Revision articles

Preschool preterm infants' oral language assessment instruments: a literature review

Instrumentos de avaliação da linguagem falada de pré-escolares nascidos prematuros: uma revisão de literatura

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ABSTRACT

Prematurity is considered a risk factor for the overall development of children, especially of the spoken language. The current study had as purpose to introduce a bibliographic review about assessment instruments of spoken language in preschoolers born premature, used in scientific research nationally, and to contrast the results of this assessment. We selected eleven articles and eight assessment instruments related to the spoken language skills of preschoolers born premature. Out of these eight instruments, six of them are international adapted for the Brazilian culture, and two of them were built by Brazilians researchers. Among the instruments used in Brazil, there are: two scales and one screening instrument; one observation protocol; two assessment instruments of specific skills (i.e., vocabulary, fluency); and two for assessment of the receptive and expressive skills. The results of the evaluations revealed that preschool children born preterm might show changes in the spoken language. It is emphasized that, despite previous researches, the dimension of the linguistic problems of the development of children born premature still must be studied, considering the heterogeneity of this population.

Keywords: Language; Language Tests; Infant, Premature; Premature Birth; Child, Preschool

RESUMO

A prematuridade é considerada um fator de risco para o desenvolvimento global de crianças, sobretudo da linguagem falada. O presente estudo teve como objetivo apresentar uma revisão bibliográfica sobre instrumentos de avaliação da linguagem falada de pré-escolares nascidos prematuros, utilizados em investigações científicas em âmbito nacional, e destacar os resultados dessas avaliações. Onze artigos foram selecionados, os quais utilizaram 8 instrumentos para a avaliação de habilidades relacionadas à linguagem falada de pré-escolares nascidos prematuros. Destes 8 instrumentos, 6 são internacionais adaptados para a cultura brasileira e 2 construídos por pesquisadores brasileiros. Dentre os instrumentos utilizados no Brasil têm-se: duas escalas e um instrumento de triagem; um protocolo de observação; dois instrumentos para avaliação de habilidades específicas; e dois para avaliação dos níveis receptivo e expressivo. Em relação aos resultados das avaliações observou-se que pré-escolares nascidos prematuros podem apresentar alterações na linguagem falada. Destaca-se que, apesar das investigações já realizadas, a dimensão dos problemas linguísticos a respeito do desenvolvimento de crianças nascidas prematuras ainda deve ser objeto de estudo, considerando a heterogeneidade desta população.

Descritores: Linguagem; Testes de Linguagem; Lactente; Prematuro; Nascimento Prematuro; Pré-Escolar

INTRODUCTION

According to the World Health Organization – WHO (1980), prematurity is regarded as a risk factor for global development and it can be classified into three types: extreme preterm, when the gestational age is below 28 weeks; very preterm, when the gestational age is between 28 and 32 weeks; moderate preterm, when the gestational age is between 32 and 37 weeks and the children are underweight (e.g., children who are born weighing less than 6.70 pounds)[1].

It is important to note that the neurodevelopment aspects (e.g., neurological maturity and emotional link formation) occur during the first months of life and they are key milestones for the child development[2]. This way, preterm underweight children are more inclined to show both survival risk and risk at the development of cognitive, motor, social and linguistic skills at receptive and expressive levels[3]. The concern for the preterm children and the early identification of the spoken language alterations are necessary not only when they are born, but also throughout their development period, so it can contribute to soothe the severity of these alterations and improve their quality of life, considering the neural plasticity which enhances the healing effectiveness[4,5].

In this study, we carried out a selection for the analysis of preschool preterm children. The chosen definition for preschooler in this study refers to children aged between two and six, according to the World Health Organization (WHO)[6].

The language assessment enables to identify if there are linguistic alterations and the knowledge about the spoken language development both at receptive and expressive levels in their different skills. In this regard, the utilization of systematic and/or formal instruments for the spoken language assessment is important because it enables to asses and diagnoses difficulties both at the acquisition and development processes, besides allowing development comparisons among a reference group[7].

Therefore, this study aimed to show a bibliographic review on the oral language assessment instruments on in preschool preterm infants used in national territory scientific researches and to highlight the outcomes of these assessments.

METHODS

We used an integrative literature review approach in this study. This review aims to search and synthesize the scientific knowledge about a particular subject in a pre-determined or not period of time with a commitment to collect and summarize available evidences and present how and by which researchers the knowledge was produced[8]. The integrative review creation followed the following steps: (1) identification of the theme; (2) definition of the research question; (3) sample selection and definition of the inclusion and exclusion criteria; (4) search at the data base and the periodical portal; (5) reading and evaluation of the selected studies; and (6) knowledge synthesis presentation.

We asked the following research question: Which instruments were used in Brazil in order to investigate the preschool pre-term infants' oral language?

The inclusion criteria established were articles: (1) duplicate in different database; (2) repeated in more than one language; (3) from review, thesis, essays and editorials; (4) which showed casuistry with chronological age below two and over six years old; (5) in which the full text was not available; (6) and which investigated twin children.

We searched for scientific articles which used systematic and/or formal assessment instruments, characterization and investigation of preschool pre-term infants' oral language and which were published in the literature without a restriction on the article's publishing date.

We searched the national and international databases: Biblioteca Virtual em Saúde - BVS (Lilacs, Ibecs and Bdenf), PUBMED/MEDLINE and Web of Science, and also the periodical portal Scielo (*Scientific Electronic Library Online*). The keywords were selected after consulting the keyword database in Health Science (DeCS-BVS). The combination of the selected uniterms was divided into six different researches: the first three were performed at the national database; the fourth, at the periodical portal; and the last two, at the international databases, namely:

Research 1: ("LANGUAGE" or "LANGUAGE development" or "LANGUAGE tests" or "LANGUAGE disorder" or "LANGUAGE development disorder" or "infant LANGUAGE") or "VERBAL BEHAVIOR") or "SPEECH DISORDERS") or "COMPREHENSION") or "cognition"[keyword] and "PRETERM" or "PRETERM infant" or "extremely PRETERM infant" or "PRETERM birth" or "PRETERM newborn" or "extreme PRETERM"[keyword]

Research 2: ("LANGUAGE" or "LANGUAGE development" or "LANGUAGE tests" or "LANGUAGE disorder" or "LANGUAGE development disorder" or "infant LANGUAGE") or "VERBAL BEHAVIOR") or "SPEECH DISORDERS") or "COMPREHENSION") or "cognition"[keyword] and "PRETERM" or "PRETERM infant" or "extremely PRETERM infant" or "PRETERM birth" or "PRETERM newborn" or "extreme PRETERM"[keyword]

Research 3: ("PRETERM" or "very underweight PRETERM" or "neonate
PRETERM") or PREMATURITY or FETAL PREMATURITY or PREMATURITY [all indexes] and (LANGUAGE) or LANGUAGE DEVELOPMENT) or LANGUAGE DEVELOPMENT DISORDER) or COGNITION [all indexes]

Research 4: ("language development" or "language development disorders") or "infant language") or "language") or "language disorders") or "language tests" or "verbal behavior") or "speech disorders") or "comprehension" [keyword] and ("PRETERM") or "preterm infant") or "extremely preterm infant") or "PRETERM BIRTH") or "preterm newborn") or "EXTREME PRETERM" [keyword]

Research 5: ("Language"[Mesh] OR "Language Disorders"[Mesh] OR "Language Development Disorders"[Mesh] OR "Language Development"[Mesh]) OR "Cognition"[Mesh]) OR "Comprehension"[Mesh]) AND ("Preterm Birth"[Mesh] OR "Infant, Extremely Preterm"[Mesh] OR "Infant, Preterm"[Mesh]) AND expressive ("Language"[Mesh] OR "Language Disorders"[Mesh] OR "Language Development Disorders"[Mesh] OR "Language Development"[Mesh]) OR "Cognition"[Mesh]) OR "Comprehension"[Mesh]) AND ("Preterm Birth"[Mesh] OR "Infant, Extremely Preterm"[Mesh] OR "Infant, Preterm"[Mesh]) AND receptive.

Research 6: Search ("Language"[Mesh] OR "Language Disorders"[Mesh] OR "Language Tests"[Mesh]) AND ("Infant, Preterm"[Mesh]) OR "Preterm Birth"[Mesh]) OR "Infant, Extremely Preterm"[Mesh]) Sort by: Publication Date

LITERATURE REVIEW

At the end of the information gathering, we found 902 articles and 11 met the inclusion criteria. The findings concerning the search are arranged according to the database in which they were selected.

We selected 11 articles and 8 were used as different assessment instruments of the skills related to the preschool preterm infants' oral language. Among these 8 instruments, 6 were adapted for the Brazilian culture and 2 were developed by Brazilian researchers (Table 1).

Given these data, we show the results of the Brazilian studies that used the eight instruments for the assessment of the skills related to the preschool preterm infants' oral language, namely: two scales and one screening instrument; one protocol of observation; two instruments for the assessment of specific skills (e.g., vocabulary, fluency); and two for the receptive and expressive levels assessment.

Skills' assessment instruments related to oral language and used by Brazilian researchers in preschool preterm infants.

Early Language Milestone Scale (ELM)[18,19]

The ELM Scale —[18,19] — assesses the hearing-receptive, hearing-expressive and visual hearing-receptive areas related to language and is designed for children aged 0-36 months old. This scale allows to assess if the child has a suitable or modified (failure) performance and was used in a study that assessed 77 preterm children. The result indicated that 67.5% of the children showed a suitable performance at the hearing-receptive and visual hearing-receptive skills while 32.5% showed modified results.

Denver Developmental Screening Test[20,21]

The Denver Developmental Screening Test – Revised (Denver II) – is an infant developmental screening test which assesses four areas, namely: personal-social, delicate-adaptive motor, language and solid motor, being indicated for children aged 0-6 years old. Each item is correlated to the age and the percentage of the standard population that performed such item, being classified as regular, "delay" or "caution/care".
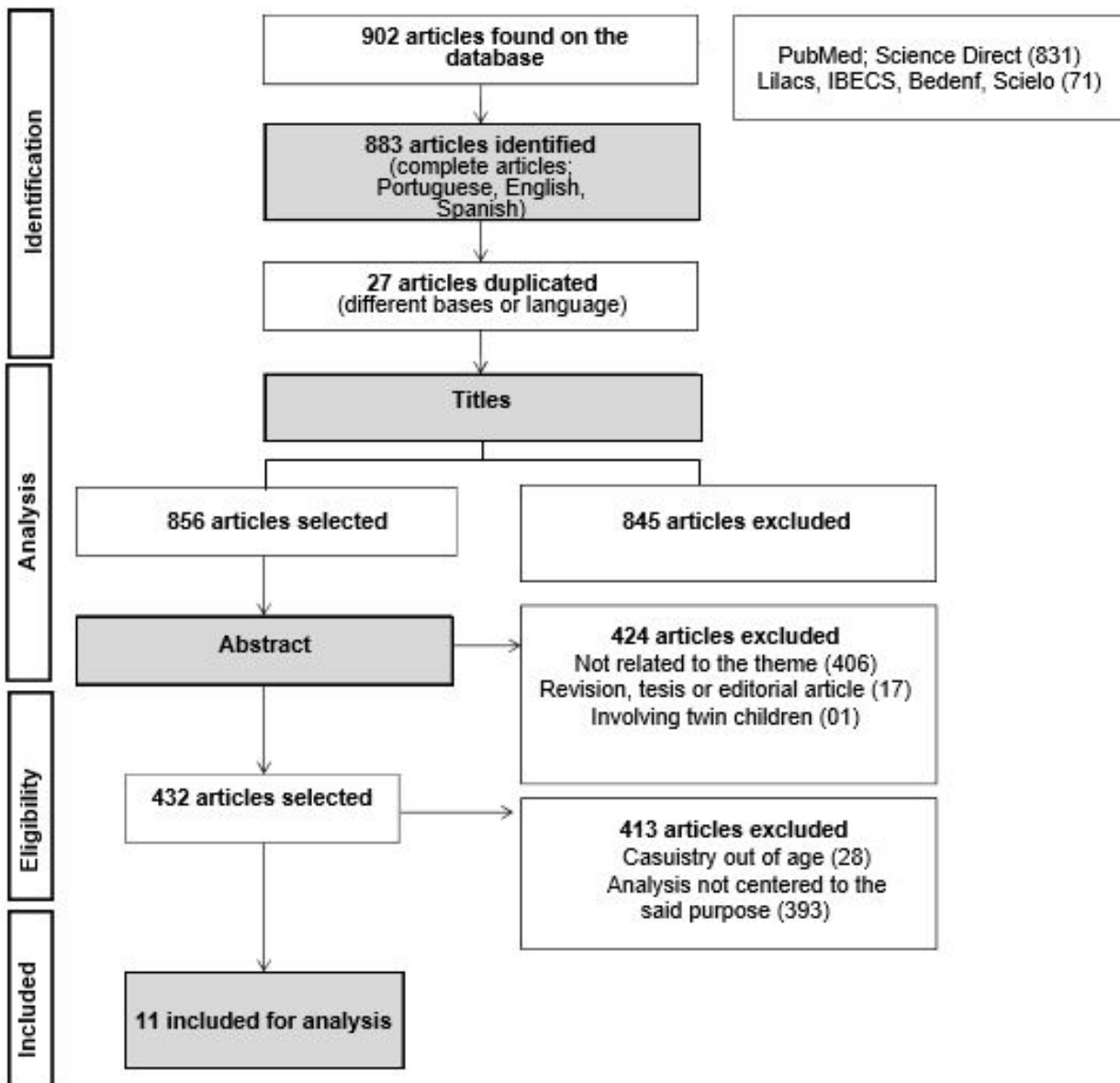
Note: Adapted from Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA Statement. PLoS Med. 2009;6(7):e1000097. doi:10.1371/journal.pmed1000097

Figure 1. Selection process and survey's results

The authors of one of the studies[9] aforementioned - in which ~~they~~ 77 preterm children were assessed - used the Denver II scale and among the skills assessed, they noticed that most of the children showed a performance considered *regular* (63.6%). With regard to the language, they found that 37.6% of the children showed the caution/care and delay ratings.

Another study[10] assessed – through Denver II – 69 preterm three-year-old children – both underweight and very underweight, divided into two groups: one with the absence and the other with the presence of language alterations. It was shown that 94.1% of the children

without language alteration had a regular performance, while 5.9% had altered results at the given test. Regarding the group with language alteration, 68.6% presented a normal result and 31.4%, an altered one.

Bayley Scales of Infant Development[22,23]

The Bayley Scales of Infant Development[22,23], showed at the BSID I, II, III, and the Screening Test versions assess the risk for development problems and are made up of five fields: cognition, language, motor, socio-emotional and adaptive behavior. They were

Table 1. Articles oral language assessments instruments on preschool preterm children and the respective instruments used by brazilian researchers.

TITLE	INSTRUMENTS USED	OBJECTIVES	PARTICIPANTS
Language abilities performance of children born preterm and low birth weight and associated factors 9	*Early Language Milestone Scale (ELM)*	To analyze the skills for the language development of two and three-year-old infants, who were born preterm and underweight, and the risk factors associated with it.	77 preterm and underweight infants with chronological age of two and three years old (incomplete)
Clinical assessment of language development in children at age 3 years that were born preterm 10	*Denver Developmental Screening Test II* Bayley Developmental Scale II	To assess the influence of the gestational age and birth weight on the language acquisition and neurodevelopment	69 three-year-old infants who were born weighing between 1500-2500grams
Biopsychosocial risks to development in preterm children with low birth weight11		To describe and analyze the relations between psychosocial and birth variables and the cognitive, linguistic, motor and behavioral performances of infants	Preterm and underweight infants at the age of 12-36 months olds
Cognitive and language development in preterm infants2	Bayley Developmental Scale III	To correlate the cognitive and language development aspects of preterm infants	104 preterm newborns (gestational age <33) were assessed (17 - 30 months old corrected age).
Evaluation of neurodevelopment of preterm infants using Bayley III scale.12		To assess the motor, linguistic and cognitive development of preterm infants and perinatal, neonatal and socioeconomic factors that are associated with the abnormal development	10 preterm infants at the chronological age of 24-42 months old
Communicative abilities in premature and extreme premature infants 13	Observação do Comportamento Comunicativo (OCC)	To compare the performance at the communicative skills of preterm, extreme preterm and typical infants	20 preterm, 16 extreme preterm and 36 infants with typical development with chronological age between two and three years old
Relation between mother-child interaction upon the development of oral language of the preterm newborn 14		To check the impact of the mother-child interaction for the oral language development of preterm infants	20 combinations of mothers and 5-6-year-old infants who were born premature
Fluency speech and language profile of preterm children15	Teste de Linguagem Infantil ABFW	To outline the speech and language fluency profile of preterm infants	14 infants at age 2-3 years who were born preterm and weighing less than 2.500 grams at birth and with a normal neurological exam
Linguagem expressiva de crianças nascidas pré-termo e termo aos dois anos de idade 16	Lista de Avaliação do Vocabulário Expressivo (LAVE)	To compare the expressive language of preterm infants with the on term infants' one	118 protocols of phonoaudiological assessment divided into 50 preterm and 60 on term
Characterization of linguistic behaviors of premature four-year old children17	Psychomotor Development Test	To describe the linguist behavior performances of preterm infants at the age of 4 and to identify which have higher and lower occurrence	20 protocols of infants at the age of four years old
Linguistic performance in 2 years old preterm, considering chronological age and corrected age 4	Test of Early Language Development (TELD-3)	To check the linguistic perform of preterm infants at the age of two considering their chronological age and the corrected one	23 preterm infants at the age of two years old

made for children aged 1 to 42 months and give three risk factors: *Competent, Emergent* and *At Risk*. One of the recommendations is that this scale be applied only by trained and specialized professionals.

An aforementioned study[10] used the Bayley II fields in order to assess preterm children, divided into absence and presence of language alteration. The result reported that 66% of the preterm children with language alteration had a lower performance at the Bayley tests when compared to underweight and very underweight, without language alteration[10].

A subsequent study used the Screening test version of the Bayley scales III to assess 40 preterm children at the ages 12, 24, 36 months old. As for the expressive language, two children (5%) showed *At Risk* rating, 10 (25%), *Emergent* rating, and 12 (30%), *Care* rating. As for the receptive language, 12.5% of the children obtained *Emergent* rating and no children *At risk* were found.

With respect to the fields of the cognitive, receptive language and expressive language Bayley III scales, the authors of another study[2] correlated the developmental aspects of 10 preterm children aged 24 to 42 months.

The results showed a correlation between the chronological ages and the correct cognitive development age and the receptive and expressive language, despite the different performance of the receptive language when compared to the expressive one.

The authors of another study used the BayleIII[2] to assess 104 children aged 17 to 30 months. They pointed out that the language skill performance of preterm children was altered, showing a higher deficit when compared to the cognitive and motor aspects.

Observação do Comportamento Comunicativo (OCC)[24] – Communicative Behaviour Observation

The OCC[24] test was designed based on a protocol used in a school clinic of a Higher Education Institution. The assessments are made through communication behavior observation in semi-guided situations, like ludic and interactive activities, in which concrete objects are offered, in order to check their actions and interactions of the children. These situations are filmed for further response analysis whose purpose is to verify the occurrence of communicative categories (e.g., interact with the examiner, respect the change of shifts). The categories for the communicative behavior analysis go through the following criteria: zero, for absent behavior; one, when the child shows behavior in restricted situations; and two, when the child shows behavior in any situation.

This instrument was used to assess 72 children who were divided into three groups: 20 preterm children, 16 extreme preterm children and 36 with typical development, all in the age range two and three years. As a result, the authors[13] pointed out that there were statistically significant differences in the communicative skills, while comparing the preterm group (preterm and extreme preterm) and the typical one, however, no statistically significant differences were seen, while comparing the preterm and the extreme preterm groups.

Teste de Linguagem Infantil (ABFW)[25,26] – Infant Language Test

The ABFW[25] – is a systematic instrument directed to the assessment of the Vocabulary, Fluency, Pragmatic language and designed for children aged 2 to 12 years old.

The authors of a study[14] assessed 20 preterm and born-underweight children aged between 5 and 6 years, and their interactions with their own mothers.

They concluded that the participants performed below the expected for their chronological age, mainly on the vocabulary and pragmatic tests. It was found that on the fluency test, all children performed as expected for their age.

Another study[15] used only the Fluency and Speech Assessment Protocol, which is part of the ABFW[26], and assessed 14 preterm children aged between 2 and 3 years and with a normal neurological exam. As a result, the authors pointed out that the preterm children showed a significant reduction of the oral speed ratio which may be indicative of language delay related to vocabulary and phonology. Those children also show fluency deficit related to language and not suggestive of developmental stuttering. This way, these children show a fluency profile significantly out of phase, when compared to children born on term.

Lista de avaliação do vocabulário expressivo (LAVE)[27,28] - Assessment List of Expressive Vocabulary

LAVE is an adapted version of the Language Development Survey (LDS) [27,28] into Brazilian Portuguese and aims at investigating the expressive language, identifying delays at the vocabulary development. It comprises a list of 307 words divided into 14 semantic categories, based on studies about the lexical developmental and considered recurrent in Brazilian Portuguese.

This instrument was used in a study that compared the expressive language of preterm and on term children, and concluded that the former showed a higher occurrence of delays at the expressive vocabulary development. The preterm children showed a significant reduction at the vocabulary when compared to on term children and with the same chronological age, in all semantic categories[16].

Psychomotor Development Test[29,30]

The Psychomotor Development Test[29,30] has the purpose of detecting possible alterations at the development through 52 behaviors divided into areas, namely: (1) Coordination – made up of 16 behaviors which assess manual driveability, graphical responses, visual motor coordination and handling of objects in various situations; (2) Language – made up of 24 behaviors which assess the receptive and expressive skills of oral language and the ability of using basic concepts, understanding and executing orders; (3)

Driveability – made up of 12 behaviors which assess balance, movement and control of the parts and the body, as a whole. The performance is rated as Regular, Risk or Delay, both for the total test and each assessed area. This instrument is designed for children aged between two and five years.

While assessing 20 4-year old preterm children, the authors of a study got the following results: 35% of the children were rated Regular, 40% Risk and 25% Delay. In relation to the language field, 40% were rated Regular, 45% Risk and 15% Delay.

Test of Early Language Development (TELD-3)[31,32]

TELD-3[31,32] is designed for children aged 2-7 years and 11 months, and has the purpose of early alterations detection at the development process of the receptive and expressive skills of oral language.

A study[4] used TELD-3 to assess 23 preterm children with gestational age of 36 weeks and weighing under 2.500g at birth. From the results obtained, the authors pointed out that the preterm children showed an altered total performance in this test, being rated as an at risk population for language alterations.

CONCLUSION

In studies performed in Brazil, we used 8 different instruments for the assessment of the oral language skills of preschool preterm infants and covered the receptive and/or expressive level. It is important to highlight that despite the previous investigations the extent of the linguistic problems regarding the development of pre-term children still has to be studied, measuring the heterogeneity of this population and the risk of showing alterations at the receptive and/or expressive level of oral language, as described in the literature.

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