MAR Pathology & Clinical Research (2023) 2:3

Research Article

Speech Intelligibility of Malayalam Speaking Cerebral Palsy Children

Ms. Elizebath. P. Paul (ASLP) *[1], Ms. Victoria. P. Paul (M.Ed) [2]

***Correspondence to:** Ms. Elizebath. P. Paul.

Copyright

Received: 09 August 2023

Published: 01 September 2023

Abstract

Due to the defect of speech motor control cerebral palsy children often show slower, poor articulation which have significant impact on speech intelligibility. The present study compare speech intelligibility rating cerebral palsy children five different tasks, familiar words, unfamiliar words, nonsense words, picture description, and general conversation and to compare speech intelligibility rating of cerebral palsy children between three groups SLP, Non SLP and mother of the cerebral palsy children . Recording was done using PRAAT software. Five point rating scale was used for this study. The result indicates that familiar words was rated better followed by unfamiliar words , nonsense words, picture description and general conversation and yield significant difference. Speech language pathologist rated better followed by mothers and non-speech language pathologist with high significant difference.

Introduction

Speech is the most basic way of communication for human beings. Not only in daily communication, but also in emergency situations, a better understanding of speech is essential. The percentage of correctly understood the speech is speech intelligibility.

Speech intelligibility is a measure of speech efficiency. This metric is usually expressed as the percentage of messages that are correctly understood. Speech intelligibility does not mean speech quality. There are many factors that affect speech intelligibility such as interference, noise, reverberation and echo.

The ‘Speech intelligibility ‘refers to the degree to which a speaker intended message can be recovered by other listener (Kent & Duffy, 2001).

Cerebral palsy is a collective term encompassing a group of neurological syndromes resulting front abnormalities in the brain development or an acquired non-progressive cerebral lesion (Bax1964) Bobath (1980); Platt & Pharoah (1995)in most cases the etiology of CP remains unknown because CP is a range of specific symptoms rather than a disease(Hardy,1983).

Cerebral palsy is commonly associated with dysarthria, a deficit in speech motor control. Cerebral palsy is characterized by disturbance in speech muscular contract due to paresis, paralysis, slowness, in-coordination, or aberrant tone of muscles. Speech in CP children may indicate impairment of one or more motor process of speech production, including respiration, phonation, articulation and prosody.

An approximate of 30% to 90% of individuals with CP was considered to expose reduced speech intelligibility and some form of dysarthric speech. Individual with CP often presence with spastic or weak muscle tone resulting in in-coordinated speech patterns, as shown in in the presence of imprecise consonants short phrases, and reduced rate of speech (Hardly, 1983; Love, 1992; Rutherford, 1950, Workinger, 2005)

Methodology

Aim of the study

The purpose of this study is twofold:

1. To compare CP children's speech intelligibility ratings for five different tasks: familiar words, unfamiliar words, nonsense words, picture description, and general conversation.
2. To compare the speech intelligibility ratings of CP children in three groups: speech pathologists, non-speech pathologists, and mothers of CP children

The purpose of this study was to compare speech intelligibility ratings of CP children for five different tasks, including familiar words, unfamiliar words, nonsense words, picture description, and general conversation, as well as to compare speech intelligibility ratings of CP children between three groups of Speech Language Pathologists (SLP) Non- Speech Pathologist (Non SLP), and mother of CP children

Subject Selection Criteria

Three group of listeners participated in the study. First group of listeners consisted of ten Speech Language Pathologist. Second group consisted of individual who were not experienced with CP children. The third group of listeners were mothers of CP children.

Procedure

The cerebral palsy children were given 5 tasks to repeat familiar words, unfamiliar words, and nonsense words said by the tester, to describe a picture given and general conversation. These were recorded using PRAAT software and saved as WAV files.

Recording

The recording was done using PRAAT software (version5.1.3.7). A constant mic to mouth distance of 15 cm was maintained. All the recording lasted 10 min for 5 different tasks.

1. Familiar words: this task included few familiar words which should be repeated after clinician. The recording was done for 2 minutes.
2. Unfamiliar words: This task included few non familiar words which should be repeated after clinician. The recording was done for 2 minutes.
3. Non sense words: this task included few nonsense words which should be repeated after clinician. The recording was done for 2 minutes.
4. Picture description: This include child describing the pictures shown by clinician. The recording was done for 2 minutes.
5. General conversation: this task include conversation of the child with clinician for 2 minutes.

Analysis

Three group of listeners participated in the study. The first group of listeners participated in the study consist of 10 speech language pathologist with same educational background of masters in speech and hearing. Second group consist of individuals who are not experienced participated in the study.

Speech samples collected from CP children was given to listeners for intelligibility rating. A 5 point rating scale was used where 1 indicates complete intelligibility and 5 indicates complete unintelligible

Result and Discussion

The aim of the present study was two folded to compare the speech intelligibility rating of cerebral palsy children for 5 different task, familiar words, unfamiliar words, nonsense words, picture description and general conversation and to compare speech intelligibility rating of cerebral palsy children between 3 groups: SLP, Non- SLP, and mother of cerebral palsy children.

The obtained data was analyzed statistically and results are discussed below.

Familiar Words

	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
SLP	10	11	19	12.90	2.283	12.00	25.80	22.852	.000 HS
Mothers	10	21	30	25.00	2.582	25.00	50.00		
Non SLP	10	24	42	31.40	6.022	30.50	62.80		

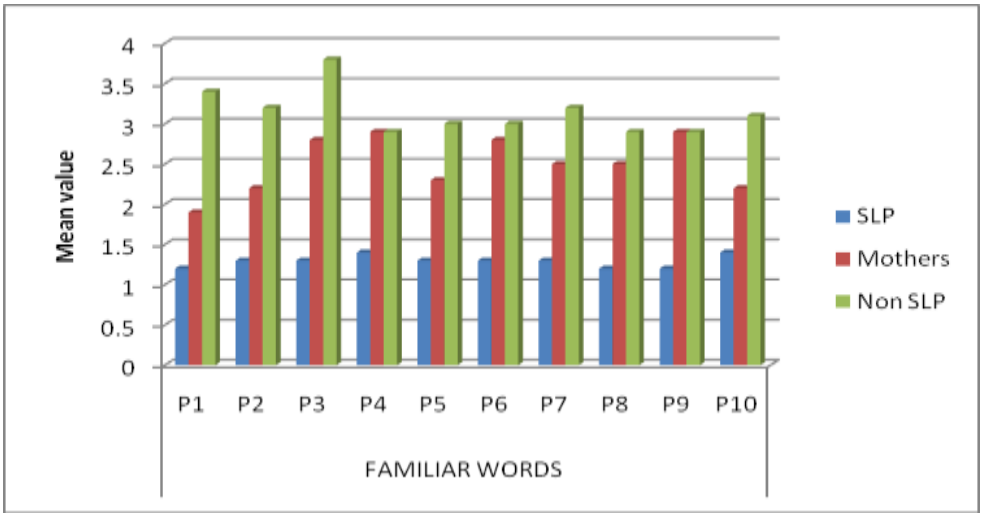

Table 1: Showing the mean, standard deviation and significant value for familiar words among SLP mothers and NON SLP

1: showing the rating of SLP mothers and Figure NON SLPs for familiar words.

From the above table 1 and figure 1 it can be seen that, the SLP rated the speech intelligibility better with mean of 12.90 whereas mothers rated second best with the mean of

25.00 followed by NON SLP rated the speech intelligibility very poorly with the mean of 31.40. It may be noted on a 5 point clinical judgment scale of speech intelligibility, which was converted to percentage for better calculation and the comparison between three groups for their rating for familiar words shows highly significant difference (p =.000).

Unfamiliar Words

Unfamiliar	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
SLP	10	19	22	20.80	.919	21.00	41.60		
Mothers	10	18	29	23.30	3.713	22.50	46.60		0.00
Non SLP	10	24	33	28.10	2.961	29.00	56.20	17.275	HS

Table 2: showing the mean, standard deviation and significant value for unfamiliar words among SLP Mothers and NON SLPs

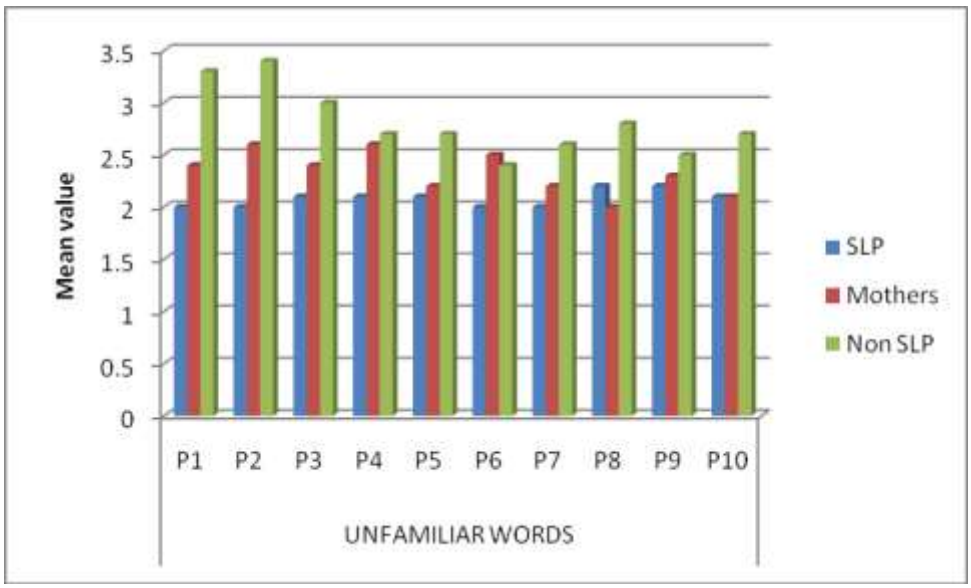

Figure 2: Showing the ratings of SLP, words mothers and NON SLPs for unfamiliar.

From the above table 2 and figure 2 it can be seen that the SLP rated the speech intelligibility better with mean of 20.80 whereas mothers rated second best with the mean of 23.30 followed by NON SLP rated the speech intelligibility very poorly with the mean of 28.10. It may be noted on a 5 point clinical judgment scale of speech intelligibility, which was converted to percentage for better calculation and the comparison between three groups for their rating for unfamiliar words shows highly significant difference. (p = .000)

Nonsense Words

Nonsense words	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
SLP	10	22	27	25.00	1.764	25.50	50.00	23.836	.000 HS
Mothers	10	24	32	28.60	2.319	28.50	57.20		
Non SLP	10	36	40	37.90	1.729	37.50	75.80		

Table 3: showing the mean, standard deviation and significant for nonsense words among

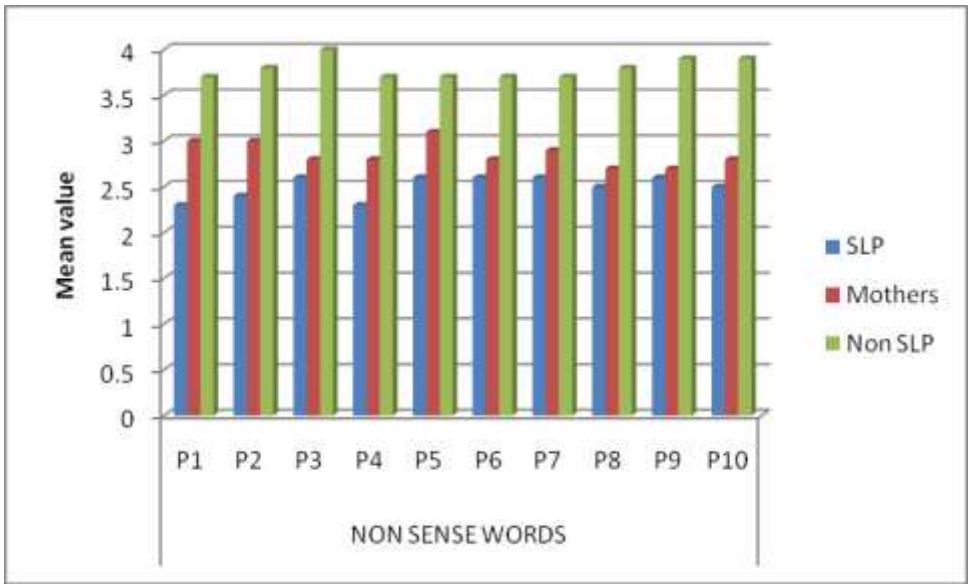

Figure 3: showing the ratings of SLP words mothers and NON SLPs for nonsense.

From the above table 3 and figure 3 it can been seen that the SLP rated the speech intelligibility better with mean of 25.00 whereas mothers rated second best with the mean of 28.60 followed by NON SLP rated the speech intelligibility very poorly with the mean of 37.90. It may be noted on a 5 point clinical judgment scale of speech intelligibility, which was converted to percentage for better calculation and the comparison between three groups for their rating for nonsense words shows highly significant difference (p = .000)

Picture Description

Picture description	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P Value
SLP	10	24	34	27.70	2.908	28.00	55.40	23.807	.000 HS
Mothers	10	34	43	38.80	2.781	38.50	77.60		
Non SLP	10	42	44	42.60	.699	42.50	85.20		

Table 4: showing the mean, standard deviation and significant value for picture description among SLP Mothers and NON SLPs

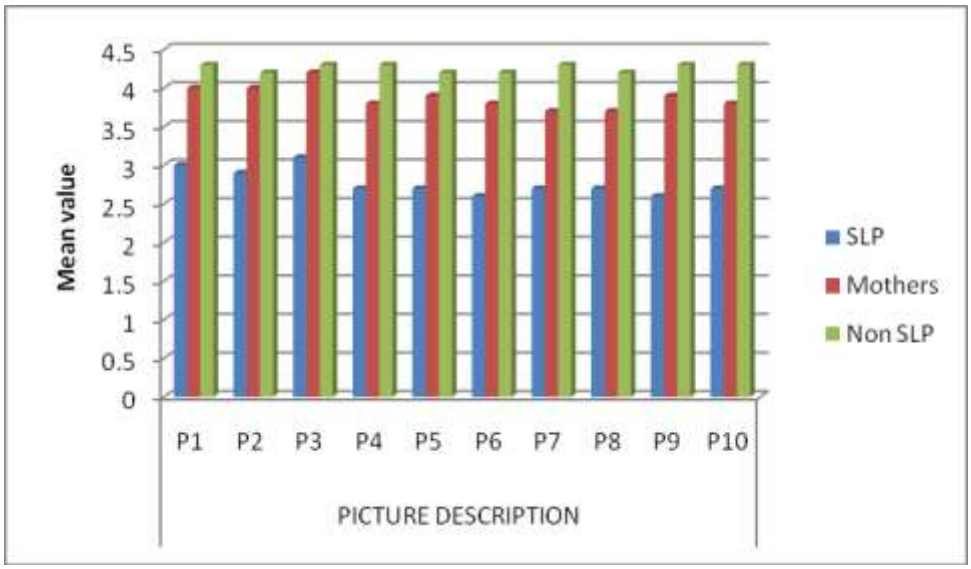

Figure 4: showing the rating of SLP mothers and NON SLPs for picture description.

From the above table 4 and figure 4 it can be seen that the SLP rated the speech intelligibility better with mean of 27.70 whereas mothers rated second best with the mean of 38.80 followed by NON SLP rated the speech intelligibility very poorly with the mean of 42.60. It may be noted on a 5 point clinical judgment scale of speech intelligibility, which was converted to percentage for better calculation and the comparison between three groups for their rating for picture description, shows highly significant difference between ratings in all three groups for picture description.

General Conversation

	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
SLP	10	32	41	35.40	2.547	35.00	70.80	22.713	.000 HS
Mothers	10	35	43	38.70	2.111	39.00	77.40		
Non SLP	10	44	50	47.10	2.183	47.00	94.20		

Table 5: showing the mean standard deviation and significant value for general conversation among SLP Mothers and NON SLPs.

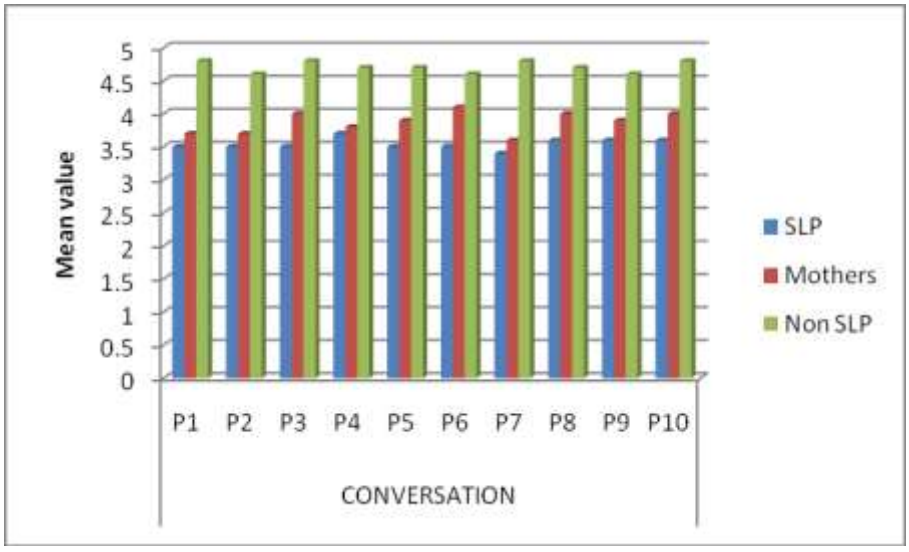

Figure 5: showing the rating of SLP mothers and NON SLPs for general conversation.

From the above table 5 and figure 5 it can be seen that the SLP rated the speech intelligibility better with mean of 35.40 whereas mothers rated second best with the mean of 38.70 followed by NON SLP rated the speech intelligibility very poorly with the mean of 47.10. It may be noted on a 5 point clinical judgment scale of speech intelligibility, which was converted to percentage for better calculation and the comparison between three groups for their rating for general conversation, shows highly significant difference. (p =.000)

Results in this section shows that there is a significant difference between the speech intelligibility rating between SLPs and Mothers. The SLP have rated better when compared with mothers the reason which attributed is that since the SLP are having more experienced in assessing speech. One more reason is that this could be due to the over expectations of the mother regarding the child's speech. The NON SLP have rated the speech intelligibility poorer compared to SLPs and mothers since the NON SLPs are not experienced with the disordered speech.

Speech Language Pathologist

SLP	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
Familiar Words	10	11	19	12.90	2.283	12.00	25.80	45.361	.000 HS
Unfamiliar Words	10	19	22	20.80	.919	21.00	41.60		
Non sense Words	10	22	27	25.00	1.764	25.50	50.00		
Picture Description	10	24	34	27.70	2.908	28.00	55.40		
Conversation	10	32	41	35.40	2.547	35.00	70.80		

Table 6: showing the mean standard deviation and significant value of different task among SLP

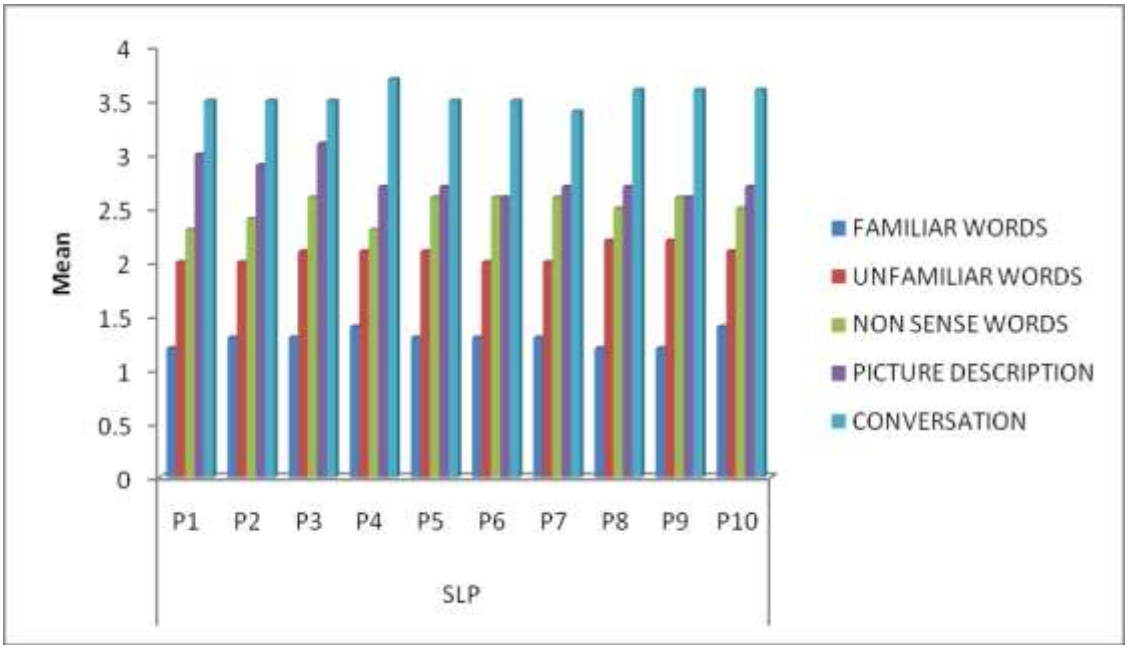

Figure 6: showing the rating of SLP for all tasks (Familiar words, unfamiliar words, nonsense words picture description and conversation)

From the above table 6 and figure 6 it can be seen that speech intelligibility rating for 5 different task (familiar words, unfamiliar words, nonsense words, picture description and general conversation), where SLP scores was better for familiar words and intelligibility scores observed to reduce for following hierarchy, unfamiliar words, nonsense words, picture description and general conversation. The speech intelligibility is better in familiar words for SLP with mean 12.90and poorer in general conversation with a mean of 35.40. It is noted that on the 5 point clinical judgment scale of speech intelligibility, it converted to percentage for better calculation and the comparison of between 5 different task with SLP shows very high significant difference(p=.000).

Mothers

Mothers	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
Familiar words	10	21	30	25.00	2.582	25.00	50.00		
Unfamiliar words	10	18	29	23.30	3.713	22.50	46.60		
Non sense words	10	24	32	28.60	2.319	28.50	57.20		
Picture description	10	34	43	38.80	2.781	38.50	77.60	39.733	.000
Conversation	10	35	43	38.70	2.111	39.00	77.40		HS

Table 7: showing the mean standard deviation and significant value of different task among Mothers

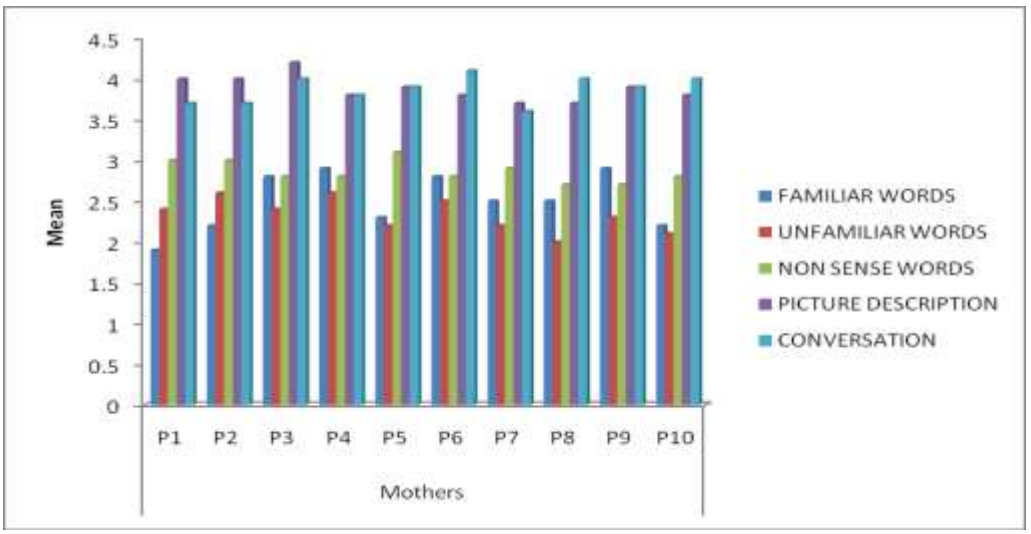

Figure 7: showing the rating of Mothers for all tasks

From the above table 7 and figure 7 that describes the rating of speech intelligibility rating between 5 different task with Mothers the scores of speech intelligibility was better for familiar words and intelligibility scores observed to reduce for following hierarchy, unfamiliar words, nonsense words, picture description and general conversation. The speech intelligibility is better in familiar words for mothers with mean 25.00 and poorer in general conversation with a mean of 38.70. It is noted that on the 5 point clinical judgment scale of speech intelligibility, it converted to percentage for better calculation higher the score poorer the rating of speech intelligibility and the comparison of between 5 different tasks with mothers shows very high significant difference.

Mothers	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mean (%)	Kruskal Wallis test value	P value
Familiar words	10	24	42	31.40	6.022	30.50	62.8	42.582	.000
Unfamiliar words	10	24	33	28.10	2.961	29.00	56.2		
Non sense words	10	36	40	37.90	1.729	37.50	75.8		
Picture description	10	42	44	42.60	.699	42.50	85.2		
Conversation	10	44	50	47.10	2.183	47.00	94.2		

Table 8: showing the mean standard deviation and significant value of different task among NON SLPs

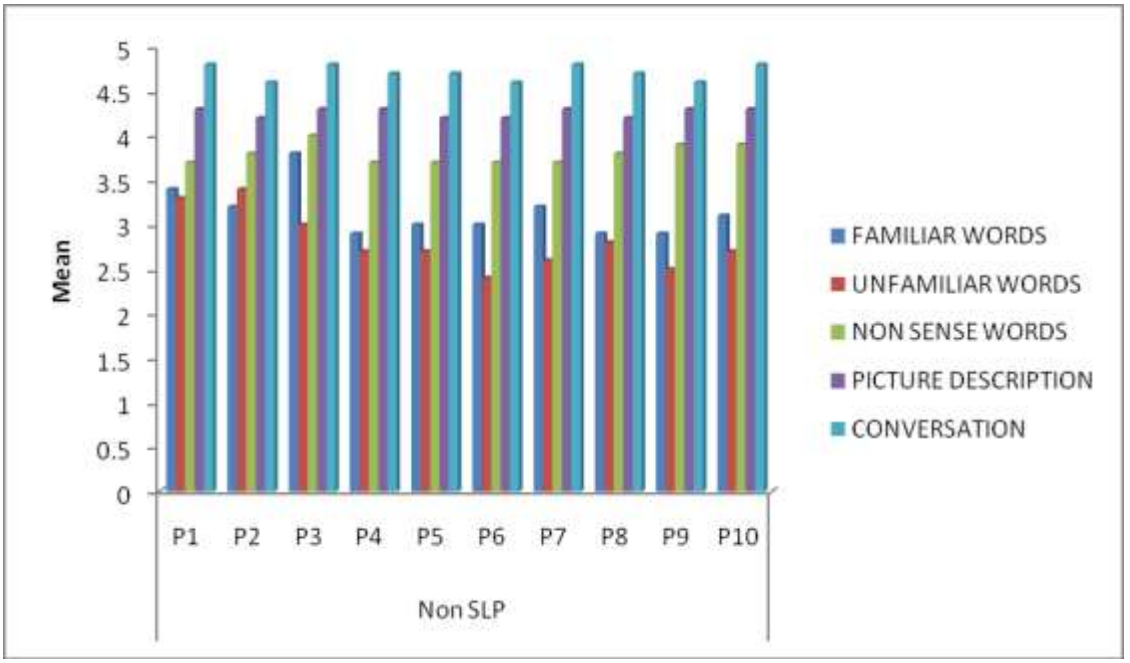

Figure 8 tasks: showing rating of NON SLPs for all

From the above table and figure describes the rating of speech intelligibility rating between 5 different task (familiar words, unfamiliar words, nonsense words, picture description and general conversation) with NONSLPs the scores of speech intelligibility was better for familiar words and intelligibility scores

observed to reduce for following hierarchy, unfamiliar words, nonsense words, picture description and general conversation. The speech intelligibility is better in familiar words for NONSLPs with mean 31.40 and poorer in general conversation with a mean of 47.10. It is noted that on the 5 point clinical judgment scale of speech intelligibility, it converted to percentage for better calculation and the comparison of between 5 different task with mothers shows high significant difference (p=.000)

Discussion

The five different tasks were rated by Speech Language Pathologist Non speech language pathologist and mothers using 5 point scale and the obtained data was statistically analyzed and result indicated that familiar words was rated better followed by unfamiliar words, nonsense words, picture description and general conversation and yielded significant difference. Speech language pathologist rated better followed by mothers and non-speech language pathologist with high significant difference.

Summary and Conclusions

The present study aimed at evaluating the outcome after the cerebral palsy children surgery through rating the speech intelligibility by 3 different groups of listeners i.e.; SLP, NON SLP and mothers of the implanted children using 5 different task (familiar words, unfamiliar words, non-sense words, picture description, and general conversation)

Ten cerebral palsy children who were implanted before the age of 3 years and having a device experience of more than 3 years were selected as subjects. All the subjects had a pre surgical hearing threshold above 90 dB and were attending auditory training.

The speech samples were recorded for 10 minutes which was divided into five different tasks in a sound treated room using PRAAT software (version 5.1.37) and were saved as WAV files: familiar words, Unfamiliar words, Nonsense words, Picture description, General conversation.

Three group of evaluators 5 SLP, 5 NON SLP, 5 Mothers of cerebral palsy child - rated the speech samples on a 5 point intelligibility rating scale. They were asked to rate separately for the five tasks. The data has been subjected to relevant for statistical analysis.

Result showed that familiar persons – mothers and Speech language pathologist rated speech intelligibility better when compared to NON SLPs. Familiar topics like repletion of familiar words were rated better when compared to all other tasks.

This indicates that general public, mostly unfamiliar listeners may not be finding the intelligibility of speech in cerebral palsy children easy to understand. We need larger studies in different cultural context to validate. The smaller number of subjects and the number of trails provided to listeners can be increased in future studies.