Original Research Article

A Quasi-Experimental Study to Assess the Effect of Controlled Room Temperature (AC) on Oral and Axillary Body Temperature among Healthy Young People of Selected College of Nursing, Ludhiana

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ABSTRACT

Introduction- Vital signs are a person's temperature, pulse, respiration and blood pressure and are indicators of health status and body functions, regulated through homeostatic mechanisms and falling within certain normal ranges. A change in vital signs might indicate a change in health. There are individual variations of the temperature as well as normal changes occur during the day, and with the external environment. Nowadays, the patients admitted in the hospitals are kept under controlled (AC) environment and it can affect the body temperature readings. Body temperature measurement is a continued procedure performed in health care system and because of its sensitive nature, it is necessary to record the accurate temperature.

Materials & Methods- The study was conducted on seventy six B.Sc. Nursing 3rd and 4th year students of College of Nursing, DMC&H, Ludhiana & were selected by simple random sampling (lottery method) as per inclusion and exclusion criteria. The study subjects were exposed to normal room temperature (27^{0}C) for 30 minutes and three successive oral and axillary body temperature readings were recorded at 15 minutes interval by digital thermometer. The study subjects were then subjected to controlled AC room temperature (20^{0}C and 30^{0}C) for 30 minutes and the procedure of recording three successive oral and axillary body temperature readings at 15 minutes interval was followed.

Results- Out of 100 eligible study subjects, 76 participated in study. The study findings revealed that there was significant difference of 1^{0}F between oral and axillary body temperature of a healthy person at normal room temperature (27^{0}C) and 0.9^{0}F at controlled room temperature (20^{0}C and 30^{0}C). There was also a significant difference in pre-intervention and post-intervention oral and axillary body temperature at room temperature (27^{0}C) and controlled room temperature (20^{0}C) independently.

Conclusion- It was concluded that there was no difference in oral and axillary body temperature at normal and controlled room temperature (20^{0}C).

Key words- Healthy young people, Oral temperature, Axillary body temperature, Room temperature, Controlled room temperature.

INTRODUCTION

The health status of a person is indicated by vital signs. These are a person's temperature, pulse, respiration and blood pressure and are indicators of health status and body functions, regulated through homeostatic mechanisms and falling within certain normal ranges. The normal

temperature of the body maintained by thermoregulatory centre in hypothalamus, known as euthermia or normothermia, and is hovering around 98.6°F (37°C). It is a concept that depends upon the place in the body at which the measurement is made at the time of day and level of activity of the person. [1]

The primary source of heat production in the human body is metabolism. It is the by-product of metabolic activities that generate energy for cellular functions.

Heat is lost from an organism in several ways such as by conduction which depends on gradient between body temperature and environmental temperature. The other is by convection, radiation and evaporation which is especially used during increased heat production. Radiation is the primary method for discharging the body's excess heat at rest in form of electromagnetic waves (heat waves). The heat loss or gain depends upon the temperature gradient between skin and environment. Evaporation is the most important heat dissipation mechanism in warm environments. With increased environmental humidity, the loss of heat by sweating is easier. Though it accounts for only 20% of body heat loss at rest but more than 80% of body heat loss is achieved by evaporation when environmental temperature exceeds 20°C (68°F). [2]

A change in vital signs might indicate a change in health. There are individual variations of the temperature as well as normal changes occur during the day, and with the external environment. Nowadays, the patients admitted in the hospitals are kept under controlled (AC) environment and it can affect the body temperature readings. Body temperature measurement is a continued procedure performed in health care system and because of its sensitive nature, it is necessary to record the accurate temperature.

MATERIALS & METHODS

The study was conducted on Seventy six B.Sc. Nursing 3rd and 4th year students of College of Nursing, DMC&H, Ludhiana & were selected by simple random sampling (lottery method) as per inclusion and exclusion criteria. The study subjects were exposed to normal room temperature (27^0C) for 30 minutes and three successive oral and axillary body temperature readings were recorded at 15 minutes interval by digital thermometer. The study subjects were then subjected to controlled AC room temperature (20^0C and 30^0C) for 30 minutes and the procedure of recording three successive oral and axillary body temperature readings at 15 minutes interval was followed.

Exclusion criteria- The subjects who were aged below 18 years & above 22 years & not medically fit i.e., who were suffering from any bacterial or viral infection, any acute or chronic illness or taking any medicine during the study period excluded from the study. It was confirmed by history from subjects only.

Data processing & Analysis- Data was entered, compiled in computer & analysed using Smith's Statistical Package. A p value of < 0.001 was considered highly significant & p value of > 0.5 was considered non-significant.

RESULTS

Analysis and interpretation of data are organized under the following headings-

Part 1- Data related to sample characteristics

Part 2- It includes comparison of data related to-

- baseline oral and axillary body temperature at the room temperature

- oral and axillary body temperature in controlled room temperature (AC)
- pre-intervention and post-intervention oral and axillary body temperature

The study findings revealed a significant variation ($p < 0.001$) of 1^0F between the oral and axillary body temperature at normal room temperature (27^0C) and at controlled room temperature (20^0C and 30^0C). However, the difference between oral and axillary body temperature when taken at normal and controlled room temperature (20^0C) was found to be statistically non-significant ($p > 0.05$).

Table 1: Comparison of the baseline oral and axillary body temperature at normal room temperature (27^0C) N=76

Room temp. (^0C)	Body temp.	Range (^0F)	Mean $\pm$ SD	Mean diff. (^0F)	t value	p Value
Normal room temperature (27^0C)	Axillary	95.2 – 98.7	97.1 $\pm$ 0.80	1	t=10.88 df=75	0.001**
	Oral	97.0 – 99.0	98.1 $\pm$ 0.43			

** Highly significant at $p < 0.001$

Table 2: Comparison of oral and axillary body temperature at controlled room temperature (20^0C and 30^0C) N=76

Controlled room temp. (^0C)	Body temp.	Range (^0F)	Mean $\pm$ SD	Mean diff. (^0F)	t value	p Value
(AC) 20^0C	Axillary	92.9 – 98.4	96.5 $\pm$ 1.16	0.9	t = 6.80 df = 75	0.001**
	Oral	94.5 – 98.6	97.4 $\pm$ 0.72			
(AC) 30^0C	Axillary	96.1 – 98.7	97.3 $\pm$ 0.63	0.9	t= 11.45 df =75	0.001**
	Oral	96.6 – 99.4	98.2 $\pm$ 0.43			

** Highly significant at $p < 0.001$

Table 3: Comparison of pre-intervention and post-intervention oral body temperature   N=76

Variation in room temperature		Paired Mean diff. $\pm$ SD	SE Mean	t value	p value
Oral Body Temperature	$27^0C – 20^0C$	0.67 $\pm$ 0.67	0.07	8.62	0.001**
	$30^0C – 20^0C$	0.77 $\pm$ 0.73	0.08	9.19	0.001**

** Highly Significant at $p < 0.001$

Table 4: Comparison of pre-intervention and post-intervention axillary body temperature   N=76

Variation in room temperature		Paired Mean diff. $\pm$ SD	SE Mean	t value	p value
Axillary Body Temperature	$27^0C - 20^0C$	0.60 $\pm$ 1.03	0.11	5.01	0.001**
	$30^0C - 20^0C$	0.82 $\pm$ 1.11	0.12	6.41	0.001**

** Highly significant at $p < 0.001$

Table 5: Comparison of pre-intervention and post-intervention oral and axillary body temperature at room temperature and controlled room temperature (20^0C) N= 76

Body temperature	Paired Mean diff. $\pm$ SD	Mean $\pm$ SD	SE	t Value	p Value
Oral $_{27}$-Axillary$_{27}$	1.04 $\pm$ 0.82	0.55 $\pm$ 1.09	0.12	t = 0.45 df = 75	0.64^{NS}
Oral$_{20}$-Axillary$_{20}$	0.99 $\pm$ 1.22				

NS- Non Significant at $p > 0.05$

DISCUSSION

The study determined the range of normal body temperature at normal room temperature (27^0C). The range of oral body temperature was 97.0^0F to 99.0^0F with mean of $98.1^0F \pm 0.43$. The study findings were nearly similar to an observational cross sectional study conducted by Mehreen Adhi et al. (2008) and they showed the oral temperature range of 97.0^0F to 99.8^0F with mean of 98.4^0F. [3] The present study also found the range of axillary body temperature between 95.2^0F to 98.7^0F with mean of $97.1^0F \pm 0.80$. However, no related research was found.

The study depicted the upper limits of oral and axillary body temperature at normal room temperature (27^0C). The upper limit of oral temperature was 99.0^0F and the upper axillary temperature limit was 98.7^0F respectively. The results were almost similar to Mackowiak et al. (1992) study findings which showed the upper limit of normal oral temperature as $98.9°F$ in the early morning

and 99.9°F in the afternoon. [4] However, no related research study was found about upper axillary body temperature limits.

The study findings revealed that there was significant difference ($p < 0.001$) of 1^0F between oral and axillary body temperature of a healthy person at normal room temperature (27^0C) and 0.9^0F at controlled room temperature (20^0C and 30^0C). There was also a significant difference ($p < 0.001$) in pre-intervention and post-intervention oral and axillary body temperature at room temperature (27^0C) and controlled room temperature (20^0C) independently. However, the comparison of pre-intervention and post-intervention oral and axillary body temperature at normal room temperature and controlled room temperature (20^0C) showed mean of 0.55 ± 1.09 which was statistically non-significant ($p > 0.05$).

CONCLUSION

It was concluded that there was a significant variation ($p < 0.001$) of 1^0F between the oral and axillary body temperature at normal room temperature (27^0C). Similarly, the significant difference ($p < 0.001$) of 0.9^0F between oral and axillary body temperature was found at controlled room temperature (20^0C and 30^0C). However, the difference between oral and axillary body temperature when taken at normal and controlled room temperature

(20^0C) was found to be statistically non-significant ($p > 0.05$). So, the research hypothesis was rejected.

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