Research Article
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Topical application of juices from fresh leaves of Lycopersicon esculentum against fungal skin infections in Tanzania

Abstract

Background: Skin fungal infection is one of the global problem nowadays. The aim of the study was focused to examine the antifungal activity of tomato (Lycopersicon esculentum) leaf juices (extracts) for topical application against fungal skin infections.

Methodology: The juices were topically used to fungal skin infected area. Topical application of the juices from fresh leaves to the skin affected by fungi was conducted three times a day for seven days.

Results: Infected skin areas were healed maximum for seven days. Healing of infected skin indicated that juices from tomato leaves were having chemical substances with antifungal activities.

Conclusion: The study gave information that, we can use tomato leaf juices for against fungal infections. Moreover, promised bioactives need to be isolated and elucidated for consideration in synthesizing and development of fungal agents that can be used for topical application in management of fungal skin infections.

Keywords: Antifungal activity, Lycopersicon esculentum, fungal skin infection, bioactives

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Introduction

Fungal infections are among of the problematic communicable diseases worldwide. The prevalence fungal infections are mostly caused by Candida species. In Africa fungal infections are mostly pronounced in sub-Saharan Africa of which Tanzania is inclusive. For instance in Tanzania, fungal infections cause 18% deaths and contribute 80% deaths to people with HIV/AIDS.[1] Candida infections pose a serious threat to people with immuno-suppressed especially those with cancer and HIV/AIDS. Fungal Skin infections are commonly caused by Candida species and ringworms fungi. Fungal skin infections nowadays are causing many acute as well as chronic ill health among human beings and cattle's. Fungal skin pathogens often cause a red, itchy rash to forming folds of the skin. This rash may also spread to other areas of the body. So far antifungal agents are used employed to fight against fungal pathogens. Antifungal agents are the drugs that used to destroy or kill fungi. The emerging resistance towards effective used fungicides such as fluconazole and azole threaten global public health settings. Also, antifungal resistance account for most of Africa's diseases burden including Tanzania. The emerging antifungal resistants such as *Candida albican* and *Candida auris* among many have global implications for morbidity, mortality and health care in the community.[2–4] Moreover, synthetic antifungal agents available in the market are expensive and some effective ones are currently threatened by resistance strains. Regarding to this situation, searching for more and alternative antifungal agents is highly needed. However, herbal remedies are considered the oldest forms of health care known to mankind on this earth. For instance, in Tanzania, the parts of the plant used for medicinal purposes are leaves, root, stem, fruits, the complete aerial parts, flowers and the barks of root and stem.[5] Traditional system of medicine through medicinal plants has been healing non communicable diseases and communicable diseases by eliminating various pathogens including Candida species causing skin infections. Natural products are well known as bioactives or phytochemicals from medicinal plants are the ones play roles of herbal remedies. Tomato (*Lycopersicon esculentum*) is among of many plants used for management of infectious diseases.[6,7] It is commonly tomato fruits that scientist dealt with in details while other parts left aside. Literature shows that tomatoes has been used traditionally for management of diabetes, lowering cholesterol, proper functioning of brain, dysentery, aching back, rheumatism and essential antioxidants.[7] Moreover, few studies on tomato leaves extracts indicate to have antimicrobial activities and it is unfortunately that no study has been done on tomato leaf juices. So far in Tanzania, there is no literature showing pharmacological studies and medicinal use of *Lycopersicon esculentum*. Thus, this study focused on searching of herbal remedy of juices from tomato plant leaves rather than commonly used solvent extracts.

Material and methods

Collection of plant materials

The tomato (Solanum lycopersicum) plant leaves were collected from the garden field in Iringa, Tanzania during September 2015 and October 2016. The collected leaves were washed to remove the debris. The washed fresh leaves were grinded, suppressed and then followed by filtration to obtain juices. Obtained juices were topical applied directly to the fungal skin infected (rashes) areas.

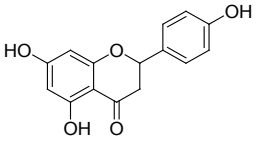
Antifungal activity

Topical application of the juices from fresh leaves to the skin affected by fungi was conducted three times a day for seven days. Duration of juice application was carried in the morning at 6:00 Am,

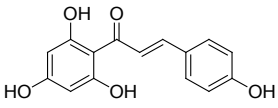
in the noon at 1:00 Pm and in the evening at 7:00 Pm. Juices were administered to three candidates (people) in September 2015 and four candidates in October 2016. Improvement of the affected skin commonly observed from the third and fourth days in both years. On the seventh day the infected areas become healed and the patients appreciated the use of juice from the tomato fresh leaves. It is only one candidate who healed at the ninth day.

Results and discussion

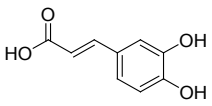
The study revealed that juices of the tomato fresh leaves showed significant antifungal activity. Antifungal activity is commonly contributed with bioactives found in leaves juice. Tarpenes, Polyphenols and steroid compounds have great contribution in fighting against antimicrobials. On other hand, polyphenols especially flavonoids play a great role of antioxidant agents. Tomato fruits as have reported to contain flavonoids such naringenin and naringenin chalcone that played role of antioxidants and anti-allergic activities.[8,9] With this scenario, some of polyphenol bioactives in the tomato leaves juice that used in this study might include flavonoids 1-6 that have ever reported from tomato.[7] It should be noted that, they may be different because plants synthesize secondary metabolites based to environmental factors and pathogens attached the plant. Plants synthesize secondary metabolites that play role to fight against invading pathogens. Healed of infected skin indicated the presence of prominent bioctives or secondary metabolites that can be developed for antifungal agent from tomato leaves. However the safety of the tomato leaf juices (extract) and the chemical constituents responsible for the activity had not determined. On the other hand, this preliminary study inspires more investigations of antifungal from tomato leaves and other parts. Further studies from tomato leaves have to be carried out on this in future because it showed promising to have significant antifungal agents.



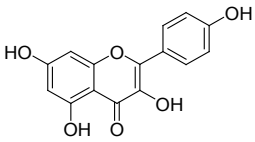
1. Naringenin



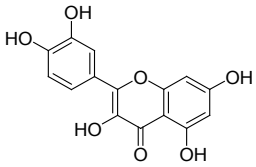
2. Naringenin chalcone



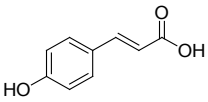
3. Caffiec acid



4. Kaempferol



5. Quercetin



6. Coumeric acid

Conclusion

The administered juices of the tomato fresh leaves were effective to cure skin infections. With this promising, it can be concluded that bioactives or phytochemical compounds responsible for antifungal activity were present in the juices of leaves of *Lycopersicum esculentum*. On other hand, natural products could provide a sustainable solution to the skin fungal infections and problems related to resistance due to use of synthetic agents of which many researchers are trying to identify effective natural products to replace them. Moreover, secondary metabolites (bioactives) being so important, there is a need in future to continue with isolating, identifying and bioassaying compounds that may be effective from tomato leaves. Therefore, the use of juices from tomato fresh leaves as antifungal agent indicates that there are natural sources of compounds for topical applications for management of skin fungal infections.

Acknowledgement

None.

Conflict of interest

None.

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