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The Grammatical Deficits of Persian-Speaking Children with Specific Language Impairment

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ABSTRACT

Background: Specific language impairment (SLI) is one of the most common disorders of language development in children, which has been less addressed in Persian studies. The aim of this study was to evaluate the grammatical characteristics of Persian-speaking children with SLI using Photographic Expressive Persian Grammar Test (PEGT).
Methods: This case-control, cross-sectional study was conducted on 16 children with SLI and 16 normal children aged 4-6 years, who were monolingual Persian speakers. The subjects in both groups were age- and gender-matched. After selecting each participant, PEGT was administered and results were recorded in an answer sheet and analyzed. To analyze the data, the mean total scores of the test and mean scores related to each syntactic structure of the PEGT were compared between the two groups using Mann–Whitney test.
Results: In this study, a significant difference was observed in mean total scores of the test between the studied groups. In detail, the mean score of the normal group was significantly higher as compared with the SLI group (P<0.05). Moreover, a significant difference was found between the groups regarding each of the evaluated syntactic structures (P<0.05).
Conclusion: According to the results of the present study, children with SLI had weaker performance as compared with their normally developing age-matched peers in evaluated morphosyntactic structures.

Introduction

Specific language impairment (SLI) is a language development disorder characterized by deficit in learning linguistic skills despite normal intellectual, social, emotional, and auditory functioning of the child [1]. These children have no history of seizure, clear neurological disorders, or sensory-motor and visual impairments. In addition, their oral structure and function

are efficient for speech. According to the reported statistics, the prevalence rate of SLI is estimated at 1-8% of the population [1]. For example, Oryadi-Zanjani (2015) estimated the prevalence of SLI in 6-year-old Persian-speaking children to be 2.7%, while studies have also shown the prevalence rate of SLI in 5-year-old Persian-speaking children to be 3.3% in Shiraz City of Iran [2, 3]. Moreover, in a study, it was shown that the prevalence rate of this disorder was higher in boys as compared with girls, with a ratio ranging from 1:3 to 1:4 in various researches [4].

As regards age and intelligence level, children with SLI showed significantly weaker language performance

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in all the language domains as compared with their normal peers [5]. Their scores were at least 1.5 standard deviations below averages in comprehensive and standard language tests [6].

While children with SLI showed a variety of language problems (at different language levels, including phonology, morphology, syntax, semantics, pragmatics, perception, and production) [1], their morphology and syntax were affected as compared with other domains [7-9].

According to literature, normal children were able to produce all grammatical morphemes before the age of four [10], whereas children with SLI could not master this skill even until the age of eight [11]. Problem in bound and free morphemes are the main characteristics of children with SLI [12]. While learning syntactic structures in these children is similar to their normal peers, it occurs in a longer duration with more errors, along with greater use of ungrammatical sentences. In a study by Paul and Norbury (2012), children with SLI had difficulties with syntax representations and could not determine the structural associations between the main elements of syntactic structure [13]. Due to the severity of language and communication problems in children with SLI, the relatively high prevalence and persistent nature of this disorder and its negative consequences in the individual, family and social life of affected people, in recent years, study on the characteristics of children with SLI from different aspects, especially grammar, has been one of the most widespread topics of interest in recent research on various languages [14].

In addition, Hanson and Nettelbladt (2002) showed that that Swedish- speaking children with SLI had delay in comprehension and expression of grammar by one and two years, respectively as compared with their normal peers. It could be stated that the problems of these children were more in expressive morphology than comprehensive morphology in a way that a significant difference was observed between children with SLI and their typically developing peers with respect to expressive morphology of verbs [15]. Redmond (2004) proposed that English- speaking children with SLI often showed limitations in syntactic and lexical development and bound morphemes as compared with normal children [16]. Hewitt et al. (2005) evaluated three speech index of mean length of utterance (MLU), the index of productive syntax (IPSYN), and the number of different words (NDW) in English-speaking children with SLI and their normal peers. According to their results, the performance of children with SLI was significantly lower in the mentioned measures as compared with the control group [17].

Moreover, the results obtained by Marini et al. (2008) regarding Italian-speaking children showed that participants with SLI produced shorter phrases and less complicated sentences as compared with normal children. They claimed that this reduction in syntactic complexity of sentences produced by children with SLI was mainly due to deletion of content and function words [18]. A study was conducted by Marina et al.

(2005) on understanding and using prepositions by children with SLI and comparison of their performance with normal children. According to their results, children with SLI made errors, which were indicative of problems in understanding and using prepositions. In addition, poor performance in expressive language skills in these children was observed as deletion of prepositions [19]. Ahadi (2015), in a study, compared subject-verb agreement in children with SLI and two age-matched and language-matched control groups. It was indicated that children with SLI showed poorer performance in this task as compared with the control groups [20]. Maleki et al. (2008) also compared 5-7 years old children having SLI with their typically developing language-matched peers (n=12 in each group) in terms of a series of story retelling tasks and variables of MLU, percentage of content and function words, the ratio of function words to content words, percentage of derivational and inflectional morphemes, and clitics. According to the results, the percentage of use of words and morphemes in children with SLI was almost equal to their same-language normal peers. In addition, Persian version of Test of Language Development: p3_ [21] was administered and showed a 9-month delay as compared with the mean chronological age in syntactic understanding subtest for children with SLI [22].

In another study, Maleki et al. (2011) evaluated the language performance of 5- to 7-year-old Persian-speaking children with SLI and their typically developing age-matched peers. According to the results, no significant difference was observed between the participants in terms of the use of inflectional and derivational morphemes and clitics in speech. However, a significant difference was observed regarding the mean MLU and the percentage of number of content and function words [23]. At present, accurate diagnosis of SLI is deemed as a challenging necessity. One of the obstacles in this regard is the diagnosis of this impairment based on inclusion and exclusion criteria [3]. The exclusion criteria help in distinguishing these children from children with other disorders (e.g., children with sensory-motor or developmental problems), and it seems that researchers and therapists are in agreement with these criteria. Contrary to the unanimous agreement on the exclusion criteria, researchers and therapists use different and almost arbitrary inclusion criteria (e.g., standardized tests, criteria-referenced tests, and informal assessments) for detecting and confirming the presence of language impairments [24].

Evidently, language sample analysis is one of the best methods that complement standardized tools for speech and language evaluation in various domains [25]. Given its advantages, such as the possibility to simultaneously examine different aspects of language, the application of language sample analysis in clinics has been recommended in a wide range of studies. However, intrapersonal and interpersonal validity of language samples was lower than formal assessments due to their dependence on the experience and skill of the examiner and type of linguistic context employed [26]. Some of

the benefits of using standard tests, such as uniformity of the application protocol and the scoring method, minimal effects of the examiner or test conditions on the assessed skills, objectiveness and simplicity, interpretable results for researchers, and lack of need for special preparation for each patient separately, have led to increased tendency of researchers and therapists toward the use of language standard tests as inclusion criteria for the detection of children with SLI [27]. Despite the extensive research background of SLI in other languages, especially English [14], the number of studies conducted in Persian is very limited. Thus none of these studies have accurately evaluated the grammatical features of the Persian- speaking children with SLI using a valid and reliable test, and did not compare them with normal children. Since Persian has different structures coined from languages such as English (that majority of research has been done in that language) and the findings of this studies cannot be generalized to Persian, it was imperative that this study be carried out to examine the grammatical characteristics of these children using a valid and reliable tool titled the Photographic Expressive Persian Grammar Test (PEGT) that exclusively evaluates the morphosyntactic properties of Persian-speaking children aged 4–6 years [28] and compare them with normal children in Persian.

Methods

Participants

This case-control, cross-sectional study was conducted on 16 Persian-speaking children with SLI (11 boys and 5 girls) aged 4-6 years. The control group comprised 16 normal Persian-speaking children (11 boys and 5 girls), each of whom was matched with a participant from the SLI group in terms of age, gender, and socioeconomic status. To select the samples, first the children suspected of having SLI were referred by speech and language pathologists working at governmental and private rehabilitation centers of Mashhad, Iran. In the first stage, a short medical and developmental history was provided by the parents to bolster the identification and classification of these children, followed by oral examination of the subjects. Then the Persian version of Wechsler Preschool and Primary Scale of Intelligence (WPPSI) [29] was applied for children with initial diagnosis of SLI, whose medical and developmental history was indicative of normal growth in various developmental areas (e.g., motor, cognitive, perceptual, social, and emotional developments), with the exception of language, and had no history of seizure or clear neurological disorders. Examination of their oral performance showed efficient oral structure and function for speech.

Participants with a non-verbal intelligence of 85 or higher were evaluated for hearing. The participants were screened for hearing using the whisper test [30]. If child's hearing was normal, a sample of child's spontaneous speech was prepared. To sample the speech of the participants, their mothers were asked to play with their child using a set of standard toys for 20 min. The toys included a doll house, two dolls, a car, and animals on the forest game mat.

After sampling, recorded language samples were transcribed and the MLU of each child was estimated based on words. Participants with MLU less than 2.96 were regarded as children with SLI and were entered in the study after obtaining the consent of their parents. In case of MLU higher than 2.96, the children were excluded from the study due to normal language development [31].

Medical history of each typically developing child, regarding hearing, neurological, and mental conditions and physical health, was assessed using their files in kindergartens and information provided by their teachers. Moreover, parents and kindergarten teachers were asked to inform the researcher if they had any worries about speech and language communication abilities of the children. However, no information was reported in this regard. This study was derived from a research project approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran (ethical code: IR.MUMS.REC.1395.153).

The Photographic Expressive Persian Grammar Test was employed for each of the subjects. This test is a fast- and easy-to- administration test that comprises 40 image items and designed to evaluate the production of important morph-syntactic structures of Persian in 4 to 6 years old children. It has a content validity of over 86%, and reliability of over 90% [28]. In this study, the test was administered in a well-lit room free from auditory and visual distractions. Table height was appropriate for each child to see the stimulus pictures easily. During the test administration, the examiner placed the photographic stimulus book in front of the child, and the response form in front of himself or herself, not easily visible to the child, and then presented the eliciting sentences. Every test question had one correct and one wrong answer in the response form. If the child chose the answer indicated on the response form, a circle was drawn around the answer. Otherwise, the child's answer (correct or wrong) was transcribed. For some items, the aim was to evaluate the expression of grammatical morphemes. If the child expressed morpheme in combination with a word other than the word targeted by the test, his or her answer would be recorded and considered as a correct answer. As regard other grammatical structures, such as conjunctions, which are variegated in Persian, some can be used interchangeably; if the answer a child provided was not the one anticipated, but similar to the target answer in terms of meaning and of the same structure, it was considered a correct answer. If the child gave no answer, the examiner used the prompt sentence without referring to the target structure. If a child did not answer even after the prompt sentence was repeated, the examiner placed a dash (–) in the last column of the response form. The child's correct answers were indicated by a check mark (√) and wrong answers by a cross mark (&cross) in the last column on the response form. Finally, the examiner added up all correct items to calculate the raw score [28].

Data Analysis

In this study, Kolmogorov-Smirnov test was applied to assess the normal distribution of the variables. Since the distribution of the variables was not normal (P<0.05), Mann–Whitney test was used to compare the mean scores of the PEGT between the normal and SLI groups. In addition, Mann–Whitney test was performed to compare the mean scores of each grammatical structures between the study groups.

Results

In the present study, to determine the morphosyntactic properties of the participants using the PEGT, 11 boys (68.8%) and five girls (31.3%) were assessed in each study group. Therefore, the male to female ratio was 2.19. Mann–Whitney test was applied to compare the mean total scores of the test and the mean scores related to each grammatical structure. The results of these evaluations are shown in Table 1.

As shown in Table 1, a significant difference was observed between the SLI and the control groups in terms of mean total score of the test (P<0.05). In addition, a significant difference was found between the mean scores of SLI and the normal children based on each grammatical structure (P<0.05), including different types of sentences (conditional sentences, yes-no questions, interrogative sentences, and exclamatory sentences), prepositions (coordinating and correlative prepositions), subordinate clauses (subjective, complementary, and

Table 1: Comparison of the means, SD of grammatical structures in children with SLI and typically developing children

Grammatical structures	Group	Mean±SD	Minimum	Maximum	Mean Rank	Significance level
Question–word interrogative sentences	SLI[1]	0.56±0.62	0	2	10.03	0.000
	TD[2]	2.31±1.13	1	4	22.97	
Conditional sentences	SLI	0.19±0.40	0	1	12.50	0.003
	TD	0.69±0.47	0	1	20.50	
Yes–no interrogative structures	SLI	0.31±0.47	0	1	11.50	0.000
	TD	0.94±0.25	0	1	21.50	
Exclamations	SLI	0.00±0.00	0	0	13.00	0.004
	TD	0.44±0.51	0	1	20.00	
Causal conjunctions	SLI	0.06±0.25	0	1	10.50	0.000
	TD	0.81±0.40	0	1	22.50	
Coordinating	SLI	0.00±0.00	0	0	11.50	0.000
	TD	0.62±0.52	0	1	21.50	
Subjectrelative clauses	SLI	0.25±0.62	0	2	12.13	0.006
	TD	1.25±1.13	0	3	20.88	
Adverb relative clauses	SLI	0.00±0.00	0	0	10.50	0.000
	TD	0.75±0.44	0	1	22.50	
Complement relative clauses	SLI	0.25±0.44	0	1	11.50	0.000
	TD	0.88±0.34	0	1	21.50	
Copulas	SLI	0.37±0.61	0	2	9.53	0.000
	TD	1.93±0.68	1	3	23.47	
Bound subjects	SLI	0.75±0.77	0	2	12.38	0.005
	TD	1.50±0.63	0	2	20.63	
Verb inflection (Tense, mood, aspect)	SLI	0.87±0.80	0	2	9.31	0.000
	TD	3.56±1.26	1	5	23.69	
Connected personal pronouns	SLI	1.12±1.14	0	3	8.94	0.000
	TD	2.68±1.07	2	4	24.06	
Disjunctive personal pronouns	SLI	0.50±0.81	0	3	11.28	0.000
	TD	3.12±0.80	1	5	21.72	
Reflexive pronouns	SLI	0.00±0.00	0	0	11.50	0.000
	TD	0.62±0.50	0	1	21.50	
Demonstrative pronouns	SLI	0.12±0.34	0	1	13.50	0.023
	TD	0.50±0.51	0	1	19.50	
Prepositions	SLI	0.00±0.00	0	0	13.00	0.004
	TD	0.44±0.51	0	1	20.00	
Comparative adjective	SLI	0.31±0.47	0	1	13.00	0.012
	TD	0.75±0.44	0	1	20.00	
Superlative adjective	SLI	0.00±0.00	0	0	12.50	0.002
	TD	0.50±0.51	0	1	20.50	
Genitive case	SLI	0.19±0.40	0	1	12.00	0.001
	TD	0.75±0.44	0	1	21.00	
Causal verbs	SLI	0.00±0.00	0	0	10.50	0.000
	TD	0.75±0.44	0	1	22.50	
Total	SLI	5.81±3.70	0	15	8.50	0.000
	TD	25.75±4.40	19	34	24.50	

[1]Specific Language Impairment; [2]Typically Developing

adverbial), copula, verb inflection (bound subjects, tense, aspect, and mood), pronouns (subject and object personal, reflexive, and demonstrative), prepositions, inflection of adjectives (comparative and superlative), genitive case, and casual structures. As expected, the mean total score of the test and the mean scores related to each grammatical structure were significantly higher in normal children as compared with those having SLI.

Discussion

The results of the present study showed that Persian-speaking children with SLI had significantly poorer performance in grammatical evaluated structures in this test as compared with normal children. In addition, the results related to the use of bound subjects (second person plural and third person plural), verb mood, aspect, and tense (present perfect, past continuous, simple irregularpast, and present subjunctive) showed that children with SLI had significantly poorer performance as compared with the normal children.

A large number of studies have shown that inflection of verb tense is the primary grammar deficit in SLI [32, 33]. In this regard, Paradis and Crago (2000) explored the use of verb tense in children with SLI and showed two types of error in past and future tenses: 1) use of nonfinite structures and 2) use of present tense [34]. Norbury et al. (2001) also compared the performance of children with SLI to sensorineural hearing impairment and control groups (age-matched and language matched peers) in terms of verb inflection. They suggested that children with SLI had a significantly lower performance in this regard as compared with the other groups [35].

In another study, Redmond (2005) showed that elimination of past test affix was indicative of SLI [36]. Charest and Leonard (2002) evaluated the ability of two groups of normal developing and SLI children in time/agreement use of specific grammatical morphemes. It shown that children with SLI failed to produce inflectional morphemes [37]. In addition, Pawlowska et al. (2006) pointed out that in SLI children, the most problematic areas are related to time/agreement morphemes which are used at a significantly low rates [38].

Moreover, Van der ley (2004) showed that children with SLI had problems with inflection of verb tense marker in both regular and irregular verbs [39, 40]. Given the extensive problems of children with SLI in grammar, grammatical deficiencies are commonly introduced as sustained clinical markers of SLI [9]. Rice and Wexler (1996) studied 122 preschool children in three groups: SLI, normally developing age-matched and language matched peers. According to their results, tense morphemes (including *-ed* in regular verbs, *be*, and *do*) can be used as clinical markers of SLI in English [41].

In the present study, a significant difference was observed between children with SLI and their normal peers in terms of simple irregular past tense verbs. Redmond and Rice (2001) also reported children with SLI over-regulate irregular past tense verbs [42]. According to prediction of the Computational Grammatical Complexity model,

syntactic, morphological and phonological deficits affect the form of the irregular verb that is produced in past tense contexts, [34, 43]. Also, the Extended Optional Infinitive Hypothesis that is based on the development of the morphology in children with SLI supports that in children with SLI, the use of infinitive forms lasts longer than usual. This is explained by means of assumptions that, in the beginning, finite marks may be presented explicitly or not, in an optional way—and that the period lasts longer in children with SLI (Principles and Parameters) [44].

Based on the use of pronouns, a significant difference was found between the SLI and typically developing children in the present study. Similarly, Jacobson and Schwrtz's (2002), in their study on Spanish-speaking children with SLI, showed a significant difference between the SLI subjects and their normal peers in terms of use of pronouns [45]. In another study by Hamman et al. (2003), it was shown that the growth pattern of pronominal clitics in children with SLI was similar to normal ones, but it was delayed. In addition, problems associated with pronominal clitics would remain in children with SLI aged more than 5 years [46]. These results are in line with the findings of the present study on children's use of connected personal pronouns.

Also, it was shown that children with SLI had significantly weaker performance in using subject, complement, and adverb relative clauses as compared with their peers. Results obtained by Novogrodsky and Friedmann (2006) on the use of relative clauses in children with SLI also showed that while these children were able to use subject relative clauses better than other relative clauses, they had weaker performance in this regard, when compared with normal children [47].

Marina et al. (2005), in their study, compared children with SLI with their typically developing peers in terms of comprehension and use of prepositions, affirming that children with SLI made errors that were indicative of problems in these areas. In addition, deletion of prepositions in sentences was observed in children with SLI [19]. The results of the present study on the use of prepositions in children with SLI are in line with the results of this study. As regard adjective inflection, the results showed a significant difference between children with SLI and normal ones. In addition, Bedore and Leonard (2001) showed that children with SLI had more problems in this regard, as compared with their language-matched normal peers [45]. Further, it was outlined that children with SLI had problems in producing question–word interrogative sentences. Van der ley and Battell (2003) confirmed a defect in the ability to produce wh-questions in children with SLI [39]. Leonard et al.'s (1992) surface hypothesis claims that there is an auditory perceptual impairment in SLI, causing problems in the perception of morphemes with 'low perceptual salience' [46].

One of the major limitations of this study was lack of a standard test with a cut-off point for initial diagnosis of children with SLI and normal children, which was resolved using MLU scale despite its time-consuming

nature. While the results of this study were indicative of the ability of Photographic Expressive Persian Grammar Test to differentiate between the performance of normal children and children with SLI, it is worth mentioning that the use of standard language tests for the detection of these children can be beneficial only when accurate information is provided regarding their diagnostic precise [48]. Thus, diagnostic accuracy and optimal cut-off point of Photographic Expressive Persian Grammar Test should be determined in future studies, so that it could be applied to distinguish children with SLI from typically developing ones.

Conclusion

According to the results of the present study, children with SLI had weaker performance as compared with their normally developing age-matched peers in the evaluated morphosyntactic structures, including different types of sentences (conditional sentences, yes-no questions, interrogative sentences, and exclamatory sentences), prepositions (coordinating and correlative prepositions), subordinate clauses (subjective, complementary, and adverbial), copula, verb inflection (bound subjects, tense, aspect, and mood), pronouns (subject and object personal, reflexive, and demonstrative), prepositions, inflection of adjectives (comparative and superlative), genitive case, and casual structures. Based on the results obtained in this study, it can be concluded that Photographic Expressive Persian Grammar Test can differentiate children with language disorder from normal children.

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