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Immediate Effect of Cold Water Enema On Fever Among Adults: A Single Arm Study

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Abstract

Background:
Fever is a frequent bodily reaction to infection or inflammatory conditions, marked by a rise in core temperature and accompanying alterations in cardiovascular and respiratory functions. Within Naturopathic practice, Hydrotherapy especially the application of Cold-Water Enema has long been used to lower body temperature and ease systemic congestion. However, despite its traditional acceptance, there is limited scientific literature examining its immediate impact on cardiac and respiratory parameters in individuals with fever.

Objectives:
The present study sought to evaluate the immediate impact of a cold-water enema on body temperature and selected cardiopulmonary variables in adults presenting with fever

Methods:
A pre-experimental, single-group pretest–post-test design was adopted for this study. Adult in patients with fever (body temperature ≥100°F) were selected using purposive sampling. Baseline recordings of body temperature and cardiopulmonary parameters were obtained prior to the intervention. A cold-water enema (15–20°C, 500–1000 ml) was then administered with the patient placed in the left lateral (Sims') position. Follow-up measurements were taken at 15-minute intervals for one hour, and subsequently at the 3rd and 6th hours. The collected data were analysed using suitable descriptive and inferential statistical techniques.

Results:
The intervention led to a marked decrease in body temperature and pulse rate, alongside a slight reduction in respiratory rate and a mild rise in blood pressure. No adverse effects were noted.

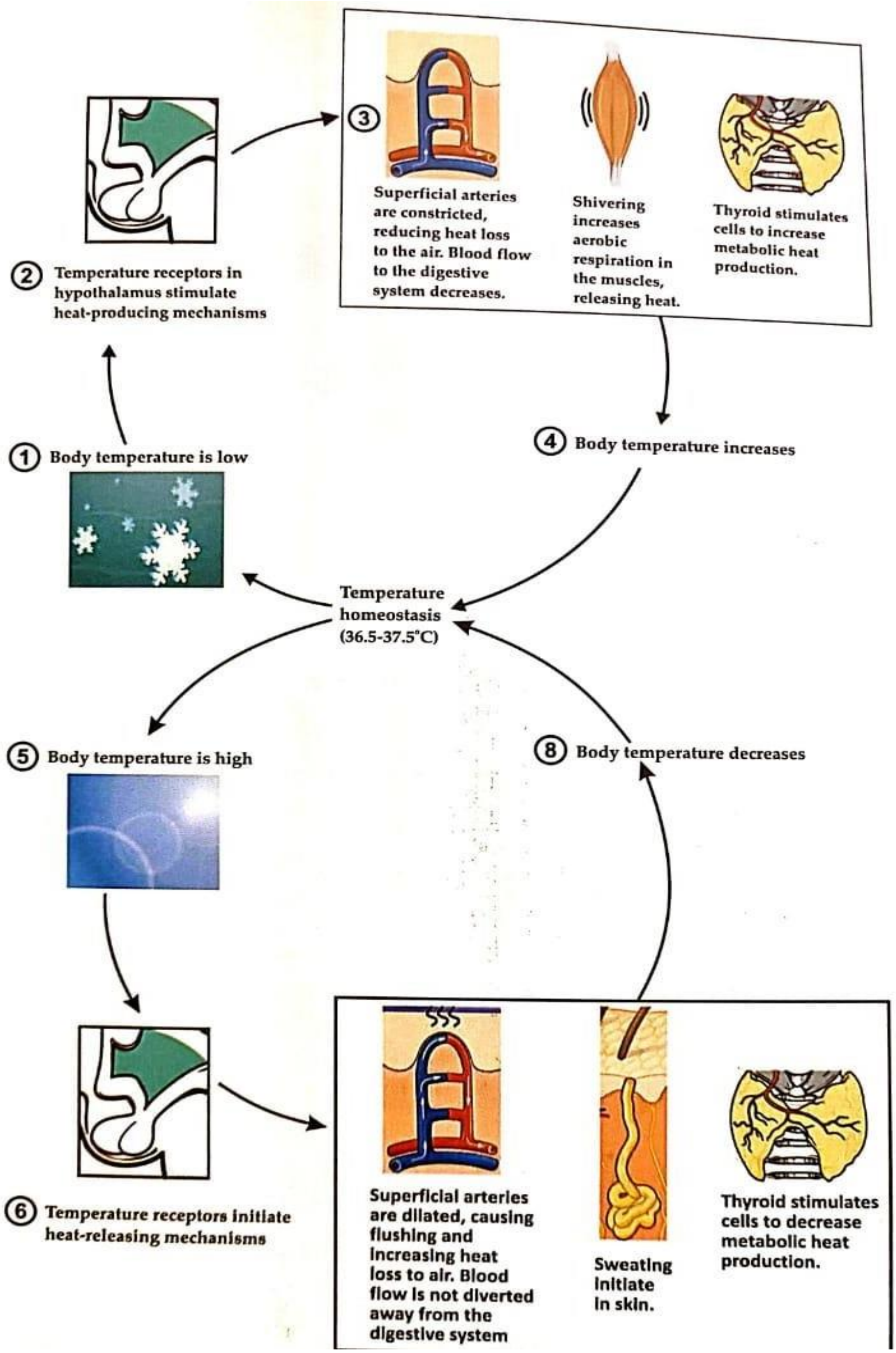
Conclusion:
Cold-water enema appears to be a safe and effective adjunct hydrotherapeutic measure for lowering body temperature and modulating cardiopulmonary parameters in adults with fever.

Keywords:
Cold-water enema, Fever, Hydrotherapy, Naturopathy, Body temperature, cardiopulmonary parameters.

1. Introduction

Normal human body temperature is generally accepted to be around 37 °C (98.6 °F), though it may naturally vary by approximately 1 °C (1.8 °F) either above or below this value.(1) Fever has been defined as "a state of elevated core temperature, which is often, but not necessarily, part of the defensive response of multicellular organisms to invasion by live microorganisms or inanimate matter recognized as pathogenic or alien by the host".(2) Raised body temperature is a common clinical feature of many illnesses and may result from a range of causes, including infections (such as bacterial or viral infections) as well as non-infectious conditions like inflammatory disorders, heat stroke, or adverse effects of medications. It represents a natural defence response to infection, as it helps stimulate immune activity. The terms pyrexia, fever, and hyperthermia are often used interchangeably.(3) Fever may be categorised according to body temperature as low-grade, ranging from 37.3 to 38.0 °C (99.1–100.4 °F), moderate, from 38.1 to 39.0 °C (100.6–102.2 °F), and high-grade, between 39.1 and 41.0 °C (102.4–105.8 °F). Body temperatures above 41.0 °C (105.8 °F) are regarded as hyperthermia.(4) A febrile state is associated with a number of metabolic alterations, including rises in heart rate, respiratory rate, and basal metabolic rate.(5) Fever also enhances immune functions while restricting the growth of certain microorganisms.(6) At the same time, blood pressure may decrease,(7) and blood flow to the gastrointestinal system is reduced.(8) Liver enzymes, including AST and ALT, tend to increase,(9) and renal function may deteriorate, as indicated by a reduction in the glomerular filtration rate.(10) Thermoregulation preserves core body temperature under the control of the hypothalamus. Excess heat prompts vasodilatation and sweating to promote heat loss, whereas exposure to cold induces vasoconstriction and shivering to conserve and produce heat, supported by behavioural responses.**[FIGURE 1]** (11) In Naturopathy, fever is regarded as a natural internal cleansing process, in which reduced vitality results in the accumulation of toxins, subsequently activating heat-generating eliminative mechanisms that aid detoxification and promote the body's inherent healing capacity.(12) An enema is a method of cleansing the colon that involves gently instilling water into the rectum using irrigation equipment and is widely employed in naturopathic detoxification practices. Traditionally known as basti in yoga and Ayurveda, enema therapy developed from ancient colon purification techniques into a contemporary approach used for bowel cleansing, reduction of fever, and therapeutic interventions.(13)

Figure 1: Thermoregulation in human body



Materials and methods

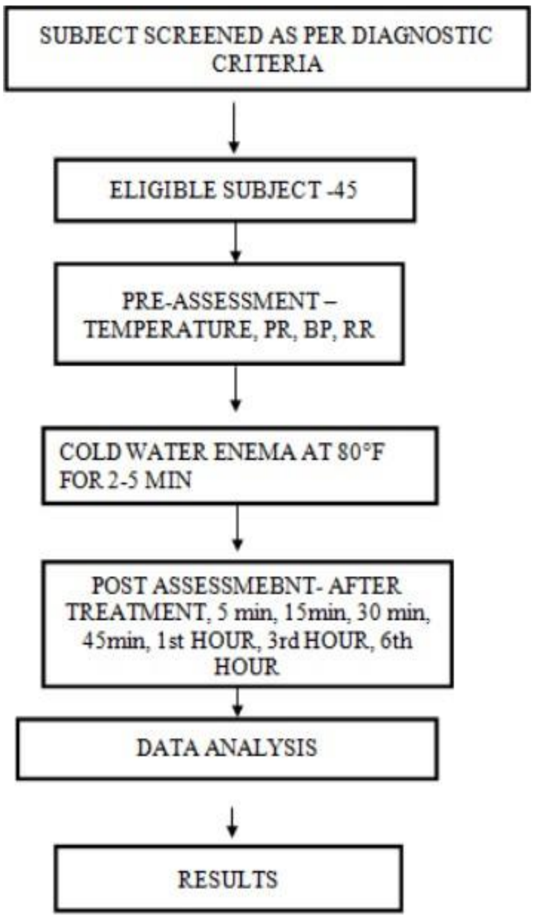
Study Design and Setting

A single arm study is conducted on fever individuals of temperature ≥ 38°C [100.4°F] between May 2025 and October 2025 at Alva's Anandamaya hospital and Alva's college of naturopathy and yogic sciences, a unit of Alva's education foundation®. Moodbidri, following ethical approval from the Institutional Ethics Committee (ACNYS/IECHS/2023/77) dated on 13/10/2023. The trial was registered prospectively with the Clinical Trials Registry of India (CTRI/2025/04/084893).

Study Population and Recruitment

A total of 45 participants were screened, and those meeting the inclusion and exclusion criteria were enrolled in the study. The overall study duration was seven hours, including screening, baseline evaluation, a 10–15 minute intervention, post-intervention assessments, and data analysis.**[FIGURE 2]**

Figure 2: Consort Flow chart



Eligibility Criteria

Inclusion criteria

- Patients with fever ≤ 3days
- Temperature ≥ 38°C [100.4°F]
- Age group – 18-30yrs
- Gender – both males and females
- Willingness to participate in the study

Exclusion criteria

- Females with menstrual cycle
- Fistula
- Anal fissure
- Hemorrhoids
- Diarrhea
- Pregnancy
- Fever with chills
- Any Medication if they are taking
- Alcohol, Tobacco chewing, Smoking, Narcotic drugs

Diagnostic Criteria

Most febrile condition is readily diagnosed on the basis of presenting symptoms and problem focused physical examination.

Non specific fever is diagnosed based on the temperature measured by Thermometer. The rectal temperature of 100.4°F or greater then it is diagnosed as fever.(14)

Diagnostic criteria for fever of unknown origin [R50, R50.9]

- A state of febrile illness for more than three weeks.
- Body temperature greater than 38.3 °C on several occasions
- Uncertain diagnosis after one week of study in hospital.(15)

Intervention

The subject lies on the left side with the left leg straight and the right knee flexed. A lubricated nozzle is gently inserted rectally. Water at 80°F is infused slowly from a three-foot height, adjusted if discomfort occurs, up to 1–1.5 liters, then retained briefly before evacuation.(13,16)

Outcome Measures and Assessments

Outcomes were assessed at 8 time points, one at baseline and other after completion of intervention duration that is 5min, 15min, 30min, 45min, 1st hour 3rd hour and 6th hour . The parameters measured are, Temperature, Pulse rate, Respiratory rate, Systolic Blood Pressure, Diastolic Blood Pressure.

Automatic non-invasive patient cardiac monitor EFFICA CM10 a Philips model, Manufactured by PHILIPS MEDICAL SYSTEM, MA01810 USA.

Ethical Considerations

All participants received verbal and written information about study procedures. For those unfamiliar with English, Kannada translations were provided. Participation was voluntary, and individuals were free to withdraw at any time without consequence. Written informed consent was obtained from all participants.

Statistical Analysis

Data were entered in MS Excel and both descriptive and inferential statistics were analyzed using SPSS v26.0. The data was visually inspected for manual typographic errors. The shapiro-wilk's test for normality showed that the data was normally distributed. Paired samples t-test was used to assess within group differences. The Friedman test, which is the non-parametric equivalent of the Repeated Measures ANOVA, was used to assess within-group differences across multiple time points. For all the analyses, we present 95% confidence interval (CI) and considered $p < 0.05$ as significant. Sample size calculation done with G*Power 3.1.9.4 with effective size 0.6 were estimated sample size is 40 considering any dropouts the total sample size is 45.(13)

Results

Participant Flow: A total of 45 individuals with diagnosed fever (body temperature ≥ 38°C [100.4°F]) were recruited for the study. Baseline recordings of body temperature and cardiopulmonary parameters were obtained from all participants prior to the intervention. The intervention was carried out for a duration of 5–10 minutes. Subsequent assessments were conducted at 5, 15, 30 and 45 minutes, and at the 1st, 3rd and 6th hours following the intervention.

Baseline Characteristics: The study population showed a nearly even gender distribution, comprising 21 males and 24 females. The participants had a mean age of 25.07 ± 2.08 years. Baseline demographic details are summarised in **[TABLE 1]**, with no statistically significant differences observed in age or gender between participants.

TABLE 1: Baseline characteristics of participants

Characteristics	**study group**
Gender-N (%)	45
Male	21[46.67]
Female	24[53.33]
Age-Mean ±SD	25.07±2.08

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TABLE 2: Within-group comparison (Friedman's Repeated Measures ANOVA with Bonferroni-adjusted Wilcoxon post-hoc tests) of physiological variables at different time intervals following cold-water enema administration

Variable s	Mean ± SD								W - Value	p value
	Pre	Post _ 5Min	Post _ 15min	Post _ 30m in	Post _ 45m in	Post _ 1hr	Post _3hr	Post _ 6hr		
Temperature	101.17±0.71	100.99±0.73*	100.57 ±0.68***	100.24±0.62***	99.89 ±0.61 ***	99.54 ±0.61 ***	98.08±0.66***	97.99 ±0.66 ***	304.28	<0.001
PR	101.17±0.71	102.84±6.45**	100.62 ±6.12***	95.31 ±5.3***	89.8±4.6***	88.73 ±4.59 ***	85.47±4.26***	74.29 ±3.52 ***	464.58	<0.001
RR	16.32 ±1.72	15.68 ±1.61	16.11±1.5	16.02 ±1.21	16.5±1.86	16.02 ±1.21	16.41±1.34	16.66 ±1.1	16.06	<0.05
SBP	117.33±6.73	116.98±5.87	120.36 ±4.81**	122.58±4.21***	124.09±3.27***	125.29±2.63***	126.18±2.21***	126.04±2.19***	175.71	<0.001
DBP	72.67 ±3.36	72.0±2.13	72.0±2.13	73.38 ±2.44	73.73 ±2.58	73.64 ±2.64	77.42±3.0***	77.42 ±3.0***	171.47	<0.001

Post Hoc Results: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Outcomes:
Body Temperature

The mean body temperature demonstrated a consistent and highly significant decline following the cold-water enema. The baseline temperature of 101.17 ± 0.71 °F decreased steadily at each subsequent assessment, reaching 97.99 ± 0.66 °F after 6 hours. Statistical analysis using the Friedman test showed a significant variation across the observed time points ($W = 304.28$, $p < 0.001$), suggesting a definite thermoregulatory response, possibly due to enhanced heat dissipation, improved peripheral blood flow and activation of parasympathetic mechanisms **[FIGURE 3].**

Pulse Rate (PR)

The pulse rate showed a progressive reduction, falling from a baseline value of 101.17 ± 0.71 bpm to 74.29 ± 3.52 bpm at 6 hours after the intervention. This decline was statistically significant ($W = 464.58$, $p < 0.001$) and indicates increased parasympathetic activity along with a reduction in cardiac excitability following normalisation of body temperature **[FIGURE 3].**

Respiratory Rate (RR)

The respiratory rate exhibited only slight fluctuations, increasing from 16.32 ± 1.72 breaths per minute at baseline to 16.66 ± 1.10 breaths per minute at the 6-hour follow-up. Although the overall change was minimal, Friedman test analysis revealed a statistically significant difference ($W = 16.06$, $p < 0.05$), which may indicate subtle stabilisation of respiratory patterns as body temperature reduced **[FIGURE 3].**

Systolic Blood Pressure (SBP)

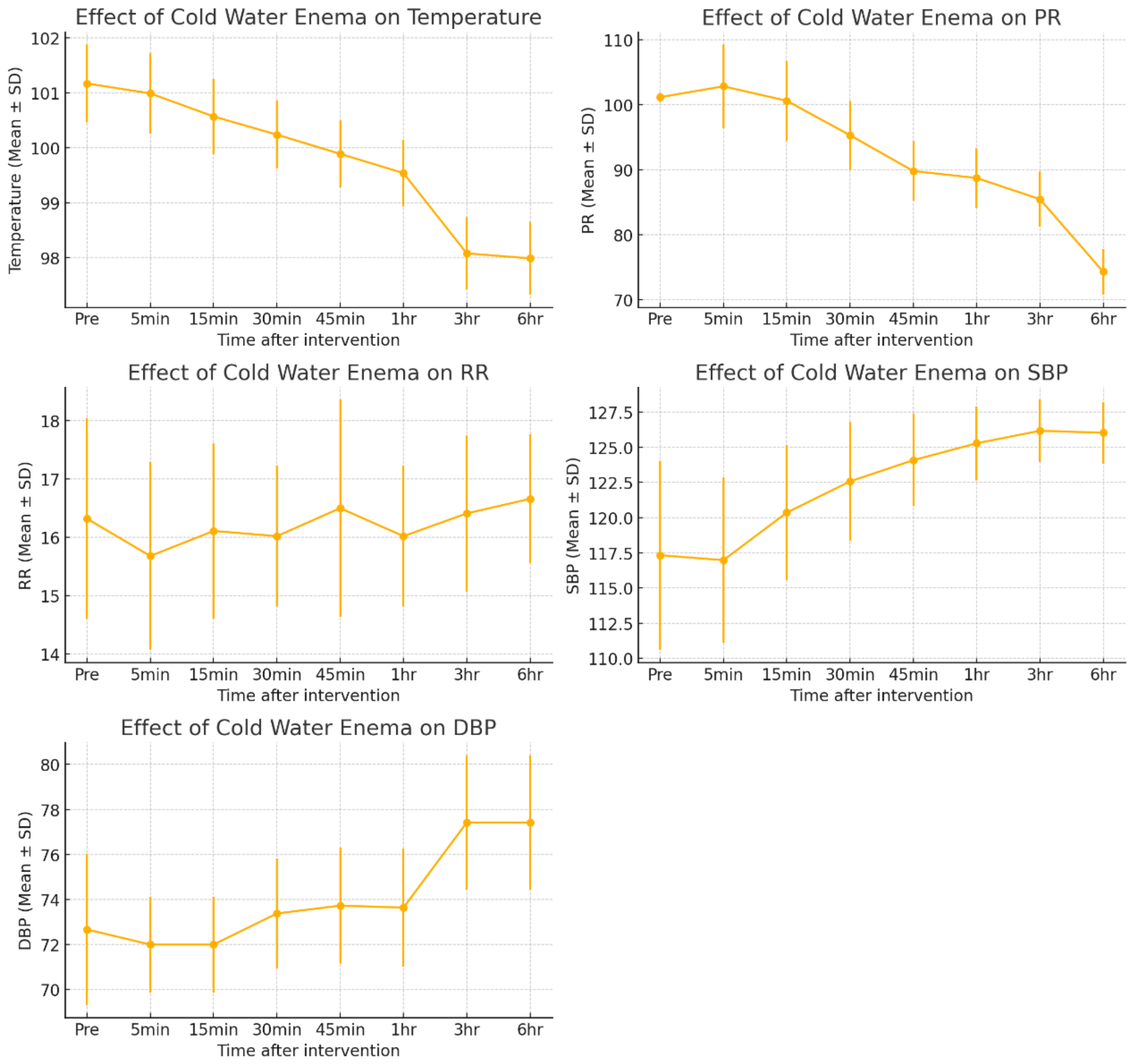
The mean systolic blood pressure demonstrated a gradual rise from 117.33 ± 6.73 mmHg at baseline to 126.04 ± 2.19 mmHg at the 6-hour assessment. Analysis using the Friedman test confirmed a statistically significant change over time ($W = 175.71$, $p < 0.001$). This transient increase may reflect autonomic regulation and enhancement of vascular tone during recovery from the hyperthermic state **[FIGURE 3].**

Diastolic Blood Pressure (DBP)

Diastolic blood pressure likewise showed a modest yet statistically significant rise, increasing from 72.67 ± 3.36 mmHg before the intervention to 77.42 ± 3.00 mmHg at the 6-hour follow-up ($W = 171.47$, $p < 0.001$). This variation may be attributed to compensatory vasomotor mechanisms linked to cooling and the subsequent re-establishment of systemic equilibrium **[FIGURE 3].**

All the statistical results outlined above are summarised in **[TABLE 2].**

Figure 3: Graph showing changes of Temperature, Pulse rate, Respiratory rate, Systolic BP, Diastolic BP pre and post cold enema at different time lines



DISCUSSION

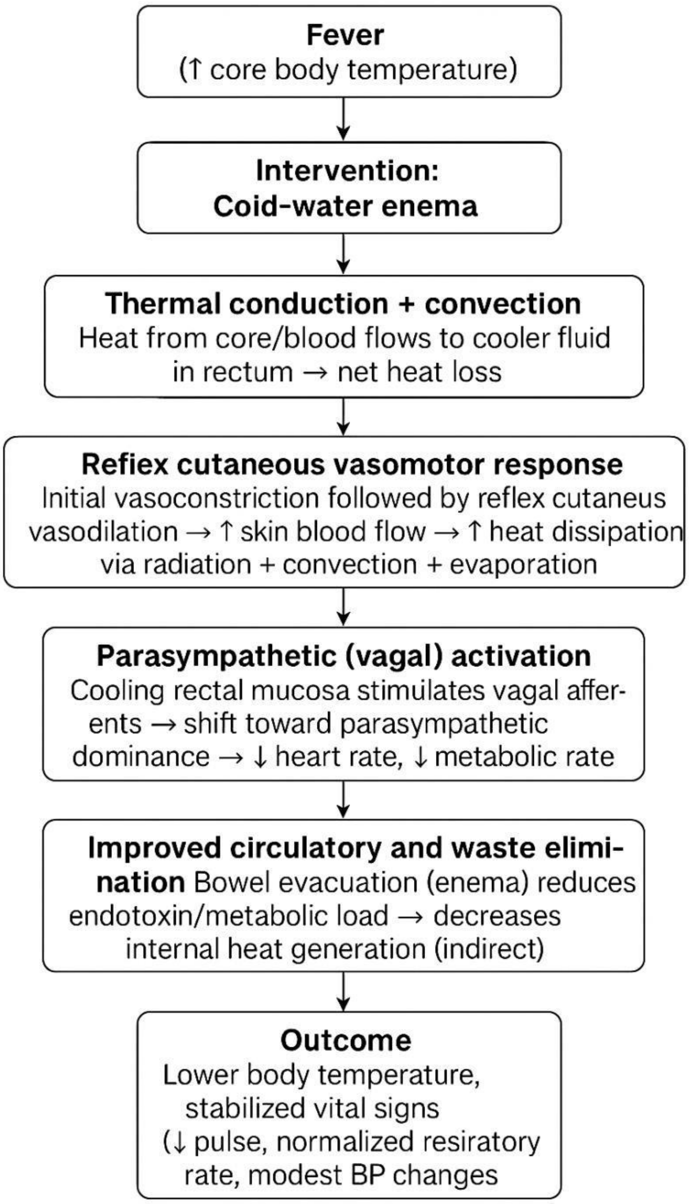
Summary of Key Findings: The current study assessed the immediate and short-term effects of a cold-water enema on body temperature and vital signs in adults with fever. The results demonstrated a marked reduction in body temperature and pulse rate following the intervention, accompanied by mild yet clinically meaningful changes in respiratory rate and blood pressure. These findings suggest that a cold-water enema may be a useful natural measure for reducing temperature and supporting physiological stability during fever. Earlier studies have highlighted the role of naturopathic and hydrotherapy methods in fever management, and this study appears to be the first to specifically examine the effects of a cold-water enema in an adult population. The cooling response is thought to occur through the removal of excess body heat by cold water, producing an initial cutaneous vasoconstriction followed by reflex vasodilation, thereby facilitating heat dissipation without altering the hypothalamic temperature set point.(17)

Interpretation: The pronounced and progressive fall in mean body temperature, from 101.17 ± 0.71 °F at baseline to 97.99 ± 0.66 °F at six hours, underscores the strong thermoregulatory influence of the cold-water enema. This effect is largely attributed to direct heat dissipation as the cooler fluid absorbs excess body heat, combined with reflex cutaneous vasodilation that enhances heat loss through radiation and evaporation. Cooling of the rectal mucosa further activates parasympathetic pathways, reducing metabolic activity and supporting temperature regulation. Additionally, bowel emptying may contribute to a reduction in metabolic heat by lowering the systemic toxin load.

The marked decrease in pulse rate, from 101.17 ± 0.71 bpm to 74.29 ± 3.52 bpm, suggests a transition from sympathetic predominance to parasympathetic regulation. This shift indicates a reduction in cardiac demand and better autonomic balance following normalisation of body temperature. Changes in respiratory rate were minimal but showed slight stabilisation, most likely reflecting reduced metabolic strain as the fever resolved. Both systolic and diastolic blood pressures exhibited a small yet statistically significant rise, pointing to enhanced vascular tone and improved circulatory function during recovery from hyperthermia. **[FIGURE 4]**

Overall, the beneficial effects of the cold-water enema seem to arise from interplay of thermal, neural and circulatory processes. Through facilitating heat loss, enhancing parasympathetic activity and maintaining circulatory stability, the intervention aids in re-establishing physiological equilibrium, lowering metabolic stress and easing the discomfort associated with fever.

Figure 4: Cold-Water Enema: Mechanism of Action in Fever Management.



Strengths: The intervention is low in cost and straightforward to apply in a clinical environment. No adverse events were observed among the participants, suggesting a good safety profile. The treatment yielded positive results in controlling fever and associated physiological parameters. Furthermore, this study is the first to assess the use of a cold-water enema as a therapeutic approach for fever, thereby contributing new evidence to the existing body of literature.

Limitations: The comparatively small sample size may have reduced statistical power and limited the extent to which the results can be generalised to a wider population. Moreover, there is a scarcity of robust scientific literature specifically examining the use of cold-water enemas in fever management, which limits direct comparison and external validation of the findings. The study also did not differentiate between the various causes or types of fever, leaving the effectiveness of the intervention in specific febrile conditions unclear. In addition, the assessment was confined to short-term outcomes, making it difficult to ascertain the durability of the effects or to detect any delayed physiological responses over a longer follow-up period.

Future Directions: Future studies should include more objective outcome measures to better support and confirm the benefits noted in the present research. Investigations with larger sample sizes and longer follow-up durations are required to enhance reliability and evaluate sustained effects. Moreover, assessing the intervention in specific febrile conditions such as typhoid, malaria and dengue would help determine its clinical relevance in particular disease settings.

Conclusion

This study showed that the use of a cold-water enema led to a marked and rapid reduction in body temperature and pulse rate in adults with fever. The results indicate effective temperature control and autonomic stabilisation following the intervention, with no adverse effects reported. Given its favourable safety profile and short-term benefits, this method may offer a useful complementary, non-pharmacological option in the supportive management of fever.

Reference

1. O'Grady NP, Barie PS, Bartlett JG, Bleck T, Carroll K, Kalil AC, *et al.* Guidelines for evaluation of new fever in critically ill adult patients: 2008 update from the American College of Critical Care Medicine and the Infectious Diseases Society of America. *Crit Care Med.* 2008;36(4):1330-49.
2. Mackowiak PA, Chervenak FA, Grünebaum A. Defining fever. *Open Forum Infect Dis.* 2021;8(6):ofab161.
3. Walter EJ, Hanna-Jumma S, Carraretto M, Forni L. The pathophysiological basis and consequences of fever. *Crit Care.* 2016;20(1):200.
4. Osilla EV, Marsidi JL, Sharma S. Physiology, temperature regulation. *StatPearls [Internet]*. 2023.
5. Evans SS, Repasky EA, Fisher DT. Fever and the thermal regulation of immunity: the immune system feels the heat. *Nat Rev Immunol.* 2015;15(6):335-49.
6. Balli S, Shumway KR, Sharan S. Physiology, fever. *StatPearls [Internet]*. 2023.
7. Akhtar MJ, Al-Nozha M, Al-Harthi S, Nouh MS, *et al.* Electrocardiographic abnormalities in patients with heat stroke. *Chest.* 1993;104(2):411-4.
8. Lambert GP. Role of gastrointestinal permeability in exertional heatstroke. *Exerc Sport Sci Rev.* 2004;32(4):185-90.
9. Alzeer AH, El-Hazmi MA, Warsy AS, Ansari ZA, Yrkendi MS. Serum enzymes in heat stroke: prognostic implication. *Clin Chem.* 1997;43(7):1182-7.
10. Mustafa S, Elgazzar AH, Essam H, Gopinath S, Mathew M. Hyperthermia alters kidney function and renal scintigraphy. *Am J Nephrol.* 2007;27(3):315-21.
11. Tansey EA, Johnson CD. Recent advances in thermoregulation. *Adv Physiol Educ.* 2015;39(3):139-48.

12. National Institute of Naturopathy. *Clinical naturopathy and yoga: a manual for physicians and students.* 1st ed. Pune: Dept. of AYUSH, Ministry of Health and Family Welfare; 2017. p. 84-8.
13. Prasul SKJ, Shaji J, Shalmali M. Comparative study of cold and neutral enema on autonomic variables in healthy volunteers. *RJAS.* 2020;7(2):1157.
14. Barnett BJ, Nunberg S, Tai J, Lesser ML, Fridman V, Nichols P, *et al.* Oral and tympanic membrane temperatures are inaccurate to identify fever in emergency department adults. *West J Emerg Med.* 2011;12(4):505.
15. Unger M, Karanikas G, Kerschbaumer A, Winkler S, Aletaha D. Fever of unknown origin (FUO) revised. *Wien Klin Wochenschr.* 2016;128:796-801.
16. Kellogg JH. *Rational hydrotherapy.* 3rd ed. Pune: National Institute of Naturopathy, Dept. of AYUSH; 2016. p. 891-5.
17. Aluka T, Gyuse A, Udonwa N, Asibong U, Meremikwu M, Oyo-Ita A. Comparison of cold water sponging and acetaminophen in control of fever among children attending a tertiary hospital in South Nigeria. *J Family Med Prim Care.* 2013;2(2):153.

Declarations

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Research ethics:
The study was approved by the Institutional Ethics Committee (ACNYS/IECHS/2023/77). All procedures followed the principles of the Declaration of Helsinki.

Informed consent:
Informed consent was obtained from all individuals included in this study.

Author contributions:
All authors have accepted responsibility for the entire content of this manuscript and approved submission.

Use of large language models, AI and machine learning tools:
ChatGPT (OpenAI) 5.1 was used solely for language refinement and clarity improvement during manuscript preparation. All scientific content, data analysis, interpretation, and conclusions were generated and verified by the authors, who take full responsibility for the accuracy and integrity of the work.

Conflict of interest: Authors state no conflict of interest.

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Data availability
The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Clinical trial registration: CTRI/2025/04/084893.