INTRODUCTION

The cochlear implant (CI) is a device surgically placed in a child’s inner ear that aims to restore the cochlear function. Clinical experience and recent research have systematically demonstrated that CI is an effective treatment in severe or profound neurosensory hearing loss (Ramos-Macias, 2012). This device deeply increases the auditory input received by the child, and, provides main benefits on the speech and language development. (e.g. Ertmer, Strong & Sadagopan, 2003; DesJardins, Eisenberg & Hodapp, 2006). In the current study, language development as measured by Mean Length of Utterance in words (MLUw) will be analysed in two cochlear implanted children and compared with two matched hearing children. In addition, MLU-w values in cochlear implanted children sharing similar characteristics will be examined.

AIMS

This study aims to determine if there are differences between the values of MLU in words (MLU-w) in two deaf implanted children paired with two hearing children on gender, age and parental education. Additionally differences in MLU-w results between the two cochlear implanted children sharing similar characteristics will be analysed.

METHODS

Participants: This study analyzed data of two cochlear implanted children with a profound bilateral loss since birth - from a longitudinal project about language acquisition (Ref. PTDC/LIN/111889/2009), as well as, data of two normally hearing children. All the children are female and their parents have high school diplomas. Both deaf bilateral implanted children were raised in a bimodal bilingual environment (Portuguese European - PE e Lingua Gestual Portuguesa – LGP).

Cognitive development and motor skills were determined to be within normal limits for all children.

Data collection: For normally hearing children, half-hour interactions with a researcher were audio-recorded individually. For cochlear implanted children, both audio and video were used. Researcher-child interactions involved a conversational play-based sampling procedures with a standard set of toys (kitchen objects, toy animals and medical objects).

Language measure: Mean length of utterance in words (MLU-w) was calculated using rules for European Portuguese.

RESULTS

Table 1. summarizes the main characteristics of cochlear implanted children and hearing pairs. The MLU-w values (Figure 1) were lower in two cochlear implanted children when compared to their pairs. In the first paired case (A CI / A HC) the cochlear implanted children show differences of only one word per utterance in the MLU-w values. Nevertheless, in the second paired case (B CI / B HC) the differences in the MLU-w values were more than two words per utterance. Farther, MLU-w values of cochlear implanted children (A CI and B CI) show differences of at least one word per utterance.

Table 1. Characteristics and results of MLU-w for cochlear implanted children (CI) and hearing pairs (HC)

<table>
<thead>
<tr>
<th>Child</th>
<th>Gender</th>
<th>Chronological age (A)</th>
<th>CI activation (B)</th>
<th>Time since CI activation (C)</th>
<th>Language environment</th>
<th>Parental education</th>
<th>MLU-w</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CI</td>
<td>F</td>
<td>5,04</td>
<td>2,00</td>
<td>4,05</td>
<td>Bilingual (LGP e PE)</td>
<td>High school</td>
<td>4,25</td>
</tr>
<tr>
<td>A H</td>
<td>F</td>
<td>5,04</td>
<td></td>
<td></td>
<td>Bilingual (LGP e PE)</td>
<td>High school</td>
<td>5,26</td>
</tr>
<tr>
<td>B CI</td>
<td>F</td>
<td>3,02</td>
<td>1,10</td>
<td>3,10</td>
<td>Bilingual (PE)</td>
<td>High school</td>
<td>3,46</td>
</tr>
<tr>
<td>B H</td>
<td>F</td>
<td>5,02</td>
<td></td>
<td></td>
<td>Multilingual (PE)</td>
<td>High school</td>
<td>6,02</td>
</tr>
</tbody>
</table>

DISCUSSION

This study shows that cochlear implanted children have shorter MLU-w when compared with hearing pairs. The MLU-w values in implanted children suggest a word-combining ability delayed. These results corroborate with the study of Geers, Moog, Bidenstein, Brenner and Hayes (2009) that there were a number of implanted children who did not reach age-appropriate levels of spoken language ability. Nevertheless, the MLU-w values of cochlear implanted children were closer to hearing children aged between 4,00 - 4,05 (MLU-w= 4,49) (Cacela, 2013), i.e. near their hearing age. Thus, hearing age seems to be a relevant aspect in the research of cochlear implants (Estabrooks, 2003)MLU-w values of implanted children (A CI and B) show a large variations in language skills among cochlear implanted children (almost one word per utterance in MLU-w values) (Inscoe, Archbold & Nikolopoulos, 2009), even when sharing similar characteristics.

CONCLUSIONS

This study shows differences in MLU-w values for cochlear implanted children and hearing pairs. Additionally, it examined variations in language skills among cochlear implanted children, highlighting the hearing age as an important feature to explore in cochlear implanted research.