Case Reports and Reviews

Case Series

Phytotic Infections: An Emerging Medical Terminology With Similar Implications Like Zoonotic Infections

Kenneth Yongabi Anchang

Phytobiotechnology Research Foundation (PRF) Research Group, Imo State University State, Owerri, Claretian University Nigeria, Nigeria

Correspondence

Kenneth Yongabi Anchang

Phytobiotechnology Research Foundation (PRF) Research Group, Imo State University State, Owerri, Claretian University Nigeria, Nigeria

- Received Date: 19 Jan 2025
- Accepted Date: 28 Jan 2025
- Publication Date: 30 Jan 2025

Keywords

Phytotic infections, Phytotics, Phytoses, Immune suppression, environment, altered, habitats.

Abstract

Background: *For the first time in the history of medicine and public health, we observed some clinical situations where a parasitic infection on a plant infects humans and other animals and vice versa and is unfamiliar in medicine and plant pathology nor in veterinary medicine. We noted that this is similar to the kind of situation where diseases from animals are transmissible to humans and versa, but in this situation, transmission is between plants and humans and vice versa. The medical description we termed as Phytotic Infections and we copyrighted (LW14008) and trademarked 29680 in Africa, as a novel medical term. This is similar but in sharp contrast to a well-known medical concept of Zoonosis in which an infection from an animal infects humans and vice versa but in phytotic infections, certain conditions such as immune suppression occur to enhance or trigger trans kingdom transmission while in zoonotic infections, immune suppression is not a clinical obligation.*

Purpose: *We detailed clinical cases from patients suffering phytotic infections exhibiting trans-kingdom transmission of infection from plants to humans and vice versa -a phenomenon that exist and has not been considered in medical studies. In this case, unlike in zoonosis, this infection from plants to humans and vice versa, only occurs with conditions where the human is in an immunosuppressed situation or change in habitat due to climate change.*

Methods: *A mixed study methods was employed based on clinical observations, clinical lived experience with patients, bacteriological and mycological laboratory as well as molecular diagnostic tools were employed. Four clinical cases of patients in different immunocompromised situation were carefully studied; A leukaemia patient, diabetes situation and two clinical cases of HIV/AIDs were under studied, clinically.*

Result and Conclusion: *A first line generic observation is that without immunosuppression and altered environmental conditions, phytotic infections in the way defined here, may rarely occur. Previously, Phytosis-phytoses in dictionaries has been defined as an infection of a plant with or a disease caused by parasitic fungus which is aptly referred to as phytopathology, as well as dermatophytosis where a fungus from animals infects humans but hasn't defined whether, from humans the same fungus can infects plants and other animals. In our study, Phytosic and in plural Phytotics- is defined for the first time a new phenomenon in medicine orchestrated by change in environmental conditions and immune suppression in humans and other primates.*

Introduction

Phytosic infections are diseases caused by parasitic plants, such as a fungus (https://www.collinsdictionary.com/dictionary/english/phytosis. The word phytosis comes from the words phyto- and -osis. Phytosis is a type of infection caused by a vegetable parasite Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/phytosis. Accessed 10 Jan. 2025. Yongabi [1] posited that the etymology of the word phytosis in Wikipedia is, grossly, limited, confusing and delves more on dermatophytosis (https://en.wiktionary.org/wiki/phytosis). Now dermatophytosis is referred to as skin infection of humans and animals as a result of a fungal infection. Although dermatophytosis has been exclusively referred in clinical microbiology and dermatologist spheres as skin infections due to fungi, certain bacterial infection and other infections such as *lichen planus* can also be the etiology of dermatophytosis as described by Yongabi [1] Botanists still, arguably, refer bacteria as plants, and by such contentious posits, dermatophytosis would, literally, mean a plant like infection of the skin, and going by the strength of botanists as an etiology of dermatophytosis [1-3]. Akin to this, a number of skin fungal and bacterial

Citation: Anchang KY. Phytotic Infections: An emerging medical terminology with similar implications like Zoonotic Infections. Case Rep Rev. 2025;5(1):06.

infections from animals do infect humans and are considered zoonotic - cases of strains of the etiology of streptothricosis or *Dermatophilus congolensis*, a cattle disease in the family of *Norcadia* can also infect humans in certain rare conditions [3,4] However, Yongabi et al [1,2,3,4,5] observed that none of the literatures nor any clinical infectiology books and medical practice has referred a case where a fungal or bacterial infections originating from plants infect humans and from humans infect the plant tissues or cells or contaminate plants and cause disease or deterioration. This is beyond the spheres of dermatophytosis as noted by Yongabi [1,4]

In medicine, the previous concept of phytosis, a disease which is caused by a vegetable parasite, for example a fungus (https://www.thefreedictionary.com/phytosis) according to Merriam-Webster.com, Collins English Dictionary, Wordnik, Wiktionary, Dictionary.com and Medical dictionary. The above definition sticks onto a disease cause by vegetable parasites on humans [1-7] In this same direction, plant pathologists have, exclusively, looked at diseases of plants under phytopathology, and to them phytosis is a disease cause by a fungus on plants [3-9] This is very limited understanding of the phenomenon of phytosis as first recoined by Yongabi and trademarked in 2024 in Nigeria. However, phytosis is seldom used in diagnostic plant pathology apart from the centralization as phytopathology, while in medicine a disease cause by a vegetable parasite on humans has generally been referred to as dermatophytosis or cutaneous and or systemic mycosis and the term phytosis is seldom used in medicine, but the concept phytosis being revealed in our study as we observed trans-kingdom infections from plants to humans and back to plants; from plants to other animals and back to plants and to humans [1,9-13]. This has been coined by Yongabi, 2024 and attention drawn to the Nigerian Government (LW14008) and trademarked 29680) and had been previously captured in the definition of phytobiotechnology which Yongabi in 2008 referred to as the founder and father of phytobiotechnology cited [1-3]. Phytosis -Phytoses expresses trans-kingdom migration of pathogens or microbes from one kingdom to another kingdom not traditionally known to habit. This is fueled by immunosuppression and climate change as observed by Yongabi in 2024.Mold fungi is the main organisms in phytosic and with the alteration of host, fungi become more invasive and adaptable [1,2,14-20]

In the one health and planetary health, the human interaction with the environment and animals has been definitive in the mainstream one health understanding [17-22]. Zoonotic diseases have been at the core but never had it been considered that phytosis plays a role in the one health phenomenon [23-34] In this study we report phytosis -phytoses, where an infection caused by a vegetable parasite from plants infects humans and from humans infect and or contaminate plants and vice versa.

Methodology and Study Area

A mixed study methods were employed at the Phytobiotechnology Research Foundation Clinic (PRF) in Cameroon, involving clinical controlled case studies and observation, laboratory culture studies and pathogen characterization at the PRF clinics and Laboratory [1,3,5,35-38]. The Phytobiotechnology Research Foundation clinics (PRF) in Cameroon is a registered medical research NGO (NW/GP/29/07/10856) in Cameroon mandated to develop and translates low-cost integrative medicine to solve pressing health and environmental problems, and to shift away from faulty conventional thinking. One of PRF's mandates is to provoke a culture of medical independence, in Africa, for a people who are basically with low health care infrastructure [1,3,7] PRF offers a variety of medical services including naturopathic, alternative and complementary clinic which provides 70% less cost of diagnosis for tropical endemic diseases for more than 50% of the rural populace of Africa, although domicile in Cameroon [2,4].

Ethical Clearance

In the research follow ups at PRF clinics in Cameroon, these researches were done both clinical and laboratory with ethical clearances (Ref.528/RA/NWR/RDPH/August 132104; Ref. CBC/DHS-L/14/2080, August 25, 2019 and renewed yearly up to 2022)

Clinical case study 1; Aspergillosis presentation as Phytotic infection.

A clinical case observation of with HIV with a CD4 count less than 50 cells/ml and a very high viral load (above 30,000) reported at the Phytobiotechnology Research Foundation Clinic, reported to our clinic with a persistent respiratory problem. The patient had met with his doctor who prescribed the requisite antibiotics (Erythromycin and Ampicillin/cloxacillin) and the patient took the prescribed dose but with no clinical and therapeutic benefit. The doctor advised the patient to continue on the prescribed antiretroviral drugs. We did a re-assessment and to trace the origin of the problem and observed it was due to eating infected tomatoes salad with a mold according methods described previously [1,2,3]. With worsening situation, we decided to take sputum from the patient and cultured bacteriologically on Nutrient and blood agars and mycologically on potatoe dextrose and sabauraud dextrose agars as described by standards protocols [12,14,23] and observed no bacterial isolates, yet we isolated *Aspergillus fumigatus*. A contact tracing to his home where we collected samples of the tomatoes decayed that the patient took as salad mixture with, we isolated *Aspergillus fumigatus*, consistent with the isolate from the sputum. We now took fresh tomatoes with no infection, surface sterilized it (Koch postulate) and inoculated the isolate from the patient and another with the isolate from from the infected tomato salad [32] The fresh uninfected tomatoes both express the growth of the *Aspergillus fumigatus* similar to each other. The *Aspergillus fumigatus* isolate from the patient, the tomatoes at home and the inoculated isolate on fresh tomatoes from both patient and tomatoes from yielded *aspergillus fumigatus* with same growth characteristics. The molecular characteristic of all the isolates of *Aspergillus fumigatus* at 18sRNA as a marker all the isolates to have 29.4Mb genome size with 335 genes per Mb [32-34]. We didn't disclose to this result immediately to the patient, the patient continued to eat his tomatoes salad and the symptoms continued but the children who were none HIV positive and healthy never had any infection from the tomatoes. At the end of the tracing, the results were disclosed to the patient and the doctor and the patient was treated with ketoconazole antifungal drug and was completely healed.

This indicated a case of *Aspergillus fumigatus* a vegetable parasite that infected the patient and the isolate from the patient infected fresh tomatoes, but the healthy children who ate the tomatoes salad had no symptoms of the disease. This condition where the vegetable parasites infect both human from huma infect plant or contaminate the plant and vice versa is referred as phytosis-phytoses as described in phytobiotechology research

by Yongabi [1,2] This is similar to zoonosis where a disease from an animal infects human and vice versa, but in the case of phytosis differs in that Phytosis occurs with a compromised or situation with underlying health factors.

Clinical Case study 2: Geotrichosis presenting as Phytotic Infection

A clinical case observation of case 2 was the wife of clinical case 1 also presenting with HIV with a CD4 count less than 100 cells/ml and with a rather undetectable viral load reported at the Phytobiotechnology Research Clinic, Cameroon in 2020, suffered abdominal problems due to eating infected tomatoes salad, she had no respiratory complains as the husband in clinical case 1. The patient had met with a doctor who suspected typhoid fever and dysentery, the prognostics by the doctor was typhoid and *Entamoeba histolytica* which are endemics in Africa, so the physician prescribed the requisite antibiotics which were metronidazole (flagyl 500mg) and Amoxicilline (500mg) and the patient took the prescribed dose but with little clinical and therapeutic benefit. With continuous complaint of dysentery, the physician prescribed Imodium and increased dosage of antiretroviral drugs. However, we decided to take stool from the patient and cultured bacteriologically and mycologically as in clinical case 1, we observed no bacterial isolates [2,33], yet we isolated *Geotrichium candida*. We also observed that the stool was semi formed and charcoal in colour, which the physician had previous suspected hemorrhage or use of hematinic. None of this turn out to be true. A contact tracing to his home where we collected samples of the tomatoes-lettuce salad that the patient took salad with, we isolated also Geotrichium candidium. We now took fresh surface sterilized tomatoes and lettuce (Koch postulate) and inoculated the isolate from the patient and another cohort from the decaying tomatoes to which we previously isolated the fungi, The fresh uninfected tomatoes and lettuce both expressed the growth of the *Geotrichium candida* similar to each other. We didn't disclose to the patient, the patient continued to eat his tomatoes salad and the symptoms continued, until at the end of the tracing where we disclosed to both the patient and the doctor. The patient was treated using ketoconazole.

This indicated a case of *Geotrichium candida*, a vegetable parasite that infected the patient and the isolate from the patient infected fresh tomatoes, but the healthy children who ate the tomatoes salad had no symptoms of the disease. This condition where the vegetable parasites infect both humans and plants and vice versa is referred as phytosis-phytoses

Clinical Case study 3: Aspergillosis not only opportunistic infection but Phytotic infection

A clinical case observation of case 3 was a case of lymphatic leukemia patient heavily on chemotherapy at Laquintini Hosptal in Douala, Cameroon, in 2021, presented at our clinic in an exit poll, opting to be placed on food supplements at the PRF clinic. We noted that despite being on Hydroxyurea and other cohort of chemotherapies, the total white blood cell counts could only drop from millions to thousands of cells per ml of blood. The patient presented with a dry cough and with white coated tongue suggesting yeast infection. From the sputum, we did a direct Potassium hydroxide (KOH) smear and observed budding yeast and spores of fungi, A mycological culture yielded *Candida species* and *Aspergillus* spp. We decided to find out if the patient salads, vegetables etc, which she accepted. However, we took the isolated strain of the *Aspergillus* spp and inoculated into fresh sterile tomatoes and cabbage which was the composition of the salad the patient had eaten, and sprayed also on a field with cabbage and after two weeks, we observed spores of *Aspergillus* on tomatoes and we also isolated *Aspergillus* spp from the field cabbage. We concluded that the *Aspergillus* from the immune suppressed patient with leukaemia infecting plants and to which the patient eats cabbage and tomatoes clearly shows a case of Phytosis-Phytoses.

Clinical Case study 4: Oral candidiasis Aspergillosis complex presenting as Phytotic Infection.

A clinical case observation of case 4 was a case of type 2 diabetes with a diabetic foot ulcer at a clinic at Anambra state in Nigeria in 2022, presented at our clinic in an exit poll, opting to be placed on food supplements at the PRF. We noted that despite being on cohort of chemotherapies including insulin and metformin The patient presented with a white coated tongue suggesting yeast infection. Working with the family doctor, we collected a buccal swab we did a direct potassium hydroxide (KOH) smear and observed budding yeast and spores of fungi, A mycological culture yielded *Candida species* and *Aspergillus* spp. We decided to find out if the kind of plant-based food the patient eats frequently, vegetables, eggplant, tomatoes, salad etc., which he accepted. We also took swabs from the wife and person in the family where they eat the same foods, no isolate of *Aspergillus* from the family members. We isolated candida from the wife. However, we took the isolated strain of the *Aspergillus* spp and inoculated into fresh sterile tomatoes, and fufu – a common cassava-based meal and after two weeks, we observed decayed of tomatoes caused by *Aspergillus* and we also isolated according to methods previously described [2,3,34] We concluded that the *Aspergillus* from the immune suppressed patient with diabetes type 2 infecting plants and to which the patient feeds on clearly shows a case of phytotic infection.

Conclusion and Recommendation

Phytotic infections are defined for the first time a new phenomenon in medicine and public health orchestrated by change in environmental conditions and immune suppression in humans. Without immunosuppression and environmental conditions, transmission and spread of phytotic diseases, in the way defined here, may rarely happen, this sharply contrast with zoonotic infections where a disease is transmitted from animals to humans and vice versa, irrespectively of immunosuppressive condition. Previously, Phytosis-phytoses in dictionaries has been defined as an infection of a plant with or a disease caused by parasitic fungus which is aptly referred to as phytopathology, as well as dermatophytosis where a fungus from animals infects humans but hasn't defined whether, from humans the same fungus can infects plants and other animals. In this study it is observed that phytosis can be caused by bacteria and fungi and mostly fungal diversity plays a crucial role than other phyla. Phytotic infection , truly, expresses a trans-kingdom transmission of pathogens from plant kingdom. In this scenario, microbes contaminating plant-based foods can infect persons (with underlying health challenges) handling the food and in turn the persons can contaminate the food. This has been exampled by the clinical case studies where *Aspergillus fumigatus* with the same genetic constituents was isolated from patient, food and following Koch postulate, the same organism causing decay in food was re isolated. It is recommended that further studies be conducted in this area to unravel the

emerging disease-causing organism from plants infecting humans and vice versa.

References

1. Kenneth Y. The role of phytobiotechnology in public health. In: Horst W. Doelle, Edgar J. Dasilva, eds. Encyclopedia of Life Support Systems (EOLSS). Oxford, UK: UNESCO EOLSS Publishers; 2009. Available at: http://www.eolss.net.
2. Yongabi K. Application of phytobiotechnology in the control of tropical infectious diseases. Hauppauge, NY: Nova Science Publishers, Inc; 2015. Available at: http://www.novapublishers.com.
3. Yongabi KA, Okechukwu N, Oly-Alawuba N, Chika E, Nwadike CN, Verla A. To accelerate food security in Nigeria: an anthroposophy manual to curbing post-harvest losses of perishable foods in Nigeria. Milestone Publishers Ltd; 2023. ISBN 978-978-999-431-1.
4. Kenneth Y, Lisa A, Ambar P. A commentary of occupational infectious diseases due to agricultural practices in Sub-Saharan Africa. Biomass Bioenergy. 2024;70:99-111.
5. SimõesD,SabinoR.Fungiinaonehealthperspective.Encyclopedia. 2023;3:900–918. doi:10.3390/encyclopedia3030064.
6. Blackwell M. The fungi: 1, 2, 3, 5.1 million species? Am J Bot. 2011;98:426–438.
7. Hawksworth D, Lücking R. Fungal diversity revisited: 2.2 to 3.8 million species. Fungal Kingd. 2017;5:79–95.
8. Grossart HP, Van den Wyngaert S, Kagami M, et al. Fungi in aquatic ecosystems. Nat Rev Microbiol. 2019;17:339–354.
9. Naranjo-Ortiz MA, Gabaldón T. Fungal evolution: major ecological adaptations and evolutionary transitions. Biol Rev. 2019;94:1443–1476.
10. Afsah-Hejri L, Jinap S, Hajeb P, Radu S, Shakibazadeh S. A review on mycotoxins in food and feed: Malaysia case study. Compr Rev Food Sci Food Saf. 2013;12:629–651.
11. Seyedmousavi S, Bosco SD, De Hoog S, et al. Fungal infections in animals: a patchwork of different situations. Med Mycol. 2018;56:165–187.
12. World Health Organization. One Health. Available online: https://www.who.int/health-topics/one-health#tab=tab_1.
13. Carbas B, Simões D, Soares A, et al. Occurrence of Fusarium spp. in maize grain harvested in Portugal and accumulation of related mycotoxins during storage. Food. 2021;10:375.
14. Binder EM, Tan LM, Chin LJ, Handl J, Richard J. Worldwide occurrence of mycotoxins in commodities, feeds and feed ingredients. Anim Feed Sci Technol. 2007;137:265–282.
15. Lye MS, Ghazali AA, Mohan J, Alwin N, Nair RC. An outbreak of acute hepatic encephalopathy due to severe aflatoxicosis in Malaysia. Am J Trop Med Hyg. 1995;53:68–72.
16. Viegas S, Veiga L, Figueiredo P, et al. Occupational exposure to aflatoxin B1: the case of poultry and swine production. World Mycotoxin J. 2013;6:309–316.
17. Viegas C, Carolino E, Sabino R, et al. Fungal contamination in swine: a potential occupational health threat. J Toxicol Environ Health A. 2013;76:272–280.
18. Sakamoto T, Yamasaki A, Funaki Y, et al. An onion farmer with a case of hypersensitivity pneumonitis caused by *Aspergillus* niger. Respir Med Case Rep. 2018;23:60–62.
19. Koehler P, Bassetti M, Chakrabarti A, et al. Defining and managing COVID-19-associated pulmonary aspergillosis: the 2020 ECMM/ISHAM consensus criteria for research and clinical guidance. Lancet Infect Dis. 2021;21:e149–e162.
20. Van Der Linden JWM, Warris A, Verweij PE. *Aspergillus* species intrinsically resistant to antifungal agents. Med Mycol. 2011;49:S82–S89.
21. Gnat S, Nowakiewicz A, Dyla M. A global view on fungal infections in humans and animals: infections caused by dimorphic fungi and dermatophytoses. J Appl Microbiol. 2021;131:2688–2704.
22. Al-Hatmi AMS, Meis JF, De Hoog GS. Fusarium: Molecular diversity and intrinsic drug resistance. PLoS Pathog. 2016;12:e1005464.
23. Tiew PY, Mac Aogain M, Ali NABM, Thng KX, Goh K, Lau KJX, Chotirmall SH. The mycobiome in health and disease: Emerging concepts, methodologies, and challenges. Mycopathologia. 2020;185:207–231. doi:10.1007/s11046-019-00372-8.
24. Tell LA. Aspergillosis in mammals and birds: Impact on veterinary medicine. Med Mycol. 2005;43:71–73. doi:10.1080/13693780400028819.
25. Guillot J, Guérin C, Chermette R. Histoplasmosis in animals. In: Emerging and Epizootic Fungal Infections in Animals. Springer International Publishing; 2018:115–128. ISBN 9783319720937.
26. Brömel C, Sykes JE. Epidemiology, diagnosis, and treatment of blastomycosis in dogs and cats. Clin Tech Small Anim Pract. 2005;20:233–239. doi:10.1053/j.ctsap.2005.12.008.
27. Velegraki A, Cafarchia C, Gaitanis G, Latta R, Boekhout T. Malassezia infections in humans and animals: Pathophysiology, detection, and treatment. PLoS Pathog. 2015;11:e1004523. doi:10.1371/journal.ppat.1004523.
28. Byrnes EJ, Bartlett KH, Perfect JR, Heitman J. Cryptococcus gattii: An emerging fungal pathogen infecting humans and animals. Microbes Infect. 2011;13:895–907. doi:10.1016/j.micinf.2011.05.009.
29. Chomel BB. Emerging and re-emerging zoonoses of dogs and cats. Animals (Basel). 2014;4:434–445. doi:10.3390/ani4030434.
30. Fuller N. Projecting the compound effects of climate change and white-nose syndrome on North American bat species. Clim Chang Ecol. 2022;3:100047.
31. Garcia-Solache MA, Casadevall A. Hypothesis: Global warming will bring new fungal diseases for mammals. mBio. 2010;1:e00061-10. doi:10.1128/mBio.00061-10.
32. Akinbobola AB, Kean R, Hanifi SAM, Quilliam RS. Environmental reservoirs of the drug-resistant pathogenic yeast Candida auris. PLoS Pathog. 2023;19:e1011268. doi:10.1371/journal.ppat.1011268.
33. Alan Pounds J, Bustamante MR, Coloma LA, et al. Widespread amphibian extinctions from epidemic disease driven by global warming. Nature. 2006;439:161–167. doi:10.1038/nature04246.
34. Pegg KG, Coates LM, Neill WTO, Turner DW, Dita M, Carpentier SC. The epidemiology of Fusarium wilt of banana. Front Plant Sci. 2019;10:1395. doi:10.3389/fpls.2019.01395.
35. Zingales V, Taroncher M, Martino PA, Ruiz MJ, Caloni F. Climate change and effects on molds and mycotoxins. Toxins (Basel). 2022;14:445. doi:10.3390/toxins14070445.
36. Kenneth AY, Joseph AM, Elvis TF, et al. Perspectives on indigenous knowledge in mitigating climate change. Res Rev Healthc Open Acc J. 2023. doi:10.32474/RRHOAJ.2023.08.000293.
37. Burgess RA, Osborne RH, Yongabi KA, et al. The vaccine rush: In this stage of the COVID-19 response, 'community' matters more than ever. Lancet. 2020. doi:10.1016/S0140-6736(20)32642-8.
38. State of the Climate in Africa (2023). WMO-No. 1360. © World Meteorological Organization; 2024. ISBN 978-92-63-11360-3.