



Original Article

Prevalence of Speech Language Disorders in Monolingual Persian Children with Normal Development During 2012-16

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ABSTRACT

Background: Speech-language disorders are associated with symptoms, such as illiteracy, problems in social skills, as well as poor academic and professional performance. Investigating the prevalence of the mentioned disorders would be helpful in programming for management of these disorders by preventing the associated symptoms. Since there is a lack of data on the prevalence of children's speech-language disorders in Shiraz, investigating such issue is critical or early detection, intervention, and prevention of associated symptoms. The aims were: 1) to estimate the prevalence of speech-language disorders in 4-6 year old children in Shiraz, and 2) to determine the relationship between these disorders with gender and age.

Methods: A total of 1588 normal monolingual children (761 girls and 827 boys) of average socioeconomic status, aged 4-6 years were recruited in this cross-sectional study during 2012-16 in Shiraz-Iran. Language samples were obtained by describing series pictures. Chi-square was used to analyze the data.

Results: 53 percent of the participants had at least one disorder. Specifically, the rates for different disorders were articulation disorders: 40 percent; fluency disorders: 13 percent; voice disorders: 3.3 percent; language comprehension disorders: 2.2 percent, and language expression disorders: 16.2 percent. Boys had higher rates of disorders in comparison to girls. Articulation and comprehension disorders were significantly higher amongst the younger age group, suggesting a decrease in these disorders as the age increased.

Conclusion: The results of this study generally correlate with those of previous ones, showing that language exposure is a key factor in reducing speech language disorders. The high prevalence of speech-language disorders in Shiraz indicate the need for increase in public awareness, intervention efforts, and to further investigate the matter.

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Introduction

Speech and language are important skills that a child develops throughout childhood, playing an important role in one's social, professional and academic life. Any speech deviation (poorly articulated or non-fluent), out of

ordinary is considered as speech disorder [1]. Disorders in comprehension, expression, content, and form or use of language are indications of language disorders [1]. These disorders are categorized as articulation, stuttering, voice language comprehension, and language expression [2], which may affect one's emotional status [3], social life [4], academic and professional life [5]. Reports on prevalence of speech language disorders vary depending on cultural and linguistic variations [6], types and design of the studies as well as number of participants

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[7]. Nelson reported prevalence of speech-language disorders in 2-4.5 year old American children as 5 to 8 percent and the prevalence of speech-language delay as 2.3- 19 percent [8]. In the US, the prevalence of speech sound disorders in young children was reported as 8-9 percent [9], and the fluency disorders as 8.5-11 percent [10]. McLeod et al. reported the prevalence of speech language disorders in 5-6 year old Australian children as 41.2 percent and in 4-5 year old as 24.5 percent [11]. However, there are few studies on the prevalence of speech language disorders amongst Iranian children. A recent study in Tehran indicated that 40.3 percent of children under age 5 had speech language delay, 6.21 percent had articulation and voice disorders and 2.21 percent had stuttering. In a study in Arak, it was found that 11.9 percent of school aged children have speech disorders [12], out of which 85 percent had articulation problems, 3.5 percent had stuttering, and 1 percent had voice disorders. In this study, the prevalence of these disorders amongst boys appeared to be higher than girls, and the prevalence of disorders decreased as age increased [13]. In a similar study in Kermanshah, it was found that 11.2 percent of school age children had speech disorders, out of which 10 percent had articulation problems and 1.15 percent had voice disorders and no children with fluency disorders were found in this study. Also, in this study the prevalence of disorders decreased as age increased [6]. A study from Isfahan showed that frequency of articulation disorders was 40 percent, stuttering 33 percent, and delayed speech-language 27 percent [14]. In Yazd, Akavan Karbasi et al. found that 13.8 percent of first graders had articulation disorders, 1.2 percent had stuttering, and .047 percent had voice disorders [15]. To the best of our knowledge no study has been conducted on the prevalence of speech language disorders in Fars province, in particular Shiraz. Thus, to prevent, identify and plan for such disorders and their possible symptoms, early identification is vital [8, 7]. Therefore, the aims of this study were: 1) to estimate the prevalence of speech-language disorders in 4-6yearold children in Shiraz, Iran; and 2) to determine the relationship of these disorders with gender and age.

Methods

Participants

This cross-sectional study was conducted during the years 2012-16 in Shiraz, Iran (ethic code: IR.SUMS.REC.1393.5156). The population was normal monolingual Persian speaking children from 18 kindergartens of the four school districts of Shiraz, managed under the welfare organization. The inclusion criteria were: normal physical conditions in terms of movement skills, oral facial structures, dentition and hearing; and normal cognitive skills in terms of attention, memory, and learning. The children were excluded if they were not cooperative, had significant cognitive and/or physical problems, or if they were bilingual.

The sample size was calculated based on McLeod's report [11], and using the sample size calculation formula

$n = [(z)^2 \cdot P \cdot (1-p)] / d^2$, with $d=0.015$, $P=0.1$, $P=24.5$ and $z=1.96$, and type I error=0.05. Sampling method was through cluster sampling. After signing a written informed consent form by the parents or guardian of the children, 1588 children (761 girls and 827 boys with two age groups of 48-59 months and 60-72 months) were enrolled in this study.

Testing

Testing and scoring procedures were based on the Townsville District Screening [16] which was interpreted to Farsi. There were five examiners: four senior students majoring in speech therapy who were trained for the experiment by the investigator plus the investigator who has a Master degree in speech language pathology. As the test guidelines indicated, language areas were assessed, rated and scored objectively. Speech areas were assessed and rated perceptually according to the definitions provided to the examiners. The standard definitions were given to the examiners to ascertain uniformity of the diagnoses.

Testing method included describing four colorful serial pictures. The examiners collected language samples in a standard room (with minimum noise and suitable lighting) at each kindergarten. The children were individually examined. After that children were asked to listen to a standard explanation for the mentioned pictures given by the examiner. Then, the children were asked to recall the description based on the examiners. Hence, two description samples were presented by children and were transcribed to be scored during the test session.

Finally, in a separate task, articulation skills were double checked to assess the children's ability in producing Farsi language sounds in a different context. For this purpose, children had to name 25 black and white drawing pictures, and if they were not able to name the pictures, the child would repeat after the examiner. Responses to articulation test were transcribed phonetically by the same examiner.

Scoring

In a different time point, all language transcriptions were rated and scored on the scoring forms by the investigator (Copies of the English version and the translated version forms are provided in the appendix). The diagnoses for speech disorders were also transferred on the same forms. For scoring, the comment boxes that best described the participant's narrative were checked on the forms. These comment boxes included story organization, details, sentence structure (conjunctions, vocabulary, cohesion and grammar), and retelling story (to ensure the recall of the details). We assigned marks in each column out of the three columns from 0 to 2 points. The points were summed and the total score indicated the skill level. The levels were named as age appropriate, mild difficulty and significant difficulty, indicating level of speech language skills for each child.

The validity and reliability of English version of the test are not available. However, this project led the experimenter to objectively obtain reliability. All

testing contents and procedures were approved by three faculty members of rehabilitation department of Shiraz University of Medical Sciences.

Statistical Analysis

The diagnoses for different speech-language disorders were tallied. The data were presented using frequency and percentage. To evaluate the differences of the gender and age groups with the frequency of the disorders, Chi-square test was used. All the statistical analyses were performed, using SPSS (version 23.0 Amonok, NY: IBM Corp.). $P < 0.05$ was considered to be statistically significant.

Content validity of the test was determined prior to the experiment initiation. For content validity, copies of the original and translated version were separately given in different periods to three available experts, who were the faculty members at the rehabilitation department of Shiraz University of Medical Sciences and agreed to cooperate with the main investigator. These experts considered the validity by reviewing the original test and contents of the Persian version, and reached consensus about the contents and scoring procedures. Furthermore, the intrarater scoring reliability was obtained by selecting 140 score forms randomly, which were scored by the same rater similar to other forms. Using Chronbach's alpha, the reliability score was 0.77 which indicates that the scores are within acceptable limits.

Results

The results indicate that 53 percent of the 1588 subjects had at least one of the speech language disorders. As indicated in Table 1, the prevalence of articulation disorders is the highest among all speech disorders.

Next are fluency and voice disorders, respectively. Language expression disorders were more prevalent than language comprehension (Table 1, Figure 1). There were significant differences in articulation disorders, ($P < 0.001$), fluency ($P < 0.001$), voice ($P < 0.001$), and language expression ($P < 0.001$) between boys and girls. In other words, the prevalence of speech disorders was more evident amongst boys than girls. On the contrary, girls had higher language expression disorders (Table 1). No significant differences were found for language comprehension problems between boys and girls ($P = 1.00$, Table 1).

Significant differences were found for articulation and comprehension problems between the two age groups ($P < 0.001$). There were no significant differences for disorders of fluency, voice, and expression between the two age groups ($P > 0.001$, Table 1).

Discussion

This study showed a high prevalence of speech language disorders in the population of children aged 4-6 years old. Furthermore, significant correlation was found between the results of this study and other studies. The prevalence of speech-language disorders, shown in this study is similar to a recent study conducted in Brazil [17]. However, studies from other countries indicated lower prevalence rates [7-10]. In fact, sample size, age, language and socioeconomic backgrounds, as well as testing methods and diagnostic standards [6, 7] may make differences in prevalence rate.

The results of this study indicate that articulation disorders (40%) were the most frequent types of speech disorders among 4- 6 year old children in Shiraz. Fluency disorders (13%) and voice disorders (3.3%) are the next

Table 1: Frequency of Speech and Language Disorders and values for age and gender

Disorder	Frequency	Percent	P value for age	P value for gender
Articulation Disorder	635	40%	0.000	0.01
Fluency Disorder	200	13%	0.106	0.000
Voice Disorder	53	3.3%	0.098	0.000
Comprehension Disorder	35	2.2%	0.000	1.00
Expression Disorder	257	16.2%	0.633	0.000

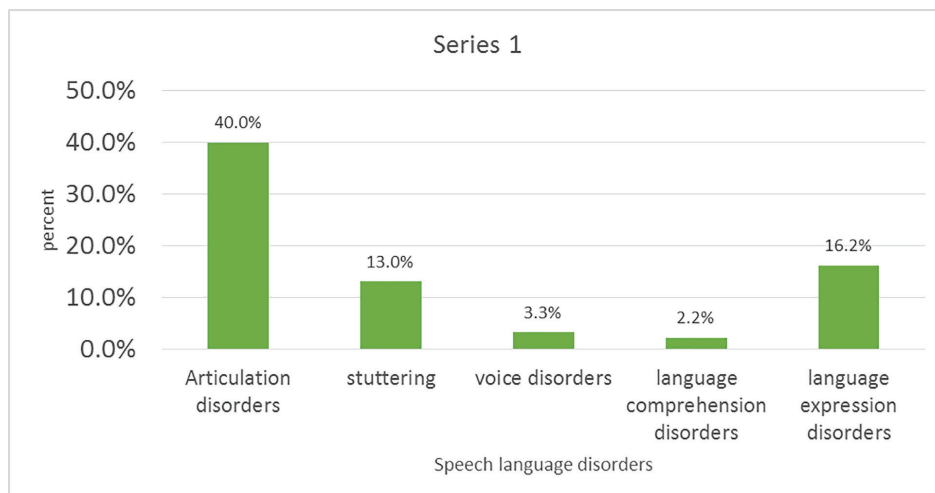


Figure 1: Percentage of Speech Language Disorders

frequent disorders, respectively. Language expression disorders (16.2%) were more prevalent than language comprehension disorders (2.2%). The prevalence rate of speech-language disorders in this study (Figure 1) correlate with the results of previous studies. Prevalence of articulation disorders has been found to be the highest type among all speech-language disorders [6, 8, 12, 14, 15, 18]. The next prevalent disorders as shown in this study, are fluency disorders and voice disorders respectively [6, 8, 12, 14, 15]. Language expression disorders were found to be more prevalent than language comprehension disorders. The higher prevalence of expression disorders could possibly be explained by the fact that children need more time and experience to improve their expression, and that development of comprehension precedes the development of expression.

Furthermore, the results showed that boys had significantly more speech language disorders than girls which correlates with the results of the previous studies by Yavari, Akhavan Karbasi, Black et al, and Bernthel, who indicate that communication disorders are more prevalent in boys than girls [13, 15, 19, 20]. In this study, it was found that articulation disorders, fluency disorders and voice disorders are significantly more prevalent amongst boys, which is in line with the results of McLeod et al, Shriberg et al, and Akhavan Karbasi et al [11, 15, 20]. Also, Black et al, West, Goldman, and Silva et al. reported more prevalence of stuttering amongst boys [18, 21-23]. Earlier findings showed that stronger recovery of stuttering in girls is a factor for lower prevalence of fluency amongst them [24]. Carding et al., and Martins et al. reported higher prevalence of voice disorders in males than females [25, 26]. In terms of language disorders, no significant differences were found between males and females for comprehension disorders, but for expression disorders girls exhibited significantly higher rate of disorders. Although during language acquisition girls have a slight advantage, results of different studies suggest that gender differences in language development gradually disappear, reaching similar performance [27]. Therefore, in line with the results, we can conclude that although language expression disorders of girls might be lesser than boys, language competency is similar in both groups.

The results of speech-language disorders in relation to the two age groups indicate that articulation disorders are significantly more prevalent in the younger age group (48-59 months) than in the older group (60-72 months). This is consistent with the reports that as children grow older, their speech sound disorders decrease [4, 20]. There were no significant differences between fluency disorders and voice disorders of the two age groups. Reports indicated that stuttering occurs more frequently between the ages of 2-6 [28, 29] which is in line with our results. Language comprehension disorders were significantly more prevalent in the younger group, as it is expected this group naturally has less exposure to language. There were no significant differences between language expression disorders of the two age groups.

Since it would be expected that the older group is better

in expression due to more experience and exposure to language, any conclusions on language expression disorder of the two age groups should be taken with cautious. None of the findings from the earlier researches supports the results of voice disorders when comparing the two age groups. The rates obtained in this study can only be specified in Shiraz. However the general results of this study which are in line with other studies are extensible to other places. The results of this study indicate that professional help and planning are essential for early diagnosis and treatment of speech language disorders. Further studies should use other methods to confirm the results of this study and perhaps to find the rates of prevalence for a different population.

Conclusion

The prevalence of speech language disorders was 53 percent which is fairly high. However, there are other studies that indicated different rates. Sample size, age, socioeconomic status, language background, studies design, and diagnostic standards might have made differences in rates of prevalence. There are several general points about all the mentioned studies: (1) as age increases the rates of different disorders decrease, (2) for most speech language disorders boys exhibit more disorders than girls, (3) most of the studies showed that articulation disorders were the most prevalent among all speech language disorders. Finally, the results of this study and similar studies indicate that professional help and planning are warranted for early diagnosis and treatment of these disorders.

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Conflict of Interest: None declared.

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