



ASSESSMENT OF MIDDLE EAR FUNCTION OF PATIENTS WITH CEREBRAL PALSY AT THE UNIVERSITY OF BENIN TEACHING HOSPITAL

BY

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**A DISSERTATION SUBMITTED TO THE FACULTY OF O.R.L
IN PARTIAL FULFILMENT FOR THE AWARD OF FELLOWSHIP OF THE WEST
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Outline



- Introduction
- Aim and objectives
- Participants, Materials and Methods
- Results
- Discussion
- Conclusion
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- Summary



Introduction

- Cerebral palsy : Static neurologic condition, from brain injury, before cerebral development is complete. {Kriger KW 2006}
- It is characterized by motor impairment
- The prevalence of 2.5 to 10.3 per 1000 live births in Nigeria. {Tella BA 2011, Frank-Briggs AI 2011}
- Brain damage in children with cerebral palsy; more vulnerable to hearing problems {Elaine G }
- **Justification** : Hearing loss due to middle ear pathology; preventable and correctable



Aim And Objectives

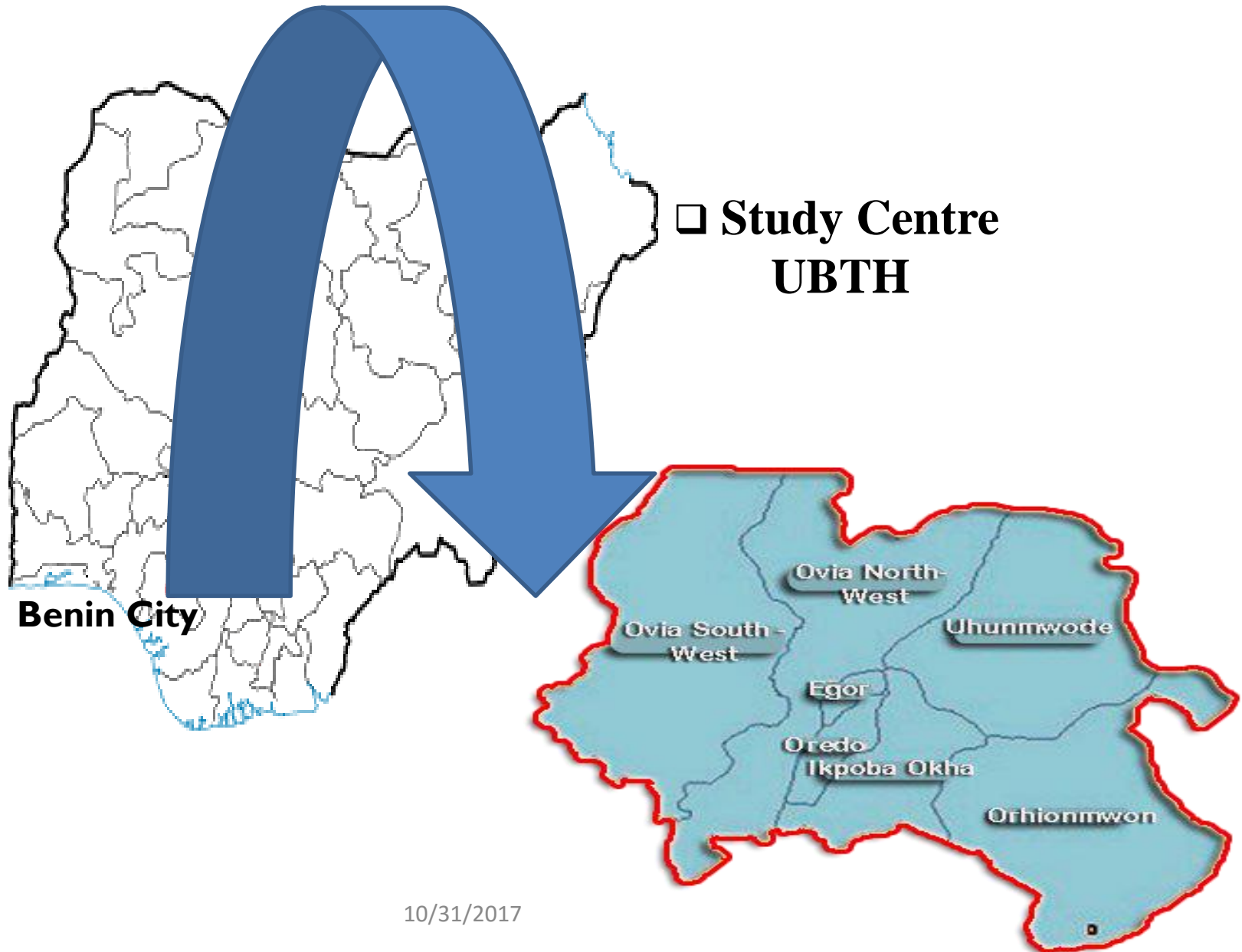
- The middle ear function of children with Cerebral Palsy

Specific Objectives

1. The pattern of middle ear pathology
2. The severity of Eustachian Tube Dysfunction



Participants, Materials & Methods





Participants, Materials & Methods

Contd'



- ❑ **Study design:** Prospective Descriptive study carried out for fourteen months from May 2014 to June 2015.

- ❑ **Sampling technique** – Total population sampling technique.
-Stratified sampling technique{Control group}

- ❑ **Study Population:** - All children with Cerebral palsy who attended occupational therapy sessions in UBTH during the period of study.

- Control : all recruited children attending Russell International group of schools, Ugbowo Benin city, whose parents gave consent.



Participants, Materials & Methods Contd'

Inclusion criteria:

Children with Cerebral palsy whose parents or caregivers gave consent.

Exclusion criteria:

Patients with cerebral palsy whose parents or caregivers did not give consent to the study.



Participants, Materials & Methods

Contd'



- ❑ **Sample Size Determination:** $n = Z^2 pq/d^2$ [Araoye 2004].
Attrition : 10%
 $n = 96. (100)$

- ❑ **Participants:** - 112 subjects
 - 112 control subjects (Russell International Group of Schools, Ugbowo, Benin city).

- ❑ **Study Materials:**
 - Head light
 - Handheld battery powered Otoscope (R.A. Bock Diagnostics)
 - Tympanometer (Type BFIEC 6060 I-I/EN 6060 I-I).
 - Questionnaire.



Participants, Materials & Method Contd'



☐ Method :

- Clearance from Ethics & Research Committee U.B.T.H
- Pretest
- Health talk on aim and objectives of the study and possible intervention (parents and caregivers)
- An interviewer administered Questionnaire



Participants, Materials & Method Contd'

- General examination / Otoscopy.
- Each ear as a separate entity
- Disinfection of speculum, wax and foreign body removal
- Impedance audiometric test
(Welch-Allyn version 4, 2008, Probe Tone frequency of 226HZ ,
Sound Pressure level of 85dB with Pressure range of +200 to –
400 daPa).



Participants, Materials & Method Contd'



- Type A (and subtypes As, Ad) - Middle ear pressure
+ 200 to – 99mm of Water.
- Type B - Flat traces without a well defined compliance.
- Type C1- Middle ear pressure – 100 to –199mm of Water
- Type C2- Middle ear pressure – 200 to – 400mm of Water



Participants, Materials & Method

Contd'

- Types C1 and C2 : negative middle ear pressure
(Eustachian tube dysfunction; middle ear effusion)
- Type B : Middle ear effusion
- **Type B, C1 and C2** : Indicators of Otitis Media with Effusion.
- Each probe thoroughly disinfected prior to re-use.
- Each Tympanogram analyzed , compared to symptoms /otoscopic findings of each participant
- Patients that had middle ear pathology referred to E N T Department, UBTH {further evaluation and management}



Participants, Materials & Method Contd'

- Similar procedures were carried out among controls matched 1:1 for age and gender.
- Data analysed using SPSS
- Results presented in tables and figures
- Categorical data analysed using chi-square and Fisher's exact test, with p value < 0.05 considered statistically significant.



Participants, Materials & Method Contd'

❖ Limitation of Study

- Pure Tone Audiometry; inability to cooperate
- Pneumatic Otoscope, beneficial; not available
- More objective tests; Otoacoustic Emission {OAE}, Auditory Brainstem Response {ABR}; not available

RESULTS



TABLE 1: SOCIO-DEMOGRAPHICS



Age (years)	Case N (%)	Control N(%)	Total N (%)
1–5	37 (33.0)	48 (42.9)	85 (37.9)
6 – 10	25 (22.3)	23 (20.5)	48 (21.4)
11 – 15	33 (29.5)	34 (30.4)	67 (29.9)
16 – 18	17 (15.2)	7 (6.2)	24 (10.7)
Total	112 (100.0)	112 (100.0)	224 (100)

mean age = 9.69 ± 6.53 years



TABLE 2: Otoscopic findings



Variable	Cases N (%)	Control N (%)	P value
Hyperemic tympanic membrane	38 (16.9)	4 (1.9)	0.000*
Intact and shiny tympanic membrane	67 (29.9)	83 (37.1)	
Intact and dull tympanic membrane	24 (10.7)	12 (5.4)	0.037*
Intact, dull and retracted tympanic membrane	108 (48.2)	24 (10.7)	0.000*
Perforated tympanic membrane	2 (0.01)	0 (0.0)	

Total of 224ears

***significant**



TABLE 3 : Tympanometric findings

Variable	Cases N= 224(%)	Control N=224 (%)	Total N (%)
A	48 (21.4)	134 (59.8)	182 (40.6)
As	22 (9.8)	32 (14.3)	54 (12.1)
B	25 (11.2)	26 (11.6)	51 (11.4)
C1	106 (47.3)	27 (12.1)	133 (29.7)
C2	23 (10.3)	5 (2.2)	28 (6.2)
Σ	224 (100.0)	224 (100.0)	448 (100.0)



Table 4: Prevalence of Middle Ear Pathology

Variable	Case N=224(%)	Control N=224(%)	Total N=448(%)
As, B, C1, C2	176 (78.6)	90 (40.2)	266 (59.4)
OME*	154 (68.8)	58(25.9)	212 (47.3)
ETD*	129 (57.6)	32(14.3)	161(35.9)
Reduced middle ear compliance	129 (57.6)	32(14.3)	161(35.9)
Facial nerve paresis			
Multispeck interpretation* (CSOM)	Type B, C1 and C2 indicators of OME.1(0.4)	0(0.00)	1(0.4)

P < 0.001.

C1 and C2 are indicators of ETD



FIGURE 5: ACOUSTIC REFLEX FINDINGS OF CASES AND CONTROL AT 85db SPL

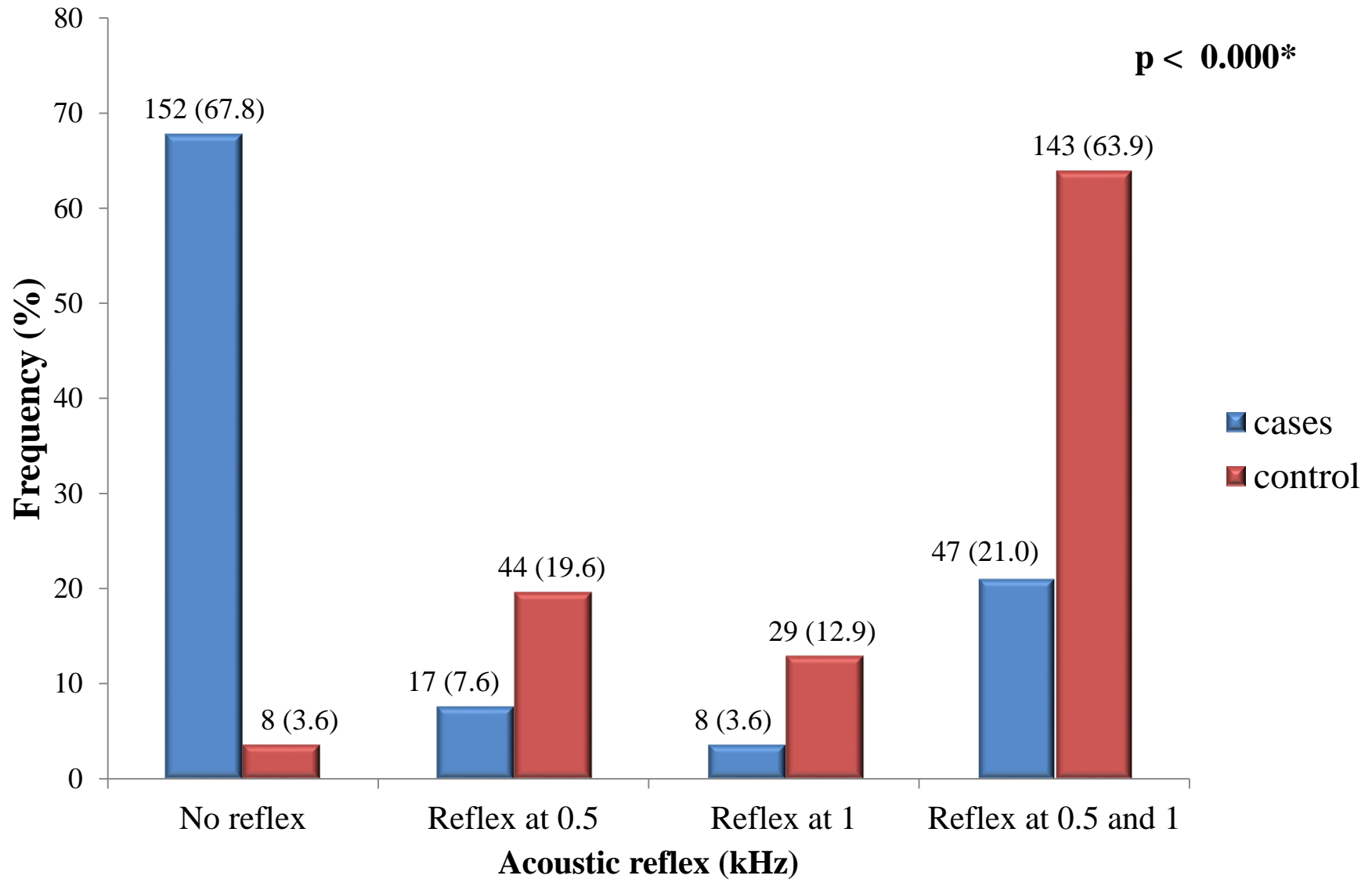




TABLE 5: PATTERN OF MIDDLE EAR PATHOLOGIES AND EUSTACHIAN TUBE DYSFUNCTION



Diagnosis	Otосcopy N (%)	Tympanometry N (%)
Otitis Media with Effusion		154 (68.8)
Eustachian Tube Dysfunction		129 (57.6)
Reduced middle ear compliance		22 (9.9)
Chronic Suppurative Otitis Media	2 (0.01)	-
Facial nerve paresis (HouseBrackmann Grade 3)	1 (0.4)	-



Discussion

- Male gender predominated {Tella et al 2011}
- Normal middle ear function: 48 (21.4%) ears of cases
134 (59.8%) ears of control
18(60%) {El-behairy et al 2010}
.....(sample size 112; 30)
- Abnormal middle ear function: 176 (78.6%) ears of the cases
90 (40.2%) ears controls.
(statistically significant as $p < 0.001$).
20.9%..... Ijaduola et al



Discussion

➤ **Prevalence of middle ear pathology** { general study population };

176 (78.6%) ears of the cases
90 (40.2%) ears controls

Otitis Media with Effusion, 154 (68.8%) ears cases,
58 (25.9%) ears control

6.7% {El-behairy et al 2010}.....(sample size 112; 30)

15.9% {Okolugbo et al 2009}

1.2% type B, 6.8% type C {Ogisi}

18.7% and 18.2% {Ijaduola and Nwawolo}

respectively.

64.0%, developed countries.



Discussion cont'd

- **Pattern** {in this study}
- Otitis Media with Effusion predominated
154 (68.8%) ears of the cases
58 (25.9%) ears of the control

Contrasted {El-behairy et al 2010}

{Amusa et al 2007} CSOM

commonest

- **(Recurrent upper respiratory tract infection)**



Discussion cont'd

- Eustachian tube dysfunction , 2nd common,
129 (57.6%) ears of the cases
32 (14.3%) ears of the control

33.33% {El-behairy 2010}
5.8% {Mwaniki Kiama 2009}
- Type C1, (-100 to -199 mmH₂O) predominated
106 (47.3%) ears of cases,
27 (12.1%) ears of the control
C2, 5%, C1, 4%; {Okolugbo et al 2009}
- Least pathology– facial paresis / meningitits (0.4%)



Conclusion

- Middle ear pathology is predominant in cerebral palsy patients {78.6% }.
- Otitis Media with Effusion is the commonest {68.8% }.
- Type C1 tympanogram predominated {47.3% }.



Recommendations

- Audiological examinations, middle ear assessment mandatory
- High index of suspicion, referral, adequate audiological evaluation
- Multidisciplinary approach reinforcement



References



1. Tella BA, Gbiri CA, Osho OA, Ogunrinu AE. Health-Related Quality of Life of Nigerian Children with Cerebral Palsy. *Disability, CBR & Inclusive Development*, 2011; 22: 13- 24
2. Frank-Briggs AI, Alikor EAD. Pattern of Paediatric Neurological Diseases in Port Harcourt, Nigeria. *International Journal of Biomedical Sciences* 2011; 7:145-149
3. El-Behairy H, Alyan L, El-Menshawy A, El-Sawah A, Fathy MA, Auditory Impairment in Children with Cerebral Palsy. *Australian Journal of Basic and Applied Sciences*, 2010 4(12): 6239-6243
4. Akinlade, O, Nwawolo CC and Okeowo PA: Tympanometric screening for otitis media with effusion(OME) in Nigerian children aged 2-7 years; *Nig. Qt. J. Hosp. Med.* 1998; 8:44-46.
5. Akinpelu O, Amusa Y: Otological diseases in Nigerian children. *The Internet Journal of Otorhinolaryngology.* 2007:7:1
6. Okolugbo NE, Ugwu M. Prevalence Of Secretory Otitis Media Amongst Primary School Children in Benin City Nigeria ; *Continental J. Medical Research* 2009; 3: 12 – 15
7. Lasisi A. The Chronic discharging ear in the Sub-Saharan Africa- Need for improved Management. *The Internet Journal of Otorhinolaryngology.* 2007 :7: 2



Appendix



- **QUESTIONNAIRE ON ASSESSMENT OF THE MIDDLE EAR FUNCTION OF CHILDREN WITH CEREBRAL PALSY IN UNIVERSITY OF BENIN TEACHING HOSPITAL**
- **A) Socio-Demographic data of Parents/ Guardian**
- Your Age in years as at last Birth day: -----
- Sex: Male { } Female { }
- Ethnic Group: Hausa { }; Ibo { }; Yoruba { }; Benin { }; Etsako { }; Esan { }; Others (specify): -----
- Occupation:
- Religion: Christianity { }, Islam { }, Traditional { }, None { }, Others (specify): ---
- Highest Educational Attainment: Primary { }; Secondary { }; Tertiary { }, None { }



Questionnaire cont'd



- Marital Status: Married { }; Single { }; Divorced { };
Widow/Widower { }; Separated { }
- Relationship to patient: Father{ }; Mother { }; Foster { }; Guardian
{ }; Others { }(specify)
- Family structure : Monogamous{ } Polygamous{ } Separated { }
- Family size: Less than 4{ } More than 4 { }
- Type of residence : Shared apartment { } Flat/self-contained { }



Questionnaire cont'd



- **B) Socio-Demographic data of patient**
-
- Age in years as at last Birth day: -----
- Sex: Male { } Female { }
- Ethnic Group: Hausa { }; Ibo { }; Yoruba{ }; Benin{ };Etsako { }; Esan { };
- Others (specify) -----

-
- Religion: Christianity { }, Islam { }, Traditional { }, None { }, Others: (specify)

- Highest Educational Attainment: Primary { }; Secondary { }; Tertiary { },
None { }
- Degree of Disability: can walk { } Can't walk { } Walk with restrictions { }
Assistive walking { }



Questionnaire cont'd



- **C) Questions on Possible pattern of any middle ear pathology present in the patient with Cerebral Palsy**
- 46) Any ear pain : Yes{ }No { }
- 47) Any fever in the presence of any ear problem: Yes { }No { }
- 48) Any history of frequent tugging of the ears: Yes { } No { }
- 49) Any feeling of water in the ears: Yes { } No { }
- 50) Does the patient scream on touching the ears Yes{ } No { }
- 51) How does the patient respond to calls: poorly{ } fair { } very well { }
- 52) Is the patient always poking hands inside the ears: Yes { }No { }
- 53) Does the child communicate with others: Yes { } No { }
- 54) Is there any visible matter inside the ears: Yes { } No { }



Questionnaire cont'd



- 55) Anything (pus, water, blood) coming out from the ears: Yes { }
No { }...specify....
- 56) Any swelling at the back of the ears: Yes { } No { }
- 57) Any pus coming out from the back of the ears: Yes { } No { }
- 58) Any convulsion following any ear problem: Yes { } No { }
- 59) Does the patient complain of Headaches in the presence of any ear problem: Yes { } No { }
- 60) Any history of neck pain or stiffness following any ear condition: Yes { } No { }



Questionnaire cont'd



- **D) Questions on possible Eustachian Tube pathology in the patient with Cerebral Palsy**
- 61) Any tickling of the ears: Yes { } No { }
- 62) Any popping of the ears or at the back of the nose: Yes { }
No { }
- 63) Any noise in the ears: Yes { } No { }
- 64) Upon yawning or chewing, any feeling of discomfort at the back of the nose: Yes { } No { }



Ethical clearance form



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ETHICS AND RESEARCH COMMITTEE CLEARANCE CERTIFICATE

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/913

PROJECT TITLE: "AN ASSESSMENT OF MIDDLE ^{EAR} FUNCTION AMONG CHILDREN WITH CEREBRAL PALSY IN UNIVERSITY OF BENIN TEACHING HOSPITAL, EDO STATE."

PRINCIPAL INVESTIGATOR(S): DR. IMMACULATA OGECHI AKPALABA

DEPARTMENT/INSTITUTION: DEPARTMENT OF OTORHINOLARYNGOLOGY, UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, NIGERIA.


DATE CONSIDERED MAY 6th, 2013

DECISION OF THE COMMITTEE: APPROVED

REMARK:

CHAIRMAN: PROF. M.N. OKOBIA

SIGNATURE & DATE.....

 6/5/2013

SUPERVISORS: MR. VITALIS EZEUKO, DR. IGHALO EDWIN EBHO-ORIAZE

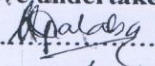
DECLARATION BY INVESTIGATOR(S)

PROTOCOL NUMBER (please quote in all enquiries)

To be completed in four and three copies returned to the secretary, Ethics and Research committee, Clinical services and Training Division. University of Benin Teaching Hospital Benin City.

I/We fully understand the conditions under which I am/we are authorized to conduct the above mentioned research and I/We undertake to resubmit the protocol to the Ethics and Research Committee.

Signature.....


10/5/13

Date..... 10/05/13



CERTIFICATE OF CONSENT



I have read the above information. I had the opportunity to ask questions about it and they have been answered to my satisfaction.

(A) I consent voluntarily to take part as a Participant in this Study

(B) I do not consent to participate in this Study.

Name of Participant :.....

Signature of Participant:.....

Date:.....

Witness:

Address of Witness:.....

Researcher's signature and date:.....



WELCH-ALLYN TYMPANOMETER





THANK YOU



Summary



❑ **Title:** Assessment of middle ear function of children with Cerebral Palsy in University of Benin Teaching Hospital

❑ **Background:**

Cerebral palsy is characterized by motor impairment

Up to 15 percent of children with cerebral palsy also have some kind of hearing impairment.⁵

❑ **Aim and Objectives:**

To assess the middle ear function of children with Cerebral Palsy in University of Benin Teaching Hospital .

Pattern of middle ear pathology and Eustachian Tube pathology.



Summary cont'd



□ Patients, Materials and Methods:

A descriptive prospective study

Systematic random sampling technique.

Data collection; six months from May 2014 to October 2014.

Sample size, using the Cochran's formula.

One hundred and twelve subjects participated

Pretest on 60 subjects at Project Chari-love.

Structured interviewer questionnaire administered; Tympanometry, Data analyzed {SPSS; 16}



Summary cont'd



□ Results:

Male gender predominated, 68 (60.7%).

Otitis Media with Effusion, more predominant in 152 (68.5%) ears

Followed by Eustachian Tube Dysfunction in 127 (57.2%), mostly Type C1 tympanogram.

Reduced middle ear compliance recorded in 22 (9.9) ears

Chronic suppurative otitis media, in 2 (0.9%) ears.

Facial nerve paresis, meningitis noted in similar proportion, 1 (0.4%) subject. Subjectively, hearing loss was noted in 174 (78.4%) ears.



Summary cont'd



❑ **Conclusion: :**

Middle ear pathology common among children with Cerebral palsy.

Otitis Media with Effusion predominated followed by Eustachian tube Dysfunction,

Reduced middle ear compliance, Chronic suppurative otitis media complicated with facial nerve paresis and otogenic meningitis.

The less severe type of Eustachian tube dysfunction noted
{Type C1 Tympanogram}

❑ **KEYWORDS: Middle ear function, Cerebral Palsy, Tympanometry**