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Morgellons as a Somatopsychic Disorder with Organic Etiology

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Morgellons Disease (MD) is a multi-system disorder with a primary symptom characterized by the emergence of tiny, multicolored fibers from the skin. A study conducted in Northern California led the Centers for Disease Control and Prevention to not recognize MD as a separate diagnosis. The study involved 115 patients with MD-like symptoms. The researchers conducted interviews, analyzed patients' blood and urine, and studied skin biopsies, but they failed to find a correlation between MD and any infectious or environmental cause. The study concluded that MD was more like a delusional disorder.

The purpose of this review is to evaluate the said study and describe the limitations and biases therein. This includes lack of a comparison group, sampling bias and problems in analyzing the results. The review will also highlight why MD should be considered a separate multisystem condition with an underlying pathology based on evidence from more recent studies.

Keywords: Morgellons Disease; Centers for Disease Control and Prevention; Delusional Disorder; Borrelia burgdorferi.

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1. INTRODUCTION

Morgellons Disease (MD) is characterized by the presence of multicolored filaments under the skin [1]. The filaments resemble textile fibers and appear in different colors. Commonly reported colors include black, red, and blue (Fig. 1). In addition to that, patients report experiencing formication, which is an insect stinging sensation. The symptoms, however, are not limited to skin only. Patients present various systemic manifestations, including fatigue, cardiac complications, joint pain, and neuropathy [1]. Therefore, etiology of MD could be multifactorial.
MD has a worldwide distribution and it had over 14,000 self-reported cases in 2009 [2]. It was first reported in 2002 in the United States, but it might have a longer history than that. For instance, it resembles some of the characteristics of bovine digital dermatitis (BDD). BDD is an infectious disease of cattle, which spread throughout US, Europe and Australia in the 1970s. However, BDD and MD was treated in very different ways by the medical community as BDD was subject to extensive scientific investigation by researchers. Conversely, the medical community had a very negative attitude towards MD [2].

Since it was first reported, many doctors and scientists denied discovering any underlying etiologies causing the symptoms. Instead, they ignored the facts and considered it as just a mental illness and often blamed the patient. This behavior is irresponsible as a patient cannot be declared "delusional" without an appropriate psychiatric evaluation. Moreover, not finding an etiology does not necessarily mean that it is absent but merely that the researchers could not find it.

A delusional or psychotic disorder is a severe mental illness where the patient cannot differentiate between reality and imagination [3,4] The patients usually report seeing something that is not real, but they have a fixed belief that it is reality. It is generally diagnosed by excluding other conditions, and they will be referred to a psychiatrist if the doctor finds no physical reason for the symptoms. The psychiatrist will then use different assessment tools to evaluate the patient [3]. MD patients also provide physical and photographic evidence of the fibers, ruling out delusions as a definite possibility.

As mentioned before, the study done by Centers for Disease Control and Prevention (CDC) does not link MD with any etiological agent, but this might be due to the limitations of the study. Therefore, this review will discuss the significant limitations and biases of the study in detail. These include lack of a comparison group and biases in sample selection and analysis of the results.

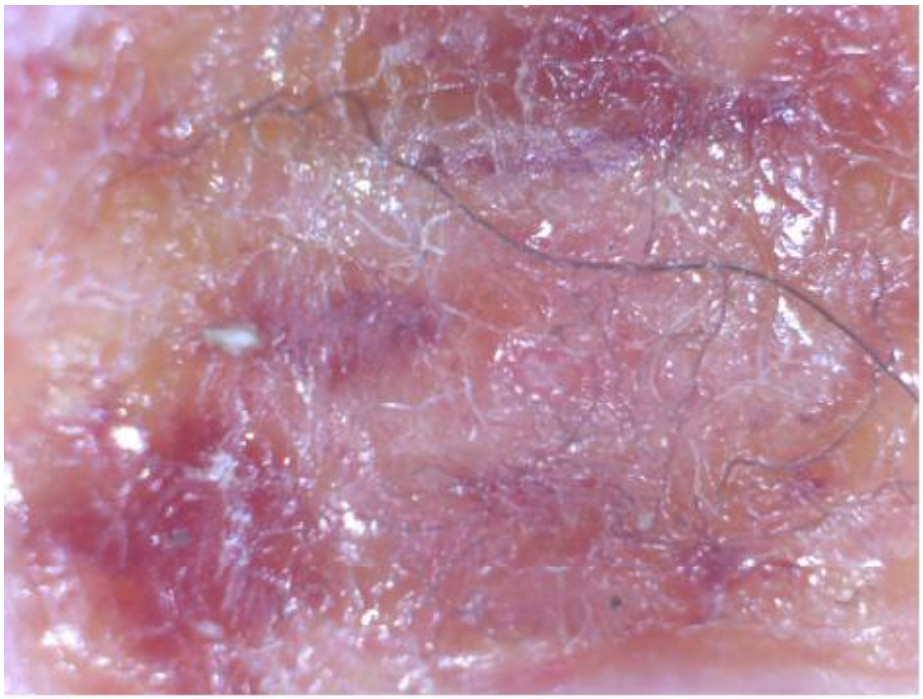

Fig. 1. Embedded blue and white filaments in a MD patient

2. LACK OF A COMPARISON GROUP

In the study conducted by the CDC, they searched for enrollees from the Kaiser Permanente of Northern California (KPNG) from July 2006 to June 2008 [5]. KPNG is an American care consortium with over 3.2 million enrollees in 2006. First, a case was defined as a patient who reported seeing any fibers along with a skin lesion or a disturbing sensation. One hundred fifteen patients matching case definitions were identified, out of which 104 patients were identified using the electronic health records. Table 1 summarizes the age and sex of the patients selected. They were then interviewed, and their blood tests, urine tests, and skin biopsies were performed. Researchers analyzed the results, but they found no underlying cause for the MD symptoms. Hence, it was concluded those patients were more likely to have a psychiatric disorder.

However, one of the major problems with this cross-sectional study is that it did not have any comparison groups. In a scientific study, a comparison group is a group with which the experimental group's results are compared [6]. For example, the study could have selected enrollees of KPNG who were already diagnosed with a mental disorder, or any other condition suspected to be related to MD. The comparison and experimental group should be treated in the same way. That would mean conducting the same interviews with the same questions and analyzing the results in the same way. However, the team studying the results should not know to which group the patient belongs to avoid any bias in the results.

A comparison group allows the researchers to make a fairer comparison among the study participants [7]. For example, if the CDC study included patients diagnosed with a mental disorder, they might have found significant differences between MD and delusional disorders, whereas if it included patients diagnosed with a disease similar to MD, they could see similarities between MD and the concerned disease. Therefore, the failure to use a comparison group makes it difficult to draw meaningful conclusions from the study.

A study with a comparison group was conducted four years later in San Francisco, California [8]. The study's primary objective was to establish a case definition for MD as patients continued to be declared delusional after the CDC study. The new study was retrospective in design, and 122 patients who reported subcutaneous fibers were identified. Then the clinical characteristics of the patients were evaluated and compared with patients diagnosed with Lyme disease. The study found that 96.8% of the patients had a positive test or were clinically likely to have a *Borrelia burgdorferi* infection. It also found that MD patients were distinct from delusional disorders in terms of demographics and symptomatology. Compared to the CDC study, this new study was more reliable as it involved a slightly larger population and had both an experimental and a comparison group.

3. SAMPLING BIAS IN THE STUDY

Another problem with the CDC study is that it had a bias in sample selection. During the selection process, they searched the electronic health records of the KPNG enrollees with specific keywords as shown in Table 2 [5]. Unfortunately, one of the keywords they searched for is the word "delusion." Researchers also limited the search to certain clinic visits, one of which included psychiatric visits. This decision presents a considerable problem as it could mean the patients selected may already have a mental illness; it also throws the reliability of the entire study into question as the chosen patients were more likely to present with the psychiatric symptoms.

Several measures could improve the sample selection process in this study. First of all, they should have selected patients with subcutaneous fibers but were not considered or diagnosed with a delusional disorder. Second, if they wanted to include patients with delusional disorders, those patients should be split into a separate group, as mentioned in the previous paragraph. This would remove the bias in the sample population and increase the confidence and reliability of the study.

Furthermore, the search for patients amongst KPNG was limited only to 5 different types of clinic visits. Although they mentioned KPNG had 3.2 million enrollees, limiting the search to only 5 categories would exclude many potential case-patients. This would also mean only a limited number of enrollees of KPNG had the chance to be a part of the study. MD is a multisystem disorder, so there could be patients matching the definition of MD in the clinic visits not covered by the study.

Table 1. Age and Sex-specific prevalence rates of the patients identified (*Rate per 100,000 enrollees)

	No. of Enrollees	No. of cases	Rate* (95% CI)
Total	2,850,606	104	3.65 (2.98, 4.40)
Sex			
Female	1,469,118	79	5.38 (4.26, 6.70)
Male	1,381,488	25	1.81(1.17, 2.67)
Age group			
<18	685,918	1	0.15 (0.004, 0.81)
18-44	1,007,843	21	2.08 (1.29, 3.18)
45-64	801,267	65	8.11 (6.26, 10.34)
>=65	355,568	17	4.78 (2.79, 7.65)

Table 2. Keywords searched, and types of clinic visits covered during the selection process

Keywords searched	Type of visits covered
Morgellons	Dermatology
Fiber	Psychiatry
Thread	Infectious Disease
Fuzzball	Pediatric
Dots	Primary care
Specks	
Granules	
Delusion	

It should also be noted that the CDC study was limited only to California. Since MD is not very common, they could have included other states of the US as well, which will help identify more patients and increase the sample size. Although extensive sample-sized experiments require more comprehensive financial and time commitments, they help ensure the reliability of the results. They also help to sweep out any outliers in the sample [9].

4. BIAS IN ANALYZING THE RESULTS

The CDC study had problems in analyzing the results as well. The patients reported a wide range of multisystem complaints [5]. But despite this, they failed to find any infectious or environmental agent that might have been responsible for the symptoms and considered the patients to be delusional. According to WebMD, patients with delusional disorders do not have multisystem symptoms [3]. Their main symptoms include non-bizarre delusions and hallucinations, which are lacking in MD patients. This evidence further suggests MD and delusional disorders are different.

The study also mentioned that the crawling sensation reported by the patients could be a side effect of a drug. If the side effect is suspected of causing symptoms, researchers should take a complete drug history from the patients. That would involve studying the types of medications used, frequency, dosage, and side effects. However, clinicians did not do this in the study. Therefore, it is unfair even to consider such a correlation. The study also used a hair-based drug test to determine if the study subjects were under the influence of mind-altering substances, which is faulty because hair drug tests can provide positive results years after patients used the drugs.

The laboratory investigation of the study found evidence of gram-positive bacteria in 19 specimens. PCR testing confirmed the bacteria in six specimens as *Streptococcus pyogenes (1)*, *Staphylococcus aureus (11)*, and *Streptococcus sp. (7)*.Considering there were only 115 patients, 20 is a significant number as it represents 17.4% of the population, and therefore, it should be considered before concluding the study. However, researchers ignored it.

Furthermore, one patient had a positive Enzyme-linked Immunosorbent Assay (EIA) for *B. burgdorferi*. Although finding evidence of bacteria in only one patient is not strong enough to establish a correlation, this might be due to the limited technology available at that time.

A recent study done in North America in 2015 confirmed the association between MD and

Borrelia spirochetes, the causative agent of Lyme Disease [10]. The study involved 25 patients who reported seeing fibers or filaments visible under the skin. Various laboratory tests including molecular testing, culture, immunohistochemistry, and polymerase chain reaction (PCR) were done on the patient samples. The study found evidence of *Borrelia* strains in 24 patients [10]. Another recent study done in Australia involving 500 patients reported that 6% of LD patients had signs and symptoms of MD [11].

Researchers and clinicians should also note that many patients in the study reported using topical or systemic medication to alleviate their symptoms. However, no drug effectively relieved the symptoms meaning the organism responsible for MD may have been unknown or untraceable to clinicians at that time, but this possibility was also not considered in the study.

5. CONCLUSION

The sad reality is that some doctors and scientists still consider MD as a purely psychiatric disorder. The main reason for this is that the study in question, carried out in Northern California, led the CDC not to recognize MD. However, Kaiser carried out the study 13 years ago, and it had many limitations, as has been discussed in the review. Hence, academics cannot accept the results of the study. Additionally, more recent thorough studies are now available, which the researchers and clinicians should prefer over the CDC study. The CDC recognizing MD as a psychosomatic disorder with underlying organic etiology would be a huge step forward for MD patients and researchers alike.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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