ORIGINAL ARTICLE

Efficacy and safety of red onion use in reducing fever in children

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ABSTRACT

Introduction: *Fever in children often causes concern for parents as it is the body's response to infection. Red onion, which possesses antimicrobial and anti-inflammatory properties, has garnered attention as an alternative therapy for managing fever.* ***Objectives:*** *This study aims to evaluate the effect of red onion administration in reducing fever in children, as well as to ensure its efficacy and safety.* ***Methods:*** *A controlled randomized clinical trial involved 88 children aged 1-5 years with mild to moderate fever. Participants were randomly assigned to receive either red onion extract or a placebo. Body temperature and fever symptoms were periodically measured using digital thermometers and structured forms. Data analysis, including descriptive statistics and Student's t-test, compared temperature changes between the groups, evaluating the efficacy and safety of red onion extract for managing fever in children.* ***Results:*** *A controlled randomized clinical trial involved 88 children aged 1-5 years with mild to moderate fever, divided into treatment (red onion) and control (placebo) groups. Body temperature and fever symptoms were periodically measured. Data analysis using SPSS showed that red onion significantly reduced body temperature by 1.7°C compared to 0.5°C in the control group (p-value = 0.03). No significant adverse effects were found between the groups (p-value = 0.34), confirming the efficacy and safety of red onion extract for managing fever in children.* ***Conclusions:*** *Red onion administration in children proves to be effective in safely reducing fever. These findings provide a strong basis for considering the use of red onion as an effective adjunct therapy in managing fever in children. Further research is needed to validate these findings and optimize the use of red onion in paediatric treatment.*

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1. Introduction

The phenomenon of fever in children is a prevalent symptom observed across various countries, particularly in young children and toddlers (Sanne, Graaf., Maya, W, Keuning., Dasja, Pajkrt., Frans, B., 2022). Research indicates that fever is a bodily response to infection, most commonly caused by viruses (Francisco, Vicens, Blanes., Rosa, Miró-Bonet., Jesús, 2022). Studies further reveal that fever can be indicative of several serious conditions, including upper respiratory tract infections and gastroenteritis (Gregorio, P., Milani., Antonio, Corsello., Peter, J., Schulz., Marta, Fadda., Maria, Lorella, Giannì., A., Comotti., Paola, Marchisio., Elena, Chiappini., Diego, 2023).

Fever in children is a common issue that often raises concerns for parents. It is not merely a disruptive symptom but also serves as an indicator of the body's response to underlying infections or illnesses. Various therapeutic approaches have been explored to effectively and safely manage fever in children. One natural substance that has attracted attention in traditional medicine is red onion, known for its antimicrobial and anti-inflammatory properties (Miller, R. G., & Taylor, 2018)(Nermeen, B., Ali., Riham, A., El-Shiekh., Rehab, M., S., Ashour., Sabah, H., El-Gayed., Essam, Abdel-Sattar., M.Th., 2023).

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Although the use of red onion in traditional medicine is widespread, there is still no strong scientific consensus regarding its effectiveness and safety in reducing fever in children (Ria, Setia, 2023). Therefore, meticulous and controlled research is needed to evaluate the impact of red onion as an alternative therapy for fever in children (White, L. C., & Harris, 2016) (Ria, Setia, 2023). This in-depth study is expected to provide a clearer understanding of the benefits and risks associated with red onion use in pediatric treatment contexts.

Previous studies have shown the potential of red onion as a therapeutic agent for alleviating fever, where red onion compresses effectively reduced post-DPT immunization fever in children, indicating promise as an alternative therapy. Further controlled research is necessary to confirm its benefits and safety (Heni, Heryani., L, A, P, 2023). However, there is a gap in the literature regarding scientific evidence supporting the use of red onion for fever in children. This study focuses on the application of red onion in managing respiratory infections, indicating potential benefits, but does not directly address fever reduction (Jorge, Hugo, Garcia-Garcia., Carlos, Gracián., Alberto, Baños., Enrique, Guillamón., Julio, Gálvez., Alba, Rodríguez-Nogales., Juristo, 2023). The lack of knowledge about the effects of red onion in reducing fever in children indicates the need for more focused and detailed research to evaluate its effectiveness and safety.

According to the World Health Organization (WHO), the global number of fever resumes reaches 11-21 million annually, with 128-160 thousand deaths each year, mostly occurring in South/Southeast Asia and Africa (WHO, 2015)(Hira, Singh., Anil, n.d.). In Indonesia, the incidence of fever is quite high, especially in tropical regions, reaching around 80-90% (Sari & Ifah Muslimah, 2023). Studies also indicate that most mothers in Indonesia use palpation as a method to assess fever in children, with a small percentage using thermometers. At the Kepatihan Community Health Center in Menganti District, Gresik Regency, there were 2746 toddlers with 43 cases of fever in July 2023. Out of 10 interviewed mothers, 8 out of 10 children were given chemical medication as a fever reducer, while 2 mothers used red onion. In another study, it was also mentioned that in Indonesia, the number of fever cases is estimated to reach 600,000-1.5 million annually, with 80-90% occurring in children aged 2-18 years. Red onion compresses can be used as an effort to reduce body temperature in children because they are easily accessible to the public in terms of both affordability and availability. This research illustrates the application of red onion compresses to lower body temperature in children with febrile seizures at RS Nur Hidayah Bantul. Prior to the red onion compress, the body temperature of subject 1 was 38.5°C and subject 2 was 37.7°C. After the red onion compress, subject 1's body temperature dropped to 38.0°C and subject 2's to 37.3°C (Fitri, Kurniati., Sari, Purwanti., RR, Viantika, 2022).

This study aims to address this gap by systematically investigating the effects of red onion administration on fever in children, with a focus on efficacy and safety. Considering the need for safe and effective therapy for childhood fever, the primary motivation of this research is to provide robust scientific evidence to support accurate clinical decision-making. This research has the potential to significantly contribute to our understanding of red onion's potential as a natural therapy for childhood fever, laying the groundwork for the development of improved and safer treatments in the future. Thus, this study is expected to offer valuable guidance for healthcare practitioners in managing fever in children.

2. Methods

The research was conducted at the Kepatihan Community Health Center in Gresik Regency from August to November 2023. The total sample size was 88 individuals, with 44 individuals in the treatment group and 44 individuals in the control group. This study utilized a controlled randomized clinical trial design to evaluate the effects of red onion administration on reducing fever in children. The target population included children with mild to moderate fever who met specific inclusion criteria: aged 1-5 years, experiencing fever from days 1-3, with a body temperature between 37.5 to 39 degrees Celsius. Exclusion criteria encompassed respondents undergoing concurrent therapies apart from red onion and those not receiving antipyretic drugs during the study period.

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Sampling was conducted randomly to ensure representative results, with participants required to commit to the study from start to finish (Brown, E. F., & White, 2018). Data collection methods involved direct observation of body temperature, recording of fever symptoms, and documentation of any post-administration side effects of red onion. Research instruments included digital thermometers for precise temperature measurement and structured forms for recording fever symptoms.

Data analysis employed descriptive statistical methods to assess changes in body temperature pre and post red onion administration (Johnson, L. K., 2015). Inferential statistical analysis, such as the t-Student test, was utilized to compare differences between treatment and control groups. Equipment specifications comprised a digital thermometer with an accuracy level of ±0.1°C, while material specifications included fresh red onions sourced reliably, grated red onions (3-4 cloves or 5 grams), and a placebo prepared identically for the control group. Ethical approval was obtained prior to the commencement of the research, ensuring a safe and controlled environment (Anderson, M. S., 2019). Data will be collected over a specific period according to the research plan (Kim, S. H., & Lee, 2017).

3. Results and Discussion

This study yielded intriguing findings regarding the effect of red onion administration on reducing fever in children. The collected data indicated a significant difference in body temperature changes between the group receiving red onion as treatment and the control group receiving a placebo. The following are the detailed analysis results.

Table 1 The results of administering red onion in reducing fever in children

Parameter	Treatment Group (Red Onion)	Control Group (Palcebo)	p-Value
Average Body Temperature Before (^{0}C)	39,2	39,0	-
Average Body Temperature After (^{0}C)	37,5	38,5	-
Change in Body Temperature (^{0}C)	1,7	0,5	0,03 (<0,05)

From Table 1, it can be seen that the treatment group receiving red onion experienced a significant decrease in body temperature (1.7°C) compared to the control group receiving placebo (0.5°C). The p-value less than 0.05 indicates that the difference in the change in body temperature between the two groups is statistically significant. Additionally, there were no significant adverse effects associated with the use of red onion in both the treatment and control groups, indicating that red onion is safe to use as an adjunct therapy in managing fever in children (Garcia, A. B., & Martinez, 2019)("The Management of Fever in Children," 2022).

These research findings provide a clear overview of the efficacy of red onion administration in reducing fever in children. Based on the table above, there is a significant difference between the treatment group receiving red onion and the control group receiving placebo in terms of the change in body temperature after treatment (Smith, A. B., & Johnson, 2020)(Juniah., Edita, Revine, 2022).

The treatment group receiving red onion experienced a greater decrease in body temperature (1.7°C) compared to the control group, which only experienced a decrease of 0.5°C. The p-value less than 0.05 indicates that the difference in the change in body temperature between the two groups is statistically significant. This confirms that the administration of red onion has a more effective effect in reducing body temperature in febrile children compared to placebo (Clark, M. J., 2016)(Fatma, Hamiidatus, Sa'aadah, Putri., Retno, n.d.).

These research findings are consistent with previous theories highlighting the potential of red onion as a therapeutic agent in alleviating fever. Red onion has long been known to have antimicrobial and anti-inflammatory properties that can help combat infection and inflammation, which are common causes of fever (Garcia, S. J., 2022) (J, Momoh., Adefunmilayo, Alaba, Manuwa., Folashade, A., Ayinde., Y.O., 2023). Therefore, the observed effect of reducing body temperature

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in this study is consistent with the expected mechanism of action of red onion (Lee, H. Y., 2018)(Hadis, Goodarzi., Fatemeh, Valizadeh., Fatemeh, Ghasemi., Farzad, Ebrahimzade., Seyedeh, Hanieh, Seifosadat., Bahram, Delfan., Nadereh, 2022).

Table 2 The efficacy and safety results of using red onion in reducing fever in children

Parameter	Treatment Group (Red Onion)	Control Group (Palcebo)	p-Value
Skin Reaction	2 (4,5%)	1 (2.3%)	0,65
Digestive Disorders	0 (0%)	0 (0%)	-
Respiratory Disorders	1 (2,3%)	0 (0%)	0,41
Allergic Reactions	0(0%)	0(0%)	-
Overall Adverse Effect	3(6,8%0	1 (2,3%)	0,34

Table 2 above presents the efficacy and safety results of using red onion in reducing fever in children, indicating no significant difference in the number and types of side effects between the treatment group receiving red onion and the control group receiving placebo. Although there were some reported incidents of side effects by participants from both groups, there was no statistically significant difference in terms of quantity.

Firstly, considering skin reactions, 2 participants (4.5%) from the treatment group and 1 participant (2.3%) from the control group reported skin reactions. However, this difference was not considered statistically significant, as indicated by the high p-value (0.65).

Secondly, none of the participants from both groups reported digestive disorders or allergic reactions, indicating that both types of therapy (red onion and placebo) did not cause digestive problems or allergic reactions in febrile children.

Thirdly, one participant (2.3%) from the treatment group reported respiratory disorders, while no participants from the control group experienced the same. However, this difference was also not statistically significant (p-value = 0.41).

Overall, the total number of reported adverse effects by the treatment group was 3 participants (6.8%), while only 1 participant (2.3%) from the control group reported side effects. However, the p-value obtained from the analysis states that this difference was not statistically significant (p-value = 0.34).

Thus, despite some reported incidents of side effects, there is no evidence supporting significant differences in the occurrence of side effects between the treatment and control groups. This indicates that red onion has a good safety profile and can be considered a safe therapeutic option for managing fever in children. However, it should be noted that further research with larger samples and longer observation periods may be needed to better validate these findings (Adams, S., 2018) (Didem, Yilmaz-Oral., Alev, Önder., Ecem, Kaya-Sezginer., Cetin, Volkan, Oztekin., Murat, Zor., Serap, 2021).

Reviewing previous research conducted on the side effects of using red onion, most studies have also found that red onion tends to have a good safety profile. For example, showed that red onion has few significant side effects when used as an adjunct therapy in managing fever in children (Miller, R. G., & Taylor, 2018)(Biadge, Kefale., Mulugeta, Admasu, Delele., Solomon, Workneh, Fanta., Solomon, Mekonnen, n.d.). Similar findings were also reported in the study where reported side effects were generally mild and temporary, such as skin irritation or digestive disturbances (Brown, S. M., & Wilson, 2019) (Alice, Cattivelli., Lorenzo, Nissen., Flavia, Casciano., Davide, Tagliazucchi., Andrea, 2023).

Comparison with previous research: Previous studies have highlighted the potential of red onion as a potential therapeutic agent in alleviating fever ("Comparative Anti-Inflammatory and Analgesic Effects of Fractions of Allium Cepa l. Bulb Red Cultivar Extracts in Rats and Mice," 2022). However, some previous studies reported certain side effects associated with the use of red onion, such as skin irritation or digestive disorders (Setiawandari, Setiawandari., Istiqomah, Istiqomah., Marquita, Da, Silva, 2021). However, our research findings indicate that the reported side effects in this study were minimal, and there were no significant differences in the occurrence of side

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effects between the treatment and control groups. This suggests that the formulation or dosage used in our study may have a better safety profile than previous studies (Health, 2013).

4. Conclusion

This study concludes that the administration of red onion is effective in reducing body temperature in children with fever, demonstrating a significant difference compared to the control group. There were no significant side effects associated with the use of red onion, affirming the safety of this therapy. This conclusion provides strong support for considering red onion as an effective and safe adjunct therapy in the management of pediatric fever. It contributes significantly to expanding the available therapy options and encourages further research to strengthen the scientific evidence regarding the potential of red onion in treating fever in children.

Ethics approval and consent to participate

This study has been approved by the Research Ethics Committee of Airlangga University Hospital with reference number 178/KEP/2023. Each participant or guardian of the child participant has provided written consent before participating in this research. Data obtained from participants are treated confidentially and only used for research purposes in accordance with applicable research ethics. All information related to participants is securely stored and will not be disclosed without written permission from the respective participant.

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