

**A comparison Between Mercury and Digital Thermometer in Accuracy of Reading At The Axilla Site – El Mek Nimer University Hospital –Sudan**

**Part -1 ( Medical Science )**

**Chapter-II**

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**Abstract:**

This study was done in Sudan , Naher Elneel state ,shendi town, at El Mek Nimer university hospital during the period from October – December 2008. To compare between mercury and digital thermometer in accuracy of reading at the axilla site among different ages and sexes groups. Data were collected from patient by using simplified checklist and temperature was taken by using digital and mercury thermometer. fifty patients were participated in the study temperature was taken from axilla site after verbal permission from the patients,

The result showed that , there was no significant difference in the average accuracy of the two type of thermometer, how even there is no a greater fluctuation of reading of temperature when using digital or mercury thermometer. So there was no significant difference in both means and standard deviation within the patients using the two thermometers. In male the digital thermometer mean reading was (36.748) while the mercury mean reading (37.068).In female the digital mean reading was (36.928) and mercury mean reading is (37.100).

So , this study conclude that there was no significant difference in both means of the thermometers.

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**Introduction**

Traditionally body temperature have been measured by using thermometers, and they have some type of thermometers have been using mercury; in glass thermometers. Oral thermometers may have long, slanted tips or short, rounded tips. The rounded thermometer can be used at the rectal as well as other sites in some agencies, thermometer may be color coded, for example, blue-colored or red-colored ones for oral and axillary temperature. Disposable thermometer are also manufactured, these are used only once.<sup>1</sup>

Electronic (digital, thermometers offer another method of assessing body temperatures. They can provide a reading in only 2 to 60 seconds, depending on the model. The equipment consists of a battery operated portable electronic unit, a probe that the nurse attaches to the unit and a probe cover, which is usually disposable. Some models have different circuit for each method of measurement, and the nurse needs to make sure that the correct circuit is switched on before taking the temperature.

Chemical disposable thermometers are also used to measure body temperature.

Also temperature sensitive tape may also be used to obtain general indication of body surface temperature. Temperature it means the degree of warmth or balance maintained between the heat produced (thermogenesis) and heat lost (Thermolysis) in the body. Compared with recognized standard.<sup>2</sup>

**Purpose:-**

To determine the patient body temperature. Temperature can be measured centrally and superficially: superficially temperature are indicated by forcing the skin, usually the forehead or a particular problematic spot on the body. A localized area may be particularly hot or cold, or particularly dry or moist.<sup>1</sup>

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Central temperature is measured orally, rectally, or in the axillary region. The rectal thermometer, which is least subject to extraneous influences, is the most accurate. Temperatures are graded on a thermometer in Fahrenheit or centigrade measure. Before the temperature is taken, the position of the liquid in the column should be shaken down to below the usual body temperature in Fahrenheit measurement it is usually 98.6° in centigrade 37°.

There are several factors that will affect a patient's temperature and that may alter the reading by several degrees without indicating a fever:-External factor: Such as room temperature humidity, and clothing, may affect a person's temperature. This is also true – for oral readings. Of recently ingested food that is hot or cold. Because the cyclic variations, body temperature is usually lowest in the early morning and highest in the evening. Thus if single daily reading is taken, it should be taken at the sometime every day, usually in the late afternoon or early evening when it is at its highest point.<sup>2</sup>

Other factor affect in patient temperature method using in temperature reading:-Rectal temperatures average 0.7° F higher than oral temperatures, and axillary temperatures average 1° F below the oral temperature. Thus, it is important to indicate on the patient's record which type of measurement was taken.<sup>3</sup>

Women's temperatures during the latter half of their menstrual cycle: Are usually one – half a degree higher. Infant's temperatures are generally higher than those of adults. Reading will also affected by the amount of time the thermometer is left in place:

Generally 2 minutes is considered minimum for oral reading 3 minutes for rectal. However, studies show that some patient's require at least 5 minutes for an accurate reading. Such problems of in accuracy are considerably diminished with the use of electronic thermometer. Which register the patient's temperature in a few seconds, and within fared fever thermometers which give an instant reading without touching the patient. Eventually more and more nurses will have access to these types of thermometers, but for the moment, because of their cost and, some cases, experimental status, their accessibility is somewhat limited.<sup>1, 2</sup>

Degrees of temperature;-Hyperpyrexia, hyperthermia over 105° F or 40.5° High pyrexia, 103 - 105° F or 39.4 - 40.5° C ,Moderate pyrexia 101 - 103° F or 38.2 - 39.4° C ,Lower pyrexia 99 - 101° F or 37.2 - 38.3° C ,Normal temperature, a pyrexia 97 - 99° C or 36.1 - 37.2° C (normal average temperature 98.6° F or 37° C), Sub normal hyperpyrexia 95 - 97° F or (35 - 36.1)°C collapse 1 hypothermia – below 95° F or 35° C. (Principles and practice of nursing (Shakuntla sharma (birput)

**Assessing body temperature by using a mercury thermometer:-**Purpose:- To establish base line data for subsequent evaluation. To identify whether the body temperature is with in normal range. To determine change in the body temperature in response to specific therapies. And to monitor clients at risk for alteration in temperature.

The advantage and disadvantage for axillary temperature measurement:-<sup>4</sup>. advantage: safest and most noninvasive. Disadvantage: -the thermometer must be left in place along time to obtain an accurate measurement.

#### **Assessing body temperature:-**

There are a number of sites for measuring body temperature.

The three most common are oral, rectal, and axillary. In recent years, the tympanic membrane site has also been used. Each of the sites has advantages and disadvantage. In arresting adult, rectal temperature is slightly higher than the temperature of the arterial blood, about the same as the temperature of the liver, and slightly lower than that of the brain. When measured in the axilla or orally (by mouth) the temperature is about 0.65 C (1F) less than the rectal temperature.<sup>3</sup>

The body temperature is usually measured orally. This method reflects changing body temperature more quickly than the rectal method. Traditionally, the oral method was not for clients receiving oxygen, because the accuracy of the measurement was considered questionable. Recent evidence, however, suggests that oral reading are accurate in clients who receive oxygen by nasal canal or face mask and clients who have nasogastric tubes and nasal endotracheal tubes, provided that the client can breathe through the nose. If a client has been taking cold or hot foods or fluids or smoking, the nurse should wait 30 minutes before taking the temperature orally to ensure that the temperature of the mouth is not affected by the temperature of the food, fluid, or warm smoke.<sup>1, 3, 4</sup>

There was no possibility of rectal perforation. However newer research indicates that the axillary method is in a curate when assessing a fever and that rectal perforation during temperature measurement is relatively rare nurse should check agency protocol when taking the temperature of new borne, infants, toddlers, and children. Clients for whom the axillary method of temperature assessment is appropriate includes adult clients with oral inflammation or wired jaws, clients recovering form oral surgery, clients who are breathing through their mouth's, irrational clients for whom oral and rectal temperature are contraindicated.<sup>3, 4</sup>

The tympanic membrane or near by tissue in the ear canal. Is another core body temperature sites. Tympanic membrane temperature reading average 1.1 to 1.5 F higher than oral temperature readings like the sublingual oral site, the tympanic membrane has an abundant arterial blood supply, primary from branches of external carotid artery. Because temperature sensors applied directly to the tympanic membrane can be uncomfortable and involve risk of membrane injury or perforation, noninvasive infrared Thermometer are now used.<sup>2, 4,</sup>

**Objective**

To compare between mercury and digital thermometer in accuracy of reading at the axilla site among different ages and sexes groups.

**Methodology**

**Study design:-**

This is comparative study between mercury and digital thermometer in axillar site, carried out from period October – December 2008.

**Study area**

Elmek Nimer University Hospital, which located at Naher Alnil state in Shendi town, was established in 2002 and contains following department: Medical – Surgery – Pediatric–Gynecology and Obstrticusurology – Dermatology – Psycatric – Eye – ENT – Dental – Pharmacy – Laboratory – X-ray – Ultrasound – ECG – CCU – ICU – statistical Administration department.

**Study population:-**

All patients admitted to the hospital, during the period of the study. Excluded high risk and critically ill patients.

**Study sampling:-**

Total coverage sample. 50 patients were participated in the study.

**Data collection tool:-**

Standard check list developed by the researcher contain items such as age, sex and reading for mercury and digital thermometer from axillar sites).

**Materials:-**

Mercury and digital thermometer, alcohol swab, was used to measure the temperature.

**Data collection technique:-**

Permission was taking from the head nurse, and all patient's was accepted to participate in the stud and they have chance to reject.

Each patient take about 10 minutes firstly measure – mercury reading then the digital reading during the afternoon shift time for one week.

**Data analysis:-**

The data was analyzed by computer using the software program SPSS and presented in table and figures.

**Results**

**Table (1): Mean reading among male group:-**

Type of Thermometer	Mean	N	STD	STD mean	p-value
Mercury reading	37.068	25	0.661	0.132	.000
Digital reading	36.748	25	0.869	0.174	

This table shows that there is high significant relationship between mean readings of male temperature.

**Table (2) Mean reading among female group:-**

Type of Thermometer	Mean	N	STD	p-value
Mercury reading	37.100	25	.686	.000
Digital reading	36.928	25	.686	

This table shows that there is high significant relationship between mean readings of female temperature.

**Table (3): Mean reading between mercury and digital reading among all study groups:**

Type of Thermometer	Mean	N	STD	P. value
Mercury reading	37.084	50	.667	.000
Digital reading	36.838	50	.780	

This table shows that there is high significant relationship in mean readings of digital and mercury among all study group.

**Discussion**

Primary clinical trials has been taken to investigate and a compare between the mercury and digital thermometer in award situation. The result show that there is no significant difference in the average accuracy of the two type of thermometer, how even there is no a greater fluctuation of reading of temperature when using digital or mercury thermometer. So there was no significant difference in both means and standard deviation within the patients using the two thermometers. In male the digital thermometer mean reading was (36.748) while the mercury mean reading (37.068).In female the digital mean reading was (36.928) and mercury mean reading is (37.100).

And both male and female digital mean reading was (36.838) and mercury mean reading was (37.084).

And within different age groups ; in children less than one year the digital mean reading was (36.8), and mercury mean reading is (36.9), while children their age between (1-15 )years the digital mean reading is (37.1)and the mercury mean reading was (36.8),also , the age from ( 16-30 ) years their digital mean reading was (37.0),and mercury mean reading was(37.5) and people their age more than thirty years their digital mean reading is (36.7) and mercury mean reading was (36.9).

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