

Medical explanations for the myth of vampirism

Explicações médicas para o mito do vampirismo

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ABSTRACT

The mythical figure of the vampire is undoubtedly one of the most intriguing, seductive, and horrifying in current popular culture. For hundreds of years, these characters have inhabited the belief systems of many individuals and are remembered for their insatiable blood lust and the fear they trigger in people. Over the years they have been present in several pictorial, literary, and cinematic representations. This historical phenomenon has generated several theories that try to dissect the true origin of the legends regarding these creatures of the night. This article is a literature review presenting the attempts to explain the origin of vampirism through a scientific approach.

Key words: Mythology; Folklore; Superstitions; History of Medicine.

RESUMO

A figura mítica dos vampiros é, sem dúvida, uma das mais intrigantes, sedutoras e horripilantes da cultura popular atual. Esses personagens já habitam há centenas de anos a crença de muitos indivíduos - sendo lembrados pela sua inesgotável sede de sangue e pelo medo que desencadeiam nas pessoas. Durante os anos, tornaram-se figuras presentes em várias representações gráficas, literárias e cinematográficas. Esse fenômeno histórico ganhou diversas teorias nas quais se tentou dissecar a verdadeira origem das lendas sobre esses seres da noite. Este artigo, por meio de uma revisão de literatura, apresenta as tentativas de explicação da origem do vampirismo por meio de abordagem científica.

Palavras-chave: Mitologia; Folclore; Superstições; História da Medicina.

INTRODUCTION

Vampires are fictional characters, protagonists of many films, books and other art productions. However, a few centuries ago they were considered a real threat by many people.¹ This article was developed from reviews of scientific publications that raised hypotheses regarding the origin of the myth of vampirism. We also searched for possible links with historical facts.

According to the Funk and Wagnalls Standard Dictionary of Folklore, Mythology, and Legend¹, “vampires” are defined as living-dead or soulless bodies that, from their place of burial, would seek the blood of the living to drink. Belief in vampires is widespread, but it is strongly integrated into the Slavic culture. In mid-18th century Hungary, belief in vampires was so strong that it can be compared to the witch-hunt period that occurred during the colonization of New England.²

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According to current folklore, vampires do not rest in their graves and spend the night looking for victims in which to bury their fangs and drink their blood. But when the rooster crows, the sun rises or bells toll in the morning, they return to their coffins – sunlight is supposedly an important source of discomfort for such creatures. Bells, mirrors and garlic are also considered effective weapons against vampires. According to popular culture, anyone bitten by a vampire becomes one of them after death. In this transformation process, the body is preserved from decomposition and the individual retains the appearance of a living person, with red mucous membranes and blood stains around the mouth. These creatures can only be exterminated if beheaded, burned, buried, or hit with a wooden stake driven through their hearts, as depicted in Moraine's engraving (Figure 1). Based on historical concepts, it is possible to establish existing biological relations between some diseases as the basis for the myth of vampirism.



Figure 1 - Le Vampire. Engraving by R. de Moraine. Extracted from *Les tribunaux secrets* – Paris.

AIM

This study aims to draw similarities between the clinical pictures of diseases such as porphyria, hydrophobia and pellagra and historical and anthropologi-

cal relations as possible biological explanations for the origin of the centuries-old myth of vampirism.

MATERIAL AND METHODS

The bibliographic survey was done in the following databases: Index Medicus (Medline), U.S. National Library of Medicine National Institute of Health (PubMed), Scientific Electronic Library online (SciELO), Literatura Latino-americana e do Caribe em Ciências da Saúde (LILACS) e Portal Periódicos (CAPES) by using the following keywords: Vampires/Vampiros; Myth/Mito, Folklore/Lenda; History of Medicine/História da Medicina. The articles selected were those with relevant information for this review. The languages searched were Portuguese, English, and Spanish.

VAMPIRISM AND PORPHYRIA

According to the theory proposed by David Dolphin³, the mystery of vampires has its origins in the Middle Ages, in Bohemia. This is considered a historic location in Central Europe and it currently corresponds to a large part of the Czech Republic. In Bohemia, several small communities were completely isolated, either by scarcity of roads and means of transportation or, also, by the very division into fiefdoms. Individuals were not aware that there was an unexplored world beyond the borders of the mountains that surrounded their villages. These communities were forced to practice inbreeding, which led to a lack of genetic diversity.³

The lack of genetic diversity in these isolated villages of Bohemia could have led to an increased local prevalence of certain diseases. Among them was porphyria³ (from the Greek *porphiros*, purplish-red), which causes the emergence of several signs that overlap with the physical traits of vampires. Thus, individuals suffering from porphyria have an anemic aspect, with exacerbated paleness, and resemble vampiric figures.⁴

Porphyria results from a deficiency of specific enzymes of the heme biosynthesis pathway, which prevents the chemical structure called porphyrin ring from binding to iron to form hemoglobin. The porphyrin rings, unable to carry out their task, are deposited in the subcutaneous tissue, bones, and teeth. This chemical substance is photo-reactive and upon exposure to sunlight releases oxygen radicals, which

are caustic and corrosive to the skin and can cause burns.³ Interestingly, this would be the reason behind vampires' aversion to sunlight. Moreover, these creatures are characterized as having a nocturnal and gloomy behavior. If the more serious manifestations are not treated, these lesions may cause disfigurement. Among them, mutilated ears and noses, deformed lips and retracted gums that reveal red teeth that appear larger than they truly are and thus similar to fangs.³ This last change is what appears to be the origin of the image of the vampires' huge canines.

Legends also mention that vampires are repulsed by garlic. This plant has a volatile substance called diallyl sulfide which is very homologous with organic substances that promote changes in p450 hepatic enzyme activity^{3,5} through destruction of the heme groups. The products of heme destruction that compose the P450 enzyme promote inhibition of the ferrochelatase, which participates in critical reactions in the synthesis of the heme itself: it catalyzes the insertion of iron into the protoporphyrin IX. When inhibited, it becomes a limiting factor for the synthesis of hemoglobin since protoporphyrin IX is the direct precursor of the heme.^{6,7} As a result, the heme group precursors accumulate because synthesis of porphyrins through negative feedback does not happen in this metabolic pathway.^{6,7} Changes in this metabolic pathway associate with the severity of the clinical manifestations of porphyria.⁸

Another feature identified in vampire legends is the desire for blood, that is, these creatures' search for "vital energy".¹ It is known that blood-letting was a common practice among ancient peoples, such as the noble families of the Balkans. However, they compensated the effects of bloodletting by slaughtering animals to ingest their blood. This behavior of "sucking the blood of the prey" was probably incorporated into the making of the myth of vampirism.

The Belgian dermatologist Jean Goens based his theory on the following sentence: "Facts have been augmented and deformed by popular imagination until they eventually turned into sinister legends".⁹ Goens⁹ observed patients with porphyria and identified them as having mental disorders that resulted in antisocial behaviors, aggressiveness and a desire for isolation – misanthropy. These symptoms determined a markedly eccentric behavior. Over the centuries, in popular imagination, individuals affected by porphyria were considered "cursed beings", or even "demons". This interpretation was reinforced mainly by lack of knowledge about the pathophysiology of porphyria.

According to accounts in popular literature¹, vampires are often associated with the aristocracy or members of the nobility. This may have originated from the fact that porphyria worsens with sexual maturity (usually around age 16 to 17). Coincidentally, that was the age at which the young women in these communities got married.

In the communities in Bohemia, where the myth is believed to have originated, there is a passage that reinforces the description above.¹ The local leader would marry a virgin. After that, shortly after this young woman settled in her husband's castle, she became pale and began to suffer the effects of porphyria. This event was interpreted by the local community as a habit of the feudal lord, a "creature" capable of sucking the blood of his own wife.¹ throughout the generations, this legend became increasingly distorted and implausible.

VAMPIRISM AND INFECTION BY THE RABIES VIRUS

This hypothesis was developed in Dr. Juan Gómez Alonso's doctoral thesis, entitled "Rabia y vampirismo en la Europa de los siglos XVIII y XIX"^{10,11}, which focused on the relation between human rabies and the myth of vampirism. This author uses a historical coincidence as a starting point for his hypothesis. In the 18th century, around the years 1721-1729, the biggest epidemic of rabies in dogs, wolves and other wildlife animals was recorded in Hungary. Based on anthropological data collected by folklorists and historical accounts of people who believed in vampirism, the author provides a retrospective study of the myth's origin and finds evidence that it was also in the 18th century that this macabre phenomenon could have stirred the imagination of many peasants inhabiting the rugged lands of the Carpathians.¹⁰⁻¹²

According to Gómez, the most famous account of vampirism supposedly took place in Serbia, in the village of Medvedja, in the winter of 1731-1732.¹¹ The death of a few peasants was attributed to an attack by vampires, who killed, in addition to the villagers, certain animals. Seventeen bodies were discovered, all with "signs of vampirism", pierced through with stakes and subsequently beheaded and cremated. The repeated violations of graves provoked reactions of the Austrian authorities, giving rise to one of the most extraordinary debates between the Enlighten-

ment thinkers, who thought the legend was the result of ignorance and superstition,^{10,11} as can be verified by Rousseau's ironic account¹³: "If there is a well-documented history in the world, it is that of vampires. It has everything: oral accounts, corroboration from prominent people, surgeons, priests and magistrates. As we can see, who would believe in vampires?"

The rabies virus is generally introduced into the body of the host through a bite and, after an asymptomatic period reaches the central nervous system via the peripheral nerves. In humans, the incubation period ranges from 10 days to two years. However, most patients die in less than 14 days by asphyxia or cardiac arrest. This kind of death might explain some post-mortem findings documented in rabies cases that also appear in the vampire legend.

The fact that a vampire bite turns the victim into a vampire suggests a zoonosis transmitted by the bite.^{10,11} Among the few such zoonoses, only rabies has an association between the disease's fatal prognosis and the animals involved. Dogs and wolves are the animals most commonly associated with vampires. These animals were often mentioned as mortal enemies of these creatures.^{10,11} A vampire could turn into a canine figure and eliminate all the other dogs in the village. Moreover, vampires could take on the shape of a wolf, a bat or even become invisible.^{10,11}

The mystery of the metamorphosis of vampires from a human shape to an animal's, according to Gómez^{10,11}, is related to the fact that rabies is a disease that causes similar symptoms in humans and animals. Similar pictures of fits of rage were identified in peasants, as in other animals: dogs, wolves, cats, and bats. Many characteristics associated with vampirism were also described as disorders of the limbic system, the brain area responsible for emotion control and behavioral parameters. In patients affected by diseases such as rabies and epilepsy, a strong connection between aggressiveness and dysfunction among certain areas of the limbic system – hypothalamus, amygdaloid complex and hippocampus – was established. Additionally, anterior hypothalamic dysfunctions could result in insomnia and other sleep-wake cycle changes.^{10,11} These findings are consistent with the nocturnal habits usually associated with vampires. During the course of a rabies infection the individual may display laryngeal, pharyngeal, and facial muscle spasms, which can cause emission of raucous sounds through clenched teeth and pursed lips. These spasms can be triggered by certain types of stimuli such as draughts

(aerophobia), water (hydrophobia), light (photophobia) or smaller excitatory stimuli such as, for instance, a reflection in the mirror.^{10,11} The last stimulus described coincides with another archetypal feature of vampires: they are unable to project their image onto mirrors. The feeling of suffocation and shortness of breath are symptoms commonly described in advanced cases of infection and also appear in accounts of victims of vampire attacks.^{2,11}

In rabies, suffocation and cardiac arrest are final stages in the progression of the disease and cause sudden death. Consequently, the coagulation slows down and blood remains liquid for longer after death^{10,11}. Post-mortem observations of these individuals, in which bloodstains were identified in the oral mucous membranes of the corpses, give rise to a theory about the habit of vampires sucking blood.

Another relevant point is the preservation of corpses in the post-mortem period. This finding is probably due to the retarded decomposition process due to the low temperatures and the saponification process.^{10,11} This process, typical of funerals in high humid and low temperature places converts the subcutaneous tissue into a substance resembling wax, which renders the preserved body recognizable even several years after death.

VAMPIRISM AND PELLAGRA

Other clinical conditions were also associated with the mythical figure of the vampire. The most noteworthy example could be pellagra. It was speculated at times that this disease, caused by a nutritional deficiency of niacin (vitamin B3) could explain the emergence of the popular belief in vampires.

A significant historical growth in the number of cases of pellagra has been recorded from the first half of the 17th century.¹⁴ This fact can be attributed to the introduction of maize flour, which became the primary energy source in the diet of poor Europeans and has low niacin bioavailability.¹⁴ The clinical manifestations of pellagra were also related to vampires, but are nonspecific and do not contribute to explaining many of the features found in these mythological creatures. This disease is characterized by the triad dermatitis, dementia, and diarrhea. The aspect of the skin in that entity is probably the factor that most relates to the myth of vampirism. It is known that individuals with pellagra are hypersensitive to

sunlight. After being exposed to the sun, affected individuals develop reddish and hyperkeratotic lesions that eventually undergo depigmentation alternated with rough, brown-colored areas.¹⁴ In conjunction with glossitis, which would result in changes in the teeth's aspect and inflammation of the lips among individuals with pellagra, reinforcing the description of vampires as having "sharp, protruding teeth" and "prominent red lips"¹⁴. Finally, pellagra dementia could explain other traits of the vampire profile: insomnia, irritability, impulsiveness, sluggishness and unpredictable behavior.¹⁴

THE ORIGINS OF COUNT DRACULA

The legend of Count Dracula was born in the territories of Central Europe, in particular the Transylvanian Alps, which today belong to Romania, and are considered the birthplace of the Romanian nation. This territory has been washed in blood countless times by violent wars, like those that took place during the barbarian invasions of the 15th century.

It was in this scenario that, around 1430, the first Dracula, Prince of Wallachia, was born.¹⁵ His name was Vlad, but he became known as Drakul (which means dragon or devil) because of the figure that adorned his family's coat of arms. Vlad lived as a barbarian warrior and probably during captivity in Turkey witnessed and learned methods of torture that marked his sadistic personality, such as execution by impalement, a method which earned him the nickname Tepes or "Impaler".¹⁵

From generation to generation, Prince Vlad Tepes of Wallachia became the source for the creation of "Count Dracula" and was immortalized in the figure of the vampire of noble lineage and lord of a castle in the Carpathian Mountains.¹⁵ Dracula, as a stereotype of the so-called vampire, was then given form based on Romanian legends, stories and tradition.

CONCLUSION

Since the 18th century, when these stories became popular, the image of the vampire has remained consistent. A timeless image linked to corruption, pow-

er, and gloom. However, by carefully observing the vampire traits, we can identify the grounds for medical/scientific explanations. The legend is associated with a number of genetic abnormalities, nutritional deficiency or virus infections that can cause behavioral changes. Historical facts changed over time and these distortions became the increasingly romantic and seductive image of the vampire.

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