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## Effectiveness of hot water foot bath therapy in reduction of temperature among children (6-12 years) with fever in selected hospitals at Mangaluru

**Aileen Christal Pereira and Shanthi Sebastian**

### Abstract

**Background:** Fever is a natural response of the body that helps in fighting off foreign substances such as micro organisms and toxins. Hot water foot bath therapy causes blood vessels to dilate and improves blood circulation, which releases heat in the form of sweat and supplies oxygen to brain cells which aids in the elimination of toxins. The immersion of the body or part of the body in a water bath stimulates circulation and reduces body temperature.

### Objectives

1. To determine the body temperature of the children (6-12 years) in both experimental and control group as measured by digital thermometer.
2. To evaluate the effectiveness of hot water foot bath therapy among the children (6- 12 years).
3. To find out the association of body temperature with the selected demographic variables.

**Design:** Quasi experimental pre test post test control group design.

**Methodology:** The population of the study was children 6-12 years admitted with fever. Purposive sampling technique was used for selecting the study subjects (60).

**Intervention:** Pre-test axillary temperature was assessed for experimental and control group and recorded immediately in the observational chart. The experimental group received the hot water foot bath therapy (immersing of feet and ankles in hot water) for a period of 15 minutes with the water temperature 100°F - 110°F. The post-test temperature of the experimental group was checked immediately after the intervention.

### Results

1. The study showed that there was a very high significant difference between the pre test and post test reduction in body temperature in the experimental group t value 8.068 at P value 0.0001. Also the significant difference of post test body temperature between the experimental and control group  $t_{(58)}=1.99$  at  $p<0.05$  level of significance.
2. The study showed that there was a significant association of pre-test body temperature of the experimental group with initial body temperature ( $\chi^2=11.03$ ,  $p<0.05$ ) and in control group with child's age and initial body temperature ( $\chi^2=9.64$ ,  $9.33$ ,  $p<0.05$ ).
3. The result revealed that there is a significant association in post-test body temperature of the control group with child's age, gender and with initial body temperature ( $\chi^2=10.93$ ,  $3.59$ ,  $7.90$  at  $p<0.05$ ).

**Interpretation and Conclusion:** The study concluded that there was a significant reduction in body temperature in the post test in the experimental group. This proved that the hot water foot bath therapy was effective in reduction of body temperature.

**Keywords:** Body temperature; effectiveness; fever; hot water foot bath therapy

### Introduction

A fever is a symptom of an infection, ranging from the flu to dehydration to heart attack. Fever in a child is one of the most common clinical symptoms managed by paediatricians and other health care providers and a frequent cause of parental concern. Many parents administer antipyretics even when there is minimal or no fever, because they are concerned that the child must maintain a "normal" temperature. Fever, however, is not the primary illness but is a physiologic mechanism that has beneficial effects in fighting infection. There is no evidence that fever itself worsens the course of an illness or that it causes long-term neurologic complications. Thus, the primary goal of treating the febrile child should be to improve the child's overall comfort rather than focus on the normalization of body temperature [1].

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The best treatment of fever was found to be alternating hot and cold application, hot half bath and hot water foot bath therapy. Hot water foot bath therapy is said to treat the underlying infection through activating white blood cells and immune system, not just treating the fever as drugs do. During fever dilatation of internal blood vessels and constriction of skin blood vessels occurs. The tiny capillaries of the skin have been called the “second heart” [2].

#### **What is already known about the topic?**

- Thermoregulatory center in the hypothalamus regulates the body temperature.
- The treatment of fever was found to be alternating hot and cold application.
- The immersion of the body or part of the body in a water bath stimulates circulation. Water being good thermal conductor, can influence temperature regulation mechanism of the body through circulation.

#### **What the paper adds**

- When the hot water foot bath is applied for 15 minutes the veins in the feet start expanding and gets improved blood circulation and reduce fever.
- When the body or part of the body is immersed in hot water the person often feels warm, that results in sweating and vasodilation which resets the altered set point to normal level. Thus helps in reduction of temperature.

#### **Background of the study**

Fever is a natural response of the body that helps in fighting off foreign substances such as micro organisms and toxins. Thermoregulatory centre in the hypothalamus regulates the body temperature. Once the temperature goes up the person often feels warm. The symptom of sweating and vasodilation resets the altered set point to normal level. Hot water foot bath therapy causes blood vessels to dilate and improve blood circulation, which releases heat in the form of sweat and supply of oxygen to brain cell which aids in the elimination of toxins. The immersion of the body or part of the body in a water bath stimulates circulation. Water being good thermal conductor, can influence temperature regulation mechanism of the body through circulation [2].

The body's normal temperature is around 98.6 degrees F (as measured in the mouth). To qualify as a fever, the temperature usually has to top 100 degrees F. Fever has long been recognized as a symptom and not a disease in itself. It has been estimated that up to 20% of emergency department visits are children having fever and seeking for treatment and about 30% of patients seen by paediatricians with their primary complaint is fever in United States. Furthermore, parents are usually too anxious about what harm may fever cause even though their children only suffer from minor illnesses. Therefore, fever as a symptom in children and its management is a concern to both healthcare professionals as well as parents [1].

During fever dilation of internal blood vessels and constriction of peripheral blood vessels occurs [3]. It weakens the patient and makes him/her uncomfortable and anxious. Therefore fever as a symptom and its management is a concern to both healthcare professionals as well as patients. Providing comfort to patient is a basic and most important nursing intervention [4].

External cooling promotes heat production while enhancing heat loss by producing vasoconstriction, shivering, and goose bumps. Shivering can increase heat production 4 to 5 times greater than normal. The Maryland researchers found that anti-fever drugs such as aspirin and acetaminophen may prolong certain infections. They said “the good news is that anti-fever drugs make people feel better when they have infections. The bad news is that they may cause the illness to linger longer” [2].

Complementary and alternative medicine (CAM) has received an enormous amount of attention around the world over the past decade. Complementary and alternative medicine is defined by the national centre for complementary and alternative medicine as a group of diverse medical and health care systems, practices and products that are not presently considered part of conventional medicine. Incorporation of complementary and alternative medicine (CAM) therapies into the treatment plan may increase the patient's and family's feeling of control and promotes a sense of active participation and partnership with the healthcare provider throughout the healing process. Hydrotherapy, acupuncture, massage, hot water bath are some of the complementary therapies that are used around the world [5].

In complementary therapies most of the intervention done on the sole of the foot based on cord reflex. The local application of temperature produces stimuli on cord reflex on the sole of the foot. These reactions are caused by local effect of temperature directly on the blood vessels and also by local cord reflex conducted from skin receptors to the spinal cord and back to the same skin area and the sweat gland. The intensity of this local effect is, in addition, controlled by the central brain temperature controller. So that their overall effect is proportional to the hypothalamic heat control signal times to the local signal [6].

Antipyretic therapy is an effective pharmacological measure to reduce fever, along with pharmacological measures there are many non pharmacological measures like cold sponging, tepid sponging, external cooling, warm water therapy found to be effective in controlling the temperature. There is a controversy regarding the indication for and the use of the heat and cold therapy [7]. But many studies have shown that, hydrothermal therapy is an effective method for treating fever [8].

#### **Need for the study**

A wide range of childhood illnesses are accompanied by fever. Fever is said to occur in children when the body temperature is above 37 °C (98.6°F). It occurs when various infectious and non-infectious processes interact with the host's defense mechanism. Several methods have been recommended to reduce the fever in children, which include tepid sponging, warm water bath, fanning, alcohol sponging and antipyretics. The primary goal of treating the febrile child is to be improving the overall comfort rather than focus on the normalization of the body temperature [8].

A comfortable warm to hot bath brings relief to muscle spasms and cramps, increases blood flow that eliminates lactic acid and toxin waste formed in the muscle cell. A hot water foot bath therapy increases nourishment to the tissues, calms and relaxes tension. It is important for the nurse to consider the treatment modality that is apt for the client considering all the factors affecting thermoregulation. Hot water foot bath therapy can be regarded as a non-

pharmacological, safe, side effect free, cost effective and easy to perform in all settings [2].

Hot water foot bath therapy (HWFBT) is one of the hydrotherapeutic measures, which improves warmth, promotes muscle relaxation, relieves pain, dilates blood vessel and promotes circulation, relaxes the connective tissue and provides a soothing and healing effect. HWFBT is said to treat the underlying infection by activating the WBCs and immune system. Hot application to the skin increases the oxidation of the toxins and increases the blood flow through the peripheral vessels. It also increases the ability of the phagocytes to destroy the germs and detoxify the blood. Beneficial effect of increased blood flow to the tissue includes facilitation of drainage and “wash-out” effect, purging the tissue of debris and byproducts of tissue injury. Thus large quantities of bacterial poison can be eliminated [4].

An experimental study was conducted to assess the effect of hot water foot bath therapy to reduce fever. It reveals that there is a significant reduction in fever after hot water therapy. The mean pre-test temperature 101.06°F was reduced to 98.85°F during post-test. The mean difference was 2.21°F. 72% of the participants were highly satisfied with hot water foot bath therapy [2].

A study was conducted on effectiveness of warm water foot bath therapy on physiological parameters of children with fever in the paediatric unit at Calcutta National Medical College and Hospital, Kolkata, by adopting non probability purposive sampling technique. Selected sample size was 30 children with fever in the paediatric unit. Physiological parameters were assessed before giving therapy, 15 and 25 minutes after therapy. Result showed an average reduction of physiological parameters after giving hot water foot bath therapy in experimental group but in control group physiological parameters are significantly increased. Independent ‘t’ value among the mean physiological parameters between experimental and control group at 2<sup>nd</sup> observation, i.e., 6.2, 2.13, 2.21, 0.39, 0.43  $p < 0.05$  and at 3<sup>rd</sup> observation the computed ‘t’ values 16.5, 7.8, 5.84, 2.21, 2.15  $p < 0.05$  were significant after hot water foot bath therapy. The researcher recommended hot water foot bath therapy is effective in the reduction of fever by analyzing the physiological parameters [9].

There are different non pharmacological and pharmacological methods to manage the fever in children

[10]. But there will be certain complications like shivering and vasoconstriction. The routine procedure tepid sponge more discomfort during fever management in young and grown up children [8]. Hot water foot bath therapy is a complimentary alternative therapy; help the parents, family members and nurses in the management of fever, in an easy, cost effective, without shivering and complication.

**Hypotheses**

All hypothesis are tested at 0.05 level of significance

**H1:** There is a significant difference between the pre-test and post-test body temperature among children (6-12yrs) in the experimental group.

**H2:** There is a significant difference between the post-test body temperature among children (6-12 years) in the experimental and control group.

**H3:** There is a significant association in the body temperature with the selected demographic variables.

**Conceptual Framework**

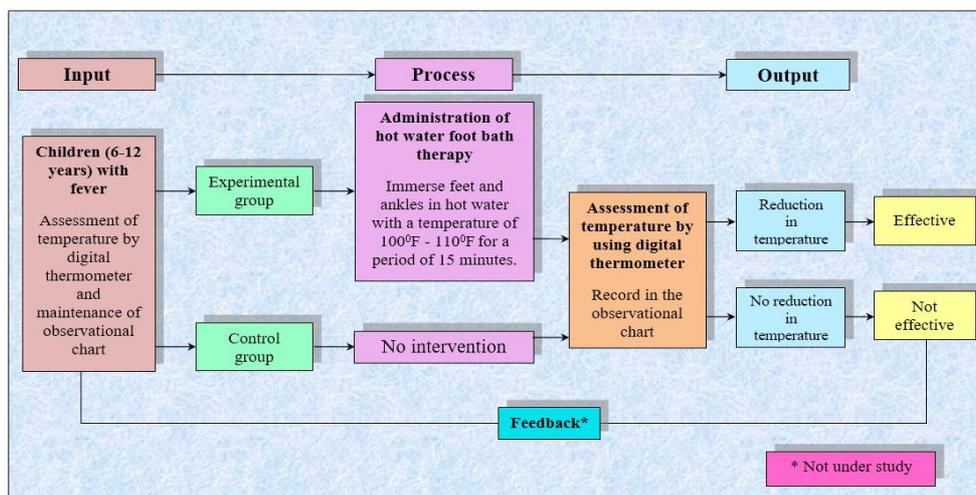
The conceptual framework for this study is based on general system’s theory given by Karl Ludwig von Bertalanffy in 1968. The system is a complex of elements interacting with each other, which on first appearance doesn’t seem to be interrelated. According to this theory human being are constantly changing due to their interaction with environment. The input is a variety of stimulus that influences the individual as a whole. Process in phase where changes occur in individual which leads to end result that is output and based on output feedback is given [11].

**The main component of system theory includes**

**Input:** Input is the children (6-12 years) with temperature. Input includes assessment of temperature by using observational chart.

**Process:** Process refers to administration of hot water foot bath therapy in reduction of body temperature. The child will receive the hot water foot bath therapy for a period of 15 minutes with the water temperature 100°F-110°F.

**Output:** The output is the change in body temperature after the use of hot water foot bath therapy.



**Fig 1:** Conceptual framework for effectiveness of hot water foot bath therapy in reduction of temperature based on General Systems Theory (von Bertalanffy, 1968)

### Delimitations

The study is delimited to

- Children with fever admitted in selected hospitals at Mangaluru.
- Children with age group between 6-12 years.

### Scope of the study

This study is to assess the effectiveness of hot water footbath therapy in reduction of temperature among children (6-12 years). Findings of the study will provide nurses and health professionals with the data for evidence-based application of hot water foot bath therapy in reduction of body temperature of children with fever. The study would stimulate and arouse interest in health professionals to conduct further researches in the field of hot water foot bath therapy.

### Materials and method

#### Research Approach

An evaluative approach was adopted.

#### Research Design

Quasi experimental pre-test post-test control group design.

#### Research setting

Study was conducted in A J hospital and Research Centre, Mangaluru, which is a 1200 bedded hospital in which the paediatric ward consists of 80 beds. There is an average of 80-100 paediatric cases that get admitted per month, in which 25-30 were children (6-12 years).

In Athena Hospital, Mangalore, which is a 310 bedded hospital in which paediatric ward consists of 20 beds. There is an average of 25-30 paediatric cases that get admitted per month, in which 10-12 were children (6-12 years).

#### Population

Population refers to children between 6 to 12 years of age admitted in the paediatric ward with fever.

#### Sample and Sampling technique

The study sample consisted of 60 children within the age group of 6-12 years in which 30 children are selected for experimental group and 30 for control group and assigned randomly. Purposive sampling technique was used to select the sample.

#### Inclusion criteria for sampling

1. Children aged between 6 to 12 years.
2. Children admitted with fever whose temperature is above 98.6°F.
3. Children with antipyretics.

#### Exclusion criteria for sampling

Children who are

1. Non cooperative.
2. Admitted with fever associated with critical illness.
3. Post operative patients.
4. Ulcer, lesion, or allergy in the leg.
5. Paralyzed.
6. Unconscious children.

#### Description of the tool

The tool consisted of two parts.

### Section A: Demographic proforma

Demographic proforma consisted of five items for obtaining information regarding age, gender, accompanying the child during hospitalization, child is under any antipyretic and initial body temperature.

### Section B

An observational chart to record the body temperature and to observe the extent of body temperature reduction.

Extent of body temperature reduction arbitrarily classified as:

3.6<sup>0</sup>F-5.4<sup>0</sup>F Great extent

1.8<sup>0</sup>F-3.5<sup>0</sup>F Average extent

0.1<sup>0</sup>F-1.7<sup>0</sup>F Some extent

### Validity and Reliability of the tool

Content validity was used for demographic proforma and observational chart. The reliability for the digital thermometer and lotion thermometer was checked by the inter-rater reliability method. The glass thermometer was calibrated at a range 0<sup>0</sup>F to 220<sup>0</sup>F, at DUC reading in 120<sup>0</sup>F and standard reading 120.6<sup>0</sup>F the error observed was -0.6<sup>0</sup>F. The digital thermometer was calibrated at a range 89.6<sup>0</sup>F to 107.6<sup>0</sup>F, at DUC reading in 90.2<sup>0</sup>F and standard reading 90.4<sup>0</sup>F the error observed was -0.2<sup>0</sup>F. Measurement uncertainty is reported at 95% confidence level with (k=2).

### Data collection method

- Permission was obtained from the concerned authority of the organization for conducting the study.
- Subjects were selected according to the inclusion criteria and confidentiality was assured.
- Written consent was obtained from the parents and child.
- Subjects were selected by purposive sampling technique and assigned randomly as experimental group and control group.
- Pre-test axillary temperature was assessed for experimental and control group and recorded immediately in the observational chart.
- The experimental group received the hot water foot bath therapy for a period of 15 minutes with the water temperature 100<sup>0</sup>F - 110<sup>0</sup>F.
- The post-test temperature of the experimental group was checked immediately after the intervention and recorded in the observational chart.
- The post-test temperature of the control group was checked and recorded in the observational chart.

### Result

#### Section A: Distribution of sample based on demographic characteristics

Highest percentage of subjects in the experimental group (43.3%) and control group (40%) were in the age group of 6-8 years and the least percentage in the experimental group (20%) and control group (26.7%) were in the age group of 8-10 years.

Majority of the subjects in the experimental group (56.7%) were males and in the control group (63.3%) were females, the least percentage of experimental group (43.3%) were females and control group (36.7%) were males.

The highest percentage of the sample in the experimental group (73.3%) and control group (70%) where mother accompanied the child, whereas the least percentage of the

subjects in the experimental group (3.3%) and control group (13.3%) were accompanied by grandparents. The highest percentage of subjects in experimental group (93.3%) and control group (96.7%) were under antipyretics. The least percentage of subjects in experimental group (6.7%) and control group (3.3%) were not under antipyretics.

The highest percentage of subjects in experimental group (56.7%) and control group (70%) had initial body temperature 99<sup>0</sup>F-101<sup>0</sup>F. The least percentage of subjects in both the experimental group (3.3%) and control group (3.3%) had initial body temperature 102<sup>0</sup>F-103<sup>0</sup>F.

**Section B: Description of extend of body temperature reduction in experimental group and control group**

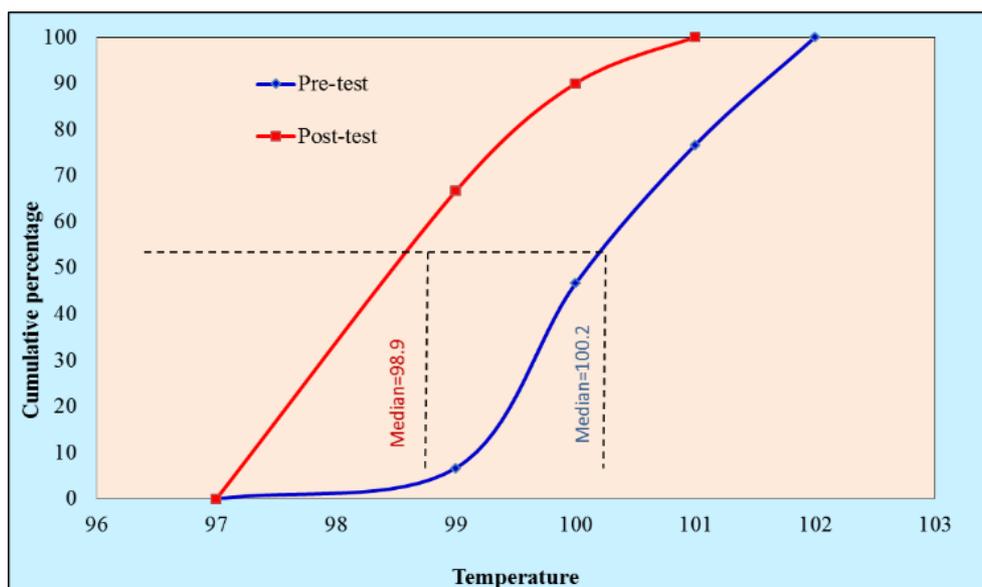
**Table 1:** Frequency and Percentage Distribution of Sample in Control group and Experimental Group Based on Extent of Body Temperature Reduction N<sub>1</sub>=30, N<sub>2</sub>=30

Extent of body temperature reduction	Experimental group		Control group	
	F	%	f	%
Great extent (3.6 <sup>0</sup> F - 5.4 <sup>0</sup> F)	-	-	-	-
Average extent (1.8 <sup>0</sup> F - 3.5 <sup>0</sup> F)	9	30	-	-
Some extent (0.1 <sup>0</sup> F - 1.7 <sup>0</sup> F)	21	70	30	100
Total	30	100	30	100

The data in Table 2 reveals that the reduction of body temperature reduction in the experimental group have ‘average extent’ (30%) and ‘some extent’ (70%), in control group all have ‘some extent’ (100%).

In the experimental group the post-test mean temperature is decreased (99<sup>0</sup>F±0.54) than the pre-test mean temperature (100.1<sup>0</sup>F±0.81). But when comparing experimental group post-test temperature with the control group post-test temperature; in the experimental group post-test temperature is less than that of the control group mean post-test temperature.

**Pre-test and post-test temperature of children (6-12yrs) in the experimental group and control group in terms of Mean, Median and Standard deviation**



**Fig 2:** Ogive representing the pre-test and post-test body temperature reduction among children (6-12years) in the experimental group.

The data in Figure 3 shows that the median value (50<sup>th</sup> percentile) of pre-test (100.2<sup>0</sup>F) was found greater than the median of post-test (98.9<sup>0</sup>F) among children (6-12 years), i.e., post-test temperature was consistently lower than the pre-test temperature.

**Section C: Analysis of effectiveness of hot water foot bath therapy among the children (6-12 years)**

**Table 2:** Mean difference, Standard deviation difference and ‘t’ value of pre-test-post-test body temperature of the Experimental group N=30

Group	Mean Difference	Standard deviation difference	‘t’ value	‘P’ value
Pre-test	1.14	0.77	8.068*	0.0001
Post-test	0.03	0.05		

\* very high significant

The data in Table 2 shows that there is a very highly significant difference of temperature in the pre-test and post-test i.e. t value 8.068 at p value 0.0001 (SPSS version 17.0). Hence the null hypothesis H<sub>01</sub> is rejected and research

hypothesis is accepted. This shows that the administration of hot water foot bath therapy is effective in reduction body temperature.

**Table 3:** mean, standard deviation, mean difference and ‘t’ value of the post-test body temperature in experimental group and control group  
N<sub>1</sub>=30, N<sub>2</sub>=30

Group	Mean	Standard deviation	Mean difference	‘t’ value
Experimental	99.06	0.53	0.55	4.155*
Control	99.61	0.49		

t<sub>58</sub>=1.99, p<0.05 \*significant

The data in Table 5 shows that the mean post-test body temperature of the experimental group is 99.06±0.53 was lower than the mean post- test body temperature of control group (99.61±0.49) and also found there is a significant difference between the post-test temperature in experimental group and control group t<sub>58</sub>=1.99 at p<0.05 level of

significance. Thus null hypothesis (H<sub>02</sub>) was rejected and the research hypothesis (H<sub>2</sub>) was accepted

**Section D: Association of body temperature with the selected demographic variables**

**Table 4:** Association of Pre-test Body Temperature of the Experimental group and control group with selected Demographic variables  
N<sub>1</sub>=30, N<sub>2</sub>=30

Variables	Experimental group		Control group	
	Chi square	P value	Chi square	P value
1. Child’s age	3.15 <sup>#</sup>	0.20	9.64*	0.008
2. Gender	1.47 <sup>#</sup>	0.22	2.01 <sup>#</sup>	0.16
3. Who is accompanying the child during hospitalization?	1.42 <sup>#</sup>	0.70	2.30 <sup>#</sup>	0.51
Initial body temperature	11.03*	0.01	9.33*	0.02

P<0.05 level of significance \* Significant, # Not significant  
The data presented in Table 6 shows that there is no significant association of pre-test body temperature of the experimental group with child’s age, gender, who is accompanying the child during hospitalization (χ<sup>2</sup>=3.15, 1.47, 1.42 at p>0.05) and control group with gender, who is

accompanying the child during hospitalization (χ<sup>2</sup>=2.01, 2.30 at p>0.05) and there is a significant association in experimental group with initial body temperature (χ<sup>2</sup>=11.03, p<0.05) and in control group with child’s age and initial body temperature (χ<sup>2</sup>=9.64, 9.33, p<0.05).

**Table 5:** Association of post-test Body Temperature of the experimental group and control group with selected Demographic variables  
N<sub>1</sub>=30, N<sub>2</sub>=30

Variables	Experimental group		Control group	
	Chi square	P value	Chi square	P value
1. Child’s age	0.83 <sup>#</sup>	0.66	10.93*	0.004
2. Gender	1.22 <sup>#</sup>	0.27	3.59*	0.058
3. Who is accompanying the child during hospitalization?	3.20 <sup>#</sup>	0.36	2.05 <sup>#</sup>	0.56
4. Initial body temperature	3.93 <sup>#</sup>	0.27	7.90*	0.048

P<0.05 level of significance \* Significant, # Not significant  
The data presented in Table 5 shows that there is no significant association of post-test body temperature of the experimental group with child’s age, gender, who is accompanying the child during hospitalization and with initial body temperature (χ<sup>2</sup>=0.83, 1.22, 3.20, 3.93 at p>0.05) and in control group with child’s age, gender and with initial body temperature (χ<sup>2</sup>=10.93, 3.59, 7.90, p<0.05) and there is no significant association in control group with who is accompanying the child during hospitalization (χ<sup>2</sup>=2.05, p>0.05).

**Discussion**

**Discussion of the findings with other studies**

**Discussion of demographic characteristics of children (6-12 years) with fever**

In the present study, the highest percentage of subjects in the experimental group (43.3%) and in control group (40%) were in the age group 6-8 years. Majority of the subjects in the experimental group (56.7%) were males and in the control group (63.3%) were females. The highest percentage of the sample in the experimental group (56.7%) and control group (70%) had initial body temperature 99<sup>o</sup>F-101<sup>o</sup>F. This finding is consistent with the study carried out in CMC Vellore, to compare the effectiveness of tepid sponging and

antipyretic drug verses only antipyretic drug among febrile children which revealed that the highest percentage of subjects were in the age group 3-6 years. Highest percentage of subjects were males in both groups. With regard to initial body temperature, majority of children (49.3%) had initial body temperature 101<sup>o</sup>F-102<sup>o</sup>F [12]. Thus the study finding concluded that fever was highest in the age group 6-8 years and among male children with initial body temperature 99<sup>o</sup>F-101<sup>o</sup>F.

**Discussion on extend of body temperature reduction in experimental group and control group**

The present study shows that the reduction of body temperature in the experimental group have ‘average extent’ (30%) and ‘some extent’ (70%), in control group all have ‘some extent’ (100%).

The study was supported by a study conducted at Coimbatore to assess the effect of hot water foot bath therapy on patients with fever. The study revealed that out of 30 sample, 72% of them believed therapy was effective to ‘great extent’, 25% of them believed it was effective to ‘some extent’ and 3% of the study sample were of the opinion that the treatment was ‘not at all’ effective [2].

Thus the study concluded that hot water footbath therapy is effective to some extent in reduction of body temperature of children among 6-12 years.

### Discussion on effectiveness of hot water foot bath therapy among the children (6-12 years)

The present study result shows that the mean post-test body temperature of the experimental group is  $99.06 \pm 0.53$  was lower than the mean post-test body temperature of control group ( $99.61 \pm 0.49$ ). Paired 't' test values showed a very high significant difference in temperature t value 8.068 at p value 0.0001 (SPSS version 17.0). Also the significant difference of post-test body temperature between the experimental and control group ( $t_{(58)}=1.99$ ) at  $p < 0.05$ .

Similar study conducted in Calcutta National Medical College and Hospital, Kolkata to determine the effectiveness of hot water foot bath therapy in physiological parameters of children with fever. Study result showed that significant changes in the physiological parameters, i.e., 't' value 2<sup>nd</sup> observation 6.2, 2.13, 2.21, 0.39, 0.43  $p < 0.05$  and at 3<sup>rd</sup> observation the computed 't' values 16.5, 7.8, 5.84, 2.21, 2.15 at  $p < 0.05$ . The researcher recommended that hot water foot bath therapy is effective in the reduction of fever by analyzing the physiological parameters [9].

The study was supported by another study conducted to assess the effectiveness of Hot Water Foot Bath Therapy in patients with fever admitted in selected hospitals of PCMC area, Pune. Mean effect of hot water foot bath on fever at pre intervention was  $101.04 \pm 0.04$  whereas in at post intervention it was  $99.37 \pm 0.58$  in experimental group. The result indicated that the level of temperature reduced in experimental group hence it was proved that hot water foot bath was effective in reducing temperature [13].

Thus the study concluded that hot water foot bath therapy was effective in reduction of body temperature.

### Discussion on association in the body temperature with the selected demographic variables

The study showed that there is a significant association of pre-test body temperature of the experimental group with initial body temperature ( $\chi^2=11.03$ ,  $p < 0.05$ ) and in control group with child's age and initial body temperature ( $\chi^2=9.64$ , 9.33,  $p < 0.05$ ).

The result revealed that there is a significant association in post-test body temperature of the control group with child's age, gender and with initial body temperature ( $\chi^2=10.93$ , 3.59, 7.90 at  $p < 0.05$ ).

The study was supported by a study where a cross-sectional survey was conducted to assess the method employed by caregivers in the management of febrile conditions of their children in parts of Eastern Nigeria. Result revealed that there is a significant relationship between age of mother, educational attainment of mother, number of children, sex of febrile children as well as occupation of mothers and management action taken. The study concluded that there is a significant association of body temperature with gender of the febrile child.

### Limitations

- Since the sample size was small, generalization of the findings is limited.
- The study was limited to the children admitted in the hospitals thereby restricting generalization of the findings.
- The study was limited with only the age group between 6-12 years, thus restricting generalization of the findings.

### Conclusion

The findings of the study revealed that the hot water foot bath therapy was effective in reduction of body temperature among children (6-12 years) with fever. Thus study suggest that hot water foot bath therapy is a complimentary alternative therapy that helps the parents, family members and nurses in the management of fever, in an easy, cost effective way without shivering and complication.

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