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Case Report

Effects of *Momordica Charantia* (MC) extract as an Immunomodulator against Cytokine Tumor Necrosis Factor alpha (TNF-α) and its Relationship to Parasite Reduction and Platelet Repair in Patients with Uncomplicated *Plasmodium Falsiparum Malaria*: A Case Report

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A B S T R A C T

The body's mechanism of action against malaria parasites is very complex, involving almost all immune components, whether naturally occurring or acquired through supplementation, due to specific or non-specific infection, whether humoral or cellular. Tumor necrosis factor alpha (TNF-α) is a major mediator of acute inflammation in response to infection. The main function of TNF-α is to stimulate the reception of neutrophils and monocytes and activate these cells to destroy microbes or parasites. *Momordica charantia* extract has immunomodulatory activity in stimulating TNF-α, which plays a role in eliminating parasites in the blood in patients with uncomplicated *Plasmodium falsiparum malaria*.

Keywords: *Momordica charantia*, TNF-α, parasite reduction

1. Introduction

Malaria is a contagious infectious disease caused by plasmodium through the female anopheles mosquito vector. There are five types of plasmodia that cause malaria, *Plasmodium falciparum* is one of the deadliest types of plasmodia[1,2]. The immune response to malaria is individualized, which is an interaction of previous infection history with current infection status. The mechanism of regulating the immune response involves almost all immune components (monocytes, macrophages, neutrophils, natural killer cells, T lymphocytes, regulatory T cells) and various cytokines, one of which is TNF-α tumor necrosis factor alpha (TNF-α), which plays an important role in protecting and eliminating parasites indirectly through activation of neutrophils and macrophages. *Momordica charantia* extract has immunomodulatory activity through the activation of cytokines[3-5].

2. Case Presentation

A 26-year-old male weighing 54 kg was diagnosed with uncomplicated *Plasmodium falsiparum* malaria through diagnose and laboratory examination. According to the results of microscopic examination before treatment (D0), the density of *P. falsiparum* parasites in the blood was 1,314/µL. The results of the doctor's examination of the general condition did not show severe symptoms; clinical symptoms felt were nausea,

chills, insomnia, headaches and weakness. The subject is a local fisherman who has no comorbidities and a history of serious illness. After diagnosis and physical examination, the man was given 1 capsule of *Momordica charantia* extract and took it for three days. Before treatment, the patient had venous blood drawn for TNF-α examination, and then the patient was given *Momordica charantia* extract capsules and asked to come after 24 hours the next day for microscopic examination again. The result of TNF-α examination before treatment (D0) was 4.95 Pg/mL and after 1x24 hours treatment (D1) was 0.85 Pg/mL. The patient was followed up for 28 days for malaria microscopic examination (D0, D1, D2, D3, D4, D7, D14, D21, D28). The results of microscopic examination of D1 parasite density of 123/µL, D2 parasite density of 25/µL and D3, D4, D7, D14 and D28 were not found again *P. Falsiparum* parasites. Clinical symptoms, respectively, nausea, chills, insomnia, headache sleep, headache and weakness disappeared on day D2. Platelet examinations were conducted on day D0, D14 and D28. The result of the D0 platelet examination was 80x103/mm^3, D14 was 165x103/mm^3 and D28 was 191x103/mm^3.

3. Discussion

The immune response to malaria begins with a natural immune response, which is then followed by a cellular immune response that plays a protective role. Elimination of parasites by immune cells occurs through phagocytosis, lysis of infected red blood cells, nitric oxide production, and the production of cytokines, one of which is TNF-α, which is toxic to parasites. The activity of *Momordica charantia* extract as an immunomodulator activates the cytokine TNF-α to phagocytose parasites[3,4]. The platelet value is one of the parameters indicating the incidence of severe malaria[6]. Syamsudin et al's research on uncomplicated *Plasmodium falsiparum* patients showed that *Momordica charantia* extract improved platelet values at D14 and D28 measurements[8,9].

TNF-α is the main mediator in acute inflammation in response to infection and has the main function of stimulating neutrophils and monocytes to destroy parasites or pathogenic organisms[10]. An adequate immune response aims to eliminate parasites, but an excessive immune response can cause organ damage and death[11,12]. Patients who respond well to malaria therapy show a rapid decrease in TNF-α; these results indicate the importance of a well-regulated immune response to the treatment of malaria sufferers[11]. One of the parameters of successful malaria treatment is the improvement of platelet values to normal and high platelet values are an indicator of severe malaria[7]. The decrease in parasites is associated with improved platelet values. Patients with high parasitemia have a potential risk of anemia and thrombocytopenia[13]. The results of the data report above indicate that *Momordica charantia* extract has immunomodulatory activity related to reducing parasites.

4. Conclusion

Momordica charantia extract has antimalarial and immunomodulatory activities. The possibility of this antimalarial activity also involves the cytokine TNF-α in reducing *Plasmodium falsiparum* parasites, in addition to other mechanisms of action that need to be studied further.

5. Conflict of Interest

None declared.

6. References

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