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Vedic Yajña: Its scientific basis and universal significance

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Abstract

Yajña, a fundamental concept in Vedic tradition, extends beyond ritualistic offerings to encompass a scientific and philosophical framework that sustains cosmic harmony, social cohesion, and individual well-being. Rooted in the Sanskrit root √yaj, meaning worship, unification, and offering, yajña has been extensively discussed in the Vedas, emphasizing its role in both spiritual and material realms. The yajñic process is not limited to fire rituals but represents a universal principle governing natural cycles, human interactions, and ethical living. This paper explores the scientific foundation of yajña, analyzing its ecological, psychological, and societal benefits. It examines the contributions of yajña to environmental sustainability, purification of surroundings, and fostering collective consciousness. The study also highlights the global relevance of yajña, drawing parallels with modern sustainable practices and holistic well-being. By integrating Vedic wisdom with contemporary scientific perspectives, yajña emerges as a timeless principle offering solutions to modern challenges. Understanding yajña as a scientific and universal process can bridge ancient traditions with contemporary advancements for a balanced and harmonious world.

Keyword: Vedic Yajña, scientific basis, environmental sustainability, ritual science, universal principle

Introduction

According to the Indian tradition, the Vedas are an infinite repository of knowledge and science. A comprehensive understanding of Vedic religion, philosophy, literature, and culture is impossible without grasping the essence of yajña. The concept of yajña is not merely a ritualistic practice; rather, it is a profound principle pervading every particle of the universe. The significance of yajña is evident in the frequency of its mention in the Vedas. It appears 580 times in the Ṛgveda, 243 times in the Yajurveda, 63 times in the Sāmaveda, and 268 times in the Atharvaveda, making a total of 1,184 occurrences across the four Vedas. The term yajña is derived from the Sanskrit root √yaj, which means 'worship of the divine' (devapūjā), 'harmonization' (saṅgatarāṇa), and 'offering' (dāna). It encompasses the worship of the Supreme, reverence for the learned, social unity, and the act of making offerings in the sacred fire.

Pāṇinian defines yajña as – "yaj devapūjāsaṅgatarāṇadāneṣu"¹, which means 'the act that includes divine worship, unification, and charity is called yajña.' According to Ācārya Sāyaṇa – "uddīśya devatām dravyatyāgo yāgo'bhidhīyate"² meaning 'the offering of oblations in the sacred fire for a specific deity is known as yajña.' The Nighaṇṭu lists various synonyms for yajña, including adhvara, megha, savana, agnihotra, devatā, iṣṭi, indra, prajāpati, and dharma.³ The Ṛgveda and Yajurveda describe yajña as the primordial dharma- "yajñena yajñam-ayajanta devāḥ tāni dharmāni prathamānyāsan...."⁴

Yajña is regarded as the highest form of action – yajño vai śreṣṭhatamaṁ karma, and on this basis, the entire human life is considered yajñamaya—imbued with the spirit of yajña. The physical act of offering havis (oblations) into the sacred fire is its gross manifestation, but its etymological and philosophical dimensions reveal a far broader significance, encompassing both spiritual and material realms. More than just an external ritual, yajña represents a

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¹ Aṣṭādhyāyī 3.3.90

² Taittirīya Samhitā 3.5.11.5; Aitareya Brāhmaṇa 1.1.7

³ Nighaṇṭu 3.17

⁴ Ṛgveda 1.164.50, 10.90.16; Yajurveda 31.16

fundamental process of human existence. It operates simultaneously at three levels—brahmāṇḍīya (cosmic), piṇḍīya (bodily), and bhāutika (material). Not only does yajña serve as a means of spiritual evolution, but it also fosters social harmony and balance. Therefore, the yajñic system is recognized as an essential way of life for humanity.

Yajña and the Brahmāṇḍa (Universe)

The term Brahmāṇḍa is derived from Brahman (the absolute reality) and aṇḍa (cosmic egg), signifying the entire manifested universe. In the scientific realm, the universe is often perceived as an egg-shaped entity, which aligns with the traditional Sanskrit definition of Brahmāṇḍa as a cosmic sphere from which all existence emerges.⁵ Yajña is a cosmic process, forming the nucleus of the universe and its origin.⁶ The entire cosmos originates from and is sustained by yajña, which remains active until the dissolution of creation.⁷

Just as the universe comprises five fundamental elements (pañca-bhūtas), yajña too is structured with five integral components.⁸ Sāyaṇa, in his commentary on the Aitareya Brāhmaṇa, elaborates on this fivefold nature by associating yajña with vital elements—life force (prāṇa), water (āpaḥ), speech (vāk), food (anna), and the enjoyer of food (annāda). Similarly, the year (saṁvatsara) is divided into five seasons (spring, summer, monsoon, autumn, and winter) according to the Śatapatha Brāhmaṇa (3.2), reinforcing the cosmic correspondence of yajña.

Julius Eggeling translates this concept as "Fivefold is the sacrifice."⁹ While yajña may outwardly appear as a ritualistic practice, it embodies profound cosmic principles, ensuring harmony between natural forces. It is not merely a religious rite but a system aligning the universe's infinite energies through mutual cooperation and synchronization. The divine deities governing the elements reside in yajña, making it an invincible fortress against demonic forces.¹⁰ Thus, yajña is the soul of all beings and deities.¹¹

The Sun (Āditya) perpetually absorbs soma (divine nectar) from nature, maintaining its energy balance. This eternal cosmic process leads to the classification of the universe as agniṣomātmaka yajña (fire and soma-based yajña). The Aitareya Brāhmaṇa states that Agnistoma, a Vedic sacrifice, is essentially a manifestation of Agni, which the deities praised through hymns, giving it the name Agnistoma.¹² The text further explains that deities prefer indirect expressions, hence the term Agnistoma is used in a concealed manner. The phonetic shift from stoma to ṣtoma due to linguistic transformation is also noted in the Aṣṭādhyāyī (8.3.82).

Thus, yajña is not only a ritual but a cosmic principle regulating the universe, sustaining all existence, and ensuring the perpetual cycle of creation, preservation, and dissolution.

Yajña and Piṇḍa (Body)

The term Piṇḍa signifies the body, which is essentially a

microcosm of the Brahmāṇḍa (universe). What exists in the universe is reflected in every particle of the Piṇḍa, hence the saying: Yat piṇḍe tat brahmāṇḍe—"As in the body, so is in the universe." Both the five-elemental Brahmāṇḍa and the human body share a fundamental unity, and the all-pervading, cosmic soul (Puruṣa) within them is also the same.¹³

Just as the mind corresponds to the moon, the eyes to the sun, the mouth to Indra and Agni, the breath to Vāyu, the navel to the atmosphere, the head to the celestial realm, the feet to the earth, and the ears to the directions—these cosmic elements are arranged within the human body.¹⁴ Similarly, deities have entered the human body in various forms: the sun became the eye, and the wind became the breath.¹⁵ The Jātharāgni (digestive fire) within the body continuously consumes the offerings of food, nourishing life.¹⁶ Moreover, the fire that exists in the lower part of the body as Kāmagni is responsible for creation and procreation.¹⁷ Both the Taittirīya Brāhmaṇa and Pañcaviṁśa Brāhmaṇa assert that human life itself is a yajña, a truth that can be realized through experience.¹⁸ The human being, as the yajamāna (sacrificer), is also the yajña-paṣu (sacrificial entity), eternally bound to the cosmic pillar in the form of the sun. The Bṛhadāraṇyaka Upaniṣad describes the human body as a yajña-śālā (sacrificial hall), with four principal officiating priests: speech (Vāk) as the Hotṛ, the eye (Cakṣu) as the Adhvaryu, breath (Prāṇa) as the Udgātṛ, and the mind (Manas) as the Brahmā.¹⁹

Speech (Vāk) is itself a yajña.²⁰ Restraining speech is akin to merging into the essence of yajña. If a person inadvertently speaks wrongly, yajña distances itself from the soul, requiring atonement.²¹ When a priest utters Svāhā, the yajña commences mentally. By saying Svāho'rorantariḥṣāt, it begins from the atmosphere. By saying Svāhā dyāvāpṛthivībhyām, it extends to heaven and earth.²² Fire (Agni) is considered the essence of speech. When Soma is offered into this fire, it becomes a yajña. Through yajña, the universe is sustained, and through yajña, self-realization is attained. The Śatapatha Brāhmaṇa equates yajña with Puruṣa (cosmic being).²³ The yajña is woven into the essence of the Puruṣa, expanding as much as the cosmic entity itself. The right arm of yajña is Juhu (offering ladle), the left is Upabhr̥t (secondary ladle), the body is Dhruva (fixed pillar), from which all other components arise. Just as the earth gives birth to all beings, Dhruva generates all yajñas. Khuhu (a ritual vessel) represents prāṇa (vital breath), just as consciousness permeates the body, animating all parts.

According to Baudhāyana Dharma Sūtra, after the Ādhāna (sacred fire installation), the ritual fires become integrated into the yajamāna: Gārhapatya Agni (household fire) as Prāṇa, Dakṣiṇa Agni as Apāna, Āhavanīya Agni as Vyāna, and Sabhyāgni and Avāsathya Agni as Udāna and Samāna, respectively. The Śatapatha Brāhmaṇa declares: Punar-mṛtyuṁ mucyate ya evam evatām agnihotre mṛtyor atimuktīm

⁵ Saṁskṛta Śabdārtha-Kaustubha, p. 835

⁶ Ayam yajñah bhuvanasya nābhīh, Rgveda 1.63.35;

Yajñah babhūva bhuvanasya nābhīh, Taittirīya Brāhmaṇa 2.4.7.5

⁷ Yajña eva antataḥ pratīṣṭhatih, Taittirīya Brāhmaṇa 1.8.12;

Brahma nityam yajñe pratīṣṭhitam, Bhagavad Gītā 3.15

⁸ Pāṅko vai yajñah, Śatapatha Brāhmaṇa 3.6.4.17; Aitareya Brāhmaṇa 2.3.6

⁹ The Śatapatha Brāhmaṇa, Part II, p. 166

¹⁰ Etad khalu vai devānām aparājitamāyatanam yajñah, Taittirīya Brāhmaṇa 3.3.7.7

¹¹ Sarveṣām vā eṣa bhūtānām sarveṣām devānāmātmā yadyajñah, Śatapatha Brāhmaṇa 14.3.2.1

¹² Sa savā eṣo'gnir eva yad agniṣtomah, tam yad astuvāns tasmād agniṣtomah, tam agniṣtomam santam agniṣtoma ityācakṣate parokṣeṇa, parokṣapriyā iva hi devāh, Aitareya Brāhmaṇa 14.5

¹³ Yo'sav āditye puruṣah so'sāv aham, Śu. Yaju. 40.17;

Sa yaś cāyam puruṣe yaś cāsāv āditye sa ekaḥ, Tai. Up. 2.8

¹⁴ Candrāmā manaso jātaḥ cakṣuḥ sūryo ajāyata... Rgveda 10.90.13-14

¹⁵ Sūryaś cakṣuḥ vātaḥ prāṇah puruṣasya vibhajire. Rgveda 11.8.31

¹⁶ Aham vaiśvānaro bhūtvā prāṇinām deham āsritah

prāṇāpāna-samāyuktah pacāmy annam caturvidham. Bhagavad Gītā 15.14

¹⁷ Naipānī śiśnam pradahati Jātavedāḥ svarga-loka bahu sṛṇam epārma. Atharvaveda 4.34.2

¹⁸ Tai. Br. 3.12.2.3-8; Pañca. Br. 25.18.4

¹⁹ Vāgvai yajñasya hotā, cakṣur vai yajñasya adhvaryuḥ, prāṇo vai yajñasya udgātā, mano vai yajñasya brahmā. Bṛhad. Up. 3.9.24

²⁰ Vāk vai yajño. Śata. Brā. 3.2.2.3, 3.2.2.38

²¹ Vāgvai yajñam yajñamevaitadātmandhatte... Śata. Brā. 3.1.3.27

²² Śata. Brā. 3.1.3.26

²³ Śata. Brā. 1.3.2.1-4

veda—By performing yajna, one is freed from worldly afflictions and ultimately liberated from the cycle of birth and death. However, over time, the subtle spiritual essence of yajna faded, leaving behind only its external ritualistic aspects.

Yajña and Physical Science

The foundation of physical science lies in harnessing fire and utilizing the fundamental elements of creation. Yajña, the Vedic ritual sacrifice, is deeply intertwined with physical science, particularly in its understanding of fire. Modern science classifies fire into three forms—light, heat, and electricity—whereas the Ṛgveda associates these with the Pārthiva (earthly realm), Antarīkṣa (atmospheric space), and Dyuloka (celestial world). Yajña primarily employs Pārthivāgni (terrestrial fire), while also incorporating Antarīkṣāgni (fire of the atmosphere) and Sūrya (the sun).

Science explains that the world is composed of three states of matter—solid (kāṣṭha, hima, etc.), liquid (jala, dugdha, etc.), and gas (vāyu, vāpa, etc.). The Vedas affirm that these three elements are integral to yajña. A yajña cannot be performed without substances, which is why Agnihotra Yajña is also called Dravya Yajña (a sacrificial ritual involving offerings).²⁴

In Yajña, solid substances such as samidhā (firewood), yajñapātra (sacrificial utensils), kalaśa (sacred pots), and yajñavedī (altar) are indispensable. Liquid offerings include ghr̥ta (clarified butter), jala (water), and dugdha (milk), while the gaseous state is represented by the fragrant vapors that arise when these substances are burned. The Śatapatha Brāhmaṇa illustrates this scientific cycle: "Agnervai dhūmo jāyate dhūmād abhram-abhrān vṛṣṭiḥ" That means from fire arises smoke, from smoke arise clouds, and from clouds comes rain. This principle demonstrates the environmental impact of Yajña. When ghr̥tāhuti (ghee offering) is made into the fire, the energy reaches Āditya (the sun), which in turn influences rainfall, leading to food production and the sustenance of life. This is why yajña is considered Prajāpati (the creator of beings) the progenitor of all beings.²⁵

Just as the nābhi (navel) is the center of the human body, yajña is regarded as the foundation of the entire universe: "Ayaṁ yajño bhuvanasya nābhiḥ"²⁶ That means this yajña is the navel of the universe. Beyond its cosmological significance, Yajña has profound benefits for the śarīra (body), manaḥ (mind), buddhi (intellect), prāṇa (life force), and ātmā (soul). It purifies the environment, strengthens the body, and elevates consciousness. Scientific studies suggest that the smoke of Yajña influences the sūkṣma tantu (subtle tissues) of the body and helps regulate rakta śarkarā (blood sugar levels). Moreover, the natural energy waves generated by planetary movements affect human physiology, aligning with the Vedic understanding of cosmic interconnectedness.

Modern science describes the state of ultimate unity in the universe as the nucleus. Vedic scriptures refer to this state as Hiranyagarbha (the golden womb of creation):

"Hiranyagarbhaḥ samavartatāgre bhūtasya jātaḥ patireka āsīti sa dādhāra pṛthivīm dyāmute mām kasmai devāya haviṣā vidhem aḥ"²⁷

The Ṛgveda further states: "Yajñena yajñamayajanta devāḥ" means through Yajña, the gods performed Yajña. This Vedic

verse symbolizes how, at the beginning of creation, all natural forces dedicated themselves to Parama-deva (the Supreme Being) through the cosmic Yajña, leading to the formation of the universe.²⁸ The Atharvaveda mentions that Brahman (the Supreme Reality) created trayastrimśat lokāḥ (thirty-three worlds) from Mahān Prakṛti (the great universal principle) and established Yajña to gain knowledge of these worlds.²⁹ This shows that Yajña is not just a symbol of creation but also a way to understand the cosmos. Remarkably, many Sanskrit words in Vedic mantras, such as Vāyu (air), Tapas (heat), Chakra (circle), and Agni (fire), hold the same meaning in modern physical science. The elements and substances used in Yajña correspond to those found in the universe, the human body, and physical science. Just as modern science provides comforts and advancements to humanity, Vedic Yajña also contributes to human well-being. There is no doubt that Yajña and science are deeply interconnected, and the process of Yajña is a scientific method in itself.

Conclusion

In the Vedic era, human beings deeply understood the true essence of Yajña. Their hearts were filled with devotion and reverence for Yajña, which led them to perform Yajñas and other sacrificial rituals at regular intervals. This practice ensured universal well-being and prosperity. As a result, there was no occurrence of excessive rainfall, earthquakes, epidemics, famine, diseases, or untimely deaths. However, in the present times, consumed by selfishness and materialistic distractions, humanity has forgotten the importance of Yajña and the sacred principles of scriptures. Instead, people have begun to act according to their own whims, disregarding the established spiritual and natural laws. Consequently, they are now suffering from various calamities and adversities. The world is overwhelmed with distrust, terrorism, fear, violence, jealousy, and hatred, echoing with cries of distress. In the past, Yajña was performed with utmost purity and selflessness, ensuring the welfare of individuals and the world while granting both material and spiritual bliss with ease. However, by either abandoning Yajña altogether or conducting it without adhering to proper rituals, mankind has invited its own destruction. It is, therefore, imperative to perform Vedic Yajñas following the authentic scriptural methods to ensure the welfare of individuals, society, the nation, and the entire world. If scientific researchers turn their attention towards Vedic Yajñas and conduct thorough investigations with sincerity, numerous wondrous and globally beneficial revelations can emerge from them.

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²⁴ Ai. Brā. 1.1.7; Tai. S. 3.5.11.5

²⁵ Agnou prāstārītaḥ samyak ādityam upatiṣṭhate

Ādityāḥ jāyate vṛṣṭis tato'annaṁ tat prajāḥ | Manu. 3.76

²⁶ Yajurveda 23.62

²⁷ Ṛgveda 10.121.1, Yajurveda 13.4, Atharvaveda 4.2.7

²⁸ Ṛgveda 10.10.16

²⁹ Etasmādvā odanāt trayastrimśataṁ lokān-niramimīta prajñāpatiḥ | teṣāṁ prajñānāya yajñamasṛjata || Atharvaveda 11.3.52-53

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