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A prospective study to compare the axillary and tympanic temperatures in children suffering from acute otitis media

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Abstract

Background: Tympanic temperature recording is one of the alternatives to record core body temperature. Accuracy of tympanic temperature recording in cases of acute otitis media(AOM) is debatable.
Methods: A prospective study conducted in outpatient department of pediatrics, involving 75 children in the age group 1 month to 12 years of age who presented with acute otitis media were taken up for study and 75 age matched controls. Temperature recordings were done at axillary and tympanic sites in both groups. The results were recorded and appropriate statistical calculations were done.
Results: In infected ears the tympanic temperature were significantly higher by 0.48 degrees +/-0.14 . There was no statistically significant difference in tympanic temperatures between the two ears. The sensitivity of tympanic temperature was 91.6 % and specificity was 75 %.
Conclusions: Tympanic temperature in the infected ear were significantly raised . In children where sympamatology of acute otitis media is nonspecific tympanic temperature recording can help in diagnosis of fever without localization to ear.

Keywords: Tympanic temperature, aute otitis media.

Introduction

One of the commonest upper respiratory disease affecting young children is Acute Otitis Media[(1)]. Around 90 % of children are likely to suffer an attack until they reach 2 years of age[(1)]. The history of acute otitis media (AOM) varies with age, but a number of constant features manifest.

In the neonate, irritability or feeding difficulties may be the only indication of a septic focus[(2-3)]. There may be excessive crying, the child may rub his ear and the sleep pattern may be altered[(4)] Older children begin to demonstrate a consistent presence of fever (with or without a coexistent upper respiratory tract infection [URTI]) and otalgia or ear tugging. These latter symptoms are not entirely exclusive to AOM; teething pain or pharyngitis can mimic these symptoms

In older children and adults, hearing loss becomes a constant feature of AOM and otitis media with effusion (OME), reports of ear stuffiness noted even before the detection of middle ear fluid[5]. OtaIgia without hearing loss or fever is observed in adults with external otitis and some dental problems like dental abscess, or pain may be referred from the temporomandibular joint. Orthodontic appliances can also be the cause of referred pain.

In around 70% of infants, fever may be a presenting feature[6]. There are various methods of recording body temperature. The core body temperature can be measured using the rectal thermometer.[7] Axillary and the tympanic recordings are other two common and easily available methods to record body temperature. Tympanic membrane temperature recording is a quick and easy way to record body temperature in children and is thought to approximate core temperature[8,9,10]. Previous studies have shown controversial results when tympanic temperature recordings have been performed in cases of AOM in children.

This study was designed to compare the tympanic temperature recordings in patients of AOM with axillary temperature and also normal ear.

Materials and Methods

The study was a prospective outpatient based observational study. It was conducted from Jan 2016 to December 2016 and conducted in the outpatient department of Rajindra Hospital and Government Medical College, Patiala.75 consecutive Patients in the age group of 1 month to 12 years of age who presented to the pediatric OPD with symptoms suggestive of AOM were included in study. Every patient's demographic data was recorded and temperature using infrared Tympanic thermometer (OMRON) in both ears and the axillary temperature was recorded using the digital thermometer (OMRON). 75 normal children in the same age group were taken as controls and the temperature recordings were done at the two sites and in both ears also.

Acute Otitis Media was diagnosed with the clinical presentation of fever of 2 days ear ache and irritability. Pneumatic otoscopy was done in all cases s/o AOM. In AOM, the tympanic membrane normally demonstrates signs of inflammation, beginning with reddening of the mucosa and progressing to the formation of purulent middle ear effusion and poor tympanic mobility.

Pneumatic otoscopy is an important diagnostic tool for differentiating AOM from acute bullous myringitis. The latter condition, in its purest form, manifests 10-14 days after a viral infection and causes severe localized otalgia without middle ear effusion.

All patients were examined by one ENT consultant using an otoscope. Axillary and tympanic temperatures more than 37.2 degrees C and 38 Degrees C were considered as high fever. Tympanic temperatures were recorded from both ears using the ear tug technique to straighten the external ear canal.

Newborns, bilateral AOM cases, and patients who had technical problems like wax in the auditory canal were excluded from the study.

Results

A total of 150 children were included in the study-75 patients of AOM and 75 controls. The patients age ranged from 3 months to 12 years of age. The mean age was 4.5,±2.8 years. The two groups did not reveal any significant statistical difference in respect of age and axillary temperatures. In the children younger than one year of age the most common symptoms of AOM were fever, agitation, excessive cry and refusal to feed while in the older patients fever and earache were the common presenting complaints. On recording temperatures by tympanic thermometer it was found that there was a statistically significant difference in temperatures in the normal as well as the infected ear which were higher in the AOM group than the control group. The mean temperature in the infected group was 37.9 ±0.84 degrees while it was 37.42 ±0.70 in the normal group. In the control group there was no statistically significant difference in tympanic temperatures between the two ears.

Compared to axillary temperature the sensitivity and specificity of tympanic temperature was 91.6% and 75 % respectively.

Table 1 Showing Axillary & Tympanic temperatures in patients of AOM

	Axillary < 37.2			Axillary ≥ 37.2		
		n	%	n	%	p
Infected ear Temperature	>38	13	25.4	22	91.6	<0.001
	<38	38	74.7	2	8.4	
		n	%	n	%	p
Normal ear Temperature	>38	5	9.8	18	75	<0.001
	<38	46	90.2	6	25	

Table 2 showing Temperature in infected ear V/s Normal ear

		Min	max	p
Infected ear	37.9±0.84	35.8	40.2	<0.001
Normal ear	37.42±0.70	35.8	40	

Discussion

In Clinical practice the recording of body temperature is an important sign. The recording of core body temperature by rectal method using mercury or digital thermometer is acceptable method. Tympanic and axillary temperature recordings are both acceptable and noninvasive methods to record body temperature. They both are easy to take and not cumbersome. Tympanic temperature recordings approximate core body temperature[7]. Its safety and usage in cases of acute otitis media has not been validated.

The presence or absence of ear pathologies makes a difference in tympanic temperature recording. Body temperature recordings are also affected by the site of measurement and the technique used. For recording of axillary temperature, the axillary skin must be dry. The presence of peripheral vasoconstriction which is a feature in the early stage of fever can have a effect on recording of axillary temperature. Tympanic temperature recordings are affected by the ear tug technique.

Studies done previously comparing the tympanic temperature and axillary temperature in cases of AOM have shown inconsistent results in previous studies[11,13,15].

Some studies showed higher tympanic temperatures in the AOM group by about 0.1-0.6 degrees. Kelly and Alexander[13] in their study showed that suppurative AOM cases had higher tympanic temperatures of 0.38 degrees. Comparing the nonsuppurative cases no significant difference in tympanic temperatures was recorded. Brennan and Falk[14] showed in their study that in patients with AOM of one year, infected ears had higher mean tympanic temperatures. (mean 0.2+/- 0.9 degrees F). Chamberlain et al[17] showed an elevation of 0.1 degrees F in cases of AOM in their study.

The sensitivity and specificity of tympanic temperature has been reported as 81% and 86 % by Parmita et al[21] while Brennan and Falk[14] reported sensitivity of 45.4% and specificity of 17.4 % in their study. Terndrup[19] et al showed in their study that there was no stastically significant difference between tympanic temperature and rectal, or axillary temperature in cases of AOM.

Parmita et al[21] compared sensitivity of rectal to tympanic and axillary temperature recordings and reported that Axillary temperature recording had sensitivity of 96 % ,specificity of 50 % while tympanic temperature recordings had sensitivity of 93 % and specificity of 50 %.They conclude that with an optimum cut off ,for diagnosing fever by axillary and tympanic methods was 37.8 degrees and the sensitivity and specificity of axillary and tympanic temperatures were comparable.

Local ear pathologies like nonsuppurative otitis media, tympanic perforation did not increase tympanic temperatures (Garcia Callego et al[20]), while Acute Otitis externa raised the tympanic temperature by 0.36 degrees F.

The limitation of infrared thermometers is that they may not be very accurate but they can still be used for monitoring body temperature as a screening method.

In our study the tympanic temperatures were significantly higher in patients of AOM. In very young children, where the symptoms of ear ache may not be prominent, tympanic temperature recordings can be used for diagnosis of AOM in children.

Conclusion

Tympanic thermometry is an important, non invasive and less cumbersome way of recording body temperature in children, which also obviates some of the drawbacks of rectal, axillary and oral temperature recordings. Tympanic temperature in the infected ear were significantly raised. In children where symptoms of acute otitis media are nonspecific, tympanic temperature recording can help in diagnosis of fever without localization to ear.

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