 (GMT+7).

Furthermore, the transition from *Ishrāq* to *Ḍuḥā* prayer was also established using the same astronomical considerations. When the solar altitude advanced further, the starting point of the *Ḍuḥā* prayer was determined. The results showed that on the same date and location, the *Ḍuḥā* prayer began at 06:17 (GMT+7), only a few minutes after the *Ishrāq*. These findings illustrate how classical *fiqh* descriptions, such as “one spear length after sunrise,” can be systematically translated into precise astronomical data, thereby offering practical guidance for contemporary Muslims in aligning worship practices with both Sharia principles and scientific accuracy.

3. Shariah and Conceptual Implications of *Ishrāq* Prayer Time: Integrating Jurisprudence, Astronomy, and Digital Applications

Sharia is not merely a legal system, but a comprehensive guide that governs all aspects of life, including acts of worship. The validity and acceptance of any act of prayer depend not only on intention and performance, but also on its conformity to the prescribed time, the direction of the

³⁵ Wahidin Abd. Karim Faiz, Agus Muchsin, “Studi Waktu Dhuha Dalam Perspektif Fiqih Dan Hisab Ilmu Falak,” *DIKTUM: Jurnal Syariah Dan Hukum* 18, no. 2 (2020): 269–282.

³⁶ Al-Fadani, *Syarḥ Samarotul Wasīlah...*, 46.

Qibla, the cleanliness of the place, and other stipulated conditions and pillars. Therefore, there is a pressing need to harmonize the principles of Sharia with empirical data and modern technology to support the accuracy and validity of worship practices in contemporary contexts.³⁷

a. Synchronizing Astronomical Data with Sharia Law

The synchronization between astronomy and Islamic jurisprudence is an urgent necessity in the worship practices of Muslims, particularly in determining prayer times.³⁸ In the case of the *Ishrāq* prayer, which is closely tied to the time of sunrise plus an estimated solar elevation (one spear length), astronomical data plays a crucial role in bridging descriptive-empirical interpretations of Sharia with the objective realities of the sky.

Some scholars apply a "*taqyid*" (restriction or contextualization) approach to hadiths concerning prayer times by aligning them with contemporary astronomical calculations (*ḥisāb*). This reflects an awareness that Islamic law is dynamic and capable of adapting to advancements in knowledge. In the context of *Ishrāq*, astronomical data can pinpoint the sunrise time down to the exact second. However, the interpretation of "one spear length" requires conversion into time units or degrees of solar altitude (commonly between 3° 30' - 5° above the horizon). Thus, this synchronization is not merely technical but also epistemological, integrating revelation with reason, text with context. Such efforts pave the way for an integrative approach between fiqh and science in the contemporary Islamic scholarly tradition.

b. Determining the Ideal Time for *Ishrāq* in Digital Applications

Many digital applications have provided exact prayer times, such as Muslim Pro, Umma, or those officially issued by institutions like the Indonesian Ministry of Religious Affairs and Malaysia's JAKIM. However, none of these applications explicitly include *Ishrāq* prayer times, due to their different legal status compared to obligatory prayers and the variation in defining their starting time. Determining *Ishrāq* time in applications requires converting traditional parameters into measurable digital formats. Some references estimate the *Ishrāq* time to fall between 10 and 20 minutes after sunrise, based on a solar altitude assumption of 3° 30' to 5°. Therefore, digital applications should provide additional options or adjustable parameters, allowing users to customize the *Ishrāq* time based on their school of thought or methodology.

For example, the Indonesian Ministry of Religious Affairs has not officially defined *Ishrāq* time in its online prayer schedule.³⁹ Similarly, many Islamic prayers time apps do not display the *Ishrāq* time. Meanwhile, JAKIM Malaysia's *e-solat.my* also does not list *Ishrāq* as a separate prayer time.⁴⁰ This indicates that the implementation of *Ishrāq* time in digital applications still requires standardization and formal parameterization—both from a jurisprudential and astronomical standpoint.

³⁷ Zainuddin, "Posisi Matahari Dalam Menentukan Waktu Shalat Menurut Dalil Syar'i," *El-Falaky: Jurnal Ilmu Falak* 4, no. 1 (2020): 36–55.

³⁸ Zainuddin.

³⁹ Bimas Islam Direktorat Jenderal Bimbingan Masyarakat Islam, "Jadwal Shalat," accessed July 15, 2025, <https://bimasislam.kemenag.go.id/jadwalshalat>.

⁴⁰ JAKIM, "E-Solat," accessed July 15, 2025, <https://www.e-solat.gov.my/>.

c. The Relevance of *Iḥtiyāṭh* (Precaution) in the Modern Context

The principle of *iḥtiyāṭh* (legal precaution) in Islamic jurisprudence plays a crucial role in ensuring the validity of acts of worship,⁴¹ Particularly in cases involving uncertainty (*shubhat*) regarding time, such as the case of the *Ishrāq* prayer. In a modern context, *iḥtiyāṭh* can be applied by allowing a sufficient interval after sunrise before performing the prayer, thereby avoiding the prohibited or disliked time (*makrūh tanzih*), which occurs when the sun is precisely on the horizon. This precaution aligns with the objectives of *maqāṣid al-sharī'ah*, ensuring that acts of worship are performed validly and without internal doubt for the practitioner. For instance, adding a buffer of 10–20 minutes after the listed sunrise time, as demonstrated in the earlier calculations, reflects this cautious approach that many Muslims adopt.

In the digital technology and information age, *iḥtiyāṭh* also entails filtering prayer time information from reliable applications, cross-verifying sources, and maintaining awareness of the differences in legal schools (*madhhab*) and methodologies used in determining times. Thus, *iḥtiyāṭh* should be understood as a literal time delay and a form of digital ethics in selecting and trusting religious information sources.

This study shares similarities with previous works that emphasize the *Ishrāq* prayer time begins approximately 10–20 minutes after sunrise, as highlighted by Nabilla Pramudyanti, who converted the term "one spear-length" into the sun's elevation measured in several degrees above the horizon. It also aligns with the findings of Encep Abdul Rojak and Ramdan Fawzi, who underscored the need for digital standardization of prayer schedules. However, their focus was more on transforming *fiqh* into algorithmic formats. Similarly, an article in the *Borneo International Journal of Islamic Studies* stresses the integration of traditional and modern methods, which resonates with the spirit of this research. The difference is that this study presents a specific case study in Surakarta with concrete calculations (06:10 AM on July 20, 2025), while other studies tend to remain descriptive-conceptual. In addition, the study on the prayer schedule algorithm of TGH Ibrahim Al-Khalidy in Lombok highlights the limitations of local methods without astronomical corrections. In contrast, this study directly applies *falakiyah* corrections such as atmospheric refraction and site elevation.

The main strength of this study is its clear synthesis between classical *fiqh* texts and modern astronomical analysis, producing a practical formula that converts "one spear-length" into a solar

⁴¹ Wahidin dan Abd. Karim Faiz, "Variasi Waktu Salat: Studi Kasus Masjid-Masjid Di Kota Parepare Dalam Perspektif Hisab Kontemporer Dan Hukum Islam," *El-Falaky: Jurnal Ilmu Falak* 6, no. 2 (2022): 207–228; Jayusman, "Akurasi Nilai Waktu Ihtiyath Dalam Perhitungan Waktu Salat," *ASAS: Jurnal Hukum Dan Ekonomi Islam* 11, no. (2019): 178–93; Muhammad Anis Aisyah Maulidatul Haq Abdullah, Halimah B, "Analisis Penentuan Waktu Salat Isya Perspektif Ilmu Falak," *Hisabuna: Jurnal Ilmu Falak* 3, no. 3 (2023): 46–61, https://journal.uin-alauddin.ac.id/index.php/hisabuna/article/view/32324?utm_source=chatgpt.com; Yusuf Nurqolbi dan Aminuddin Noosy, "Assessment of Abyadh Syafaq at the Early Time of Usha Astrophotography Method," *Elfalaki: Jurnal Ilmu Falak* 8, no. 1 (2024), <https://journal.uin-alauddin.ac.id/index.php/elfalaky/article/view/47862>; Nur Afdal Purnama Putra, "Fiqh Study on the Permissibility of Practising 10 Minutes Before Fajr Time as the Imsak Time Limit," *Kulminasi: Journal of Falak and Sharia* 2, no. 1 (2024): 114–29, https://journal.ar-raniry.ac.id/kulminasi/article/view/4297?utm_source=chatgpt.com.

altitude of $3^{\circ}30'-5^{\circ}$. The Surakarta case study also provides added value in the form of concrete and measurable precision data, making the survey not only normative but also applicable. Another significant contribution lies in its proposal to integrate the findings into digital applications, which has not been widely addressed in previous research. However, the weakness of this study is that its analysis is limited to one city, thus not yet representing geographical variations across Indonesia. The study remains primarily a simulation based on *ḥisāb*, without direct field observations (*rukyat*) that could strengthen empirical validation.

Based on these findings, the author argues that determining *Ishrāq* prayer time must be understood integratively, combining astronomical precision with the *shar'ī* principle of caution. Since hadiths prohibit prayer during sunrise, adopting an *iḥtiyāṭh* margin of about 10–20 minutes after *shurūq* is an appropriate step to avoid falling into the doubtful period of *makrūh* time. With the astronomical formula developed in this study, Muslims can obtain more precise, more valid, and *maqāsid al-sharī'ah*-compliant guidelines for practice. Therefore, the author believes that integrating *fiqh*, astronomy, and technology is a strategic solution to resolve the ambiguity of *Ishrāq* prayer times in the digital era, while also strengthening religious authority in preparing national prayer timetables and global Islamic applications.

D. Conclusion

This study concludes that the determination of *Ishrāq* prayer time represents a synthesis between classical *fiqh*, which describes its start as “when the sun has risen to the height of a spear,” and modern astronomy, which translates this into measurable units of solar altitude ($3^{\circ}30'-5^{\circ}$) or minutes (10–20) after sunrise. The findings emphasize that *Ishrāq* is invalid if performed too early, during the *makrūh taḥrīm* period. The original contribution of this research lies in providing a practical method for calculating *Ishrāq* time using standardized *ḥisāb*, exemplified by the Surakarta case study (July 20, 2025), which recommends 06:10 AM with an *iḥtiyāṭh* margin. The study further proposes the integration of *fiqh* and astronomy in digital prayer time applications to explicitly include *Ishrāq*, with customizable settings for different madhabs. Its main contribution is the empirical clarification of *Ishrāq*'s *shar'ī* boundary and a practical solution to contemporary ambiguities. Future research should validate these calculations through direct observation (*rukyat*), develop visual simulations across diverse latitudes, and expand integration into Islamic digital tools and AI-based applications.

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