Malignant but not maleficent

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Malignant but not maleficent: acute leukaemia as a possible explanation of disease and death in vampire victims

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Summary/Short Abstract:
Tales about the terror of vampires were told for centuries, but could the tales be inspired by real-life patients? We hypothesise that descriptions of the victims reflect the same underlying disease and were real cases of untreated acute leukaemia. We study three vampire novels from 1819 to 1897, focusing on the victims and their symptoms. The courses of disease described in the three novels included in our study are very similar, indicating that the victims are suffering from the same disease. Many diseases are considered as an explanation of the symptoms; however none of them match as well as acute leukaemia.

Keywords: Dracula, Acute Leukaemia, Blood Disease, Legendary Creatures, Medicine in Literature, Thrombotic Thrombocytopenic Purpura/TTP
Abstract

Background – A considerable amount of research has been put into the explanation of the origin of the vampire myth by focussing on possible symptoms of the vampire, however very little attention has been given to the victims.

Aims – To elucidate whether the myth of vampire victims follows the course of disease seen in acute leukaemia.

Methods – We studied three classical vampire novels from 1819 to 1897, focusing on 8 victims and their symptoms. The novels were chosen based on their iconic status in the classic vampire literary, which defined the vampire genre and the symptoms of the victims for many years. The symptoms and course of disease following vampire attacks described in the chosen novels were then compared to symptoms commonly seen in untreated acute leukaemia and other contemporary disorders.

Results - The earliest novel (1819) did not provide a sufficient description of any symptoms in detail, however the later novels (1872 and 1897) both provided elaborate portrayals of symptoms and course of the disease. The patients studied were all factitious - explaining the variation in symptoms, however they share common features. One case, a young woman named Lucy Westenra, described by Bram Stoker, 1897, mirrors a textbook example of an acute leukaemia patient – despite being described before the time of common acknowledgment of the diagnosis.

Conclusions - Victims in the gothic vampire novels from the 19th century could very likely be inspired by real life acute leukaemia patients.

Introduction

In the 19th century, many stories were told about how vampires spread night terrors and left a trail of death [1]. A considerable amount of research has been put into the explanation of the origin of the vampire myth by focussing on possible symptoms of the vampire [2-6]. However, much less attention has been given to the victims of vampire assaults. This, combined with increasing focus on putting patients first in research and clinical care made us look at the victims, rather than the mythical creature [7, 8]. We studied three vampire novels, focusing on victims of the vampires and extracted symptoms leading up to the death of the victims, investigating if an underlying disease was the common reason for their symptoms.

To the best of our knowledge, this is the first attempt to focus on the patient for a natural cause rather than scrutinising the mythological vampire creature for pathology.
Hypothesis
We hypothesise that descriptions of the victims reflect the same underlying disease and were real cases of untreated acute leukaemia – a disease not yet commonly acknowledged as a diagnosis at the time [9]. Our hypothesis states that the victims were suffering from a genuine disease, and that the descriptions of the symptoms were to be taken literally. We also hypothesise that the number and details of symptoms would be increasing from the earliest to the latest novel, as the medical understanding developed, and as acute leukaemia was studied and finally acknowledged as a diagnosis in the end of the 19th century [9].

Method
We examined three vampire novels published in 1819, 1872, and 1897, the Vampyre by John William Polidori, Carmilla by J. Sheridan LeFanu, and Dracula by Bram Stoker, respectively. The novels were chosen based on their iconic status in classic English gothic vampire literature, defining symptoms among victims seen in the later vampire literature, many years afterwards.

Using a hermeneutic approach, a data collecting sheet was created after an unconditioned exposure to one of the books (Dracula by Bram Stoker), to record all symptoms described in the novels. As we did not expect to find any descriptions of biochemistry in 19th century novels, we did not attempt to distinguish between subtypes of leukaemia. Next, we studied all three novels with attention to the details of symptoms and time span.

To test the hypothesis, symptoms found in the novels were then compared to the symptoms commonly found in various other diseases.

Results
All recorded symptoms among victims found in the books are listed in table 1. The list of symptoms is cumulative over time, but with core features of pallor and lethal outcome preserved in all three novels. Additional symptoms also seen in leukaemia: malaise, anorexia, fatigue, dyspnoea, fever and weight loss are preserved in Carmilla and Dracula. The most elaborate picture of symptoms was seen in one of the victims in Dracula (table 1).

The Vampyre, 1819, by John William Polidori is the transition of vampires from folktales into the gothic vampire literature. It provides only short and undetailed anamnesis of the victims. One of the
victims, a young Greek woman, is described as having no symptoms after the vampire exposure, before her unexplained death. After death, she is described as pale with blood around her mouth and on her chest. In the novel, another death of a young English woman is mentioned, however no symptoms are described.

In *Carmilla, 1879*, by *J. Sheridan LeFanu* a rich description of symptoms among victims is provided. Three young women, two of whom are vampire victims, are described with very similar symptoms and progression of disease. The symptoms include persistent exhaustion, fever, pallor, dyspnoea, and chest pain. At least two of the girls note a red mark on the chest, presumably skin bleeding. The symptoms are increasing in both number and severity throughout the course of disease, lasting between six weeks and a few months. However, only one woman succumbed, after six weeks of illness.

*Dracula, 1897*, by *Bram Stoker* has defined the genre for more than a century. The cardinal victim is a young woman, Lucy Westenra, who has previously suffered from anaemia. Her course starts with malaise, paleness, repeated infections, and increasing fatigue. She develops two persisting red marks on her neck, but she quickly deteriorates, with headache and confusion and even becomes delirious. Lucy is described as “bloodless” by three people, two of whom are doctors, and she is therefore given four blood transfusions with subsequent immediate improvement. Many of the symptoms repeatedly go into remission, only to return after few days. Lucy succumbs after 42 days of illness.

Another young woman, Wilhelmina Murray, and a young man, Jonathan Harker, are described with symptoms mimicking Lucy’s. All shared the same features and all are described as pale, with malaise, fatigue, anorexia, and suffering from dyspnoea and weight loss. The trance-like or delirious state in the final stage of Mrs. Murray’s course mirrors the cerebral affliction in Lucy’s disease. Mrs. Murray’s and Mr. Harker’s symptoms are, however, generally vaguely described and nonfatal.

**Discussion**

The vampire novels all shared common symptoms and course of disease – death and pallor are seen in all novels, and victims from *Carmilla* and *Dracula* exhibit extensive overlap of symptoms. This is in concordance with our hypothesis that symptoms were caused by the same underlying disease. The number and complexity of symptoms increased from the earliest to the latest novels, with the greatest increment from nearly no symptoms in *The Vampire* to the elaborate description in *Carmilla*. This correlates with the large time span from 1819 to 1879 and the concurrent advances in medical
knowledge. The description of Lucy Westenra’s symptoms in the latest novel, mirrors a textbook description of symptoms among patients with acute leukaemia (AL) [10, 11].

However, the symptomatology described in the novels can also be seen in other disorders, some of which were acknowledged at the time of publication:

- **Tuberculosis** (TB) is characterized by a deteriorating course of disease and many symptoms similar to those experienced by vampire victims. However, TB was a well-known disease at the time of the publication of *Carmilla* and *Dracula*, as it was finally described in 1839 [12]. The victims, who are described with a fatal course of disease in the vampire novels, all die within a few weeks, a progression much too fast to fit the natural course of TB [10]. Some of the victims are seen by doctors, none of whom recognise the disease. Most doctors would have recognised TB, at least in 1872-1897, making it very unlikely that the victims would have suffered from TB.

- **Diphtheria** is, like TB, characterized by some symptoms similar to those experienced by the victims. However, neither the cardinal patches in the mouth and throat, nor coughing, are described in any of the vampire victims. Also, the natural course of diphtheria does not match the duration described in the novels. Patients suffering from diphtheria often die much sooner than the vampire victims in the novels [10]. Diphtheria was named and given its final definition in 1826 and has distinct features, which do not fit the symptoms described in the novels [10, 13]. Consequently, it is unlikely that doctors - real or fictional - would not have recognised diphtheria as a deadly, but well known disease at the time.

- **Pellagra** has been proposed as a cause of the symptoms of the victims or as an explanation for the vampire [3, 14]. However, the symptoms do not fit the classic presentation of pellagra, as there is neither dermatitis or diarrhoea, nor Casal’s necklace. Furthermore, the anaemia associated with pellagra is usually mild. Pellagra was described as far back as 1735 and was well-known in the 19th century, making it very unlikely for a doctor to overlook this disease [10]. As pellagra is also associated with malnutrition, it is unlikely that the women in the novels, all wealthy, could develop lethal pellagra in a few weeks.

- **Anaemia** may give rise to symptoms partly mimicking those of the vampire victims. However, anaemia was a recognised disease entity at the time of the novels [15]. But before the 20th century, anaemia was considered to be a disease in its own right, with a distinct set of symptoms. The symptoms are compatible with severe sideropenic anaemia, although the link to iron deficiency was first made in 1902 [15]. None of the victims were diagnosed with anaemia in a contemporary understanding of anaemia, although most of them were seen by doctors.
Lucy, in *Dracula*, is specifically mentioned to be bloodless, but *not* anaemic, probably because she does not have symptoms associated with severe iron deficiency, which in addition would require longer time to evolve. Furthermore, Lucy is described to have suffered from anaemia earlier in life, emphasizing that this fatal malady is something new. Therefore, it is unlikely that this well-known disease entity at the time would be confused with a hitherto unknown disease.

- **Thrombotic microangiopathy such as thrombotic thrombocytopenic purpura (TTP)** and the disease described in the victims in the novels share many symptoms, e.g. the pallor, fever, skin bleeding, anaemia and cerebral affections [16]. Untreated, the patients suffering from TTP would deteriorate and die sooner than described in the vampire novels [17]. The lack of microscopic descriptions of the blood of the victims make it difficult to completely rule out TTP, but circumstantial evidence makes it unlikely. The frequent use of blood transfusions in *Dracula* and the subsequent uniform improvement in Lucy’s condition is expected when using whole blood transfusion, which provides both red blood cells and plasma, correcting both anaemia and ADAMTS13 deficiency. However, platelets in the blood product could also exacerbate thromboses in TTP all together making this differential diagnosis unlikely.

- **Acquired bleeding disorders such as immune thrombocytopenia** also share some features seen in the disease allegedly caused by vampires. However, neither muscle or joint haemorrhages nor profound skin bleedings are described in the vampire novels [18]. Other symptoms, such as the CNS affections or the effect of the repeated transfusions as seen in *Dracula*, make a bleeding disorder a highly unlikely explanation to the disease described in the vampire novels. Furthermore, the rapid progression of the disease, the pallor, the exhaustion, the anaemic symptoms and the fever are also evidence against a bleeding disorder.

- **Myelodysplastic syndrome (MDS)** shares many features seen among vampire victims. *MDS and acute leukaemia* (AL) are hard to distinguish, especially without biochemical tests. Furthermore, MDS can evolve in to AL [11]. The prognosis for AL is worse than the prognosis for MDS, and untreated patients usually survive only a few months [11]. The short span from onset of symptoms to death makes MDS an unlikely match for a common explanation. However, MDS preceding AL could explain why some of the victims survive for longer periods of time despite their similar course of disease. The frequency of blood transfusions – every few days – fits the assumption of an extinguished haematopoiesis, which may be seen in MDS after a longer time span, whereas it is not uncommonly developed “overnight” in AL [11]. This and the short course of disease make MDS an unlikely cause.
All the novels provide descriptions indicating that victims could have been suffering from AL. The symptoms are comparable with distinctive features common to AL, however, still holds features from the mythical characteristics of a vampire. Medical science evolved significantly from 1819 to 1872, which explains the more elaborate descriptions of symptoms in the later novels.

The pathological picture of the three victims described in Dracula matches the common symptoms of AL. Although not all victims suffer from the same symptoms, they all share pallor, malaise, fatigue, dyspnoea, and weight loss (table 1). Especially the descriptions of the symptoms in Lucy are alike the course of disease in AL. The other victims share some symptoms with Lucy, although more vaguely described. This supports that they could all be descriptions of acute leukaemia patients added some artistic liberties in the survivors. It is indeed very likely that the victims in Dracula were inspired by a real-life patient, as Bram Stoker’s brother, Sir William Thornley Stoker, was a famous brain surgeon at the time the novel was written. Bram Stoker had access to patients’ medical histories and discussed the medical part of the novel with his brother [19]. Therefore, Bram Stoker presumably also had access to information about patients, which could have become the inspiration for Lucy’s disease. This could also explain the elaborated descriptions of the CNS affections, which Lucy is suffering from. As especially Acute Lymphoblastic Leukaemia can give rise to CNS infiltration and cerebral symptoms, which would have brought the patients into Sir William Thornley Stoker’s care or attention.

Conclusion

The courses of disease described in the three novels included in our study are very similar, and none of the other diseases considered matched as well as AL. We therefore conclude that real-life acute leukaemia patients, very likely were the inspiration for the symptoms of victims in the gothic vampire literature.
Table 1: The table shows cumulated symptoms mentioned in the novels and which symptoms the victims were suffering from. The timespan written in Bertha and Lucy’s columns describes the length of the disease until the victims succumb.
A yellow (Yes) means that the description is too vague for a certain interpretation.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>The Vampyre 1819</th>
<th>Carmilla 1879</th>
<th>Dracula 1897</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mrs. Aubrey</td>
<td>Ianthe</td>
<td>Bertha</td>
</tr>
<tr>
<td>Death</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (6 weeks)</td>
</tr>
<tr>
<td>Pallor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Malaise</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lack of appetite</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chest pain</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fever</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Skin changes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>(red marks)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervousness</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Anaemia</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Tremor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Apathy</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
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<tr>
<td>Neck pain</td>
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<td></td>
<td>Yes</td>
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<tr>
<td>Dilated pupils</td>
<td></td>
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<td>Yes</td>
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<tr>
<td>Headache</td>
<td></td>
<td></td>
<td>Yes</td>
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<tr>
<td>Confusion</td>
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<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Weight loss</td>
<td></td>
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<td>Yes</td>
</tr>
<tr>
<td>Sore throat</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Restlessness</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Cerebral affection / Deliria</td>
<td></td>
<td></td>
<td>Yes</td>
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<tr>
<td>Depression</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Infections</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Haemorrhagic diathesis</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Bradycardia</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Amnesia</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Compliance with Ethical Standards

Conflict of interests:
CWM, and DLH love vampire tales. CWH and HF are consultant haematologists and DLH haematologist in training, which may have biased the interpretation of symptoms. Beyond this:
ST declares that she has no conflict of interest.
CWM declares that he has no conflict of interest.
HF declares that he has no conflict of interest.
DLH declares that he has no conflict of interest.

Ethical approval:
Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Given the retrospective nature of the study, for this type of study, formal consent is not required.

Informed consent: Informed consent was not obtained, as all persons described are factitious literary entities.
References

13. Bretonneau, P., *Des inflammations spéciales du tissu muqueux, et en particulier de la diphtérite, ou inflammation pelliculaire, connue sous le nom de croup, d'angine maligne, d'angine gangrèneuse, etc. 1826.