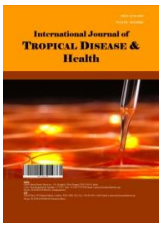

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Screening for Speech and Language Delay among Children Up to or Less than 3 years Seen in the Children Clinic of a Tertiary Hospital in Port Harcourt

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Authors' contributions

This work was carried out in collaboration between both authors. Author IMU designed the study, wrote the protocol and wrote the first draft of the manuscript. Author GJN did data collection and performed the statistical analysis of the study. Both authors read and approved the final manuscript.

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ABSTRACT

Background: In the literature, there appears to be a lot of data on speech delay in children but most emanated from the western world, but little from sub-Sahara Africa especially Nigeria. This study therefore is to determine the prevalence and the risk factors of speech and language delay among children up to or less than 3years seen in our environment.
Methodology: A descriptive cross sectional study carried out in the Paediatric outpatient clinic of the University of Port Harcourt teaching hospital within the period of June 2020 to September 2020. The Language Evaluation Scale Trivandrum (LEST 0-3) and Trivandrum Development Screening Chart (TDSC 0-3) are the tools used both to determine the speech and language delays and the developmental milestone in these children aged 0-3 years. Any child 3 years and below attending the clinic was included in the study; however children with apparent syndromes are excluded as

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well as children whose parents decline to give consent. IBM SPSS Statistics version 25 was used for data analysis. Descriptive statistics was employed in the analysis.
Results: The study comprised of 157 subjects with ages ranging from 2 months to 36 months. There is a significant relationship between hearing impairment and language/speech delay (p=0.002). There was a significant relationship between the various identified delays and a history of jaundice in the neonatal period. A prevalence of 15.3% for language/speech delay was obtained.
Conclusion: Language/speech delay is prevalent in our environment. Perinatal risk factors are significantly associated with these delays.

Keywords: Language/speech delays; developmental; LEST; TDSC 0-3 years.

1. INTRODUCTION

Speech has to do with the production of sound while language is a measure of comprehension [1]. There are two components of language; Receptive language which has to do with understanding – it is the ability to take in or understand information presented through speech and action of others. Expressive language (talking) –The ability to tell one's needs, thoughts, ideas and feelings through one's own speech [2]. Therefore speech is said to be delayed when the child's conversational speech is more incoherent than would be expected for age or the speech pattern is not appropriate for age [3].

Developmental delay is when a child does not attain normal developmental milestones at the expected age [4]. This delay could be with the gross motor and or social interaction functions. Often parents are counselled to "wait and watch" with the hope that the problems reverses itself [5,6]. This policy often leads to late diagnosis and it is known that in about 40-60% of the children if untreated, speech and language delay can persist [7]. These are then at greater risk of emotional, social, behavioural and cognitive problems in adulthood [6,7]. Speech delay is a common delay seen in children and it is known that most children acquire good verbal communication by the time they attain 3years of age [8]. The delay in speech and language can affect other cognitive functions such as IQ scores, literacy skills such as reading and spelling resulting in impairment and poor performance in these functions [9]. It has also a longtime negative effect of causing lack of school readiness in children [9]. They are more likely to have learning disabilities at school age with an overall poor academic performance [10,11, 12,13]. There are numerous risk factors associated with speech and language delay. These can be multiple and includes; male gender, seizure disorders, hearing loss, birth asphyxia, low birth weight, preterm birth, oropharyngeal deformity, paternal and maternal education, family history of speech delay etc., however, hearing loss is by far the commonly encountered risk factor [14,15]. The prevalence of speech and language delay differs in different studies because it depends on the tool employed and the population studied to a very large extent. While Mondal et al had a prevalence of 27%, others had 13.7% using similar tool but studied children 0-6 years [14,16].

In terms of treatment of speech disorders, the primary expressive language disorders tend to respond better to interventions than the receptive forms. It is postulated that early intervention in language delays can affect long-term outcome since it can reduce the number of children needing special education as well as improving language performance in these children about age 8 years [7,17,18].

The LEST is a language screening tool that is simple to use and has a sensitivity of 96% and there is a significant association between speech and language delay and delay in developmental milestone. It is known that the children that have delay in developmental milestone [TDSC] have a higher chance of having delay in speech/ language [14]. It is also known that speech and language is a good marker of a child's overall development [19]. This study therefore is to determine the prevalence of speech and language delay in children less than 3years in our environment, determine possible risk factors so as to encourage early intervention and possible prevention.

2. METHODOLOGY

A descriptive cross sectional study carried out in the Pediatric outpatient clinic of the University of Port Harcourt teaching hospital within the period

of June 2020 to September 2020. The study was on consecutive children aged 0-3 years attending the clinic. Informed consent was obtained from the parents and guardians of the children who also answered a semi structured questionnaire to determine the children's possible risk factors for speech/language and developmental delay. An interviewer administered questionnaire was used to get information on the social demographic variables and medical history of the study participants. Convenience sampling method was used.

Any child 3 years and below attending the clinic was included in the study; however children with apparent syndromes are excluded as well as children whose parents decline to give consent.

The Language Evaluation Scale Trivandrum (LEST 0-3) and Trivandrum Development Screening Chart (TDSC 0-3) are the tools used both to determine the speech and language delays and the developmental milestone in these children aged 0-3years. The LEST has 33 items while the TDSC has 27 items. A one item delay in both tools will be taken as a positive test since this has good sensitivity and specificity of determining delays in speech and language and a high percentage of negative predictive value; up to 99.8%.

Sample size was based on prevalence of 9.5% obtained by Zafar Meena et al. [20] by using Kothari formula for sample size calculation [21], with a 95% Confidence Interval (CI), an error margin placed at 5% and adjustment for non-response of 10% a sample size 0f 157 was obtained. Children who made the inclusion criteria were enlisted into the study until the calculated sample size was met.

IBM SPSS Statistics version 25 was used for data analysis. Descriptive statistics was employed in the analysis. Chi-square and t-tests were conducted for association to compare variables with a confidence interval se at 95% and a p value of ≤ 0.05 which was considered as significant. Frequency tables were used for presentation of results while results were expressed in proportions and percentages.

3. RESULTS

The study comprised of 157 subjects with ages ranging from 2 months to 36 months and a mean age of 19.9+/_ 10.1 months. There were 77(49%) males and 80(51%) females with a ratio of 1:1 majority of the subjects were in the age range of 12-24 months (39.5%) followed by those in age group 25-36 months (34.4%). About 95.5% were delivered at term with 84.4% at birth weights greater or equal to 2.5kg. While 22.3% of the subjects had illness at birth only 15.9% had hospital admission. Jaundice comprised n=26(63.4%) and was the commonest illness among the children. Hearing impairment was seen among 8.28% of the subjects. The majority of both parents had secondary level of education Table 1. Among the children admitted at birth, birth asphyxia was the commonest reason for admission followed by prematurity. Fig. 1. Hearing impairment seen among the subjects was not statistically prevalent in terms of sex however; the relationship with the term of delivery, birth weight and those jaundiced was statistically significant with P values, p= 0.04,0.000 and 0.001 respectively Table 2.

There is a significant relationship between hearing impairment and language/speech delay (p=0.002), hearing impairment and motor delay p=0.006 and hearing impairment in the presence of both delays p=0.002 Table 3.

There was a significant relationship between the various identified delays and a history of jaundice in the neonatal period. Table 4. Among the subjects, 17(10.8%) had convulsions in the first month of life, out of this 6(35.3%) had language delay while 10(58.8%) had motor delay. there was a statistically significant relationship between convulsion in the first month of life and both language and motor delay with p value of 0.02 and 0.000 respectively. Table 5. The number of subjects not admitted at birth was 132 out of which 10(7.6%) had motor delay, 13(9.8%) language and 9(6.8%) both delays while those admitted was 25 in number with motor and language delays seen in 11(44.0%) and a combination of both delays seen in 10(40.0%) of this group. The differences were found to be significant statistically Table 6.

Concerning speech delay, of the 157 subjects 24(15.3%) had speech delay. There was a significant relationship between the various identified delays and a history of jaundice in the neonatal period more males19.3% compared to the females (11.2%) had speech delay, this was not statistically significant (p=0.15).

Motor delay was observed in 21 of the 157 subjects giving a prevalence of 13.4%. More males (19.5%) had delayed motor development compared to the females (11.2%) this difference was not significant statistically (p= 0.43).

19 (12.1%) of the 157 subjects had both delays. And more males (16.9%) were affected. There was no gender difference (p = 0.07) Table 7.

Other variables such as maternal and paternal levels of education showed no significant association with speech and language delay.

4. DISCUSSION

The study was on children within the age range of 2 to 36 months. The age range 12-24 months comprised the majority in contrast to a similar study in India where the age group most affected was 0-12 months [14]. There was a male to female ratio of 1:1 but more males were found to have delays in both language and motor development however the difference was not statistically significant. This agrees with some other researchers [7]. While in contrast some studies found the male gender significantly associated with language delay [14,22,23].

Table 1. Socio-demographic characteristics and clinical history of subjects

Variables	Frequency	Percentages (%)
Sex		
Males	77	49
Females	80	51
Age (Months)		
< I2	41	26.1
12-24	62	39.5
25-36	54	34.4
Mean age 19.9 ±10.1months		
Term delivery		
No	7	4.5
Yes	150	95.5
Birth weight(kg)		
< 2.5	24	15.3
≥2.5	133	84.1
Ill at birth		
Yes	35	22.3
No	122	77.7
Admitted at birth		
Yes	25	15.9
No	132	84.1
Jaundice within the first week of life		
Yes	26	16.6
No	131	83.4
Convulsion in the first month of life		
Yes	17	10.8
No	140	89.2
Hearing impairment among subjects		
Yes	13	8.28%
No	144	91.7%
Fathers level of education		
Primary	4	2.6
Secondary	90	57.3
Tertiary	63	40.1
Mothers level of education		
Primary	12	7.6
Secondary	88	56.1
Tertiary	57	36.3
Total	157	100.0

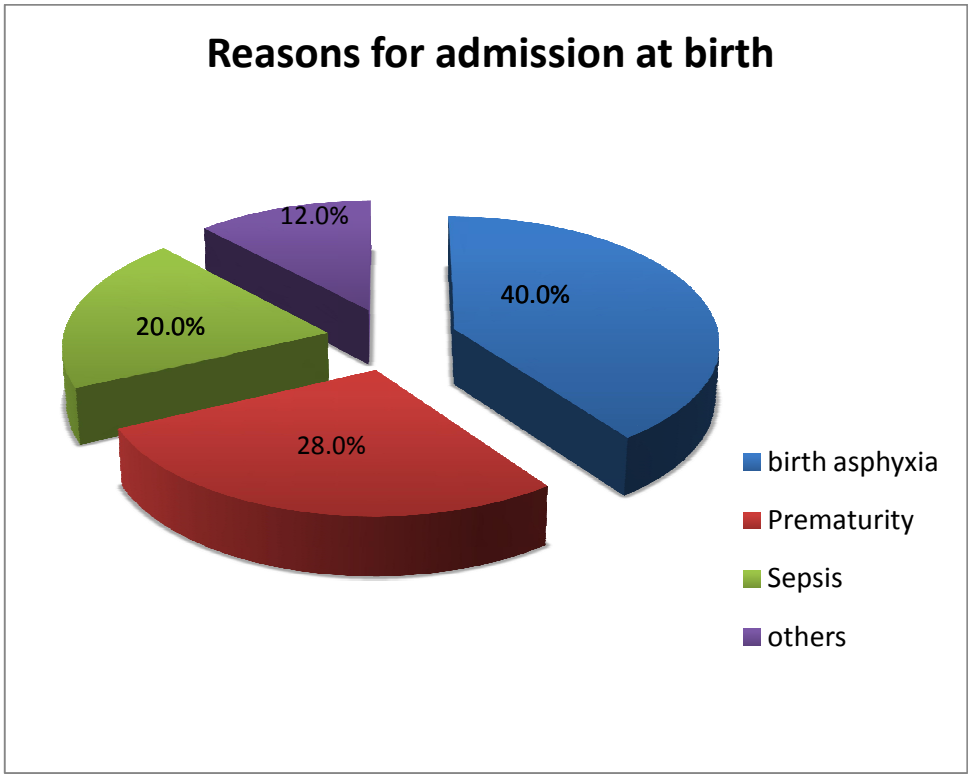

Fig. 1. Reason for admission at birth

Table 2. Prevalence of hearing impairment among study subjects

Variables	Hearing impairment		Total	χ^2	OR	p value	95% CI
Sex	**No**	**Yes**					
Female	74(92.5)	6(7.5)	80(100.0)	0.131	1.233	0.72	0.395-3.850
Males	70(90.9)	7(9.1)	77(100.0)				
Total	144(91.7)	13(8.3)	157(100.0)				
Term delivery	**Hearing impairment**		**Total**	χ^2	**OR**	**P value**	**95% CI**
	No	**Yes**					
Preterm	5(71.4)	2(28.6)	7(100.0)	3.97	5.05	0.04*	0.88-29.12
Term	139(92.7)	11(7.3)	150(100.0)				
Total	144(91.7)	13(8.3)	157(100.0)				
Birth wt	**Hearing impairment**		**Total**	χ^2	**OR**	**P value**	**95% CI**
	No	**Yes**					
<2.5kg	15(62.5)	9(37.5)	24(100.0)	31.85	19.35	0.000*	5.308-70.541
≥2.5kg	129(97.0)	4(3.0)	133(100.0)				
Total	144(91.7)	13(8.3)	157(100.0)				
Jaundice	**Hearing impairment**		**Total**	χ^2	**OR**	**P value**	**95% CI**
	No	**Yes**					
No	126(96.2)	5(3.8)	131(100.0)	20.62	0.089	<0.001*	0.026-0.303
Yes	18(69.2)	8(30.8)	26(100.0)				
Total	144(91.7)	13(8.3)	157(100.0)				

**p values are statistically significant*

Table 3. Relationship between hearing impairment and language with developmental delays

Hearing Impairment	Language delay		Total
	No	Yes	
No	125(86.8)	19(13.2)	144(100.0)
Yes	8(61.5)	5(38.5)	13(100.0)
Total	133(84.7)	24(15.3)	157(100.0)
χ^2 = 5.878, df = 1, p = 0.002*			
Hearing Impairment	**Motor delay**		**Total**
	No	**Yes**	
No	128(88.9)	16(11.1)	144(100.0)
Yes	8(61.5)	5(38.5)	13(100.0)
Total	136(86.6)	21(13.4)	157(100.0)
χ^2 = 7.698 df = 1, p = 0.006*			
Hearing Impairment	**Both language and motor delay**		**Total**
	No	**Yes**	
No	130(90.3)	14(9.7)	144(100.0)
Yes	8(61.6)	5(38.5)	13(100.0)
Total	138(87.9)	19(12.1)	157(100.0)
χ^2 = 9.26 df = 1, p = 0.002*			

**p value is significant*

Table 4. Relationship between neonatal jaundice and Developmental delays

Motor delay	Jaundiced		Total
	No	Yes	
No	123(90.4)	13(9.6)	136(100.0)
Yes	8(38.1)	13(61.9)	21(100.0)
Total	131(83.4)	26(16.6)	157(100.0)
χ^2 = 36.07, df = 1, p = 0.001*			
Language delay	**Jaundiced**		**Total**
	No	**Yes**	
No	119(89.5)	14(10.5)	133(100.0)
Yes	12(50.0)	12(50.0)	24(100.0)
Total	131(83.4)	26(16.6)	157(100.0)
χ^2 = 22.93 df = 1, p = < 0.001*			
Both Language and motor	**Jaundiced**		**Total**
	No	**Yes**	
No	124(89.9)	14(10.1)	138(100.0)
Yes	7(36.8)	12(63.2)	19(100.0)
Total	131(83.4)	26(16.6)	157(100.0)
χ^2 = 33.97 df = 1, p = < 0.001*			

**p value is significant*

Table 5. Relationship between convulsion in the first month of life and delayed development

Convulsion in the first month of life	Language delay		Developmental delay		Total
	No	Yes	No	Yes	
No	122(87.1)	18(12.9)	129(92.1)	11(7.9)	140(100.0)
Yes	11(64.7)	6(35.3)	7(41.2)	10(58.8)	17(100.0)
Total	133(84.7)	24(15.3)	136(86.6)	21(13.4)	157(100.0)
χ^2 = 5.89, df = 1, p = 0.02*			χ^2 = 33.98, df = 1, p = 0.000*		

P<0.05 significant*

Table 6. Relationship between hospital admission at birth and delayed development

Admitted at birth	Motor delays		Language delay		Both delays		Total
	No	Yes	No	Yes	No	Yes	
No	122(92.4)	10(7.6)	119(90.2)	13(9.8)	123(93.2)	9(6.8)	132(100.0)
Yes	14(56.0)	11(44.0)	14(56.0)	11(44.0)	15(60.0)	10(40.0)	25(100.0)
Total	136(86.6)	21(13.2)	133(84.7)	24(15.3)	138(87.9)	19(12.1)	157
$\chi^2 = 24.07$, df = 1, p = 0.000*			$\chi^2 = 18.93$, df = 1, p ,<0.000*		$\chi^2 = 21.70$, df = 1, p = 0.000*		

*P<0.05*significant*

Table 7. Prevalence of delays among study subjects

Sex	Type of delays		Total	χ^2	p-value
	Language delay				
	No	yes			
Females	71(88.8)	9(11.2)	80(100.0)		
Males	62(80.5)	15(19.5)	77(100.0)		
Total	133(84.7	24(15.3)	157(100.0)	2.05	0.15
	Motor delay				
Females	71(88.8)	9(11.2)	80(100.0)		
Males	65(84.4)	12(15.6)	77(100.0)		
Total	136(86.6)	21(13.4)	157(100.0)	0.64	0.43
	Both motor and language				
Females	74(92.5)	6(7.5)	80(100.0)		
Males	64(83.1)	13(16.9)	77(100.0)		
Total	138(87.9)	19 (12.1)	157(100.0)	3.23	0.07

In the present study some perinatal factors studied appeared to affect language and motor development. Perinatal illness was seen in 22.3% of the subjects with jaundice being the commonest while birth asphyxia was the commonest reason for admission among this group. Admission at this neonatal age was found to be significantly associated with both language and motor delays. This likely will be because of the illnesses necessitating these admissions. The neonatal jaundice was found to be statistically related to both language delay and motor delay. Similarly some researchers have found birth asphyxia to be significantly associated with developmental delay [24,25,26]. Convulsions or seizures were also seen in the perinatal period of some of the subjects 10.8%. It was also found to be statistically associated with both delays similar to the findings of some researchers [7,27]. But in contrast to others that found it not to be a significant association [16]. In the present study therefore, perinatal factors were significantly associated with language/speech delays similar to some authors [28].

Hearing impairment as a risk factor was found to have a significant statistical association with both language and motor development delays. A further study on hearing impairment in the subjects showed a statistically significant prevalence of hearing impairment in the subjects that were born preterm, those less than 2.5kg in birth weight and those that had neonatal jaundice. This findings gives credence to the postulation that hearing impairment is a major significant association with language delay in children [15,29].

The parents in the present study had a fairly high level of education, possibly because the study was carried out within the Port Harcourt metropolis. There was no significant association found between parental education level and speech/language delay in the subjects similar to some other authors [30]. However some found low level of parental education an important factor to speech development [31].

The prevalence of language/speech delay in the present study was 15.3% which appears to be within the range of the prevalence; 2 and 19% estimated by ASHA in preschool children [32] however it is higher than the range of prevalence documented for the developed countries; 2-8% [21]. Some others recorded still lower prevalence of 2.3% and 6.2% [22,33]. All these emanated from studies in the Western world, a similar study in terms of age of the population and tool used, from India however showed a much higher

prevalence of 27% [14]. While another study from the same India using same tool of LEST but on age 0-6 years had a close prevalence of 13.7% [16]. The differences could be due to use of different tools, population studied and the place where study was carried out. The prevalence recorded in the present study appears to be within the documented range from earlier studies in Nigeria with varying prevalence ranging from 8-30% however these in contrast were often retrospective studies with some including all ages and mainly on patients already diagnosed with speech disorders and referred to speech therapy [34,35].

The prevalence of motor delay from the TDSC was found to be 13.4% similar to the finding of Mondal et al which could be because both studies used one item cut off to determine delays [14] while the prevalence for both language/speech and motor delays in the study was 12.1%. Similarly some researchers have found motor development delays to be associated with speech/language delays [24]. In contrast some other works did not find delay in motor development significantly associated with speech/language delay [36].

5. CONCLUSION

Language/speech delay is prevalent in our environment. Perinatal risk factors are significantly associated with these delays. There is therefore a need for early screening of these at risk children so as to institute early intervention.

6. LIMITATIONS

The data depended on the mothers' information hence element of bias cannot be ruled out.

CONSENT AND ETHICAL APPROVAL

Ethical approval was sought and obtained from the hospital ethical committee. Informed consent was obtained from the parents and guardians of the children who also answered a semi structured questionnaire.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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