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RESEARCH ARTICLE

Assessment of hearing impairment among primary school children in Nasiriya city during 2018

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Abstract

Background: Over 5% of the world's population or 466 million people has disabling hearing loss (34 million of them are children). Unaddressed hearing impairment in primary school children can significantly affect the academic performance of children and poor psycho-social and intellectual development in children.

Justification of study: for early detection of hearing impairment among primary school children through activation or/and implementation of effective screening tools , and for early intervention to ensure mental , social, communication and educational development of children. Study objective: is to determine the extent of hearing loss in primary school children in Al-Nasiriya city. Also to determine the socio-demographic distribution ,ear diseases associated with hearing impairment, and to determine severity of hearing loss.

Study design: Cross-sectional primary school based survey extended during 2018.

Methodology: cross-sectional analytical and comparative school-based study carried out through multistage systematic random sampling for 9 public primary schools in the Al-Nasiriya city from 2nd of January/2018 -end of 2018.primary information was obtained through thorough otological questionnaires from patient ,teachers, parents and through direct observation , tuning fork test would be conducted on all participants and audiometry was conducted for children with suspected hearing impairment. Then children with suspected hearing impairment referred for AL-Habboby hospital to confirm the diagnosis and for further assessment. The data were collected on SPSS version 23 and analyzed using chi-square test.

Conclusion: High prevalence of hearing impairment(16.3%) among primary school children, Higher prevalence in female gender , in pupils aged > 10 years , in families with low socioeconomic class , Significant independent association was found between HI and age and socioeconomic status.The most common ear diseases associated with hearing impairment were ear wax impaction and otitis media with effusion. The majority had mild HI

Key words: Hearing impairment, primary school children, public school, tuning fork test, screening audiometry, hearing assessment.

1 | INTRODUCTION

HHearing impairment in pediatric is a common and serious disability.[1] Hearing loss can come from inherited problem , some infections affecting ear , infections during pregnancy ; complicated birth of child, use of ototoxic medications , chronic infection of middle ear and excessive exposure for noise.[2] In 2018 WHO estimated disabling hearing impairment to be more than 5% of the world's population which is about 466 million people, 34 million of them are children, and greatest of those were found in Southern area of Asia , Eastern area of Asia and subSaharan area of Africa [2] Which was in continuous rising that in 1995, WHO shown that peoples with hearing problems were 120 million [3], in 2000 , 250 million people and in 2011 they involved about 360 million with disabling hearing loss; 32 million of them were children within age less than 14 years. [4] South and East Asia and sub-Saharan Africa remain the world regions with the highest prevalence of hearing impairment in both adults and children.[5] Unrecognized hearing loss, even of a mild severity can significantly affect educational achievement, language , social and emotional development of children.[6],[7],[8]

Hearing impairment can be classified according to its severity of mild, moderate to severe or profound and also classified as conductive, sensorineural and mixed. [9] WHO developed a set of excellent and well-illustrated training guidelines for hearing care, aimed to provide primary health care workers and communities in developing countries with effective and simple methods from preconception to adulthood in order to lower the burden of hearing disorders. [10]

Early interventions through primary prevention, early detection, and assessing hearing impairment can overcome this problem. Management for children who have hearing problem that showing benefit include earlier identification; hearing aids usage , surgery of cochlear implants ; and in educational and communicational field is encouraging use the language of sign and/ or comment.

1.2 | JUSTIFICATION (RATIONALITY)

To ensure well mental , social, communication and educational development of children , there is a need for early detection of hearing impairment among primary school children through activation and /or implementation of routine effective preschool screening tools this in turn will enhance early intervention. Also because this important subject was not addressed previously in Nasiriya city ,i.e. lack of data about hearing impairment that can affect spoken language, academic performance in children. So that identification the magnitude of this problem should be given high priority like it is done in developed countries. The WHO is currently trying to implement program about primary ear and hearing care "PEHC" within work of primary health care in developing countries and urges its member states to prepare national plans to be included in the primary health care framework. The magnitude of the problem caused by hearing loss and its significant cost is not accurately known. The lack of adequate estimates of hearing impairment magnitude makes it difficult to plan effectively for interventions and services for those with hearing impairment. For this reason, this study was planned to estimate the magnitude of hearing impairment among Al-Nasiryian primary school children and to identify particular socio-demographic risk factors associated with hearing impairment among children of Al- Nasiriya primary school.

General objective: is to estimate the extent of hearing impairment among children of primary school in Nasiriya city during 2018.

Specific objectives: are

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1. To determine the prevalence of hearing loss among primary school children in Al-Nasiriya city
2. To identify risk factors associated with hearing impairment,
3. To determine the causes or associated ear diseases with hearing impairment ,
4. To determine severity of hearing impairment.

2 | MATERIAL AND METHODS

The study design: It was a cross- sectional descriptive-comparative school based- study carried out in primary schools in Nasiriya during the period from 1st day of February / 2018- 4th of May / 2018.

Cross-Sectional approach was preferred for the following reasons:

A-It measures the prevalence of disease.

B- It usually carried out in a short time.

The study population

They were primary school children of 9 public primary school in Nasiriya City aged between 6-13 years of both sexes.

Inclusion criteria; all pupils aged 6-13 years.

Exclusion criteria; excluded were pupils who refused to participate, and those who were out of studied age group.

Ethical consideration

The ethical clearance was obtained from committee of Department of Family medicine and Community / Thi-qar University. Thi-qar office of education and head teachers of recruited schools were notified and permission obtained from them to carry out the study. Informed verbal consent was obtained from parents of children, their teachers, and from children themselves, whenever applicable.

Sample size calculation

$$N=\frac{(1.96)^2 \times 0.08 \times 0.92}{(0.03)^2} \approx 314$$

At the initial time in conducting the pilot study, there was a very high unresponsive rate (13%) … even though it might be acceptable to some extent… so the reviewers add a further 41 cases to overcoming this high refusal rate and at the end the sample size estimated totally as 355 pupils.

Sampling procedure

Multistage random sampling was carried out. Firstly Nine primary schools were randomly selected (by simple random sampling from a list of primary schools obtained from Thi-Qar Education Directorate; 5primary school from the first area and 4 primary school from 2nd area, those were be labeled then) from 9 primary health care sectors in Al Nasiriya city.

The sample size was distributed depending on proportional allocation between the sampled schools on assumption that the sampling fraction was 0.08.

Table 1. PHC sectors specific- Target sampling population Distribution

PHC sector	Primary school name	Total number of student	pupil in the final sample
1st	Al- shmokh	680	**54**
2nd	Al- Fatah	390	**31**
3rd	Al- Fyhaa	554	**44**
4th	Al-Jumhuriu	640	**50**
5th	Daebal Al –khuzai	402	**32**
6th	Al- Markazia	560	**44**
7th	Safia bint Abd Al- matlab	425	**33**
8th	Al-Kadhimi	460	**36**
9th	Jabal Al-saaber	397	**31**
Total		4445	**355**

Sampling fraction: 8%

Source: Directorate of Education Thi- Qar Nasiriya

3. | THE STUDY TOOLS

1. The questionnaire

Section one: includes the identity child information about (name, age, sex, class type, address , socio-economic status and residency of pupils and number of family members.

Section two: The otological history about reduced hearing, ear discharge, earache; family history concerning ear problems including (hearing impairment, ear discharge, otalgia, tinnitus and vertigo (in SNHL); history of any complication during pregnancy such as fever, rash and after birth such as neonatal jaundice.

2. Tools of the study

Full E.N.T examination was done stressing on the ear examination by otolaryngologist (as in appendix B) including: inspection of external ear through *direct observation for congenital malformation, and discharge.

* Otoscopic examination had been performed by using mini 3000 otoscope (Model 25020) called Welch Allyn Heine otoscop to discover presence of any abnormalities in ear canal whether blood, discharged pus, cerumen (whatever excessive or impacted ear wax); growth or tumor ; and foreign object in the ear canal .The tympanic membrane was examined for any abnormality regarding its color , its integrity whether intact or perforated, its transparency , presence of air bubble, and its contour whether retracted or bulging.

*** Tuning fork tests, Rinne test and Weber test, was used.**

screening by Pure tone audiometer was done for them because screening audiometry has multiple pure tone frequency (500 , 1000,2000,4000 Hz) but it need longer time to be done for those selected pupils who have reduced hearing or earache or ear discharge on otological history. Pure tone Audiometry: It was mini portable audiometer with its supraaural headphones.it was done in quiet environment for four hearing frequency 0.5, 1, 2, and 4 kHz

* Tympanometry: unfortunately was not performed in present study because it was not available as screening. So those with suspected hearing impairment through history and clinical finding, then referred to Al-Habboby hospital to confirm the diagnosis by dignostic audiometry and to differentiate between those who have CHL or SNHL and for tympanometry evaluation.

Definition of variables

1-Types of hearing problem on otoscopic examination:

1. Normal. 2. Cerumen impaction. 3. External ear Foreign body (paper and an insect) .4. Otitis media with effusion. 5. Chronic suppurative otitis media.

2-Tuning fork test finding: Rinne test: Positive or negative .

• Weber test: Central or lateralized.

3-Screening audiometric-based severity of hearing impairment according to WHO classification: 1-Mild HI 2.Moderate HI. 3. Moderately severe HI. 4. Severe HI. 5. Profound HI

Data analysis: Statistical analysis was performed using SPSS package(version 23).Descriptive data statistics expressed [in form of frequencies, percentages , and graphs] , inferential statistics for testing of association by using tests of significance[Chi-square or Fisher exact test which are used for analysis of variables] .Means and standard deviations were used to present data of continuous variables.. Logistic regression analysis was performed to detect the independent risk factors. P-value ≤0.05 was considered to be significant

4. | RESULTS

3.2.2/ Frequency and percentage of the affected ear based on audiometry. Of the 58 pupils with hearing impairment, 25(7%) showed bilateral HI, while the remaining 33(9.2%) had unilateral defect.

Table .1 Frequency and percentage of ear symptoms among the affected pupils

Affected ear	Frequency	Percent
Unilateral HI	33	**9.3**
Bilateral HI	25	7
Total	58	**16.3**

Percentage and frequency of HI according to tuning fork tests: Of the 58 pupils who complaint from ear symptoms, 31(8.7%) showed negative Rinne test without lateralization and the remaining 27(7.6%) was positive Rinne test without lateralization.

Table .2 percentage and frequency of HI according to tuning fork tests

Tuning fork tests	Frequency	Percent
Negative Rinne test without lateralization	31	**8.7**
Positive Rinne test without lateralization	27	**7.6**
Total	58	**16.3**

3.3 Prevalence of hearing impairment according to screening audiometry: Prevalence of hearing impairment in primary school children in Nasiriya city is illustrated in Figure 3.3. Among the 355studied pupils, 58(16.3%) was with HI, giving the prevalence rate of 16.3%.

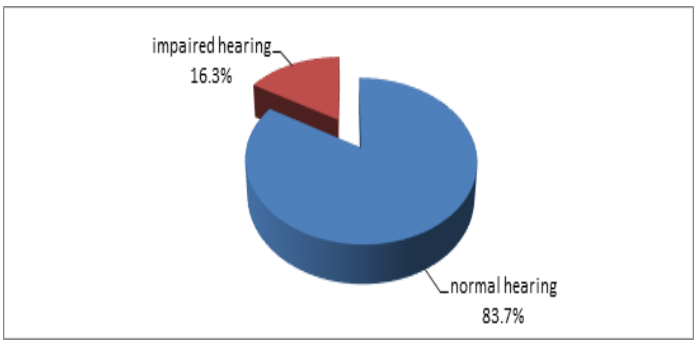

Figure.3.3 Prevalence of hearing impairment among the studied pupils

4. Figure 4 shows that of 58 pupils with HI , 24(41.4%), 23(39.7%) , 5(8.6%) , 4(6.9%) ,and 2(3.4%) had ear wax, otitis media with effusion , CSOM, ear wax ,and foreign body in external ear canal respectively.

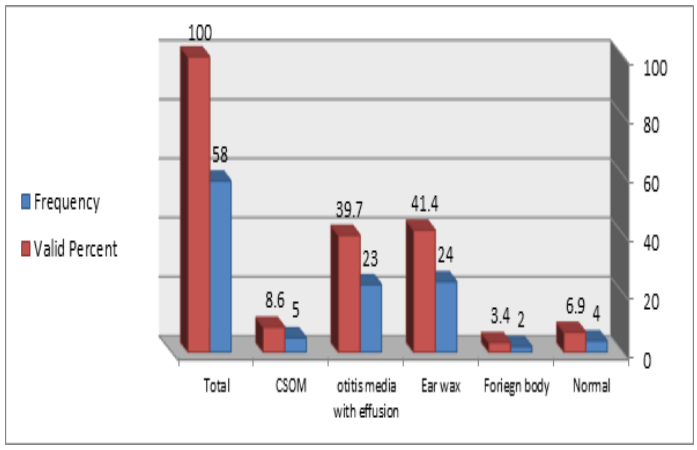

Figure 4Ear diseases associated with HI among affected pupils according to otoscopic examination

3.5 Prevalence of hearing impairment according to severity based on audiometry: Figure3.5 demonstrates prevalence of audiometric-based severity of hearing impairment. Of 58 pupils with hearing impairment, 52(14.7%) of studied pupils had mild hearing impairment, and 6(1.7%) had moderate hearing impairment. None showed moderately severe or sever or profound hearing loss.

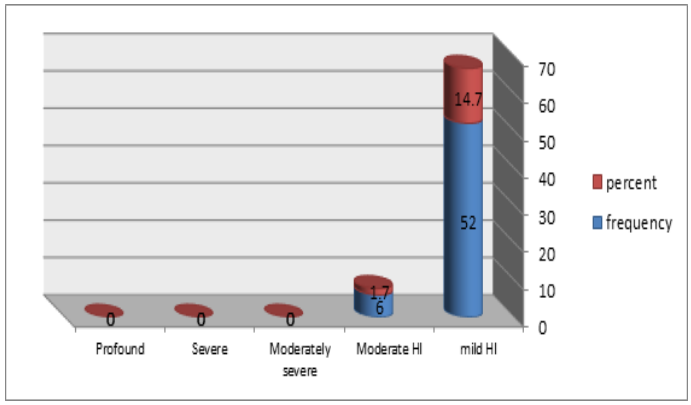

Figure 3.5 Prevalence of hearing impairment according to severity based on audiometry

Table 3 Relationship of socio-demographic characteristics with ear diseases associated with HI

Variables		Normal	foreign body in external ear canal	Earwax	Otitis media with effusion	Chronic suppurative otitis media	Total	p-value, X^2 test
Age	(6-7)years	3(11.5%)	1(3.8%)	6(23.1%)	13(50.0%)	3(11.5%)	26(100%)	0.111, *11.017
	(8-10)years	0(0.0%)	0(0.0%)	10(52.6%)	8 (42.1%)	1(5.3%)	19(100 %)	
	>10 years	1(7.7%)	1(7.7%)	8(61.5%)	2(15.4%)	1(7.7%)	13(100%)	
Sex	Female	2(7.4%)	0(0.0%)	14(51.9%)	8(29.6%)	3(11.1%)	27(100%)	0.237, *4.511
	Male	2(6.5%)	2(6.5%)	10(32.3%)	15(48.4%)	2(6.5%)	13(100%)	
Socio-economic status	High	4(9.1%)	1(2.3%)	19(43.2%)	18(40.9%)	2(4.5%)	44(100%)	0.278, *9.437
	Moderate	0(0.0%)	0(0.0%)	4(57.1%)	2(28.6%)	1(14.3%)	7(100%)	
	Low	0(0.0%)	1(14.3%)	1(14.3%)	3(42.9%)	2(28.6%)	7(100%)	
Family size	<5	2(4.7%)	0(0.0%)	20(46.5%)	16(37.2%	5(11.6%)	43(100%)	0.028, *8.416
	≥5	2(13.3%)	2(13.3%)	4(26.7%)	7(46.7%)	0(0.0%)	15(100%)	
Total		4(6.9%)	2(3.4%)	24(41.4%)	23(39.7 %)	5(8.6%)	58(100%)	

***Fisher exact test**

Table 4 demonstrated that mild HI was more prevalent in pupils aged 6-7 years (42.3 %%) but without significant statistical association.

It was of equally prevalence in females and in female. Mild HI was more prevalent in high socioeconomic status (75%) and this association was not statistically significant. It was more in pupils living within large family (66.7%) and this association was also statistically significant.

Variable		Mild HI	Moderate HI	Total	p-value ,X^2 Test
Age	(6-7)years	22(42.3%)	4(66.7%)	26 (100.0%)	0.078, *7.486
	(8-10)years	91(36.5%)	0(0.0%)	19(100.0%)	
	>10 years	11(21.2%)	2(33.3%)	13(100.0%)	
Sex	Female	26(50.0%)	1 16.7%	27(100.0%)	3.467, *2.635
	Male	26(50.0%)	5(83.3%)	31(100.0%)	
Socio-economic status	High	39(75.0%)	5(83.3%)	44(100. %)	0.431, *1.683
	Moderate	12(13.5%)	0(0.0%)	7(100.0%)	
	Low	6(11.5%)	1(16.7%)	7(100.0%)	
Family size	<5	42(19.2%)	1(16.7%)	43(100.0%)	0.002, *9.987
	≥ 5	10(66.7%)	5 (83.3%)	15 (100.0%)	
Total		52(100%)	6 (100.0%)	58(100.0%)	

*Fisher exact test

Table 5. Demonstrates the independent association of selected risk factors and hearing impairment. There was significant association between age, socio-economic status of studied population and Prevalence of hearing impairment by logistic regression analysis.

Table 5. Association of independent risk factors with prevalence of HI

HI		B	Significance	Exp(B) [Odds ratio]	95% C.I.for EXP(B)	
					Lower	Upper
Insignificant	Sex	-0.538	0.073	0.584	0.324	1.051
	Family size	0.582	0.104	1.789	0.886	3.610
Significant	AGE	-0.423	0.031	1.526	1.039	2.242
	SES	-0.851	0.001	2.342	1.418	3.870

5. | DISCUSSION

1. Strengths of the study

It is the first study about hearing impairment implemented in Nasiriya city, and it was conducted for three classes (grades) in primary schools of Al- Nasiriya city / Thi-Qar Governate.

2. Limitations of the study

The cross-sectional design of this study allowed only for single observation and for short period (limited to school time) ,to assess the hearing acuity among primary school children, and cannot follow selected pupils with hearing impairment for any changes in prevalence rate over time (it may be with temporary or permanent cause). The referred suspected cases of HI to differentiate them as CHL or SNHL by diagnostic audiometry and tympanometry in Al-Habboby hospital were not attend. Also Prevalence of ear infections associated with hearing impairment were limited mostly for particular season, so this promotes short period for their estimation(underestimation). Screening audiometry is used only for determining prevalence of hearing impairment and hearing threshold ,but it wasn't done to determine type of hearing loss whether conductive, sensori-neural or mixed type that could be done only in presence of the diagnostic audiometry which was available in hospital.

3. Extent of hearing impairment

A cross sectional study extended over 4 months including 355pupils of primary school children in Al-Nasiriya city who were selected randomly with male: female ratio 1.8:1 as comparable to study in Port Harcourt, Nigeria[11], to estimate extent of hearing impairment among pupils in primary school as 16.3%, as comparable to study which was conducted in Aligarh, Uttar Pradesh, that was found to be 17.9% [12]. It is compared with study conducted in Egypt (20.9%) 13 [total of 555 children aged 6-12 years from both a rural and an urban school in El-Kom District of Egypt]. In Nigeria (29.4%) [11] [the study conducted from January 10th to May 21th); a higher percentage of HI among primary school children than in Al- Nasiriya city. In comparing with study conducted in Tikrit city/ Iraq(5.14%)[it was conducted in period from September through to 15 of December for 1420 pupils and the pure tone audiometry was done for pupils who have HI] , a lower than the present estimation for the extent of the problem in Al-Nasiriya city. The extent of unilateral impaired hearing (9.3%) had been higher than extent of bilateral impaired hearing (7%). It is comparable to study done by Obukowho et al and also Khairi et al who reported that unilateral hearing loss as being more common(61.1%) [11].

4. Age specific - prevalence of hearing impairment

The Prevalence of hearing impairment was shown to be higher in pupils aged >10 years (24.1%) and least in pupils aged 6-7 years (13.3%) but this was statistically significant by logistic regression analysis. Comparable to study conducted in Nigeria (32.8%)11[that was HI more in those aged more than 10 years(32%) than those who aged 5-7 years(24%)].

5. Sex specific-prevalence of hearing impairment

The present study showed that the prevalence was higher in females (21.3%) than in males (13.6%) and

this sex difference is statistically not significant. Comparable to study in Nigeria[11].

They had been shown that girl's cochlea is shorter and stiffer than that in males which can lead to a more sensitive frequency response. In addition to the hair cells are stiffer and more sensitive in girls than in boys[13].

6. Socio-economic status specific-prevalence of hearing impairment

The prevalence of hearing impairment had been more in low socio-economic class(26.7%) and lowest among high class of pupils(7.4%).This association between HI and the socio-economic class was statistically significant. it is comparable to study done in India13(where prevalence of HI was more in those with low standard of living).

7. Family size specific- prevalence of hearing impairment

Prevalence of hearing impairment was higher in large family size (14%) than in smaller family size (7.7%). This difference is not statistically not significant. This was comparable to study by Parvez et al [13] (that family with overcrowding showed more prevalence of HI that was 18.5%).

8: Prevalence of ear diseases associated with hearing impairment according to otoscopic examination

In the present study, the most prevalent ear disease associated with hearing impairment were earwax (41.4%) and then otitis media with effusion (39.7%).Oitis media with effusion is the most frequently acquired cause of hearing loss in older children 2. Children are predisposed to otitis media because nasopharyngeal secretion can readily pass through a relatively wider, shorter and more horizontal Eustachian tube than in adult.[14].

The present study results about ear disease prevalence was compared to study in the central zone of Lusaka district, Zambia shows that the commonest ear disease was wax impaction (66%) found in children followed by acute otitis media (20%), then foreign body into ear (4%) and chronic suppurative otitis media (2%) 32 and similarly in that most prevalent ear disease (earwax) in study reported by Absalan A et al15 and by Tahir etal16.

11: Prevalence of hearing impairment severity according to audiometry

Regarding the most prevalent type of hearing threshold was of mild hearing impairment (14.7%). As comparable to these studies.[17],[18] In this study, risk factors which significantly associated with prevalence of hearing impairment were socioeconomic status and family size by logistic regression analysis.

6. | CONCLUSIONS

High prevalence of hearing impairment (16.3%) among primary school children Higher prevalence in female gender, in pupils aged > 10 years, in families with low socioeconomic class Significant independent association was found between HI and age and socioeconomic status. The most common ear diseases associated with hearing impairment were ear wax impaction and otitis media with effusion. The majority had mild HI.

7. | RECOMMENDATIONS

Routine screening audiometry should be carried out children for early detection of hearing impairment as preschool enrollment. This should be implemented as an integral part of the school health program . Further assessment should be done at least at third class and maximum at fifth class. Educational program should be provided to enroll teachers , at least one from each school in predetermined periodic training course or session. Further study needed to classify HI into CHL and SNHL

REFERENCES

1. Schoem SR, Darrow DH. Pediatric Otolaryngology. American Academy of Pediatrics; 2012 Jun 15.
2. World Health Organization. Deafness and hearing loss, Fact sheet N◦ 300. Geneva, Switzerland: WHO Media Centre. 2015 Mar.
3. Smith AW. The World Health Organization and the prevention of deafness and hearing impairment caused by noise. Noise and Health. 1998 Oct 1; 1(1):6.
4. Mathers C, Smith A, Concha M. Global burden of hearing loss in the year 2000. Global burden of Disease. 2000; 18(4):1-30.
5. Duthey B. Background paper 6.21 hearing loss. Geneva: WHO Int. 2013 Feb 20.
6. Yoshinaga-Itano C, Sedy Al, Coulter DK, et al. language of early and later identified children with hearing loss. Pediatrics.1998; 102:1161-71.
7. Moller MP. early intervention and language development in children who are deaf or hard of hearing .pediatrics.2000;106:43-46.
8. Westberg BD, Showronski DM, Stewart IF,et al. prevalence of hearing loss children in Zimbabwe. Int J pediatrOtorhinolaryngol.2005:69(4):517-25.
9. Dhingra PL, Dhingra S. Diseases of Ear, Nose and Throat-E-Book. Elsevier Health Sciences; 2014 Jun 5: 21.
10. WHO G. WHO methods and data sources for global burden of disease estimates 2000-2011. Geneva: Department of Health Statistics and Information Systems. 2013 Nov.
11. Obukowho O L , Enekole O , Ifeoma A. Risk Factors of Hearing Impairment among Lower Primary School Children in Port Harcourt ,Nigeria. Glob J Otolaryngol. 2017 March; 5(5).
12. Parvez A, Siddiui A R, Khan Z ,Hashim SF, Khan M S. Prevalence of hearing impairment among primary school children in rural and urban areas of Aligarh , Uttar Pradesh , India. International Journal of community medicine and public health, 2016 My 3 :(3) 5:1273-1277
13. Taha AA, Pratt SR, Farhat TM ,Abdel-Rasoul GM,Albtanony MA ,Elrashiedy AL,et al. Prevalence and risk factors of hearing impairment among primary –school children in Shebin El-kom District, Egypt. Am J Audiol.2010; 19(1) 46-60.
14. Margolis RH, Zapala DA, Hanks WD: holterms, presented at: 14th Annual convention of the American Academy Audiology, Philadelphia, 2002; page 40, 18-22.
15. Absalan A , Pirasteh I, Khavidaki G A , Asemi rad A , Esfahani AA ,Nilforoush M H. A Prevalence Study of Hearing Loss among Primary School Children in the South East of Iran, Int J Otolaryngology. 2013 ; (138935):4
16. Tahir H, Abdullah A, Muhammad R. Prevalence of hearing impairment in school children. Int J Health Sci (Qassim). 2011; 5(2) 46-48.
17. Al-Rowaily MA, AlFayez Al, AlJomiey MS, Al BaberAM ,Abolfotouh MA. Hearing impairment among Saudi preschool children. International Journal of pediatric otorhinolaryngology.2012 Nov; 76(11):1674-1677.
18.Karatas E, Karilikama M, Mumbuc S (2006) Auditory functions in children at schools for the deaf.J Nati Med Assoc 2010;98(2):204.

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