The Insomnia Plague in Fictional Macondo

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ABSTRACT
Disease and medicine are found throughout Gabriel García Márquez’s work. This article examines the insomnia plague described in the novel One Hundred Years of Solitude and performs a differential diagnosis exercise with conditions that affect both sleep and memory. The main finding is that the insomnia plague narrated by García Márquez, with its clinical manifestations, the sequence of symptoms, and its resolution, cannot be associated with any specific diagnosis. However, similarities to and differences from several clinical conditions are discussed, as well as the relation between the neurophysiologic phenomena of sleep and memory.

INTRODUCTION
Disease and medicine are present in several works of Gabriel García Márquez. Some cases documented bear considerable similarities to actual medical practice, whereas in others, they are transformed by the use of magical realism. In García Márquez’s short story No One Writes to the Colonel,1 a physician uses the Lieben reaction to diagnose diabetes in the protagonist. In the novel Love in the Time of Cholera,2 another physician detects the smell of bitter almonds and describes the changes in a corpse due to cyanide poisoning. Moreover, there is an extremely detailed description of an autopsy performed on Santiago Nasar in the novella Chronicle of a Death Foretold.3 One Hundred Years of Solitude is a novel about the Buendía family and their lives in the fantastical town of Macondo, located in Colombia on the Caribbean coast, where an insomnia plague occurs.4 The heads of the family are José Arcadio Buendía and his wife, Ursula Iguarán.

The objective of this article is to make a differential diagnosis of the insomnia plague reported in One Hundred Years of Solitude,5 with real clinical pictures, in an attempt to determine parallels between the Macondian world and the real world. The insomnia plague that is described in the third chapter of the novel will be analyzed.

CLINICAL FEATURES OF INSOMNIA PLAGUE
The insomnia plague appears in the plot of One Hundred Years of Solitude with the arrival of the natives Visitación and Cataure from La Guajira, Colombia, who come to Macondo fleeing from an evil that attacked their tribe. Thereafter, Rebeca, an orphan girl from La Guajira, is delivered by an emissary with a letter that entrusts her to the Buendías. She is mute, apparently lacks understanding of Spanish, and refuses any food. At night, she sneaks eating dirt in the Time of Cholera,5 one night, Visitación finds the girl awake, sucking her fingers “with her eyes lighted up in the darkness like those of a cat.” Seeing this, Visitación acknowledges that the insomnia plague has reached Macondo. Although her brother, Cataure, runs away, Visitación accepts the circumstance and explains to the Buendías that the loss of sleep is not the gravest part of the disease, “but its inexorable evolution toward a more critical manifestation: A loss of memory.”6,7 In addition, Visitación describes the manner in which once the person “became used to his state of vigil, the recollection of his childhood began to be erased from his memory, then the name and the notion of things, and finally, the identity of people and even the awareness of his one being, until he sank into a kind of idiocy that had no past.”8

Rapidly, the other inhabitants of the house experience insomnia, and this symptom is welcomed with euphoria, as Aureliano Buendía says, “That way we can get more out of life.”9,10 Subsequently, the symptom that reportedly produced the most terror—forgetfulness—appears. The sweets that Ursula makes and sells in town spread the disease throughout Macondo: “Children and adults sucked with delight on the delicious green roosters of insomnia, the exquisite pink fish of insomnia, and the tender yellow ponies of insomnia.”11

The inhabitants of Macondo initially welcome insomnia positively and use the time to perform necessary tasks; however, when they complete their tasks, they begin to feel melancholic because they no longer have dreams on account of the insomnia. Thereafter, they start repeating the same jokes and stories between them. To combat the insomnia, Ursula prepares an aconite (Aconitum sp) concoction and gives it to her relatives. The remedy does not induce drowsiness but produces dreams while they are awake. In this state, they see the images of their own dreams and those that others dream.

The inhabitants of Macondo quickly recognize the contagious characteristics of the plague and establish a quarantine to prevent any visitors coming to town from contracting the disease. Outsiders are forbidden from drinking or eating anything and are required to carry bells to report that they are healthy.

When oblivion begins to affect their daily lives, Aureliano invents a way to remember the names of objects—by writing their names to them. Subsequently, the information on the labels requires further description to include the details of the object that is being named: “This is the cow. She must be milked every morning so that she will produce milk, and the milk must be boiled in order to be

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mixed with coffee to make coffee and milk. However, this system “would escape irremediably when they forgot the value of the written letters.” As the oblivion deepens, the inhabitants resort to reading sets of playing cards regarding the past and “began to live in a world built by the uncertain alternatives on the cards.”

Aureliano attempts to invent a memory device that would allow individuals to remember the activities of each day, functioning as a “spinning dictionary.” While Aureliano is working on the construction of this device, Melquiades returns to Macondo. This old friend of the family and alchemist provides Aureliano a substance of “gentle” color from which he, and subsequently the entire town, regain their memory. Months later, Macondo is visited by the minstreel Francisco el Hombre, who along with his songs, brings the stories of the events in the villages he has visited.

Differential Diagnosis of Insomnia Plague

This chapter from the novel One Hundred Years of Solitude, in which the alteration of the sleep and memories of the Buendía family is narrated and which extends throughout Macondo, leads us to conduct a differential diagnostic exercise. The form of presentation, sequence of the appearance of different symptoms, and outcome for the solution of the epidemic demonstrate characteristics that do not facilitate the definitive diagnosis of a clinical syndrome. Here, the use of fantasy and imagination in this García Márquez novel is evident and is a part of a literary style called magical realism. This style is characterized by the inclusion of magical, miraculous, mythical, and fantastical elements in a realistic piece of fiction.

In García Márquez’s work, partial representations of the reality of a disease are common. Regarding these disease descriptions, in some works the description is considerably similar to the actual clinical presentation; however, in the case of the insomnia plague, it is possibly full of symbolism and therefore does not resemble any medical condition described. However, we will review some possible clinical pictures consistent with this condition (Table 1).

Infectious Encephalitis

Infectious encephalitis is an acute clinical syndrome characterized by focal neurologic deficits, generalized or focal seizures, altered mental status, behavioral changes, and fever (optional presentation). The incidence of this infection is 1.5 to 7/100,000/y. It is usually caused by a virus but also can be caused by bacteria, fungi, and some parasites. It can be a parainfectious or postinfectious phenomenon. Some of the autoimmune encephalitides can present with sleep disturbances.

Although the insomnia plague has an infectious behavior, none of those affected had a fever, focal neurologic symptoms, seizures, or behavioral changes. In addition, memory disorders are not always part of the clinical symptoms. Sleep disturbances, which are common to some autoimmune encephalitis cases, are predominantly characterized by nighttime awakenings and drowsiness. In García Márquez’s plague the insomnia is the main symptom.

However, the insomnia plague indiscriminately affects children and adults, like some types of infectious encephalitis. Typically, in pediatric patients, encephalitis presents in more severe forms, usually accompanied by motor disorders, such as choreoathetosis, and rapid compromise of consciousness. In Macondo, the first affected is a child, Rebeca, who has a very similar pattern to an adult’s disease.

Encephalitis Lethargica

In 1916 in Europe, a clinical picture appeared characterized by fever, drowsiness, eye movement alterations, and abnormal movements, among other signs and symptoms. Constantine von Economo reportedly evaluated a substantial number of those affected by this condition and called it encephalitis lethargica. This epidemic spread worldwide until the mid-1930s. The clinical symptoms were initially nonspecific similar to a flulike state. The condition can occur in an acute form, which is characterized by the symptoms just described and is associated with high mortality. In addition, there is a chronic form that presents with parkinsonism, sleep disturbances, involuntary movements, and language disorders, among other symptoms. The cause of this disease remains unknown, and hypotheses, such as environmental and infectious causes, have been proposed.

In García Márquez’s description of the insomnia plague, there is no fever, no mortality, and no motor symptoms, and, contrary to the drowsiness that occurs in this encephalitis, in the insomnia plague, the characteristic symptom was the complete absence of sleep. Interestingly, encephalitis lethargica has an epidemic behavior like the insomnia plague.

Variant Creutzfeldt-Jakob disease

Variant Creutzfeldt-Jakob disease (vCJD) is a rare infection of the central nervous system caused by prions. It can affect various animal species including humans. The first cases were described in Germany in 1922 and are important in terms of public health because of their zoonotic variant and high mortality. This infection is characterized by rapidly progressive dementia and any of the following symptoms: Myoclonus, visual or cerebellar signs, pyramidal or extrapyramidal signs, and akinetic mutism.

Although vCJD is contagious, it occurs more frequently in cohabiting family groups, which suggests a genetic susceptibility. The symptoms of vCJD are not comparable with the clinical symptoms described by García Márquez because vCJD is clearly a rapidly progressive condition that triggers dementia and has varied neurologic symptoms, with high mortality, which was not the case in Macondo.

Neurocysticercosis

Neurocysticercosis is the infection of the nervous system by larvae of the parasite Taenia solium. Patients affected with this condition may exhibit various neurologic symptoms depending on the location of the larval cysts. Symptoms include seizures, illusions and hallucinations, catatonia, and cognitive disorders, such as amnesia. Some authors term this syndrome as “dementia due to cysticercosis.” This form of dementia can affect individuals of any age; early diagnosis is important because with proper medical treatment, it is a curable condition.

In the Caribbean Colombian region, where the imaginary town of Macondo was located, this condition is highly prevalent. Neurocysticercosis is acquired via contaminated pork, whereas in Macondo, the plague is dispersed throughout the village by...
the sweets prepared in the Buendía house. In neurocysticercosis, sleep disorders are unusual, whereas insomnia was a cardinal symptom in the plague. These differences render the diagnosis of cysticercosis as a possible cause of the insomnia plague unlikely.

**Fatal Familial Insomnia**

Fatal familial insomnia is an autosomal dominant genetic disease caused by a mutation in PRNP D178N, the prion protein gene.\(^{19,20}\) It was first described in 1986 and has been reported in more than 100 families. The clinical symptoms include insomnia, sleep fragmentation, an impaired consciousness state, sympathetic hyperactivity, and progressive cognitive impairment (memory impairment). To date, there is no treatment, and all cases lead to death within an average of 18 months.\(^{20}\)

Sghirlanzoni and Carella\(^{21}\) compared some of the characteristics of fatal familial insomnia with the clinical symptoms described by García Márquez. Their analysis, however, is more focused on the literary characteristics, which are not unique to this author but have been used in other great works of literature that employ different diseases as a narrative resource.

In the case of the Buendía family, the clinical symptoms of sleep disturbance and memory impairment are severe; however, there is no description of altered consciousness state or symptoms that suggest dysautonomia. Furthermore, the outcome is not fatal, as evidenced by the improvement of the population after the therapy offered by Melquiades.

**Semantic Dementia**

In 1892, Pick and Sérieux described a condition characterized by the asymmetrical atrophy of the frontal and temporal lobes. In 1975, Elizabeth Warrington\(^{22}\) described a group of patients with difficulty naming things but showed the preservation of grammar and language phonology, accompanied by atrophy of the frontal and temporal lobes. In 1989, Julie Snowden and colleagues\(^{23}\) called this semantic dementia. It is currently considered to be a semantic variant of primary progressive aphasia.\(^{24}\)

Semantic dementia is a condition whose clinical symptoms commence with difficulty naming objects, while the affected individual retains the ability to describe the use of the object, tone of voice, prosody, and memory. As the disease progresses, there is greater difficulty in naming objects, accompanied by impaired understanding; in addition, there are issues with reading and recognizing faces. The terminal state is characterized by a complete loss of communication, considerable changes in behavior, eating disorders, and ultimately death.\(^{25}\) In the initial stages, episodic and autobiographical memory are preserved, and rigidity of thought and apathy are typical.\(^{24}\) In more advanced stages, autobiographical memory is lost, and this seems to be associated with the semanticization of this information.\(^{26}\)

Rascovsky et al\(^{27}\) analyzed the insomnia plague in One Hundred Years of Solitude\(^{28}\) and proposed semantic dementia as a diagnostic possibility. The loss of the ability to name objects and write a list of words that serve as a guide to retain information is described in the article. Initial preservation of childhood memories is noted, whereas the most recent memories are lost. Despite important similarities between the characteristics of semantic dementia and the insomnia plague, insomnia should be noted as a cardinal symptom of the Macondo epidemic, as noted by Heilman\(^{29}\) in a commentary on the article by Rascovsky et al.\(^{27}\) In García Márquez’s story, the clinical symptoms have a contagious behavior and indiscriminately affect all age groups, whereas semantic dementia is a sporadic condition that mainly affects individuals older than 65 years.\(^{29}\)

The characteristics of forgetting words while maintaining the initial preservation of verbal expression, without grammatical errors, are consistent with semantic dementia in its initial stages. However, the progression of deterioration in the Macondo cases does not lead to the absence of language; on the contrary, it induces the inhabitants to search for alternatives, such as reading playing cards, to help structure new memories. Semantic dementia progresses toward death, whereas in the insomnia plague, the clinical picture of the population is reversed by Melquiades’ gentle-colored substance.

**Alzheimer disease**

Alzheimer disease is the most prevalent cause of dementia in the world. It constitutes a neurodegenerative disorder that progressively compromises memory and other cognitive abilities. It is characterized by the aggregations of Aβ and tau proteins in amyloid plaques as well as neurofibrillary tangles in the nervous tissue that are related to deterioration of this patients.\(^{30}\) Two forms of disease presentation have been described: Early-onset and late-onset. Early-onset Alzheimer disease usually is a phenotypic variant of nonfamilial neurodegenerative diseases with important clinical variability,\(^{31}\) or it can have an autosomal dominant inheritance.\(^{32}\) On the other hand, late-onset Alzheimer disease is multifactorial that includes genetic, environmental, and lifestyle factors. The late-onset form typically begins in the middle of the seventh decade of life and is the most frequent form.\(^{33,34}\)

At the beginning of the disease, the most characteristic symptom is forgetfulness. As memory deterioration becomes more evident, both spoken and written language and arithmetic skills are compromised. There is deterioration of visuospatial orientation, and as the disease progresses, apraxia appears. Motor skills are altered, and behavior is impaired. In terminal forms, there is global amnesia, mutism, akinnesia, and loss of sphincter control; in addition, there are associated dysautonomias and ultimately death.\(^{35}\)

Early-onset forms are noted in populations where inbreeding is frequent. In Colombia, in the Antioquia department (region), there is a family group with an extremely severe form of Alzheimer disease. It begins in the fourth decade of life, and patients show rapid deterioration\(^{36}\); this form of early-onset Alzheimer disease is frequent in this region of Colombia. The insomnia plague had no age preference, and children were also affected.

For the inhabitants of Macondo, memory loss begins with forgetting words, followed by the loss of childhood memories and the “notion of things.” However, forgetfulness does not progress completely. On the contrary, sufficient functions are maintained as the ill residents find a way to re-create or build new memories using various supports. Moreover, there is no deterioration of other functions, such as orientation or behavior. Additionally, in
the insomnia plague, all individuals with the disease recover their memory and do not progress inexorably toward death.

**Korsakoff Syndrome**

Korsakoff syndrome was described by Korsakoff and colleagues in 1889 in alcoholic individuals in whom a memory disorder developed, accompanied by apathy, a dreary mood, and confabulations. Declarative memory impairment is the main characteristic, with a greater compromise of recent memory and preservation of older memories. Semantic memory is preserved, but patients with this condition find it difficult to learn new semantic categories. Memory impairments that involve long-term and semantic memory lead to confabulations, which are defined as the mechanisms by which memory gaps are filled by the patient with facts, data and events, or general information, without the intention of deceit.

The syndrome is caused by thiamine deficiency, and although the main cause is the nutritional deficiency associated with alcoholism, it has been described in hyperemesis gravidarum, bariatric surgery, starvation, and AIDS, among others.

The insomnia plague does not seem to be a deficiency condition, and memory loss begins with forgetting the oldest of memories. Finally, it is important to note the compromise of the semantic memory. Among the inhabitants of Macondo, there is disease awareness, which causes them to activate quarantine procedures to protect those who are in the town temporarily. On the contrary, in the case of Korsakoff syndrome, recent memories are lost, and semantic memory is preserved. However, the resource of creating new memories from reading the playing cards could be a form of confabulation.

**SLEEP AND MEMORY**

Beginning in the last century, sleep started to be considered a fundamental component of memory consolidation. For a long time, it was thought that the rapid eye movement stage of sleep was the key factor. More recently, slow-wave sleep has been proved to influence memory consolidation. These conclusions were based on experimental studies. Molecular biology in the last decades has been useful for the understanding of the physiologic and neurochemical dynamics between sleep and memory.

Luria is reported to have defined memory as the recording, retention, and reproduction of the traces of experience that allow the accumulation of information. Memory is a fundamental biological function of human survival allowing us build our identity, store experiences, and relate to our environment.

Different classifications of memory have been proposed with respect to temporary acquisition (short or long term), cerebral location (dependent and independent of the hippocampus), and functional (declarative and nondeclarative) criteria. Studies in animal models and humans who present with nervous system lesions have allowed us to identify brain regions associated with memory. Some of these regions are the medial temporal lobe, corpus striatum, neocortex, amygdala, and cerebellum.

With the advances in neuroscience, some molecular pathways that are considered fundamental for learning and memory processes have been clarified. The brain-derived neurotrophic factor has been identified as a precursor for relevant genes within memory formation, because it promotes synthesis of the CREB protein. In studies in animal models in which brain-derived neurotrophic factor is blocked, results have demonstrated the inability to create new memories.

Sleep is a process of the nervous system that is regulated by the suprachiasmatic nucleus of the hypothalamus in a circadian manner. During the course of sleep, different phases can be identified that are regulated by multiple substances, which include melatonin, prostaglandins, and adenosine.

Multiple studies have been conducted regarding the benefits that sleep brings to memory, and it is considered to play a fundamental role in the consolidation of new memories. Results of research in university students undergoing sleep deprivation have been shown to generate consequences on academic performance, with worsened academic results. In addition, functional imaging studies showed that sleep deprivation causes a decrease in cortical activity in areas related to memory.

In recent years, an exclusive lymphatic system for nervous tissue called the glymphatic system has been described. This system has been attributed to toxin degradation during sleep. Findings of studies in animal models subjected to sleep deprivation have shown the accumulation of Aβ-amyloid plaques and other degradation products, which further results in mild cognitive impairment.

It has experimentally been proved that the storage of recent learning and attention levels, which are apparently not compromised in García Márquez’s characters, are altered because of insomnia. Chronic insomnia has other effects besides those related to memory, which include emotional issues and poor adaptive responses to stress. These aspects are not compromised in the inhabitants of Macondo, who, on the contrary, develop adaptive mechanisms that allow them to continue with their lives.

**CONCLUSION**

In the interviews with García Márquez that appear in *One Hundred Years of Solitude* is not based on any real event and is full of representations that only he and his closest friends understand. In this interview, he refers to the forgetfulness of the Colombian individuals. However, in this work, there are references to different historical events, such as the War of a Thousand Days or the Banana Massacre of 1928. The insomnia plague, according to García Márquez, is based on other literary works that explore the emergence of different plagues and communities’ reaction to them.

We analyzed the differences and similarities of different diseases proposed as a differential diagnosis for the insomnia plague. García Márquez’s insomnia plague is described as a unique clinical presentation that does not fully resemble any real-world disease (Table 1). However, it is interesting to note the close resemblance of García Márquez’s description of a sleep and memory disorder with the clinical disorders discussed in this article. The similarity of the descriptions relating to health and illness are so profound that this is not the first medical dissertation on García Márquez’s works.
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Table 1. The insomnia plague and its differential diagnoses

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<th>Infectious encephalitis</th>
<th>Encephalitis lethargica</th>
<th>Variant Creutzfeldt-Jakob disease</th>
<th>Neurocysticercosis</th>
<th>Fatal familial insomnia</th>
<th>Semantic dementia</th>
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