REVIEW ARTICLE

Scientific medicine and the belief in the supernatural

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ABSTRACT

Magic, witchcraft and miracles have accompanied medicine since the beginning of mankind. At first, the causes of diseases were believed to be supernatural, but progressively, with the development of knowledge and the advent of science, more rational and objective explanations were found.
Rationality was based on concepts, judgments and reasoning that followed logical rules. All of these elements then formed new ideas, which did not accumulate chaotically but were organized into sets and ordered systems, called theories. Objectivity, in turn, was related to the search for factual truths that aligned with the object of study, confirming that ideas corresponded with the facts through observation and experimentation, thus making them reproducible.
During their evolution, the new ideas were confronted with numerous theological prejudices, especially in the Middle Ages. This period was dominated by Catholic Christianity and caused a severe stagnation of medicine. Religion and superstition hindered progress: people believed in the efficacy of sacred relics and the laying on of hands as well as in demonic possessions and healing through miracles.
In this evolution, many thinkers stopped to seriously reflect on and analyze what miracles actually were. Among many philosophers, it was the Dutch Baruch Spinoza and the English David Hume, who in the 17th and 18th centuries, respectively, provided the clearest and most compelling answers. Even in the 21st century, despite the successes of scientific medicine, many people continue to believe in supernatural healings. Modern science maintains that these cases arise due to errors in critical thinking, misunderstandings or the use of flawed logic.
This article attempts to explain the reasons that promote the persistence of this type of mindset, how pseudomedicine uses it and how we can address events that seem inexplicable, especially in the medical field.
Objectivity and reason have given us centuries of progress, and we must not abandon them. True "miraculous healings" are the result of the hard and careful work of scientists, physicians and researchers.

Keywords: Science; Medicine; Religion; Placebo Effect; Ethics; Knowledge (Source: MeSH NLM).

INTRODUCTION

The simple fact of being alive means that, at some point, we are going to get sick, and we share this evolutionary effect with all living beings. The inevitability of illness has never meant that humans have remained passive or complacent; on the contrary, from the beginning, they have sought causes and treatments.

The first thing considered was supernatural etiology [1]. They believed that ailments were the consequence of an offense to the deity or a punishment for their wrongdoing [2,3]. Nevertheless, questions would arise, such as why congenital diseases exist. If a baby was stillborn, could it also be a consequence of their actions? Some blamed it on the actions of the parents, while others on the sins of a past life. Likewise, the doubt was always prevailed as to why an innocent had to pay for someone else's debts [4].

There were also those who wondered why there was so much suffering, pain and sickness, as well as so much evil among mankind [5-7], in a world supposedly created by a good and omnipotent deity.

Although the scientific method is relatively recent, many centuries ago, thinkers and physicians sought truth and reliable knowledge based on coherent ideas, distant from the supernatural realm [8].

The human brain is the product of a long evolutionary process, it did not emerge from nothing, nor was it made in the image and likeness of any supernatural being. We know that humans have the tendency to attribute intentions, reactions, thoughts and even consciousness to objects, natural phenomena, plants and animals. This occurred as a consequence of applying to the environment around us the same mental mechanisms that initially emerged for understanding human societies [9]. That is to say, it was a kind of hypertrophy of the mental devices destined to interpersonal relations that were applied to face and explain the external world. All this, ultimately, generated gods and religious ideas.

On the other hand, some have attributed the origin of morality to religion; however, evidence suggests that

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it is, rather, an automatic and universal behavior that is not related to the level of religiosity in society or in the individual. The human brain has a series of circuits specialized in executing social moral behaviors. In the ventrolateral prefrontal cortex, a kind of "list of social norms" is established, dictating what is right and wrong for a given society. This part of the brain is necessary, for instance, to adjust our behavior towards altruism or selfishness, depending on the circumstances [9].

While it is true that the emergence of religious dogmas initially provided an adaptive advantage for human group cohesion [10,11], they were later used as a political tool [12,13] and a means of social domination, especially against women [14]. A famous German expression attributed to Kaiser Wilhelm II of Prussia states that the traditional feminine destiny consisted of the three K's: *Kinder*, *Küche* and *Kirche* (children, kitchen, church) [15,16].

SEARCH STRATEGY

The present work is based on a literature search aimed at identifying publications by various scientists and thinkers who have investigated the relationship between science (primarily medicine) and supernatural beliefs (especially religious). First, a matrix was created for the literature search in several languages (Spanish, English, Portuguese and German). The author included personal library texts and electronic publications from the Internet. After this phase was completed, he filtered and selected the main publications, organizing them chronologically.

Antiquity

The Egyptian god of medicine was a deified historical figure: Imhotep, a physician and vizier of the pharaoh Djoser. Imhotep was venerated for centuries and, in the time of Ptolemy (100-170 AD), attained the rank of god [17-19].

In the Greek pantheon, the god of medicine was Asclepius. However, the first to be attributed the power of healing was Apollo, the god of sudden death, plagues and diseases, as well as healing and protection against evil forces.

The most important figure in Greek medicine was Hippocrates of Cos (460-370 BC). Although the Hippocratic school was based on the erroneous conception of the four humors (blood, black bile, yellow bile and phlegm) [17], it represented the first attempt to fight against charlatanism and pseudomedicine. The theories developed by Hippocrates were compiled six centuries later by Galen of Pergamon (129-216 AD) in Rome [1].

Middle Ages

A large part of medieval medical knowledge was concentrated among the so-called Church Fathers, with whom conceptions took on a religious tinge. Augustine of Hippo (354-430 A.D.) held, "All diseases of Christians are to be ascribed to demons; chiefly do they torment freshly-baptized Christians, yea, even the guiltless new-born infants [20]." The early Christians did not deny the existence of the Olympian gods, but considered them servants of Satan. Demons were pagan deities who were "annoyed" by the advance of Christianity [21].

Gregory Nazianzen (329-389 AD), Archbishop of Constantinople, maintained that medicine was useless, as the only effective resource was the laying on of hands [22].

The efficacy of sacred relics was believed; therefore, their possession also represented a source of income for both the church and the city in which they were [22]. Despite the proven inauthenticity of many relics, belief in them often persists.

For example, the relics of St. Rosalia of Palermo (1130-1156), protector against plague and other infectious diseases, were examined by the British paleontologist William Buckland (1784-1856), who concluded that they were goat bones [22]. His opinion caused an angry reaction from the ecclesiastical authorities, who tried to discredit the illustrious scientist by emphasizing that he was a non-Catholic.

The first period of Catholic thought was dominated by Augustine of Hippo, while the second by Thomas Aquinas (1224-1274), who associated Christian with Aristotelian ideas. Aquinas continued to defend the faith and invoked reason to support his arguments [23]. However, anatomical misconceptions persisted: it was assumed that the heart was the center of the body and the seat of the soul. The role of the brain was that of a simple blood cooler.

At that time, frequent plagues and pestilences were attributed to the wrath of God or to the action of demons. The Black Death in 1348 triggered outbreaks of superstitions in various places [24]. One tactic to mitigate the divine anger was the persecution of Jews: 12,000 were killed in Bavaria and 13,000 in Erfurt, and 2,000 were burned in Strasbourg [22], and so on in other places. Another method recommended by the clergy was the donation of lands to the Church [22].

During this period, not only were these beliefs favored, but also the scientific study of medicine was frowned upon. The dissection of human bodies was forbidden because it was believed to interfere with the resurrection of the dead [17].

The mentally ill fell into the hands of exorcists and witch and warlock persecutors. Madness was considered a demonic possession [17]. Many times, the healing could be done by exorcism, by touching a relic or through the command of a holy man to expel the demon. Soon it was

thought that the best way to cast out the evil spirit was to torture it or to humiliating its pride, for which foul odors and disgusting substances were used. When these methods failed, the patient was whipped, even tortured. In Vienna alone, in 1583, the Jesuits expelled 12,652 devils [22]. Year after year, thousands of helpless schizophrenics were given over cruel jailers.

The Middle Ages were a dark period in which science and medicine were vilified [25,26] to the point that their development had to be carried out in secret—when luck allowed it [27].

Renaissance and Modern Age

During the Renaissance, a phenomenon occurred related to sorcery and linked to madness. In 1486, the German Dominicans Kramer and Sprenger published the *Malleus maleficarum* (Hammer of the witches) [28]. The papal bull *Summis desiderantes affectibus*, issued by Pope Innocent VIII, recognized the existence of sorceresses and appointed the aforementioned monks as inquisitors to investigate witchcraft crimes in the northern provinces of Germany. The influence of the "Hammer" increased as the printing press spread its effect, causing great impact across France, Italy and England.

It was held that witchcraft was more prevalent among women due to their inherent wickedness. The most common accusation was that of causing storms and lightning [22]. A list of questions was drawn up to be used on women suspected of witchcraft, who were tortured until they "confessed" the expected answers. Hundreds of thousands were burned for witchcraft over the 300 hundred years of persecution [22,29]. Many of these alleged sorceresses would today be considered mentally ill.

Protestants also joined in this insanity. James I of England (1566-1625) wrote *Daemonologie*, a study of demons, werewolves and vampires. The book sought to demonstrate that the diabolical arts had always existed, justifying their persecution, trial and punishment. The law against witchcraft passed during his reign remained in effect until 1736. The last witch in Scotland was burned in 1722 [22].

Andreas Vesalius (1514–1564) overcame the official censure of his time, becoming the first to practice scientific anatomy. His work was one of the most influential of the time [30,31]. Vesalius had the protection of Emperor Charles V, but when Philip II took the throne, he could no longer obtain cadavers for dissection. At that time, the Church proclaimed the existence of an indestructible bone from which the resurrection of the dead would occur at the Last Judgment. When questioned, Vesalius denied having found such a bone, which earned him the enmity of the clergy.

Finally, the followers of Galen denounced Vesalius to the Inquisition, accusing him of performing an autopsy on a Spanish grandee while her heart was allegedly beating—a claim now known to be false. Due to the influence of the king, he was allowed to do penance by making a pilgrimage to the Holy Land [22]. Subsequently, Vesalius traveled to Jerusalem; however, on his return the ship was shipwrecked, he managed to dock on the island of Zante and, shortly thereafter, died of exhaustion.

Eighty years later, the Englishman William Harvey (1578-1657), the discoverer of blood circulation, no longer suffered such harassment [17]. Opinions on medical matters had become more liberal, particularly in Protestant countries.

In 1687, Isaac Newton and his discovery [32,33] led many to believe that God had created nature and established natural laws without requiring further intervention, except for the revelation of the Christian religion. However, some still considered it impious to regard lightning and thunder as natural phenomena rather than divine acts.

Old theological prejudices were rekindled whenever some important novelty arose. Variolation, discovered by Edward Jenner (1749-1823) [17], unleashed a storm of ecclesiastical protests. At that time, smallpox had become a terrible plague. Jenner began testing his method on a healthy eight-year-old child and later on adults, achieving highly favorable results. Even the Sorbonne pronounced against it on theological grounds. Scottish pastors protested, claiming that it was "endeavoring to baffle a Divine judgment." Other clergymen argued that it was a "bidding defiance to Heaven itself, even the will of God [22,34]." However, the decrease in the number of deaths was so evident that sermons failed to counteract the terror of the disease. In 1768, Empress Catherine and her son allowed themselves to be inoculated. Later, in 1805, Napoleon ordered the vaccination of his entire army.

In 1885, a Montreal priest stated, "If we are afflicted with smallpox, it is because we had a carnival last winter, feasting the flesh, which has offended the Lord [7]." For that reason, he ordered a procession and a solemn appeal to the Virgin and carefully recommended the use of the rosary.

Another conflict occurred with the discovery of anesthetics. The Scottish physician James Simpson (1811-1870) described the properties of chloroform [17] and successfully introduced it into general medical practice. Simpson also recommended it for childbirth, but the clergy reacted arguing that it went against the divine will, for God told Eve, "In pain you shall bring forth children." The matter was only overcome when Queen Victoria agreed to be anesthetized during the birth of Prince Leopold of Albany in 1853.

The harm that theology has done to medicine has not been through cruel impulses, but by giving an apparently sacred character to practices based on ignorance and superstition.

From the 17th century onwards, the scientific method began to take hold in physical science. Based on this methodology, at the end of the 19th century [35,36], modern medicine emerged, introducing germ theory, antibiotics, asepsis, hormones, corticosteroids, blood transfusions, modern surgical techniques and other advancements [37].

Contemporary Age

An extreme concern for health has led the population of the 21st century to a paradox: people adhere more easily to unvalidated remedies, even though it is precisely scientific medicine that has made our lives longer and healthier [38].

Despite the evident successes of scientific medicine—such as increased life expectancy and reduced infant mortality—it is currently challenged by irrational beliefs and pseudoscientific therapies, misleadingly called "alternative [39]." There is a widely held belief that alternative treatments are harmless and that there is nothing to lose by trying them [17].

Thus, health has become a battlefield between science and superstition. We are living in a time when "alternative facts" and fake news are everywhere. One of the most harmful medical deceptions of the last century has been the connection between vaccines and autism, which originated with a publication by Andrew Wakefield in the prestigious journal *The Lancet*. It was later demonstrated that Wakefield had a conflict of interest and was declared "unfit to practice medicine" due to his unethical and irresponsible behavior. For its part, the journal retracted [40], clarifying that the conclusions of that article were completely false.

However, the media continued to spread various stories that defied reality, despite a wealth of evidence that, year after year, indicated otherwise.

At present, many people still readily accept so-called "magical healings" without any evidence [41,42]. On the other hand, the intervention of theology in medical matters is not over either. Ecclesiastical texts and decrees still have influence on important issues, such as birth control, abortion, euthanasia and homosexuality [43], among others.

In 1994, John Paul II beatified the pediatrician and Catholic laywoman Gianna Beretta (1922-1962), who refused to undergo surgery for uterine cancer, an operation that would have saved her life while she was pregnant [44]. Gianna was anti-abortionist and considered that the life of the fetus was more valuable than that of the mother. Consequently, she died and left three orphaned young children. Although this decision is more deserving of pity than admiration, today Gianna is the patron saint of pregnant women and those suffering from uterine and breast cancer.

What is a miracle?

The story of a miracle never comes from a firsthand witness. Rather, it is a story that has passed through many people, ultimately becoming misrepresented and distorted [45]. On many occasions, the original source is usually a mere rumor.

Homo sapiens are social beings, and our brain structure has never stopped evolving (in fact nothing ever does) [9]. Our mind is evolutionarily predisposed to see human faces, even where there are none [46,47]. For this reason, people often perceive faces in cloud patterns, wet spots on the wall, the bottom of pots or anywhere else.

The philosopher Baruch Spinoza (1632-1677) maintained that nothing ever occurs in contradiction to nature or outside its laws, even though we understand it in a limited and imperfect way [48,49]. Thus, a miracle is merely a phenomenon whose natural cause cannot be explained by humans based on analogy with other commonly observed events [48]. According to Spinoza, everything that is contrary to nature is contrary to reason, and what is contrary to reason is inconsistent; therefore, it must be rejected [50].

For the renowned Scottish philosopher David Hume (1711–1776), a miracle was also a violation of natural law [51], such as walking on water, turning a frog into a prince, transforming water into wine, stopping a clock with the power of the mind, resurrecting a dead person, etc. In response to any of these situations, Hume stated the following:

"No testimony is sufficient to establish a miracle, unless the testimony be of such a kind, that its falsehood would be more miraculous, than the fact which it endeavors to establish [52]."

If for Spinoza a miracle was an absurdity, for Hume it was simply not credible. Suppose a great friend claims to have seen a pig flying. No matter how trustworthy or honest this person is, the possibility that your friend is telling a lie or suffering from a hallucination is less miraculous than accepting that a pig can fly. Therefore, the most likely explanation is that this friend lied, was mistaken or had a hallucination.

On the same topic, Richard Dawkins gives us another example. In May 1917, in Fatima, Portugal, three shepherd children claimed to have witnessed a woman "brighter than the Sun," called the Virgin Mary, long dead and venerated almost as a goddess in that locality. She told them that she

would return on the 13th of each month until October 13, and instructed them to pray the rosary [46].

Rumors of the supposed miracle spread, and on the appointed day, more than 70,000 people attended. The accounts of what the Virgin supposedly did with the Sun vary. For some, it seemed to dance; for others, to swirl; others said, "The Sun seemed to plummet from the sky and rush over the terrified crowd [46,51]."

The Virgin was only seen by the children, remaining invisible to everyone else. Nevertheless, about 70,000 people saw the Sun move. Applying Hume's reasoning, there are three alternatives:

1. The Sun actually moved in the sky and approached the terrified crowd (or Earth moved closer).
2. Neither the Sun nor Earth moved. All 70,000 people experienced a simultaneous hallucination.
3. Nothing happened at all. The entire event was exaggerated and/or simply made up.

Dawkins mentions that the third possibility is the least improbable. Accepting it does not require violating any law of nature: one only needs to believe that someone lied by claiming that "70,000 people saw the Sun move," and that, through repetition, this statement spread like any urban legend [46] or like the fake news that circulates on the Internet today.

If we consider the first possibility, it would have led to a catastrophe: Earth would have been thrown out of its orbit, crashed into the Sun, and the world would have come to an end.

Hume never argued that miracles were impossible [53], he simply advised that we think of a miracle as an improbable event, that we estimate and compare its improbability with other alternatives (among them, a hallucination, a lie or a fraud).

Miraculous healings and pseudomedicine

The German philosopher Friedrich Nietzsche did not refer to humans as a rational animal, nor as a political animal, nor as a social animal, but as a "fantastic animal" [54] because they needed to fabricate fictions or illusions to inhabit this world [45,55].

When "miraculous" healings occur, the sequence is typical the same: it usually involves patients suffering from a chronic incurable (diabetes, hypertension) or serious disease (cancer) for which modern medicine is unable to provide a solution [52]. Patients, in the midst of their anguish, turn to the so-called "alternative" medicine or pray for a miracle [56,57].

Pseudomedicine has the alluring magic of using the prestige of traditional and ancient wisdoms, covering itself with an aura of profound knowledge [58,59]. These unvalidated practices are based on the existence of supernatural energies that contradict established laws of physics (such as biofields, "vital" energy, energy meridians, chakras, etc.) [60], most of which is just pure charlatanism. The expectation that some spirit or certain deity can physically intervene in an illness, or curing diseases through a miracle, is the last hope.

Radford argues that many so-called "miraculous healings" are simply the result of misunderstandings, poorly applied logic, errors in critical thinking, or the common uncertainty of medical knowledge [61].

The impression that a miracle has occurred can be created by something as simple and common as a misdiagnosis. Many times, the doctor makes an incorrect diagnosis; then the patient goes to the shaman or folk healer who claims to be able to heal the condition. Later, tests and studies confirm that the patient is healthy. This is interpreted as conclusive proof, and the miracle is accepted without taking into account the possibility that the initial diagnosis was incorrect.

Scientific medicine must demonstrate the possibility of any spiritual entity acting upon matter [37]. We might even wonder why an omniscient God would need to suspend the order of the world that He Himself established through a miracle. That is why every physician should always consider the rational analysis recommended by David Hume [62].

Let us also remember that some cases improve due to the placebo effect or as part of the natural history of the disease [63].

The truth is that those who look for miraculous solutions in these unvalidated medical practices often end up deceived and swindled, with the same or worse condition than before.

CONCLUSIONS

Although modern medicine has a spectacular record of success, it is not perfect. When a medical treatment fails to generate a good response, it is discontinued and replaced with another [64,65]. Patients should also understand that physicians, as human beings, can make mistakes.

If a result seems inexplicable, we are faced with two alternatives: either it did not actually occur (the observer lied, or was mistaken or deceived) or something happened that we have not yet discovered [66,67]. When faced with a result that we cannot explain, we should not stop until we

find an answer. As scientists, we should avoid saying "This is a miracle" or "This is supernatural." The appropriate response to such mysteries should be: "This is something we do not yet understand, and it is what we must work on."

It is truth, not faith, that sets us free [68,69]. Objectivity and reason have led away from superstition and given us centuries of progress; abandoning them would be madness. True miraculous healings are the result of the hard and careful work of scientists, physicians and researchers.

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