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Investigating Mean Length of Utterance (MLU) in Monolingual Persian Speaking Children with Autism Spectrum Disorder (ASD)

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Abstract

Background: *Mean length of utterance (MLU) is one of the most important measures in estimating language acquisition in children. The study of how language develops in these patients can be useful in providing effective treatment strategies. This study aims to investigate the developmental process of MLU in children with ASD and compare them with normal children.*

Methods: *This study is a descriptive, cross-sectional-quantitative one. The statistical society is all 3-6 years of children with ASD in Tehran, and the sample has been selected via cluster sampling among welfare organizations in region 6 (Mantaghe 6). The participants included 10 monolingual Persian children with ASD aged 3-6. In this research, the spoken utterances of children were recorded and transcribed in 30 minutes of free play sessions. The control group included 10 monolingual Persian children aged 2-5, with no previous linguistic and psychological disorders. Two groups were matched based on non-verbal IQ and gender.*

Results: *Based on the findings, the mean and standard deviation of MLU in autistic children were 2.5 and 1.24, respectively and the mean and standard deviation of MLU in normal children were 3.74 and 1.03, respectively. The results of T-test analysis showed a statistically significant difference between two groups with regard to the MLU (t (18)=-2.41, Pvalue=0.02). The results also indicated a statistically significant correlation between MLU and age in children with ASD (Pvalue=0.01, r=0.95) and in normal children (Pvalue=0.000, r=0.95).*

Conclusions: *The study showed that after controlling for vocabulary knowledge, non-verbal IQ and talkativeness, MLU was significantly lower in children with ASD than in normal children. The results also showed that MLU increases with increase of age in both groups.*

Keywords: Autism spectrum disorder, Language ability, Mean length of utterance
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Introduction

Autism spectrum disorder (ASD) is a group of abnormalities in which social, linguistic, communication and behavioral skills are delayed and deviated.[1-5] Among these disorders, autism, which occurs before the age of three, has received the most attention from researchers.[6,7] Autism is a group of neurodevelopmental disorders that manifests in three social, communicative and behavioral domains.[8] Symptoms are abnormal social interaction, delayed communication skills, and a limited set of activities and individual interests.[6,8,9,10] Communication disorders in these patients range from absolute silence at times to adequate speech but with poor communication skills. Many of these children are diagnosed with delayed language acquisition by their parents when referred by their parents,[11] and it seems that these stages of language learning are associated with early detection of the disease.[12]

Due to its severity, this disorder has a significant effect on the development of spoken and communicative language. Studies describing language in autistic patients have focused more on four areas: (a) the lack of verbal abilities (disabilities in speech-language acquisition throughout life) that occur in approximately 50-75% of people with autism,[13] (B) early disorders that are mostly related to words that are produced by normal children at the age of 12 to 18 months but produced for the first time in children with autism at the age of 35 months.[14] These types of linguistic delays are one of the diagnostic criteria used in autism; (C) abnormal features of language production such as echolalia and inappropriate language,[15] and (d) impairment in higher levels of discourse and cognitive usage.

Echolalia, which involves immediate echolalia, with a delay or repetition of the whole utterance and conversations without their analysis, is also observed in normal children. However, in children with autism, there is a higher frequency of echoes for a longer period of time. In fact, a large proportion of verbal production in many autistic children is echoed. Although the functions of echolalia are not well understood, one of its purposes can be communicative. For example, children may use echolalia of the conversation when they are not sure of their response to the other, in which case echoes the verbal role or the person tries to eavesdrop on information.[16] The use of jargon, or nonsense, has been widely reported in children with autism. Children with autism may use abnormal and inappropriate labels to name objects or even use nonsense terms instead of common meanings and associate expressions with abnormal meanings. Understanding language production may have several functions, such as echoes. For example, the inappropriate language may indicate the inability of an individual with autism to update their mental representations or use inappropriate language as a bridge when one is not confident about how they respond.[17]

In addition to phonics and inappropriate language, people with autism spectrum disorder who have speech often have a specific speech style that has special suprasegmental features. For example, their speech may be abnormally soft or most of the volume may be abnormally high; flat song; hoarseness; other features of their speech are very low.[18] Their speech also

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contains highly formal or precise words, neologisms, and the production of strange phrases.[16]

Research has also shown that areas related to language ontology, which use or use language as a social system to communicate, have been severely damaged in autistic patients. Higher speech levels in autistic patients are also impaired. These patients usually develop the following symptoms at these levels: Difficulty in speaking, interpreting sentences very literal (for example, they understand the literal meaning of metaphors and are unable to understand their metaphorical meaning and sense of humor; response to the conversation without adhering to Grecian maxims including (quantity, quality, manner, and relevance);[19] and difficulty in storytelling.[20,21] The likelihood of using words that are inappropriate in a particular situation level or in other words inappropriate in the register, in autistic people of all ages may lead to pedantic speech.[22]

Learning syntactic construction of language involves learning how to combine words to produce expressions, learning grammatical categories (such as nouns and verbs)[23,24] and learning to use grammatical elements in the language (such as morphs like -ing, ed). There are parts of words that convey the grammatical meaning of language in patients with autism spectrum disorder who have been seriously injured.[25]

To date, there have been numerous researches on language and its development in various groups of children and adults, including healthy children and adults and children and adults with language disorders around the world, in which many researchers have attempted to provide a quantitative indicator of language development which is easy to calculate. Data gathering that demonstrates child linguistic development is typically performed in two different ways: sampling natural speech (natural speech observation and children's conversations) and performing organized tests or experimental interventions.[26]

Morphological and syntactic analysis of children's verbal production is the main purpose of the spoken sample analysis. The best way to examine how a child produces language constructions is by sampling them during normal communication.[27] The following quantitative scales are commonly used to analyze linguistic samples: Mean length of utterance (MLU)25, developmental sentence score (DSS)[28] and index of productive syntax (IPS).[28,29]

The average length of utterance in children is one of the most important indicators in the process of language acquisition, which points to the number of morphemes in utterance produced by the child. The capability of this scale to measure the syntactic power is confirmed by previous research. Prior to the emergence of portable electronic devices for recording children's voice and then transcribing it, the average sentence length was considered to be "the most important criterion for judging a child's progress to an adult's level of linguistic knowledge".[30] They are generally evaluated to measure the average length of the first 50 or 100 utterance. Thus, the total number of morals produced is divided by the total number of utterances produced by that individual. The length of the utterance that is obtained by counting the number of morphemes is said to be an appropriate index for determining its syntactic complexity.[31] Brown published the results of his longitudinal study of the natural speech of three native American-English-speaking children, and for the first time used the use of punctuation counts as a simple indicator for evaluating syntactic development. She recorded two hours of children's natural speech each month during conversations with their parents. He outlined five steps for syntactic development in these individuals and found that there was a strong correlation between the mean tear length and the chronological age of the child.[25]

Different results have been obtained regarding the relationship between age and mean length of the utterance. Speech samples collected from 21 children aged 16-40 months were examined by de Villiers and de Villiers to investigate the order of acquisition of morbidity. The results of their study showed that the average utterance length cannot accurately predict the use of morphology in syntactic development.[32] Miller and Chapman studied 123 children aged 17 to 59 months who collected speech samples of children during play and conversation between mother and child. They reported that despite the positive correlation between chronological age and mean tear length (r=0.88), mean length was different in each child.[33] Dromi and Berman evaluated the mean length in 38 Hebrew-speaking 2–3-year-old children and concluded that more complex utterances were not necessarily longer.[34] Scarborough et al. suggested that the average utterance length increased by about 1.2 morphs per year from 18 months to 5 years of age, but that growth slowed after 42 months.[35] Klee and Fitzgerald concluded that vocabulary complexity can only be predicted in a child's language when the mean length of the utterance is greater than 3. Therefore, mean segment length is an impurity index in measuring syntactic development and cannot determine the structural complexity of syntactic and grammatical ability even in children with the same mean segment length.[36] Klee et al. studied the relationship between age and mean segment length in 24 normal children and 24 children with special language impairment. In children with special language impairment, it was significantly lower than the average utterance length in normal children. In their view, the average length of an utterance may only be useful in measuring the length of an utterance and may not be predictable in measuring other linguistic concepts.[37]

In Iran, one can also refer to the research done by Poladi and Khodam, who studied two groups of 48-54 months old and 54-60 month’s old normal children. The mean length of utterance in the first group was 7.09 and in the second group was 7.5. In this study, the relationship between chronological age and the average length of an utterance is mentioned.[38] In their research, Oriadi Zanjani and colleagues also examined the mean word length in 580 normal 2 to 5-year-old children in Semnan. In this study, the researcher did not indicate how many words the average length of an utterance had or how much the conversation had been calculated. The researchers used descriptive speech sampling and asking designed questions that some scholars believe lead to reduced children's verbal output. They point out that the average length of an utterance is said to increase with age in these children.[39]

Kazemi et al. can be described as the most comprehensive research on the average length of utterance in normal children.

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They estimated the mean utterance length in 171 2.5- to 5.5-year-old normal Persian-speaking children. Subjects were selected in a combined manner and categorized into six-month intervals. After informal interviewing and playing with the child to determine the natural developmental status of each child's cognition and language, linguistic samples of their interaction with the recording tester and then 75 clear, consecutive and more than one-word utterance were used to calculate the mean utterance length and mean and standard deviation of the mean. The length of the utterance was evaluated by children at 6-month intervals and their susceptibility to growth. They found that the average length of an utterance in children increased with age. The mean length of the utterance reported in their study was higher than that of the English study, and its relationship with age was also lower. They attributed this difference to the structural differences between the two related languages. The researchers have finally pointed out the relative capability of this scale as an indicator of linguistic growth in Persian.[40]

The average length of the utterance is also one of the valuable indicators in the study of children. This scale is used in medicine as a tool to diagnose language impairment in young children. The researchers have also suggested that the average length of an utterance can be used in various studies as a basis for comparing the results of language intervention in children with autism spectrum disorder.[41] Eigsti et al., by studying three groups of children with autism spectrum disorder, non-specific developmental delays, and normal children, concluded that the mean length of autobiography in the autistic group was significantly lower than two. There was another group. The mean length of an utterance in English-speaking children with autism spectrum disorder (2.97) was that of children with non-specific developmental delay (4.07) in normal children (3.6).[42]

In Iran, we can also mention a number of studies that have evaluated different language domains in children with an autism spectrum disorder. Some of these studies include research by Ferdowsi et al., Who investigated the effect of rhythmic singing on the speech quality of seven to ten-year-old Persian-speaking children. They selected 13 samples (nine non-verbal) at the Isfahan autism center as a sample. Their speech quality indices including the mean length of utterance, number of verbs, descriptive speech speed, and echolalia percentage were calculated by direct interview and transcription of speech samples. They double-checked all indices as pre-test and post-test. The researchers found that after using this method of continuous speech quality indices, the average utterance length, verb count, descriptive speech speed increased significantly and the echolalia or echolalia percent decreased significantly. In their research, the mean of this index in terms of morphology in the descriptive speech of 7-10-year-old Persian autistic children changed from 0.98 monogamy before singing to 3.78 monogamy after performing this method. The normal rate of this variable in children 41-46 months of age is about 3.5 to 4.5 morbidities; about 5.63 morbidity in healthy five-year-olds; about 4.5 morbidities in healthy four-year-olds; and in a descriptive speech in four to five-year-old Persian-speaking children. They reported about 6.1/6-74/15. According to the results of their study, it can be concluded that the average length of utterance in autistic children 7 to 10 years is much lower than in normal children.[43]

In another study by Asgari and Judge, the average length of an utterance in 10 children (8 boys and 2 girls) of Gorgan's 3-5-year-old autism who was selected using the available sampling method showed that the average utterance length in the age group of 3-4 years. It was 1.1 and in the age group of 4-5 years it was 1.6. The criteria for selecting people with autism are not mentioned in this study, and it is unclear at what level the control group used in their research is based on verbal and linguistic abilities.[44]

Studies on the mean length of utterance in children with autism spectrum disorder have yielded mixed and contradictory results. One of the main causes of variation in the findings of research on autistic children is, on the one hand, that patients' deficits due to deficits in the process of homogenizing autistic children are hidden.[16] Heterogeneous groups of children with autism are often compared with homogeneous groups of mentally retarded children. Since nonverbal abilities in children with autism are one of their strengths, and since groups are usually matched in terms of verbal abilities, there may be individuals in the autistic group who show delayed nonverbal ability. An incorrect adjustment process may hide the linguistic deficits (compared to other cognitive domains) of individuals with autism. On the other hand, most studies in Iran have not used reliable diagnostic criteria to diagnose autism, which may lead to incorrect conclusions about the abilities of this group of children.

Therefore, in the present study, to assess the average length of an utterance, subjects were recruited using high-reliability diagnostic scales such as the autism diagnostic interview (revised form), revised (ADI-R)[45] and the autism diagnosis monitoring program. Autism diagnostic observation schedule ™, second edition (ADOS ™ -2) are used.[46]

Other studies in Iran so far have not diagnosed this disease using these scales, and even if used, no such scales have been mentioned. A comprehensive examination of language in a sample of children with autism selected by standard diagnostic criteria compared to a group of normal children who match their gender and non-verbal intelligence needs to be done in Iran. The main purpose of this study was to evaluate the average length of an utterance in children with autism spectrum disorder selected by the above diagnostic scales.

Descriptive research is the basis of scientific work in all disciplines. Linguistic descriptions of children with autism can lead to a better understanding of the disease. This better understanding will enable different sections of the rehabilitation to treat these children more consciously. The present study, by examining the trend of mean split length in Persian monolingual children with autism spectrum disorder, aims to shed more light on this syntactic and developmental reference by referring to the dispersed and contradictory background of this scale in children with autism spectrum disorder. It works in children.

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Materials and Methods

This research is a descriptive-cross sectional-quantitative one. The statistical population of the present study was all children aged 6–6 years with autism in Tehran province and the sample of the study was selected through cluster sampling from welfare centers of district 6 of Tehran. The sample size of 10 children with autism was 3-6 years old. The control group also included normal or healthy children. These children had no history of mental illness or language disorders and were matched for a group of children with autism spectrum disorders in terms of nonverbal intelligence and gender. Their parents filled out a questionnaire on children's behavioral disorders, and all were informed that their child's speech would be used in the research. Children with autism were speechless and relatively high functioning, and their mean non-verbal intelligence was lower than average. Diagnosis of autism was performed by a psychiatrist using an autism diagnosis interview (revised form) and autism diagnosis monitoring program. These two scales were scored according to the fifth edition of the diagnostic and statistical manual of mental disorders (DSM-V) and the ICD-10 criteria for the diagnosis of autism. Only subjects whose initial growth and their level of functioning at the time of diagnosis met the exact criteria for autism on both scales were included in the study (table 1). These children were at least able to produce two-word phrases, 12 months had elapsed since the beginning of their speech, and none of them had Asperger's diagnostic criteria or penetrating developmental disorder. However, all autistic subjects had language impairments.

Subjects were grouped according to intelligence functions using the fifth version of Tehran-Stanford-Binet intelligence scales (TSB-5). Non-verbal reasoning includes three sub-tests of bead memory, copying, quantitative reasoning, and pattern analysis that are used to evaluate the intelligence functions of young children with developmental disorders[47] as well as for acquisition. The fourth version of the Peabody picture vocabulary test (fourth edition)[48] was used to ensure subjects' unity in terms of nonverbal verbal scales.[48] The results showed that there was no significant difference between the two groups according to age (table 1). Using these homogenization criteria, children in the two groups should be at the same level in terms of vocabulary they received, although they may have reached this level at different ages (the two groups were matched in terms of vocabulary, but differed in chronological age). The socioeconomic class was also assessed with the Hollingshead four-factor index (on this scale parental education and occupation vary from 8 to 66).[49]

Each child was given free play for 30 minutes. This was done in the second referral to the welfare centers (standardization and diagnostic tests were performed in the first session). There were toys and books by the governor's office in the playroom, and the children and the researcher started playing with these toys. Parents of children were outside the room during free play. Play sessions were usually fun for children. The whole video was filmed so that the children could not find the camera. The child was playing with a trained researcher or assistant. Although children were more comfortable with their parents, the presence of a partner to play with children in these two groups maintained the consistency of play sessions. The partner tried to encourage the child to participate in the game, but if the child did not start the game or if the game was stopped and the child was playing alone, he would use a number of incentives to encourage the child to play. The partner initially expressed his views on child activities with sentences such as "He looks like a big cow" and repeated this strategy up to five times. If the child did not respond, he would use a direct question such as "Where do you drive?" These two strategies were used intermittently, except when the child acted dangerous or inappropriate (climbing a bookshelf or throwing hard objects). In order to speak with the child, his partner would show him a number of picture books and encourage the child to describe the pictures in that book. All the children engaged in this activity for a few minutes. To analyze the data, the recorded speech of the children was transcribed first. Since there is no software for counting the morphemes of the Persian language and the linguists disagree on the morphology of the morals, the counting was done manually. The criterion for completing the sampling was 75 consecutive clear cuts. In order to calculate the average utterance length for each child, first, the number of utterances in the child's language sample was determined and then the number of morphemes according to the rules of Persian language. In the end, the number of morphemes was divided by the number of utterances to obtain the average length of the child morphemes by morph. To ensure the content validity of the selected criteria, several consultation sessions were held with two experts in linguistics. Several meetings were also held with the presence of examiners to uniform the sampling method and also to analyze the data.[50]

Table 1. Information about the research subjects

	Children with autism	Normal children	Differences between the two groups*
Number	10	10	
Average chronological age (by month), standard deviation within parentheses	(12/56) 55/2 72-36	(11/59) 43/2 60-24	
Stanford Binet nonverbal intelligence (Scale scores)	(14) 80 108-47	(8) 100 119-81	Autism children>normal children
Stanford Binet's nonverbal intelligence Age-adjusted scores (months)	(10) 42 62-28	(5) 43 55-33	
PBB Persian vocabulary test Age-adjusted scores (months)	(13) 41/2 68-20	(5/9) 48/6 60-34	
Socio-economic situation**	(10) 52	(13) 55	

*. Pvalue<0.05. **. The socioeconomic status of the subjects is estimated based on the Hollingshead four-factor index. The scores range from 8 to 66. Higher numbers indicate higher socioeconomic status.

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Table 2. Autism diagnosis scales in the autistic group

	Autism detection interview (revised form)	Cutting point A	Autism diagnosis monitoring program	Cutting point B
Relationship	(4/1) 151 22-6	7	(1/3) 6/7 9-5	5
Social interactions	(5/8) 18/6 25-10	10	(2/6) 10/7 15-7	6
Repetitive behaviors and interests	(2/5) 7/9 13-3	3	(1/2) 1/9 5-0	N/A
The emergence of differences (by month)	(6/7) 22/23			
Age at which 5 words were used meaningfully (by month)	(11/5) 28/5 49-10			
Time interval between first word evaluation and age of evaluation (in months)	(12/3) 28/7 46-4			

A. The cut-off point to detect autism spectrum
B. The cut-off point was not used here because it was possible to use the autism screening program to detect its diagnostic criteria without indicating repetitive behaviors or stereotyped interests
C. The average age at which parents notice the different and abnormal growth of their children. To diagnose autism, differences must occur before the age of three

To ensure the reliability of the recorded data, free play sessions were transcribed by a researcher and a linguist, and finally re-examined by the researcher himself. Since the tester had interviewed parents and associated with the subjects during the game, he was aware of their developmental status when transcribing utterance. Therefore, maintaining a high standard for reliability between the naive and non-naive coders was important. Following Auguste et al. (2007), 8% of free playback recordings (equivalent to 6 videos) were coded separately by coders to ensure their reliability. Word reliability (product-moment correlation coefficient) r=0.90, 2.8 (1) =98x, Pvalue=0.01.[51] Descriptive statistics (mean and standard deviation) and inferential statistics (independent t-test and Pearson correlation) were used to report the data.

Results

In the present study, descriptive and inferential statistics were used to analyze the data. To describe their data prior to statistical analysis, the researcher examined the distribution of the dependent variable to assure that the data were normal and confirmed their normal distribution. The performance of each of the research subjects was shown in separate tables based on the average length of the utterance according to their age. Then calculate the mean and standard deviation of the mean length of an utterance in each group. Then, the correlation between mean length of utterance length and age variable was calculated and mean changes of utterance length and its growth trend in both groups of normal children with autism spectrum disorder according to the six-month intervals are presented in tables and graphs.

The subjects were evaluated according to the average length of the utterance. In tables 3 and 4, we can see the average length of speech in subjects with autism spectrum disorder and normal children by chronological age.

Table 3. Mean utterance length in children with autism

Children with autism	
Average utterance length	Age of child with autism in months
2.81	60
1.52	48
4.52	72
2.50	54
4.26	72
1.67	48
2/93	66
1/97	42
2/53	54
0/35	36
(1/24) 2/50 4/52-0/35	55/2

Table 4. Mean utterance length in normal children

	Normal children	
	Average utterance length	Normal children age by month
1	3/9	48
2	2/4	24
3	2/5	30
4	4/7	54
5	4/4	54
6	3/4	42
7	3/2	36
8	3/3	36
9	3/8	48
10	5/8	60
Average rang variation	(1/03) 3/74 2/4-5/8	43/2

Table 5. Mean values of utterance length in terms of morpheme at six-month intervals in children with autism spectrum disorder

Age range (month)	Number	age average	Average utterance length	Standard deviation
36-42	2	39	1/16	1/14
42-48	3	46	1/72	0/22
48-54	3	51	2/05	0/53
54-60	3	56	2/61	0/17
60-66	3	63	2.87	0/84
66-72	4	70	3/90	0.85

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Table 6. Significant level of observed differences between different age ranges in children with autism spectrum disorder

	36-42	42-48	48-54	54-60	60-66	66-72
36-42		0/43				
42-48			0/36			
48-54				0/14		
54-60					0/15	
60-66						0/20
66-72						

Table 7. Mean values of utterance length in terms of six months intervals in normal children

Age range (month)	Number	age average	Average utterance length	Standard deviation
24-30	2	27	2/45	0/07
30-36	3	34	3	0/43
36-42	3	38	3/3	0/10
42-48	3	46	3/7	0/26
48-54	3	51	4/20	0/42
54-60	4	55	4/8	0/66

Table 8. Significant level of observed differences in mean utterance length between different age ranges in normal children

	24-30	30-36	36-42	42-48	48-54	48-60
24-30		0/19				
30-36			0/31			
36-42				0/07		
42-48					0/13	
48-54						0/36
54-60						

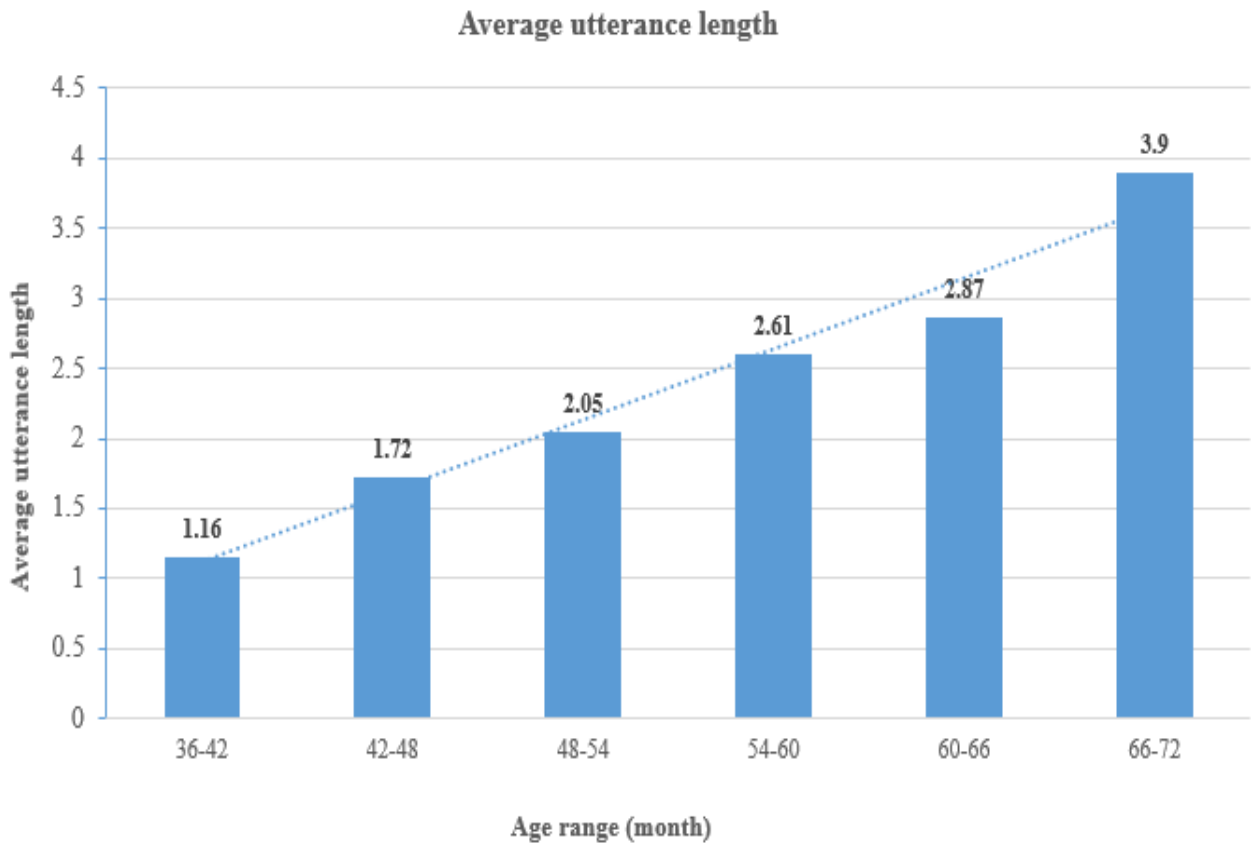

Figure 1. Trend of changes in mean utterance length in terms of autism spectrum disorder in 24-60 month-old children

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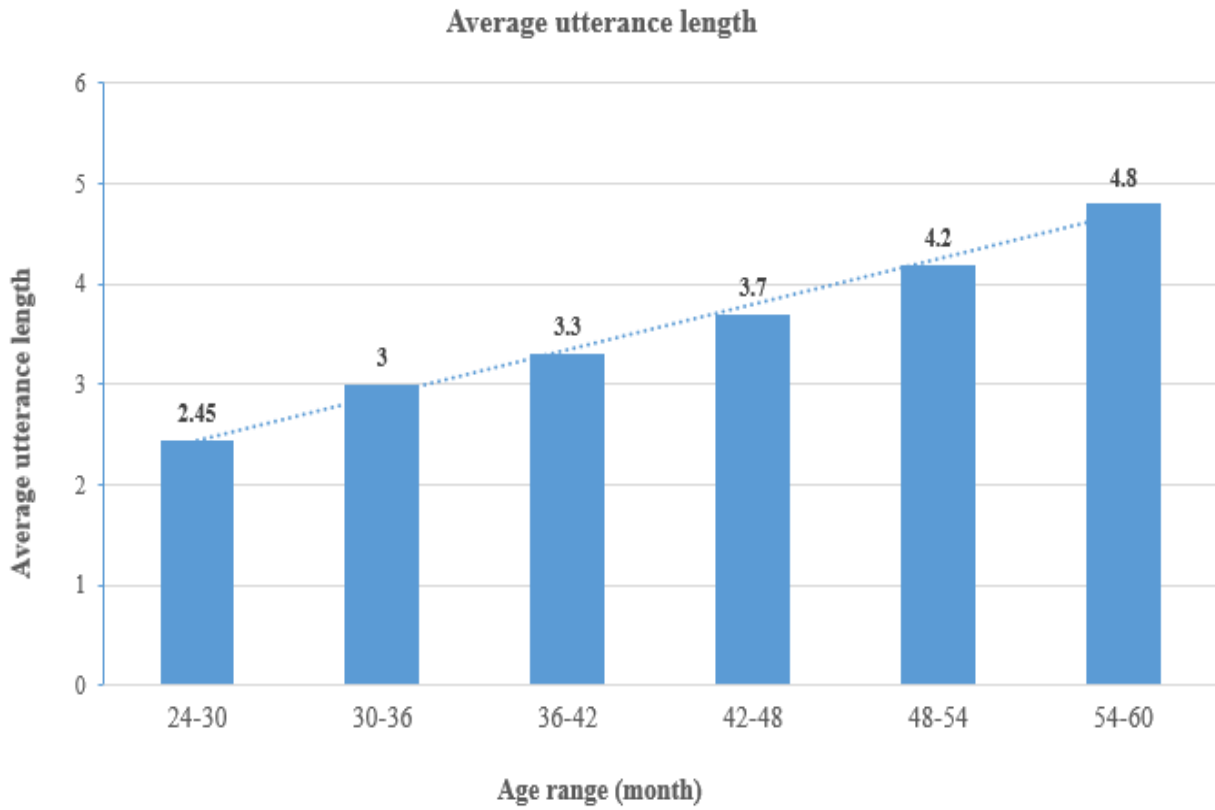

Figure 2. Trend of changes in mean utterance length in terms of morphemes in 24-60 month-old normal children

Discussion

The purpose of this study was to investigate the mean length of utterance in 6-6 year-old boys with autism spectrum disorder and to show a general delay in development of this index in these children compared to normal children. To this end, these children were compared with a group of natural Persian-speaking monolingual children who matched each other in terms of nonverbal intelligence, lexical knowledge, and gender. The subjects' vocabulary was evaluated in two groups using PDB visual vocabulary test.

The most important finding of this study was the apparent delay in autism spectrum disorder group. The findings of the present study, are in line with the findings of other researchers, such as Eigsti et al.[42], showed that after controlling for verbal knowledge and non-verbal intelligence and overall ability to produce speech in the group with autism spectrum disorder, their language production was compared to their level of natural development. The average length of the utterance was much weaker. The mean utterance length as a measure of linguistic development indicated a delay in syntactic development in autistic children compared with the control group.

The findings of the present study, also in line with the findings of research on normal children, showed that with increasing age the average length of utterance in each normal child increased.[33,35,38,40] This indicates a correlation of this scale with the age of the child in this group of children. The results also agree with the findings of Asgari and Judge's study showing that the average length of the utterance increased with age in the autistic spectrum group.[44] Overall, according to the results of the present study, the average utterance length can be used as a measure to assess language development in both groups of children.

The sensitivity of the age-fragmented mean length scale to the findings of this study indicated its relative ability as a language indicator for children with autism spectrum disorder as well as their normal counterpart children in terms of nonverbal intelligence, lexical knowledge, and gender. However, to further confirm this conclusion, it is recommended to conduct similar research in age groups.

It is important to note that the average utterance length can only predict the delay in syntactic development and complexity of syntactic constructs produced by preschoolers and children and adults with language delays, fragility x syndrome, Down syndrome, and autism. Researchers have suggested that another index, the syntactic index, should be used to assess the bias in the natural process of syntactic structures.

There are many factors contributing to the improvement of the language abilities of children with autism. Early language learning, learning time, parent-to-child communication, cognitive skills, and non-verbal intelligence are all effective interventions that include speech interventions to increase

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vocabulary storage, improve communication skills, increase speech length, focus on listening and use of phonics. Reading and writing is for communication purposes.[44]

According to many speech and language pathologists, the first three years of life play an important role in the development and development of auditory, speech and language skills. Which illustrates the need to design early intervention programs and their impact on the average length of an utterance.[44]

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Conflict of Interest

The authors declare that they have no conflict of interest.

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