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A Study of Performance of Children with History of Ear Infection on Linguistic Profile Test

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INTRODUCTION

Hearing is critical to speech and language development, communication, and learning. Infants show an inherent interest in the communicational aspects of the environment: they are selectively sensitive to human voices and faces. Nonetheless, language acquisition is a very long and complex process, some of its pre-requisites being normal hearing and auditory perception, development of fine motor control of the articulatory apparatus, and ability to develop mental representations of environmental objects (Stark & Gofffman, 1996).

Language acquisition is arbitrarily subdivided into two major stages. The *pre-speech period*, extending from birth to 18 months of age, is characterized by language comprehension prevailing over production, with only initial skills of production emerging. Most probably, first infants learn to recognize prosodic aspects of speech, followed by distinguishing short words, from which even finer structures of word components are later differentiated (Best, 1994). During this period, infants become tuned to perceiving sounds in their linguistic environment better than those belonging to other languages (Werker & Lalonde, 1988; Kuhl, 1991; Kuhl et al, 1992).

The *verbal stage* of early language development, lasting from 18 months to about 3 years of age, is marked by a dramatic increase in both language comprehension and production. During human development a period appears during which normal auditory input is crucial for a later development of optimal auditory function. In humans, the first three years of life are important for language development (Meyuk, 1996; cited in Gravel & Ruben, 1996).

One of the first reports on the developmental effects of early ear disease was made by the psychologist working with the language learning problems (Eisen, 1962; cited in Northern & Downs, 2002). Hearing loss, or deafness, is the partial or total inability to hear sound in one or both ears. Early history of fluctuating ear infection such as otitis media which causes conductive type of hearing loss disturbs the hearing mechanism which leads to significant reduction in the hearing sensitivity. The reduced auditory input, if in the early years of life when the auditory neural system is still maturing, may adversely influence the structural as well as functional development of the system which affects speech, language and communication. Children with listening difficulties due to hearing loss or auditory processing problems continue to be an under identified and underserved population.

Otitis media (OM) is a general term used to describe any inflammatory process of the middle ear (Jung & Hanson, 1999). A number of studies (Teele, et al., 1980; Marchant et al., 1984; Gravel et al., 1988; Owen et al., 1993; Hogan et al., 1997; as cited in Hartley, 2000)

reported that almost all (50 – 100%) children have an episode of OM in the first few years of life. Though most children only suffer from one or two brief episodes, a significant minority (18%) (Hogan et al., 1997; as cited in Hartley, 2000) suffers from OM for more than half of the first three years of life.

In a study on an Indian population, Jayaram reported that OM was the cause of conductive hearing loss in nearly 71% of the 1505 persons ranging in age from 1 – 80 years. Similar results have been reported also by Parsram & Jalvi (as cited in Maruthy & Mannarukrishnaiah, 2008). Kavitha, Jose, Anurudhan & Baby (2009) assessed the hearing status of 339 preschool children attending 6 kindergarten schools in Mangalore. After the audiological examination, 37 (10.91%) children were found to have conductive hearing loss and none had sensorineural hearing loss. Out of the 31 children with middle ear disease, only 11 (35.48%) were detected to have hearing impairment. Casserbalt, Brostoff, Cantekin, Flaherty, Doyle, Bluestone, & Fria, (1985) studied a group of 2 to 6 year old preschool children monthly for a period of two years. They reported a recurrence rate of 28% in the first year and 36% in the second year, this indicates the high recurrence rate of Otitis media.

Otitis Media and Its Sequelae

The fluctuating hearing loss associated with otitis media makes speech more difficult either to hear or to filter out background noise then this would cause the child to encode information inefficiently, incompletely or inaccurately which then impairs the development of language skills (Roberts et al., 1998; as cited in Stenton, 2003). Studies by (Feagans, Kipp, and Blood,1994; as cited in Stenton, 2003) found that toddlers with chronic Otitis media were less likely to attend to extended language during book-reading sessions although differences in language development were not obvious between these children and toddlers without a history of otitis media. This is an interesting finding; it lends weight to the notion that language development as such is too broad in its scope for research in this area and it is necessary to separate out various, more specific behaviours which are incorporated in language development

in order to identify the effects of mild conductive hearing loss on language development and subsequently on academic achievement, learning and communication.

In children with OM, it could also be speculated that auditory deprivation would only be serious enough to affect the development of auditory processing in the case of prolonged, moderate conductive hearing loss. If the hearing loss were only mild and the periods of impaired hearing relatively short, the developing auditory system might be resilient enough to deal with these periods of partial auditory deprivation, so the effects of OM on language and educational skills would be transitory. This hypothesis is supported by the relationship between early OM and language skills in children of up to 4 years of age (Gravel and Wallace, 1992; Rach et al., 1988 cited in Stollman, 2003,) together with the minimal or even absent influence of OM on language ability and academic achievement at age seven, as was found by Grievink & Peters, 1997, cited in Stollman, 2003) as part of the Nijmegen Otitis Media Study, a large prospective study on OM. In conclusion, the long-term effects of (early) OM on auditory processing (and language ability) are at best debatable. However, it is possible that subtle auditory processing disorders remain present in children with a history of chronic Otitis media.

Central auditory processing was studied by (Yonowitz, Yonowitz, Nienhuys & Boswell, 1995; as cited in Stenton, 2003) in the hope of revealing a link between Otitis media with effusion and problems with auditory attention, speech discrimination and with subsequent language and learning problems. Their experimental group consisted of twelve Aboriginal children who spoke Tiwi as their first language and English as their school language. Their mean age was seven years nine months. The control group consisted of twelve English speaking non-Aboriginal children (mean age = 7.7 years) who had no history of Otitis media with effusion or hearing impairment. The results indicated highly significant differences in the Masked Level Difference between the two groups.

Mody, Schwartz Gravel & Ruben (1999) studied the Speech Perception and Verbal Memory in Children With and Without Histories of Otitis Media. Two groups of children, with and without first-year histories of Otitis media, were participants in a longitudinal study that

included periodic audiological and medical evaluations during the first year of life. At age 9, these children were tested on a series of speech perception and verbal short-term memory tasks using stimuli of varying degrees of phonetic contrast. Although the Otitis-positive group performed less accurately than the Otitis-free group, the pattern of errors was the same for the two groups. The performances of the children with and without positive histories of Otitis media were negatively affected by an increase in phonetic similarity of the stimulus items. The two groups, however, did not differ on identification or on temporal-order recall when the speech sounds were differentiated by multiple features. These findings provide evidence of subtle, long-term effects of early episodes of Otitis media on phonological representations and on working memory.

Klausen (2000) in a retrospective study studied a group of 19 healthy 9-year-old children with an earlier history of long lasting bilateral OM who were presently normal were compared with an age-matched control group with no history of OM and normal otoscopy, tympanometry and audiometry. All children were examined with the Illinois test of psycholinguistic abilities (ITPA), test for articulation, Boston naming test, dichotic listening tests with additional tasks of directed attention and tests for word and sound discrimination. In the OM group they found significant lower scores in the articulation test and small, but significant, lower scores in the test regarding sound discrimination. No significant differences on other language skills were detected in the ITPA test or Boston naming test.

Friel-Patti & Finitzo (1990) reported cross-sectional findings on children's early experience with otitis media (OM) related to hearing over time and emerging receptive and expressive language skills on the *Sequenced Inventory of Communication Development Scale* (SICD). Hearing from 6 to 12 months is significantly related to scores on the SICD beginning with receptive language at 12 months. At 18 and 24 months, both receptive and expressive languages were significantly related to average hearing from 6 to 18 months. Better language is associated with better average hearing levels. These findings suggest that the relationship between OM and language is mediated by hearing. It remains to be seen whether these relationships persist as the children continue to develop language.

Rvachew , Slawinski , Williams & Green (1999) studied the impact of early onset otitis media on babbling and early language development. The study investigate d the impact of OM on the development of canonical babble in children who experienced at least one episode during the period birth through 6 months of age, in comparison with children who did not experience OM during this period. The results show a consistently lower rate of canonical syllable production among children with early onset OM, when compared to children with later onset OM, during the period 6 through 18 months of age. In addition, a relationship between canonical babbling ability and expressive vocabulary size was observed at 18 months of age.

Luotonen, Uhari, Aitola, Lukkaroinen, Luotonen, Uhari & Korkeamaki (1996) assessed the effects of early recurrent otitis media on linguistic development in children. They collected data retrospectively on recurrent otitis media episodes from the parents of 394 children in 18 school classes selected at random in a middle-sized city in Finland. Auditory comprehension was tested with a subtest of the Illinois Test of Psycholinguistic Ability, picture vocabulary with the Peabody Picture Vocabulary Test (revised test version), morphologic competence with a Finnish Morphological Test and reading comprehension with a test designed for this purpose. Results indicated that Children with more than four otitis episodes before the age of 3 years performed less well in the reading comprehension test than children with fewer otitis media episodes.. Otitis episodes after the age of 3 years were not associated with abnormal test results. They concluded that Middle ear disease in infancy had a significant adverse effect on reading comprehension as late as 9 years of age, even among children whose acute episodes were effectively treated.

As part of a prospective study of possible effects of early-life Otitis media on speech, language, cognitive, and psychosocial development (Paradise, Dollaghan, Campbell, Feldman, Bernard, Colborn, Rockette, Janosky, Pitcairn, Sabo, Kurs-Lasky & Smith, 2003) tested relationships between children's cumulative duration of middle ear effusion (MEE) in their first 3 years of life and their scores on measures of language, speech sound production, and cognition at

3 years of age. Results indicated weak to moderate, statistically significant negative correlations between children's cumulative durations of MEE.

To examine whether Otitis media with effusion and associated hearing loss (HL) during the first 5 years of life were related to children's language skills during the preschool years and to school readiness skills at entry to kindergarten (Roberts, Burchinal, Jackson, Hooper, Roush, Mundy, Neebe, Zeisel, 2000), the results revealed that there was not a significant relationship between children's early OM history or HL and language skills during the preschool years. However, children with more frequent OM had lower scores on school readiness measures.

The studies indicate that there are contradictory findings in the literature regarding the long-term effects of early onset Otitis media. It is important to explore whether the early auditory deprivation due to inferior use of auditory channel impede the acquisition of various skills for developing Speech and Language.

Need for the Study

The existing literature on sensory deprivation and literature on the development of auditory abilities strongly suggest that early auditory deprivation can result in the inferior use of the auditory channel which in turn may impede the acquisition of Speech, language and auditory skills. Serious consequences of early middle ear disease are especially significant in view of the numbers of children affected. There has been little published research on the related but somewhat different questions of the effect of early middle ear disease on the auditory abilities of children in whom the disease (and threshold loss) has been resolved.

While it is of interest to study the auditory functioning of children who have sustained mild hearing loss, in order to support the contention that the results of the research demonstrated the effects of early auditory deprivation, it seems reasonable to suggest that the subjects must have had functionally normal hearing at the time of testing. The literature and research on the effects of temporary restrictions of sensory input on infrahuman organisms support the hypothesis that children who have experienced fluctuations in auditory sensitivity may fail to develop normal auditory abilities.

The studies which have investigated the effects of early conductive hearing loss in children are in essential agreement that children who have suffered recurrent episodes of auditory restriction differ in several dimensions from normal children.

In the Indian context there have been only a few investigations particularly focusing on the brainstem and cortical auditory processing (Maruthy & Mannarukrishnaiah, 2008; Sailaja, 2005; Tyagi, 2002; Amala, 2003). However all aspects of human communication have not been focused in a group of children who have suffered episodes of OM in their childhood.

Keeping this in view aspects of language performance, such as syntax semantics and phonology are investigated in the present study. This study is expected to throw new light in the current ambiguous understanding of effects of early Otitis media in later school age on syntactic, semantic and pragmatic aspects of language.

Aim of the Study

On the basis of the previous research and identified areas of need, it was determined that an Indian study was required to examine the effects of early history of Otitis media. This study, therefore is designed to investigate the following;

1) Do students who have had a history of Otitis media in early childhood have problems related to Semantic aspects of language?

2) Do students who have had a history of Otitis media in early childhood have problems related to Syntactic aspects of language?

3) Do students who have had a history of Otitis media in early childhood have problems related to Phonological aspects of language?

METHODOLOGY

The proposed study was carried out at the laboratories of Dr. M V Shetty College Speech & Hearing, Mangalore in collaboration with different private and government schools in Mangalore situated within 4 kms in the surrounding areas of Dr. M V Shetty College of Speech and Hearing. Malady Court, Kavoor were proposed for the study. Children aged 7 to 10 years were included in the study. The subjects were selected through a parent questionnaire which was given to the parents through the class teachers.

All the children thus selected through the parent questionnaire had a history of minimum of three episodes of Otitis media within two years of age. The parents of the children selected for the study were contacted through the telephone number and addresses available from the questionnaire. To indicate their willingness to do this they were requested to complete a permission form and return it to the school teacher. The children who had early onset Otitis media (OG) (experimental group) were included in the study after obtaining the consent of the parents and, if they also:

1) Had an average of thresholds of 500Hz, 1000Hz, and 200Hz of less than 15d BHL for air conduction and bone conduction.
2) Had normal intelligence as confirmed by psychological evaluation.
3) Had normal tympanometry and acoustic reflex.
4) Had no oro facial abnormalities.
5) Had no neurological problem.
6) Had successful scholastic performances as reported by class records.

Based on these criteria, thirty six children with early history of OM were selected for the study. A control group (NG) of 36 normal children, matched for age, and without the history of Otitis media or any ear pathology was also included in the study. The children in control group were selected if they:

1) Had normal pure tone audiometry.
2) Had normal tympanometry and acoustic reflex.
3) Had normal auditory processing by the screening checklist 'Screening checklist for central

auditory processing' (Yathiraj & Mascarenhas, 2003).

4) Had no oro facial abnormalities.

5) Had no neurological problem.

6) Had successful scholastic performances as reported by class records.

All subjects in both the experimental and control groups, an oral cavity examination was also carried out to rule out any articulation defect. The children in both the group were native speakers of Kannada.

Measures

Since the study was proposed to identify the effects of early history of fluctuating conductive hearing loss on a child's Language skills, the subjects selected for the study in both experimental and control group were evaluated for different measures on he linguistic profile test (Karanth, 1980).

Linguistic Profile Test

The linguistic profile test (LPT) (Karanth, 1980) is designed in evaluating and analyzing adequate linguistic samples at the phonological, syntax and semantic levels. The LPT has 3 major sections including 1) phonology, 2) syntax and 3) semantics respectively.

Phonology

There are two subsections in the phonology section.

a) Phonemic discrimination in which there are 24 items. The subjects were asked to point out two pictures out of a set of four on hearing the minimal pairs.

b) Phonetic expression in which there are 52 items. The subjects were asked to repeat the words after the tester

Syntax

There are ten subsections in the syntax section.

a) Morphophonemic structures, b) Plural forms, c) Tenses, d) PNG markers, e) Case markers, f) Transitives, Intransitives and Causatives, g) Sentence types, h) Conjunctions, Quotatives and Comparitives, i) Conditional clauses, and j) Participial Constructions.

A total of 130 items were presented under all these subsections. The subjects were asked to judge whether the given sentences were grammatically correct or wrong.

Semantics

There are two major subsections in this section.

a) Semantic discrimination b) Semantic expression.

In the first subsection, discrimination of colours, furniture's and body parts was tested. The subjects were asked to point the colour, object or body part named. A total of 15 items were tested. In the second subsection expression ability was tested under the following tasks:

a) Naming, b) Lexical category, c) Synonymy, d) Antony my, e) Homonymy, f) Polar questions, g) Semantic anomaly, h) Paradigmatic relations, i) Syntagmatic relation, j) Semantic contiguity, and k) Semantic similarity

Administration and Scoring

The administration of 76 items of the phonology section of LPT entailed instructing the subject that he would hear a minimal pair in the phonemic discrimination task and he would have to point to the pictures presenting the pair out of a set of pictures. In the phonetic expression subsection, the subjects were asked to repeat verbally after the tester. The total score of phonology section was 100.

In the 130 items of syntax section of LPT the subjects were instructed that they would hear a list of sentences/words; some of which structurally well formed some were not. Each subject was given examples of both correct and incorrect sentences. The subject was asked to listen carefully to the items that would be orally presented and indicate whether each item was

correct or incorrect. The test items were presented orally one after the other with adequate time between items for the child to respond.

The total score of semantic section was 100. In the 85 items of semantics section based upon the type of task involved, the instructions were given. The score of this section also summed up to 100.

Analysis

The data obtained on 36 subjects belonging to the three age groups (7-8, 8-9, 9-10) on three major measures of syntax, semantics and phonology of the linguistic profile test covering the language aspects are reported in the next section.

RESULTS

The responses between the subjects of age groups 7-8, 8-9, 9-10 was carried for the following. The descriptive statistics between 7-8, 8-9, and 9-10 with each OG and NG groups were carried out using two-way analysis of variance and Bonferronni multiple comparisons. The pair wise comparisons were done using paired 't' test to compare dependent variables within each age group. Multivariate test (Wilk's Lambda) was used to measure the effect within and across groups. Similarly the above measures were also used for between group comparison.

The overall results of the present study in children with early onset Otitis media are:

The means and standard deviation values for tasks assessing semantics, syntax and phonology for the two group of subjects are given in table 1.1. The semantics was assessed by semantic reception (SR), Semantic Expression (SE) and total score (SR+SE), the Syntax by Syntactic Reception (SYR), Syntactic Expression (SYE) and total score (SYR+ SYE), the phonology was assessed by Phonemic Discrimination (PHR) Phonetic Expression (PHE) and total score (PHR+PHE). The results from the table reveal that the OG group performed than NG group in all the domains. Table 1.1 indicates that the mean scores from age groups 7-8 to age group 9-10 is increased gradually showing the hierarchical development of language in children. While noticing the standard deviation of the total scores of all the three aspects of the test it can

be inferred that increased SD is due to the fact that the language skills are not stable across the 3 age groups, which can be noticed from the mean scores of lower and higher age groups. The means of Receptive scores were better than expressions across all the age groups and across the three domains of test. It was also observed that the scores of semantics and phonology were better than syntax across the age groups in both subject groups.

The table 1.1 indicates the mean and standard deviation for both subject groups on LPT.

		Group	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
SYR	7 - 8	OG	12	36.00	1.044	35.34	36.66	35	37
		NG	12	41.00	.739	40.53	41.47	40	42
	8 - 9	OG	12	40.50	.905	39.93	41.07	40	42
		NG	12	42.42	1.379	41.54	43.29	40	44
	9 - 10	OG	12	44.17	1.337	43.32	45.02	43	46
		NG	12	45.50	.522	45.17	45.83	45	46
	Total	OG	36	40.22	3.555	39.02	41.42	35	46
		NG	36	42.97	2.118	42.26	43.69	40	46
SYE	7 - 8	OG	12	23.42	1.311	22.58	24.25	21	25
		NG	12	25.00	1.279	24.19	25.81	24	27
	8 - 9	OG	12	24.67	1.073	23.98	25.35	23	26
		NG	12	25.83	.718	25.38	26.29	25	27
	9 - 10	OG	12	26.00	.000	26.00	26.00	26	26
		NG	12	27.75	.452	27.46	28.04	27	28
	Total	OG	36	24.69	1.431	24.21	25.18	21	26
		NG	36	26.19	1.451	25.70	26.69	24	28
TS	7 - 8	OG	12	59.42	.669	58.99	59.84	58	60
		NG	12	66.00	.739	65.53	66.47	65	67
	8 - 9	OG	12	65.17	1.528	64.20	66.14	63	67
		NG	12	68.25	1.138	67.53	68.97	67	70
	9 - 10	OG	12	70.17	1.337	69.32	71.02	69	72
		NG	12	73.25	.452	72.96	73.54	73	74
	Total	OG	36	64.92	4.613	63.36	66.48	58	72
		NG	36	69.17	3.176	68.09	70.24	65	74
SR	7 - 8	OG	12	37.50	.522	37.17	37.83	37	38
		NG	12	40.92	.793	40.41	41.42	40	42
	8 - 9	OG	12	43.75	.452	43.46	44.04	43	44
		NG	12	42.67	.651	42.25	43.08	42	44
	9 - 10	OG	12	45.08	.515	44.76	45.41	44	46
		NG	12	45.75	.452	45.46	46.04	45	46
	Total	OG	36	42.11	3.387	40.97	43.26	37	46
		NG	36	43.11	2.122	42.39	43.83	40	46
SE	7 - 8	OG	12	26.00	.739	25.53	26.47	25	27
		NG	12	29.75	.452	29.46	30.04	29	30
	8 - 9	OG	12	24.58	.515	24.26	24.91	24	25
		NG	12	32.67	.778	32.17	33.16	32	34
	9 - 10	OG	12	26.42	.515	26.09	26.74	26	27
		NG	12	34.50	.522	34.17	34.83	34	35
	Total	OG	36	25.67	.986	25.33	26.00	24	27
		NG	36	32.31	2.068	31.61	33.01	29	35
TS	7 - 8	OG	12	63.50	1.168	62.76	64.24	62	65
		NG	12	70.67	.888	70.10	71.23	70	72
	8 - 9	OG	12	68.33	.888	67.77	68.90	67	69
		NG	12	75.33	.492	75.02	75.65	75	76
	9 - 10	OG	12	71.50	.674	71.07	71.93	70	72
		NG	12	80.25	.452	79.96	80.54	80	81
	Total	OG	36	67.78	3.457	66.61	68.95	62	72
		NG	36	75.42	4.017	74.06	76.78	70	81
PHR	7 - 8	OG	12	48.17	5.060	44.95	51.38	46	64
		NG	12	50.75	.866	50.20	51.30	50	52
	8 - 9	OG	12	47.58	.515	47.26	47.91	47	48
		NG	12	51.50	.522	51.17	51.83	51	52
	9 - 10	OG	12	49.67	.888	49.10	50.23	49	51
		NG	12	52.50	1.168	51.76	53.24	51	54
	Total	OG	36	48.47	3.028	47.45	49.50	46	64
		NG	36	51.58	1.131	51.20	51.97	50	54
PHE	7 - 8	OG	12	34.50	.522	34.17	34.83	34	35
		NG	12	40.08	.793	39.58	40.59	39	41
	8 - 9	OG	12	35.08	.996	34.45	35.72	34	37
		NG	12	41.58	.515	41.26	41.91	41	42
	9 - 10	OG	12	37.42	.515	37.09	37.74	37	38
		NG	12	42.25	1.138	41.53	42.97	41	44
	Total	OG	36	35.67	1.454	35.17	36.16	34	38
		NG	36	41.31	1.238	40.89	41.72	39	44
TS	7 - 8	OG	12	81.25	1.138	80.53	81.97	80	83
		NG	12	90.83	1.528	89.86	91.80	89	93
	8 - 9	OG	12	82.67	.778	82.17	83.16	82	84
		NG	12	93.08	.289	92.90	93.27	93	94
	9 - 10	OG	12	87.08	.900	86.51	87.66	86	88
		NG	12	94.75	.452	94.46	95.04	94	95
	Total	OG	36	83.67	2.683	82.76	84.57	80	88
		NG	36	92.89	1.864	92.26	93.52	89	95

The mean scores of both subject group across the age groups were statistically analyzed using two way analysis of variance as given in table 1.2 The data reveals that in all the variables there is significant interactions between the two groups at P<0.05. The similar observation was also found between the age groups. The analysis was also performed to find the interactions of group across age groups and the results from the table indicates that all the variables are highly significant at P<0.05 level, except for syntactic expressions and phonemic discrimination which were not significant.

Table 1.2

Dependent Variable	Source	F	df	p	
SYR	Group	127.286	1, 66	.000	HS
	Agegroup	225.364	2, 66	.000	HS
	Group * Agegroup	21.779	2, 66	.000	HS
SYE	Group	46.487	1, 66	.000	HS
	Agegroup	49.755	2, 66	.000	HS
	Group * Agegroup	.622	2, 66	.540	NS
TS	Group	294.959	1, 66	.000	HS
	Agegroup	442.722	2, 66	.000	HS
	Group * Agegroup	22.227	2, 66	.000	HS
SR	Group	54.000	1, 66	.000	HS
	Agegroup	713.042	2, 66	.000	HS
	Group * Agegroup	92.625	2, 66	.000	HS
SE	Group	2204.670	1, 66	.000	HS
	Agegroup	117.796	2, 66	.000	HS
	Group * Agegroup	104.365	2, 66	.000	HS
TS	Group	1640.779	1, 66	.000	HS
	Agegroup	726.022	2, 66	.000	HS
	Group * Agegroup	8.744	2, 66	.000	HS
PHR	Group	35.990	1, 66	.000	HS
	Agegroup	4.152	2, 66	.020	sig
	Group * Agegroup	.623	2, 66	.540	NS
PHE	Group	923.216	1, 66	.000	HS
	Agegroup	63.200	2, 66	.000	HS
	Group * Agegroup	6.743	2, 66	.002	HS
TS	Group	1722.250	1, 66	.000	HS
	Agegroup	163.703	2, 66	.000	HS
	Group * Agegroup	13.422	2, 66	.000	HS

Examination of pairwise comparisons using Bonferonni multiple comparisons revealed significant difference between most of comparisons. The means were subjected to comparisons within the age group. Each subject group was compared for different measures of syntax, semantics and phonology with age groups to other age groups. The comparisons were significant at (P<0.05). except for comparisons: OG→ $SE \rightarrow 7-8$ *to* 9-10 , OG →PHR - the comparison for all age groups, OG→PHE-→7-8 to 8-9, NG-→SYE-→7-8 to 8- & 8-9 to 7-8, NG→-PHR→7-8 to 8-9 & 8-9 to 7-8, NG→PHE→8-9 to 9-10 & 9-10 to 8-9, (P>0.05) suggesting that the performance of the children were similar.

The Bonferonni pairwise comparison of each age group with the pair age group of other subject groups revealed statistically significant difference at (P<0.05) except for 7.8→PHR→OG to NG. Multivariate analysis with Wilky's Lambda between groups (f=665.688, df=7.000, P<0,05), age groups (f=68.064, df=14.000, P<0,05), group x age group (f=33.176, df=14.000, P<0,05) were statistically different.

The results on Linguistic Profile test revealed that the OG group performed poorer than NG group in all the domains of the test, ie., syntax, semantics and phonology. The mean scores from age groups 7-8, 8-9 and 9-10 is increased gradually showing the hierarchical development of language in children. The means of Receptive scores were better than expression across all the age groups and across the three domains of test, scores of semantics and phonology were better than syntax across the age groups in both subject groups. Statistical analysis using the two way analysis of variance reveals that in all the variables there is significant difference between the two groups at. Fluctuating conductive hearing loss during the critical period of language development can disrupt the auditory experience for speech and language learning.

DISCUSSION

The effect of ear infections particularly early transient episodes before the age of two have been studied relatively scarcely. The available literature is still ambiguous as all the measures of language need to be understood. The present study aim to achieve this integrated data. Overall subjects in all three age groups significantly performed poorly as compared to normal groups. The overall results of the linguistic profile test indicate the poor performance of

otitis group on language measures. Similar findings are reported in the literature. (Roberts et.al, 2000; Yont, Catherine, Snow, Vernon-Feagans, 2001; Shriberg , Friel-Patti, Flipsen & Brown , 2000; Mirja et.al, 1996; Rvachew et.al, 1999) indicating the adverse effects of early onset Otitis media in childhood.

There was an increase in the overall language score as well as subsections of phonology, syntax and semantics as the age progressed in the subject sample, however the performance overall was significantly less across age groups in each section of tests. It does appear that auditory deprivation affects syntactic development which is further related to poor phonological development. To understand this issue further, the receptive and expressive scores were compared across the age group and across the 3 domain of LPT. The receptive scores were poor compared to expressive scores, hence the comprehension aspects of language affect production of larger segments of language (ex: word).

The present study has improved our understanding of the adverse effects of early Otitis media on all measures studied in the present research, namely, language expression and reception measures. The continued presence of all the adverse effects in all the 3 age groups, namely 7-8, 8-9, 9-10 indicates that the effect of OM may not be temporary.

SUMMARY & CONCLUSIONS

The present study explored the Language measures in a cross-sectional group of 7-8, 8-9 and 9-10 subjects and without early history of Otitis media. All these subjects had normal hearing and no obvious communication deficits with above average school performance.

The results of the present study point to quiet significant difficulties faced by the subjects with early history of Otitis media, as compared with previous research. The reduced auditory experience posed difficulties to subjects in processing speech language measures even by the age of 9-10 years. This study thereby indicates that the adverse effects of Otitis media are not likely to be temporary but long lasting. All though subjects did not show any hearing loss at the time of testing and did not seem to have any difficulty in processing speech under normal circumstances. Given that the classroom conditions are noisy and often overcrowded these children may face a further disadvantage in understanding the teacher's speech. The most disturbing results are

provided by poorer performance on language measures affecting syntax and semantics. Although the subjects did not show any language disorder, poorer scores on almost all subtests of Linguistic profile test does point to deprivation.

The presence of such adverse effects in all age groups (7-8, 8-9 & 9-10) indicates the permanent nature of the damage caused by Otitis media is permanent or long lasting. The present study strongly recommends that Audiologists and other professionals work towards prevention of ear infections particularly middle ear infection to prevent the serious damage to the speech, language, processing aspects and their likely effects in later academic life. The future studies can take up the issue of academic performance in subjects with Otitis media.

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