
The Effectiveness Of A Combination Of Red Onion Compresses And Paracetamol In Reducing Fever Following Dpt Vaccination In Infants Aged 2–4 Months

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Abstract

This study was prompted by findings that approximately 40–50 per cent of infants experience fever as an immune response following DPT immunisation at the Pakuan Ratu Community Health Centre, Lampung Province. Postimmunisation fever is generally managed with paracetamol, whilst red onion compresses have begun to be utilised as a non-pharmacological therapy due to their antipyretic effects. Objective: To determine the effectiveness of a combination of red onion compresses and paracetamol in reducing post-DPT immunisation fever in infants aged 2–4 months at the Pakuan Ratu Community Health Centre in Lampung. Methods: This was a quasi-experimental study. The design used was a pre-test–post-test control group design. In this design, the participants were divided into two groups: the intervention (experimental) group and the control group. Body temperature was measured before (pre-test) and after (post-test) in both groups to assess the effectiveness of red onion compresses in reducing fever in infants. Results: The findings from the Independent Samples t-test showed that both the control group, which was given paracetamol, and the experimental group, which was given a combination of red onion compresses and paracetamol, experienced a significant reduction in fever ($p = 0.000 < 0.05$). However, the experimental group showed better results with an average temperature reduction of 1.06°C , compared to 0.56°C in the control group. This difference indicates that the administration of red onion compresses as a complementary therapy to paracetamol is more effective in reducing fever following DPT immunisation in infants aged 2–4 months than the administration of paracetamol alone; therefore, the research hypothesis is accepted (H_0 is rejected). Conclusion: It is concluded that red onion compresses are effective as a complementary therapy in helping to reduce post-DPT immunisation fever in infants aged 2–4 months at the Pakuan Ratu Community Health Centre in Lampung. This therapy can be used as an alternative to pharmacological treatment in the management of post-immunisation fever, whilst ensuring that correct procedures are followed and under the supervision of healthcare professionals.

Keywords: Knowledge, Anemia, Health Education, Adolescent Girls.

INTRODUCTION

DPT (Diphtheria, Pertussis and Tetanus) immunisation is one of the essential vaccinations that must be administered to infants to prevent serious infectious diseases that have the potential to cause complications and even death. This immunisation works by stimulating the body's immune system to produce specific antibodies against the administered antigen. In response to this process, infants may experience an increase in body temperature or a fever, which generally occurs within 24–48 hours after immunisation. This condition is a physiological reaction of the body indicating the process of immunity development (WHO, 2023).

The World Health Organisation (WHO) reports that approximately 50.94 per cent (or around 1 in 2 children) experience a fever following DPT immunisation. Data from the Indonesian Ministry of Health and the results of the Indonesian Health Survey (SKI) indicate that around 45.5 per cent of infants experience a fever. In Lampung Province, the incidence of fever following DPT immunisation ranges from 40 per cent to 50 per cent. Data from Way Kanan Regency indicates that 37.1 per cent of infants experience fever following DPT immunisation, whilst at the Pakuan Ratu Community Health Centre, the incidence of post-DPT immunisation fever reaches 39.2 per cent. (Lampung Regency Health Office, 2024). The main issue is the increased anxiety among parents when their infants develop a high

fever following immunisation. If not managed appropriately, this can reduce parents' willingness to have their children receive the DPT vaccination. The management of fever in infants can be carried out using both pharmacological and non-pharmacological methods. Pharmacological therapy, such as the administration of antipyretics (paracetamol), is the primary treatment and has been proven effective in reducing body temperature in infants. Nonpharmacological therapy serves as a complementary approach to the initial management of fever in infants. One non-pharmacological therapy traditionally used is a red onion compress. Several studies have shown that the use of red onions can help reduce body temperature in children experiencing fever (Veronica et al., 2024)

Based on a review of previous research, it is known that red onion compresses have been used as a non-pharmacological therapy to reduce body temperature in infants following DPT immunisation. A study conducted by Saputri & Yuliaswati (2024) demonstrated that red onion compresses are effective in reducing body temperature in infants. Based on the results of the paired t-test, a p-value of 0.000 ($p < 0.05$), was obtained; it can therefore be concluded that red onion compresses have an effect on reducing the body temperature of infants with fever following DPT immunisation at the Yunita Vero Mirza Community Health Centre in Lampung. This indicates that the application of red onion compresses has an effect on reducing children's body temperature following DPT immunization.

Based on the results of a preliminary study conducted in November–December 2025 in the Pakuan Ratu Community Health Centre area, data was collected on 38 infants who had received the DPT vaccination. Of this number, 24 infants (63.16 per cent) experienced a fever following DPT immunisation and were unaware of the red onion compress, whilst 14 infants (36.84 per cent) did not experience a fever following DPT immunisation. However, research on the effectiveness of combining red onion compresses with paracetamol administration in reducing post-DPT immunisation fever in infants aged 2–4 months is limited, particularly amongst mothers of infants in the Pakuan Ratu Community Health Centre catchment area; hence, this study is necessary. It is hoped that this study will provide more specific scientific evidence regarding the effectiveness of the combination of red onion compresses and paracetamol administration in reducing post-DPT immunisation fever in infants aged 2–4 months, and serve as a basis for improving the quality of promotive and preventive health services at the community health centre level.

RESEARCH METHODS

This study is a quasi-experimental study. The design used is a pre-test–post-test control group design. In this design, the respondents were divided into two groups: the intervention (experimental) group and the control group. Body temperature was measured before (pre-test) and after (post-test) in both groups to assess the effectiveness of red onion compresses in reducing fever in children. The population in this study comprised all infants aged 2–4 months who received the DPT immunisation and experienced a fever ($\geq 37.5^{\circ}\text{C}$) at the Pakuan Ratu Community Health Centre in Lampung during the study period.

The sampling technique used in this study was purposive sampling. Purposive sampling is a technique for determining a sample based on specific considerations or criteria. The sample size was determined using the Slovin formula with a margin of error of 5 per cent or 0.05, resulting in a minimum sample size of 30 respondents. To account for a 10 per cent dropout rate, the inclusion criteria comprised infants aged 2–4 months who had received the DPT vaccination at the Pakuan Ratu Community Health Centre; infants experiencing fever following the DPT vaccination (temperature $> 37.5^{\circ}\text{C}$); and infants who had not been given antipyretic medication (such as paracetamol) at the time of observation; and parents who consented to their child participating as a respondent (by signing an informed consent

form). Exclusion criteria included infants with a history of allergy or skin irritation to red onions, a rash, or a skin infection in the area where the compress would be applied (usually in skin folds or on the forehead); and infants currently suffering from an infectious disease other than post-DPT immunisation fever.

Data collection was carried out using a questionnaire form containing details of the participants' characteristics and the results of axillary (underarm) temperature measurements taken using a digital thermometer at the baseline before the intervention (pre-test / T_0) and after the combined intervention (post-test / T_1 , T_2 , T_3). In addition, an observation sheet was used to record the accuracy of the paracetamol dose administered and the duration of the red onion compress (15–20 minutes), as well as data on the number of visits and the coverage of DPT-HB-Hib immunisation coverage among infants aged 2–4 months within the catchment area of the Pakuan Ratu Community Health Centre. Medical records or the Mother and Child Health (KIA) booklet were used to validate the infants' previous basic immunisation history. In this study, no validity or reliability tests were conducted on the instruments as they consisted of observation sheets. Univariate analysis was used to describe the frequency distribution of the study variables, namely the effectiveness of the red onion compress and the administration of paracetamol. Bivariate analysis was carried out to test the research hypothesis regarding the effectiveness of the combination of the red onion compress and paracetamol administration in reducing fever. The researchers will use the results of the independent- -sample T-tests. The process of data processing was carried out using statistical software (SPSS) with a significance level of 0.05.

RESULTS AND DISCUSSION

Data collection for the study was carried out in May–June 2026. It involved 30 subjects who met the inclusion criteria, comprising 15 subjects in the experimental group who received paracetamol and red onion compresses, and 15 subjects in the control group who were given paracetamol only.

Characteristics of the Study Subjects

Table 1. Characteristics of Infants Experiencing Fever Following DPT Immunisation at the Pakuan Ratu Community Health Centre

Age of Infants	Experimental Group	Control Group	Total	Percentage (%)
2 month	6	5	11	36,7
3 month	5	6	11	36,7
4 month	4	4	8	26,6
Total	15	15	30	100

Table 1 shows that the majority of respondents were 2 and 3 months old , with 11 infants (36.7%) in each age group, whilst there were 8 infants (26.6%) aged 4 months.

Univariate Analysis

Table 2. Body Temperature of the Experimental Group Before (Pretest) and After (Post-test) Administration of Paracetamol and Red Onion Compresses

No	Respondent Code	Pre-test (°C)	Post-test (°C)	Decrease (°C)
1	E1	38,5	37,3	1,2
2	E2	38,3	37,2	1,1
3	E3	38,4	37,1	1,3
4	E4	38,1	37,2	0,9
5	E5	38,6	37,4	1,2
6	E6	38,2	37,1	1,1
7	E7	38,3	37,3	1,0
8	E8	38,4	37,2	1,2
9	E9	38,0	37,1	0,9
10	E10	38,5	37,3	1,2

11	E11	38,2	37,2	1,0
12	E12	38,1	37,2	0,9
13	E13	38,7	37,5	1,2
14	E14	38,4	37,2	1,2
15	E15	38,2	37,1	1,1
Mean		38,32	37,26	1,06

Table 2 shows that all subjects in the experimental group experienced a reduction in body temperature after being administered a red onion compress for 15 minutes. The reduction in temperature ranged from 0.9°C to 1.3°C, with an average reduction of 1.06°C. None of the participants experienced an increase in body temperature following the intervention. Bivariate analysis using the Wilcoxon Signed-Rank Test showed that almost all respondents experienced an increase in knowledge scores following the intervention.

Table 3. Average Decrease in Body Temperature

Variable	Average temperature
Pre-test	38.32
Post-test	37.26
Decrease	1.06

Table 3 shows that the average body temperature before the red onion compress was applied was 38.32°C with a standard deviation of 0.24°C. Following a 15-minute intervention accompanied by the administration of paracetamol in accordance with standard care, the average body temperature fell to 37.26°C, representing an average decrease of 1.06°C.

These results indicate that almost all infants experienced a reduction in body temperature to nearnormal levels following red onion compress therapy

Table 4. Body Temperature of the Control Group Before (Pretest) and After (Post-test) Administration of Paracetamol

No	Kode Responden	Pretest (°C)	Posttest (°C)	Penurunan (°C)
1	K1	38,4	37,8	0,6
2	K2	38,2	37,7	0,5
3	K3	38,5	37,9	0,6
4	K4	38,0	37,5	0,5
5	K5	38,3	37,8	0,5
6	K6	38,1	37,6	0,5
7	K7	38,4	37,8	0,6
8	K8	38,2	37,7	0,5
9	K9	38,0	37,5	0,5
10	K10	38,5	37,9	0,6
11	K11	38,3	37,7	0,6
12	K12	38,2	37,6	0,6
13	K13	38,6	37,9	0,7
14	K14	38,4	37,8	0,6
15	K15	38,3	37,8	0,5
Mean		38,29	37,73	0,56

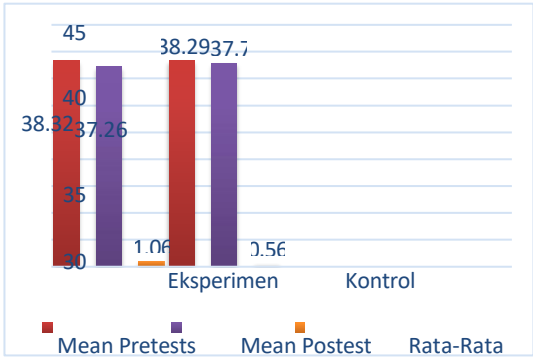
Based on Table 4, in the control group all subjects also experienced a reduction in body temperature after receiving standard therapy in the form of paracetamol. However, the reduction in 15 temperature was relatively smaller compared to the experimental group, with an average reduction of 0.56°C.

Table 5. Statistics for the Control Group

Variable	Mean
Pre-test	38,29
Post-test	37,73
Decrease	0,56

According to Table 5, the mean body temperature in the control group prior to treatment was 38.29°C. After receiving standard therapy in the form of paracetamol, the mean body temperature fell to 37.73°C, representing an average temperature reduction of 0.56°C. A reduction in body temperature was still observed in the control group due to the antipyretic effect of paracetamol; however, the extent of the reduction was smaller than in the group that received additional red onion compresses. Both the experimental and control groups experienced a reduction in body temperature; however, the experimental group showed a greater reduction in temperature compared to the control group. This indicates that the administration of red onion compresses as an adjunct therapy has the potential to enhance the effectiveness of fever reduction in infants following DPT immunisation.

Table 6. Comparison of Temperature Reduction in the Two Groups



Based on Table 6, the results of the analysis show that the experimental group experienced an average decrease in body temperature of 1.06°C, whilst the control group experienced a decrease of only 0.56°C. The difference in the average temperature reduction between the two groups was 0.50°C. These findings indicate that the application of red onion compresses as an adjunct therapy is able to accelerate the reduction in body temperature in infants following DPT immunisation compared with standard therapy alone

Bivariate Analysis A bivariate analysis was conducted to determine the effectiveness of red onion compresses in reducing fever in infants aged 2–4 months following immunisation with the DPT vaccine. A analysis was carried out using an Independent Samples t-test for each group at a significance level (α) of 0.05 using SPSS software.

Table 7: Normality Test of Data.

Kelompok	Statistic	Sig	Description
Pre-test, Control Group	0.124	0.200*	Data Normal
Control Group Post-test	0.223	0.043*	Data Normal
Pre-test for the Experimental Group	0.139	0.200*	Data Normal
Post-test for the Experimental Group	0.257	0.009*	Data Normal

Based on Table 7, the Shapiro-Wilk normality test shows that all data sets have significance values (Sig.) greater than the significance level of 0.05; it can therefore be concluded that all data are normally distributed. The Shapiro-Wilk test was chosen for this study because the sample size in each group was less than 50 respondents (n = 15), making it a more appropriate test than the Kolmogorov-Smirnov test.

Independent Samples t-Test for the Control and Experimental Groups

Table 8. Results of the t-Test

Group	Mean	Sig
Control Group (Reduction in fever following DPT vaccination through the administration of paracetamol)	37.227	0.000
Experimental Group (Reduction in fever following DPT vaccination using red onion compresses and paracetamol)	37.733	0.000

Based on Table 8, it is evident that the control group administered paracetamol had a mean value of 37.227 with a significance value of 0.000, whilst the experimental group administered red onion compresses and paracetamol had a mean of 37.733 with a significance value of 0.000. The significance values for both groups being less than 0.05 indicate that the treatments administered had a significant effect on reducing fever following DPT immunisation. Furthermore, the mean value in the experimental group being slightly higher than that in the control group suggests that the combination of a red onion compress and paracetamol yields better results than the administration of paracetamol alone.

Summary of Hypothesis Testing Result

Table 9 Summary of Hypothesis Test Results

Group	Mean Reduction	Sig.	Decision
Experiment	1,06°C	0,000	H ₀ is rejected
Control	0,56°C	0,000	H ₀ rejected

Based on Table 9 of the statistical analysis results, both groups experienced a significant reduction inbody temperature. However, the group that received a combination of red onion compresses and paracetamol showed a much greater reduction in temperature compared to the group that received paracetamol alone. This indicates that the use of red onion compresses provides an additional effect in helping to reduce body temperature in infants following DPT immunization

Overall, the results of this study support the research hypothesis that red onion compresses are effective inreducing fever following DPT immunisation in infants aged 2–4 months at the Pakuan Ratu Community Health Centre in Lampung, with an average temperature reduction of 1.06°C, which is higher than that of the control group, which experienced a reduction of only 0.56°C. The results of the statistical test, showing a p-value of 0.000 (<0.05), confirm that the difference before and after the intervention is statistically significant. Furthermore, the Discussion section will elaborate on these findings by relating them to physiological theory, the mechanism of action of red onions, and the results of previous studies.

Discussion

The results of the study indicate that the application of red onion compresses has a beneficial effect on reducing the body temperature of infants aged 2–4 months experiencing fever following DPT immunisation. Based on the results of the univariate analysis, it was found that the average body temperature of infants in the experimental group before the intervention was 38.32°C, which then decreased to 37.26°C after the application of red onion compresses combined with the administration of paracetamol in accordance with healthcare standards. Consequently, the average reduction in body temperature in the experimental group was 1.06°C, indicating that the majority of infants experienced a reduction in body temperature to near-normal levels following the intervention.

This reduction in body temperature indicates that the red onion compress acts as a complementary therapy that helps accelerate the release of body heat. According to Notoatmodjo (2020), the effectiveness of a health intervention can be assessed by the ability

of that intervention to produce changes in health status that can be measured objectively. In this study, this change was evident from the reduction in body temperature, which was not only clinically observable but also supported by measurements taken using a digital thermometer, thus demonstrating that the intervention administered was highly effective.

During the study, red onion compresses were applied for approximately 15 minutes to the back, chest and soles of the feet in accordance with the Standard Operating Procedures (SOP). Observations showed that the majority of infants began to experience a reduction in body temperature within 15–30 minutes after the intervention, accompanied by the infants appearing calmer, less fussy and beginning to rest well. These findings are consistent with studies by Yuliani et al. (2021), Rahmawati and Sari (2022), and Pratiwi et al. (2023), which reported that red onion compresses are effective in accelerating the reduction of body temperature in children with hyperthermia through improved peripheral blood circulation and the anti-inflammatory effects of the active compounds they contain.

The results of the study in the control group showed that standard therapy in the form of paracetamol was also able to reduce the body temperature of infants experiencing fever following DPT immunisation. The average body temperature before paracetamol administration was 38.29°C, which then decreased to 37.73°C after the intervention, resulting in an average reduction in body temperature of 0.56°C. These results indicate that paracetamol remains effective as an antipyretic in helping to reduce fever in infants.

This reduction in body temperature occurs because paracetamol works by inhibiting prostaglandin synthesis in the central nervous system, particularly in the hypothalamus, thereby restoring the body's temperature set point to normal. As prostaglandin levels decrease, the body begins to increase heat dissipation through peripheral vasodilation and increased evaporation, causing the body temperature to gradually decrease. Therefore, paracetamol is the recommended pharmacological treatment for mild to moderate fever in infants and children.

However, the study results indicate that the extent of the reduction in body temperature in the control group was smaller than in the experimental group. This suggests that the administration of paracetamol as monotherapy is indeed effective in reducing fever, but the process of heat dissipation occurs more slowly than when combined with non-pharmacological therapy. Statistical analysis also revealed a Sig. (2-tailed) value of 0.000 (<0.05), indicating a significant difference in body temperature before and after paracetamol administration.

These findings support the use of paracetamol as the primary treatment for postimmunisation fever, but also indicate that pharmacological therapy alone does not provide an optimal reduction in body temperature compared with a combination of pharmacological and non-pharmacological therapies. This is because paracetamol acts centrally in the hypothalamus with a peak onset of 30–60 minutes, whilst the addition of red onion compresses (non-pharmacological) simultaneously provides a local peripheral vasodilatory effect via allicin/essential oils, thereby allowing heat dissipation via evaporation and radiation to occur more rapidly within the first 60 minutes.

The results of the study showed that both the experimental group and the control group experienced a decrease in body temperature following treatment. However, the extent of the decrease in body temperature between the two groups showed a fairly significant difference. In the experimental group, which received a combination therapy consisting of paracetamol administered alongside a red onion compress for 15 minutes, the average body temperature before the intervention (pre-test) was 38.32°C and after the intervention (post-test) fell to 37.26°C, resulting in an average decrease in body temperature of 1.06°C. All participants in the experimental group experienced a reduction in body temperature ranging from 0.9°C to 1.3°C, with no participants showing an increase in body temperature following the treatment.

These findings suggest that the combination of red onion compresses and paracetamol is effective in helping to reduce infants' body temperature following DPT immunisation to a level close to normal body temperature.

In addition to the compress's effect as a heat-conducting medium, the active compounds in red onions are thought to play a role in accelerating the process of reducing body temperature. Red onions contain organic sulphur compounds such as allyl propyl disulphide, flavonoids— particularly quercetin—and essential oils that provide a warming sensation on the skin. When red onions are applied to the skin's surface, they stimulate capillary vasodilation, thereby increasing peripheral blood flow. This accelerates the transfer of heat from the body's core to the skin's surface, making it easier for heat to be released into the environment. Furthermore, the flavonoids possess antioxidant and anti-inflammatory properties that may help reduce mild inflammation resulting from the immune response following immunisation (Ministry of Health of the Republic of Indonesia, 2022).

The results of this study show that all infants in the experimental group experienced a consistent reduction in body temperature. The fact that none of the participants experienced an increase in body temperature indicates that the combination of pharmacological and nonpharmacological therapies provides a relatively stable effect in controlling post-vaccination fever. Clinically, an average reduction in body temperature of 1.06°C is a satisfactory result, given that the initial temperatures of all participants fell within the mild to moderate fever category. Following the intervention, the average body temperature reached 37.26°C, which falls within the normal body temperature range for infants. Consequently, the adjunctive therapy involving red onion compresses may be considered as a form of non-pharmacological nursing intervention that is safe, easy to perform, inexpensive, and can be applied by parents at home to complement the administration of antipyretic medication.

The findings of this study are consistent with research by Sari and Yuliana (2022), which reported that the application of red onion compresses to infants with a fever was able to significantly reduce body temperature compared to before the intervention. That study explained that the combined effect of the compress and the sulphur content in red onions accelerates the process of blood vessel vasodilation, thereby optimising the release of body heat. Similarly, a study by Pratiwi, Handayani, and Rahmawati (2023) found that the use of red onion compresses as a complementary therapy to antipyretics resulted in a greater reduction in body temperature compared to the use of antipyretics alone in infants with post-immunisation fever. These findings reinforce the conclusion of this study that red onions have the potential to serve as an effective complementary therapy in helping to reduce body temperature.

In contrast to the experimental group, the control group, which received only standard therapy in the form of paracetamol, also experienced a reduction in body temperature, albeit to a lesser extent. The results showed that the average body temperature before treatment was 38.29°C, which then fell to 37.73°C after the administration of paracetamol, representing an average reduction of 0.56°C. All participants in the control group experienced a reduction in body temperature ranging from 0.5°C to 0.7°C, indicating that paracetamol remains effective as an antipyretic in infants following DPT immunisation. However, compared with the experimental group, the reduction in body temperature achieved by the control group was only about half that achieved by the experimental group.

Physiologically, these results indicate that the administration of paracetamol is indeed sufficiently effective in managing post-immunisation fever, as it inhibits the formation of prostaglandins—the primary mediators of elevated body temperature. However, in the absence of adjunctive therapy to accelerate heat dissipation from the skin's surface, the rate of temperature reduction is slower than when combined with non-pharmacological therapy.

This explains why the average body temperature of the control group after treatment remained at 37.73°C, whilst that of the experimental group had reached 37.26°C.

Overall, the discussion of these research findings shows that both groups experienced a decrease in body temperature from the pre-test to the post-test, but the experimental group exhibited a greater reduction than the control group. These findings indicate that the application of red onion compresses as an adjunct therapy to paracetamol provides additional benefits in accelerating the reduction of fever in infants aged 2–4 months following DPT immunisation. Therefore, red onion compresses may be considered as an effective, easy-to-administer and costeffective non-pharmacological intervention, and could form part of parental education on the management of post-immunisation fever at the primary healthcare level.

The research findings indicate that both groups experienced a decrease in body temperature following the intervention; however, the magnitude of the decrease showed a fairly significant difference. The experimental group experienced an average decrease in body temperature of 1.06°C, whilst the control group experienced an average decrease of only 0.56°C, resulting in a difference of 0.50°C. These results are supported by the Independent Samples t-test, which showed p-values of 0.000 ($p < 0.05$) for both the control and experimental groups, respectively; it can therefore be concluded that both the control and experimental groups experienced a reduction in body temperature following the intervention. However, when examined based on the mean values according to the SPSS analysis, there was a statistically significant difference in effectiveness between the two groups, with the mean value in the experimental group being lower than that of the control group. Thus, although both groups experienced a reduction in body temperature, the administration of red onion compresses as an adjunct to paracetamol was proven to be more effective than paracetamol alone in reducing infants' body temperature following DPT immunisation, as evidenced by the lower mean value in the experimental group, which indicates that the experimental group's body temperature post-treatment was lower than that of the control group.

The experimental group, which received a combination of red onion compresses and paracetamol, experienced a reduction in body temperature almost twice as great as that of the control group. These findings indicate that red onion compresses provide an adjunctive effect in accelerating the reduction in body temperature. Red onions (*Allium cepa* L.) are known to contain various active compounds such as flavonoids, quercetin, allicin, sulphur compounds, and essential oils, which possess anti-inflammatory and antioxidant effects and are capable of improving blood circulation at the skin's surface. When red onions are used as a compress, their essential oils and sulphur compounds help stimulate the vasodilation of skin capillaries, thereby accelerating the release of body heat through the processes of conduction, convection and evaporation. Furthermore, applying the compress to the body's surface also helps increase heat transfer from the body's core to the environment, resulting in a faster drop in body temperature (Widodo, 2020).

The results of this study also showed that all infants in the experimental group experienced a reduction in body temperature, with no participants experiencing an increase in temperature following the intervention. The temperature reduction ranged from 0.9°C to 1.3°C, indicating a relatively consistent response across the entire sample. This consistency indicates that the red onion compress does not merely have an effect on a small proportion of participants, but provides benefits that are almost uniformly distributed across all infants experiencing fever following DPT immunisation. Conversely, in the control group, the temperature reduction ranged only from 0.5°C to 0.7°C; thus, whilst effective, the magnitude of the reduction was still lower than that observed in the experimental group.

Statistically, the results of the Independent Samples t-test further reinforce the findings of this study. A p-value of 0.000 indicates that the probability of this difference occurring by chance is extremely low. Furthermore, the calculated t-value of 11.036, which is significantly greater than the critical t-value of 2.048, indicates that the null hypothesis is rejected and the research hypothesis is accepted. This means that there is a significant difference in effectiveness between the administration of paracetamol alone and the combination of paracetamol and red onion compresses. Although both groups experienced a reduction in body temperature, the combination of the two therapies produced more optimal results in reducing fever following DPT immunisation.

These findings are also supported by a study by Sari and Wulandari (2021), which reported that applying red onion compresses to toddlers with a fever significantly reduced their body temperature compared to before the intervention. The study explained that the sulphur and essential oil content of red onions promotes vasodilation of peripheral blood vessels, thereby accelerating the release of body heat. Similarly, a study by Pratiwi, Nurhayati and Lestari (2022) found that a combination of pharmacological therapy and complementary therapy in the form of red onion compresses resulted in a greater reduction in body temperature compared to the use of antipyretics alone. These results reinforce the findings of this study that the use of red onion compresses as an adjunct therapy can enhance the effectiveness of fever management in children.

Based on the overall research results, it can be understood that the effectiveness of reducing body temperature in the experimental group was influenced not only by the administration of paracetamol but also by the contribution of red onion compresses, which act through the physiological mechanism of heat dissipation. The combination of these two interventions resulted in a faster and greater reduction in body temperature compared to the administration of paracetamol alone. Therefore, red onion compresses may be considered as a simple, inexpensive and readily available complementary therapy, with the potential to be applied by healthcare professionals and parents to assist in the management of fever following DPT immunisation in infants. These findings also address the specific objective of the study, which was to demonstrate a significant difference in the reduction of body temperature between the experimental and control groups, with the experimental group showing better results both clinically and statistically.

CONCLUSION

Based on the study results, the application of red onion compresses was significantly effective in reducing the average body temperature of infants from 38.32°C to 37.26°C (a reduction of 1.06°C). Meanwhile, the control group receiving standard therapy (paracetamol) also experienced a reduction from 38.29°C to 37.73°C (a reduction of 0.56°C). The results of the Paired Sample tTest indicated that both interventions were statistically significant with a Sig. value of 0.000 (<0.05). However, the results of the Independent Samples t-test demonstrated that the combination of paracetamol and red onion compresses was significantly more effective than paracetamol alone. This was based on a calculated t-value of 11.036 (greater than the critical t-value of 2.048) and the lower final mean temperature in the experimental group, indicating a greater reduction in temperature. Consequently, red onion compresses are highly recommended as a safe, simple, economical and easy-to-administer complementary therapy to help manage fever following DPT immunisation in infants.

However, several limitations should be taken into account: this study is limited by the fact that it was conducted at a single location over a short period and did not control for various external factors that could influence the infants' body temperature. Nevertheless,

further research with a stronger experimental design, a larger sample size, a longer observation period, and the inclusion of a control group is essential to obtain more comprehensive scientific evidence regarding the effectiveness and safety of using red onion compresses in infants following immunisation.

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