

Determination of Correlation between Rectal, Axillary and Aural temperatures in age group 0-1 year

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ABSTRACT

This study was conducted to correlate the rectal temperature with axillary and aural temperature measurements in age group 0-1 year and to find which one correlates best with rectal. Fifty-one patients from the Pediatric Medicine Emergency were investigated cross-sectionally within the age of 1 year. Correlation coefficient (r), Coefficient of Determination (r^2), Standard Deviation and Arithmetic Mean for "rectal versus axillary" were 0.92, 85.56, 0.68 and 1.00 respectively, while for "rectal versus aural" were 0.80, 63.84, 1.25 and 0.72 respectively. Which reveals that statistically axillary correlates, more than aural, with rectal temperatures. Factors like extent of exposure of body, friction, recent cold sponging, cleanliness of sensor surface, position of the aural thermometer and presence of wax in the ear and affect the results.

Key Words: Body temperature, Thermometers.

INTRODUCTION

Fever holds great importance for a physician. And thus its accurate measurement is a necessity. Rectal temperature measurement is a standard but in most places like in Pakistan axillary temperature measurement is normality especially with nursing care in Government hospitals and thus local studies are very essential in justifying the current practice. The main focus of this study was to correlate between rectal and axillary and rectal and aural temperature measurements in age group 0-1 years, along with finding out which one from aural or axillary correlated more with rectal temperatures.

Advantages of taking Axillary temperature:

1. Convenient.
2. No nuisance.
3. Least exposure of body.
4. Safe.

Advantages of Taking Aural temperature:

1. Convenient
2. Fastest method
3. Least exposure of body
4. No nuisance.
5. Painless
6. Safe

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METHODS

Participants selection: The patients were selected from the Pediatric medicine emergency, operating round the clock in Mayo hospital, Lahore, Pakistan. The patients were selected randomly at different times of the day. All those who were selected looked sick.

Duration: Two Months

Patients: 51

Thermometers: 3 Digital

Time of Placement of thermometers: All three thermometers were placed at the same time.

Duration of placement:

Rectal: 3 minutes (Irrespective of beep)

Axillary: 3 minutes (Irrespective of beep)

Aural: 6 seconds (Till beep)

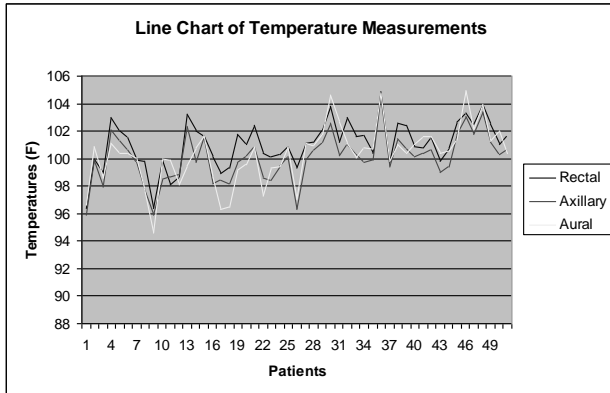
Rectal thermometer insertion length: 2.5-3.0 cm.

Rectal thermometer lubricant: Petroleum jelly, applied to a sufficient quantity.

Recording of readings: Aural thermometer readings were average of three readings, including readings from both ears. Axillary and rectal temperatures were measured only once.

RESULTS

Statistical Results



| | versus Axillary | versus Aural |
|--|-----------------|--------------|
| Pearson correlation coefficient (r) for | 0.925 | 0.799 |
| Coefficient of Determination (r^2) for | 85.562 | 63.840 |
| Standard deviation of the difference between | 0.677 | 1.256 |
| Arithmetic mean of the difference | 1.00 | 0.72 |

Other Observations: It was also observed that axillary temperatures were predominantly lesser than the rectal, while aural measurements were sometimes more and sometimes lesser than the rectal measurements.

DISCUSSION

The results revealed that there is both a high correlation as well as accuracy associated with axillary temperatures when compared to rectal. The duration of placement is crucial.

The scatter plot for “rectal versus axillary” had more correlation as compared to the scatter plot for the “rectal versus aural”.

The statistical results reveal same as the visual analysis; the “rectal versus axillary” have High correlation of 0.925 while “rectal versus aural” had Low correlation of 0.799.

Coefficient of Determination (r^2) of 85.562 for “rectal versus aural” mean that 85% of the factors affecting rectal temperatures are same as for axillary and only 14.438% of factors affecting each of them are different.

Coefficient of Determination (r^2) of 63.840 for “rectal versus aural” mean that 64% of factors were common while 36% were different factors influencing the variation.

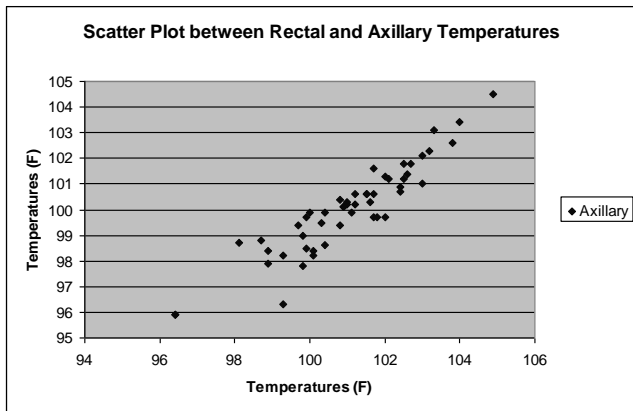
Lesser the standard deviation higher the accuracy and precision, and “difference between rectal and axillary” had a low SD: 0.677, while for the “difference between rectal and aural” SD was 1.256. Which proved that axillary temperatures have more accuracy and precision than aural.

Due to a wide range in “difference between rectal and aural temperatures” the arithmetic mean was less as compared to lesser variable “difference between rectal and axillary temperatures”.

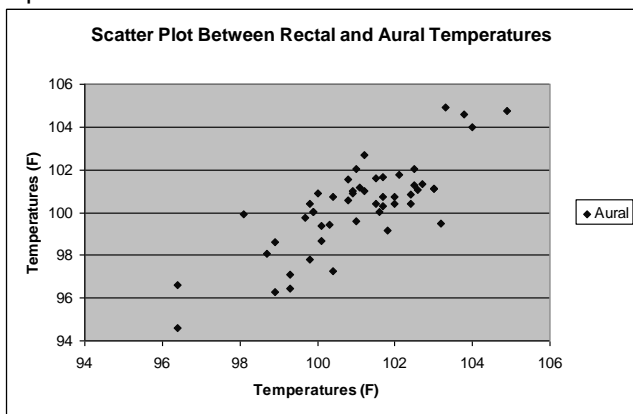
Factors affecting the variation

Aural:

1. Susceptible to the presence of wax in the ear,
2. Unclean probe surface and
3. Positioning of the aural thermometer.
4. Other factors like head turned to one side making one ear warmer, producing an error.



A positive correlation



A weak correlation

| | Rectal | Rectal |
|--|--------|--------|
| | | |

Axillary:

1. Axillary temperature is susceptible to the presence of friction, longer the duration more the axillary temperature becomes closer to the rectal (accuracy increases).
2. If the antipyretic interventions were taking place like cold sponging and exposure of the body than there were differences between axillary and rectal measurements.

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