

Oral Stereognosis Ability Among Boy Students with Down Syndrome with Mental Age 3 to 5 years Old under Special Education

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Down syndrome (DS) is prevalent among the reasons of mental disability and several researches have been done on it¹ on the present study aims to evaluate the oral stereognosis among individuals with Down syndrome with mental age 3 to 5 years old and its comparison with the similar age group. This study is on 60 students in two groups; control (N:30) and Down syndrom (N:30). The test was consisting of some objects randomly being placed into the mouth of some individuals to identify its form among three pictures and then the correctness and incorrectness of the questions with the time to present each object to present the first response by an individual was calculated. By the increase of the mental age of the children with Down syndrome, oral stereognosis ability is fixed from 3 to 5 years and the increase of the number of correct identification was not significant ($P > 0.05$). By the increase of mental age from 3 to 5 years, the time spent on stereognosis was reduced significantly ($P < 0.05$). The number of correct identification among the children with Down syndrome was significantly less than healthy control group with the same age ($P < 0.05$). There was no significant difference between the identification time in both groups ($P > 0.05$).

Key words: Oral Stereognosis ability, Down syndrome, Special education, Intra-mouth senses, speech therapy, speech disorder.

Stereognosis is the ability to recognize the shapes of objects and is a component of the epicritic sensations which involve fine aspects of touch and include the ability to identify the position that is touched (topognosis), discern vibration and determine its frequency and amplitude, and also to

resolve by touch spatial details such as the texture of surfaces and two-point discrimination².

Oral stereognosis is placing the object into the mouth of a person to recognize its shape³. Voice and speech production, taste and hearing senses are closely associated with stereognosis issue. It seems that gender is not effective here^{3,4}. Oral Stereognosis is an important sensory function in speech production. There is an association between speech production disorder and the low oral stereognosis ability. (Ringel) *et al.* showed that

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there was a direct association between production disorder and disorder severity in oral stereognosis⁵. A research was conducted on 10425 Australian students of elementary school; the general prevalence of voice production disorder was 1.06%⁶. A research was done by Bakhtiari *et al.* and it was shown that children with hearing dysfunction had low oral stereognosis ability compared to the healthy group peers. They found that in children with hearing dysfunction, as speech was used less and speech voices were not grown, the intra-mouth sensory receptors were not stimulated enough and it led into sensory dysfunction and it was a negative effective factor on their speech production.

A study was performed by Sadollahi (1998) and it was shown that oral stereognosis performance in children with production disorder aged 7 to 10 years was weaker compared healthy children with the similar age⁷. Another study was performed by Derakhshande *et al.*, (2003) on the children with cleft palate aged 5 to 8 years had significantly weak oral stereognosis performance compared to healthy children⁸.

Among the mentally retarded children and adults, production disorder is prevalent compared to the mentally healthy individuals. A study was performed by Wilson and it was shown that 53.4% of 777 mentally retarded children had speech disorder. The disorder prevalence was dedicated to sensory perception and senses physiology dysfunction of the patients compared to the healthy individuals and this showed the effectiveness of other factors leading into speech disorder in mentally retarded individuals. False answers and oral mistakes among mentally retarded individuals reflected the delicate disorder in sensory-motor systems of the individuals⁹. Down syndrome is prevalent among the mental disability reasons and no exact studies have been performed on stereognosis ability on this group, the current study was conducted to evaluate the oral stereognosis ability among the individuals with Down syndrome aged 3 to 5 years and it was compared with the peer group.

METHOD

The present study is a descriptive-analytical cross sectional design conducted on 60 boy students. The subjects were divided into two groups: control group (30 people) and Down

syndrome group with mental age 3 to 5 years old (30 people) and they were selected randomly. Each group was divided into three age groups 3, 4, 5 years old and there were 10 people in each subgroup and the test was done on each child separately. The inclusion criteria regarding the healthy children were as following: No vivid speech disorder, no dentofacial dysfunction, no apraxia, sight problems and cranial nerves dysfunction and natural intelligence being determined by visiting them and reviewing their health file in the school.

The inclusion criteria regarding the children with Down syndrome were the lack of severe sight dysfunction, structural and performance problems in speech organs.

The objects applied in the test were made of orth acrylic in dental laboratory. It is non-toxic with no side-effects in contact with the mouth. To sterilize the objects, Renuew was applied. The objects were secured with thick nylon threads to prevent accidental swallowing and when the objects were placed into the mouth, the secure threat was outside of the mouth.

Initial stage (preparation)

Draw-a-person test was used to verify the mental age. Then the mouth-dentofacial conditions were evaluated by the tester.

Second stage (recognition sensory test)

In this stage, three separate figures were applied and at first the subject was asked to identify the shape of the objects by seeing them and then the objects were placed into his mouth and he was asked to correlate the shape of the test piece in the mouth with the one on three figures in front of him. After being ensured that the subject perceived the test well, recognition sensory test was done. In this stage, the objects were placed on the table in front of the child as three choices being defined already and they were in the distance of 35-40 cm from the child to see them. This was applied similarly for all the children and the test was performed after being ensured of the child vision. The objects were placed randomly inside the mouth of each subject. Since the placement of the object on the tongue, the time was recorded. The child was free to keep the object to any time he wished. By presenting the first response, the time was recorded again and 10s relapse was considered to show the next object. Based on the dimensions being perceived from the object, the child was asked to match it with one of

the objects being placed in front of him.

Scoring

A score was considered for each correct response of the child and no score was considered for incorrect answer or no response. The time being dedicated to identify the object was calculated and the results were recorded in response sheet. The positive or negative score were recorded in the sheets and the total score was giving to the child and it showed the shapes identification ability score. To increase the validity of the results, after the first test and subject resting for 15 min, the test was done again and in case of the change of the result, the figure was re-tested and twice repeated response was considered as the final answer.

For data analysis, kolmogorov-smirnov, Shapiro-wilk, t-test, chi-squar, kruskal-

wallis, ANOVA, scheffe tests were applied and SPSS software was used. It was significant at level $P < 0.05$.

RESULTS

Stereognosis ability was conducted on 60 boy students and the results showed that by the increase of mental age of the children with Down syndrome aged 3 to 5 years, the oral stereognosis was fixed and the increase of the mean of the number of correct identifications was not significant (Table 1). The number of correct identifications among the children with Down syndrome was significantly less than healthy control group ($P < 0.05$) (Table 2).

Table 1. Comparison of the average number and spent time for object identification among individuals with mental age 3 to 5 years old with Down syndrome (year 1380)

Indicator	Mental age	Mean	S.D	Min	Max	P-value
Number of correctly identified objects	3	8.9	4.43	3	14	0.369
	4	10.1	4.09	5	16	
	5	11.5	3.57	7	18	
The time spent for object identification	3	11.91	4.48	6/99	19.56	0.007
	4	7.43	2.24	4.59	11.41	
	5	7.71	2.51	3.85	12.57	

Table 2. Comparison of the average number and spent time for object identification among individuals with mental age 3 to 5 years old with Down syndrome and their healthy peers (year 1380)

Indicator	Subject	Mean	S.D	P-value
Number of correctly identified objects	Down syndrome	10.17*	4.05	0.001
	healthy	12.65	3.69	
The time spent for object identification	Down syndrome	9.02	3.75	0.459
	healthy	8.53	3.57	

* $P < 0.05$: The significant difference in number of correct identifications with the healthy peers group

By the increase of mental age from 3 to 5 years, the time spent on stereognosis was reduced significantly ($P < 0.05$) (Table 1).

The mean time spent for identification in both groups of healthy children and the children with Down syndrome was not statistically significant (Table 2).

DISCUSSION

The results of the study showed that oral stereognosis ability is an indicator for the function of intra-mouth sensory function among the children with Down syndrome aged 3 to 5 years weaker than their peers in control group. By the increase of mental age of the children with Down syndrome

from 3 to 5 years, the oral stereognosis ability was fixed and the time spent on stereognosis is reduced significantly. The present study aimed to evaluate stereognosis ability among the children with Down syndrome because production disorder is prevalent among mentally retarded children and as Down syndrome is the most prevalent reason of mental disability and not study was performed about stereognosis ability on this group, these patients were selected. Most of the infants and children with Down syndrome were more sensitive to touch senses and they didn't want to be touched and it is called sensory defense. It was shown that after oral naturalization, these individuals could touch in the mouth and tongue and voice product was increased among the children and motor-oral skills instruction program was begun. In the current study, the children with Down syndrome aged 3 to 5 years had weak oral stereognosis ability in identification of the objects inside the mouth compared to the healthy peers.

The results of Wilson study conducted on 777 mentally retarded children showed that 53.4% of the individuals had speech dysfunction¹⁰. The findings of the study are consistent with the current study.

A study done by Mazloomi (1996) showed that the children with cerebral palsy aged 8 to 13 years had weak performance compared to the healthy children with the similar age in oral stereognosis test. Based on the sensory perception and sensory physiology dysfunction in this group, the results of the study were consistent with the current study performed on the children with Down syndrome¹⁰.

It was shown that there was no significant difference between the number of correct identification among the groups aged 3, 4, 5 mental year with Down syndrome. It means that by the increase of the age of the children with Down syndrome, the shape form identification ability don't increase while the ability was significantly increase by the age increase. The current study results were consistent with the study done by Farhangdoost. A study done by Farhangdoost evaluated the oral stereognosis ability among the healthy children aged 3 to 5 years and it was shown that by the increase of age, the objects identification ability was increased¹¹. Saadollahi rejected the relationship between the age and oral

stereognosis among the children aged 7 to 10 years with oral disorder. The results were consistent with the results of the current study⁷.

By the increase of mental age of the children with Down syndrome aged 3 to 5 years, the time spent on objects identification was reduced. The results were consistent with the study performed by Farhangdoost and it showed that by the increase of age among the children aged 3 to 5 years, the time spent for identification was reduced¹¹. The reduction of time is justified as by the increase of age among the healthy children and the children with Down syndrome, the data processing speed in central neuron system was increase and the perception and behavioral growth was increased among the children of both groups consistent with their mental age.

CONCLUSION

As the children and adults with Down syndrome have production and speech disorder, one of the important reasons of production disorder is oral spatial perception weakness and intra-mouth sensory disorder. Thus, in speech therapy program, the correction of intra-mouth senses is one of the main goals of the treatment.

REFERENCES

1. Tahir M. Malla, P.S.A.N.G., Dermatoglyphic variations among clinically diagnosed Down's syndrome cases: A cohort study. *Biomedical and Pharmacology Journal India*. 1(2).
2. Koczowski, M., W. Wozniak, and R. Koczowski, Impairment of the oral stereognosis in the partial anterior open bite. *Folia Morphol*, 2006; 65(3): p. 221-4.
3. Crum, R.J. and R.J. Loisel, Oral perception and proprioception: a review of the literature and its significance to prosthodontics. *J Prosthet Dent*, 1972; 28(2): p. 215-30.
4. Mantecchini, G., *et al.*, Oral stereognosis in edentulous subjects rehabilitated with complete removable dentures. *J Oral Rehabil*, 1998; 25(3): 185-9.
5. Ringel, R.L., *et al.*, Some relations between orosensory discrimination and articulatory aspects of speech production. *J Speech Hear Disord*, 1970; 35(1): 3-11.
6. McKinnon, D.H., S. McLeod, and S. Reilly, The

- prevalence of stuttering, voice, and speech-sound disorders in primary school students in Australia. *Lang Speech Hear Serv Sch*, 2007. **38**(1): p. 5-15.
7. Saadollahi, A., The determination of oral stereognosis ability among the children with production disorder compared to healthy children aged 7 to 10 years. Elementary schools of Semnan. 1998, Iran Medical Sciences University: Tehran.
 8. Derakhshande F, *et al.*, The study and comparison of the mean score of oral stereognosis among the children with cleft palate and healthy children. *Empowerment journal*, 2003; **3**(12): 28-33.
 9. Jonson, J., The nature and treatment of production disorder. Tehran: *Medical Sciences University Publication of Iran*, 1989.
 10. Mazloomi, M., The study of oral stereognosis of the children with cerebral palsy aged 13 years and its comparison with healthy children, in the third congress of speech therapy of Iran. 1996: Iran.
 11. Farhangdoost, H., The determination of the ability of psychological oral perception among the healthy children aged 3 to 5 years of kindergartens of Tehran., Well being and empowerment Sciences University: tehran, 2001.