

Araştırma Makalesi

# Prevalence and Relationship of Drooling Severity with Movement and Behavioral Characteristics of Handicapped Children in Rehabilitation Centers of Tabriz

Tebriz Rehabilitasyon Merkezlerinde Engelli Çocukların Hareket ve Davranışsal Özellikleriyle Salya Akımının Görülme Sıklığı ve İlişkisi

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## ABSTRACT

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**Purpose:** The aim of this study is to determine the prevalence and statistical significance of the issue in children with disabilities in Tabriz and correlation of it with muscle tone and social maturity. **Material and Methods:** The population was selected randomly out of the children in rehabilitation centers in Tabriz (176 subjects). Rate and severity of drooling and muscle tone were evaluated besides the social Maturity of the aforementioned children. Social Maturity was assessed by the standard Vineland Social Maturity Scale, intensity and rate of drooling by Tomas-Stonell and Greenberg questionnaire and muscle tone by using the Ashworth Scale. **Results:** Prevalence of drooling was identified in 79.35% of the studied population and a significant relationship between social Maturity and drooling ( $p < 0.01$ ) and also between abnormal muscle tone and drooling ( $p < 0.01$ ) was gained as a result. **Conclusion:** The high prevalence of drooling in this group of children implicates the need for special management and treatment planning in this regard. The revealed relationship between drooling, social interaction and muscle tone shall emphasize their role in treatment, rehabilitation and enhancing independence and quality of life for these children.

**Keywords:** Sialorrhea; Social intelligence; Muscle tonus; Disabled children

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## ÖZET

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**Amaç:** Bu çalışmanın amacı, Tebriz'de engelli çocuklarda salya akmasının önemini, istatistiksel yaygınlık özelliklerini ve kas tonusu ve sosyal olgunluk arasındaki korelasyonu belirlemektir. **Gereç ve Yöntem:** Tebriz rehabilitasyon merkezlerinden 176 çocuk rastgele seçildi. Salya akmasının oranı ve şiddeti, kas tonusu ve sosyal olgunluk değerlendirildi. Sosyal Olgunluk için standart Vineland Sosyal Olgunluk Ölçeği, kas tonusu için Ashworth sistemi ve Thomas-Stonell ve Greenberg anketiyle de salya akımının oranı ve şiddeti değerlendirildi. **Sonuçlar:** Salya akması yaygınlığı örneklemin % 79,35'i olarak tespit edilmiştir. Sosyal Olgunluk ve salya akması arasında ( $p < 0.01$ ) ve anormal kas tonusu ve salya akması arasında ( $p < 0.01$ ) anlamlı ilişki olduğu görüldü. **Tartışma:** Engelli çocuklarda salya akmasının sıkça rastlanan bir problem olması müdahale programlarında bu soruna yönelik tedavi yöntemlerinin uygulanması gerekliliğini göstermektedir. Ortaya çıkan salya akmasıyla, sosyal etkileşim ve kas tonusu arasındaki ilişki, tedavi, rehabilitasyon ve bağımsızlık ve yaşam kalitesini artırma önemli role sahip olabileceği düşünülmektedir.

**Anahtar Kelimeler:** Sialore; Sosyal zeka; Kas tonusu; Engelli çocuklar

In the literature, the incidence of drooling has been conducted on children with disabilities in few studies. In population of children with cerebral palsy prevalence of drooling is 10 to 37.5 and in some cases has been reported up to 58% (1; 2; 3).

Different statistics on the prevalence, importance of learning, cognition, and drooling in mental problems and lack of associated studies pointing to the factors such as drooling intensity, muscle tone, IQ and social disability, are the main reasons for proceeding this research.

Drooling means losing the oral content and water by pouring from mouth (4). Sometimes "Sialorrhoea" is used rather than the word "drooling". Sialorrhoea is defined as chronic and intermittent increased salivation, while in drooling usually secretion rate is normal but due to the inability to coordinate and proper control of the oral muscles and tongue, oral secretions accumulate in the oral cavity and lead to the pouring. (5; 3)

Saliva prevents the mouth and tooth infections due to its immunoglobulin content and pH, it helps swallow, carbohydrate digestion and speech (6), but runny mouth is a serious medical and social problem, common in children having neurological disorders (mental retardation and cerebral palsy) and adults diseases (Parkinson and stroke) (4) that can cause stress for them and change different aspects of person and family life and therefore requires special attention and team treatment holistically (7; 8; 9) salivation increment is usually compensated by increasing the ingestion times, if it is not compensated properly, it may cause drooling (6).

This problem is often due to poor oral stage of swallowing and muscle control in the face and mouth with predisposing factors such as increased secretion, impaired teeth occlusion, the position of the head and neck, inability to detect salivary flow (sensory problems), poor coordination and muscle strength in the lips, inability to effective closing of mouth or the inadequate frequency of swallowing and aspiration (2) however in many cases the cause is multi factorial (6; 10; 11; 12; 13).

Drooling is normal up to the age of 18 months and in some cases it has been observed in healthy children up to the age of 5 (1; 7) but after that

it may lead to physical problems such as wetting the lips, face, and clothing, and is a feature of social ridicule. Drooling, causes various problems such as lip cracking, fungal infections (*Candida*) at the corners of the lips and mouth, loss of body water, and the stench and social tags often can be a problem for the child and his family. Especially in preschool ages, it can lead to lack of appropriate social interaction with peers, (5; 6; 10; 11; 13; 14), and many clinical and psychological disorders; sadness, isolation and silence, mockery and embarrassment (6; 10; 14) are common social and emotional problems (10; 12; 15) Moreover, loss of saliva leads to many problems in the care of children, and social interaction in the family (9). The most important influence is on children's health problems and social development and quality of life (4; 10). The research indicated that the use of effective therapy for the reduction of water loss dramatically increased the social interactions of these individuals (5; 8; 16)

Studies in this area have shown that the amount of saliva in children with cerebral palsy isn't higher than normal (2; 5; 8) and there isn't any difference between secretion of saliva in healthy boys and girls of school age. Among the previous articles there has not been any study reporting on the relationship between the frequency and severity of drooling with handicapped children's associated problems and its importance.

In the associated studies the prevalence of drooling in children have been expressed 1 to 5 cases per 1000 children (3) and in the population of children with cerebral palsy 10 to 37.5 percent have been mentioned (6; 11; 13; 14; 15; 17) and even in some studies 58% of patients with cerebral palsy were affected by drooling (1).

The aim of this study is to determine the prevalence and statistical significance of the issue in children with disabilities and correlation of it with muscle tone and social maturity.

As mentioned above several factors can cause loss of saliva. There are different prevalence statistics in drooling of cerebral palsy children that indicate impact of the multiple factors which have not been considered in previous studies. This study was carried out to understand the importance of effective treatments, influencing concomitant factors and also providing fields for

further researches. In this study relationship of intensity and frequency of drooling with social intelligence and muscle tone in the study population is studied.

Investigated extents of the problem in society of people with disabilities will help future work in improving the life quality of the children (18). The study wasn't designed to determine the cause and effect relationship and only the relationship between the variables has been checked.

## MATERIAL and METHODS

This was a cross sectional descriptive study assessed in pre-school education and rehabilitation centers for disabled children in Tabriz chosen as the study group.

Data on children were collected from two rehabilitation centers in Tabriz, which was divided into groups, and after removing the outliers of age and anatomical problems of the mouth of 180 clients, study was done on 176 clients.

For evaluating the feature of drooling in children in different categories, the questionnaires of intensity (Tomas Stonell and Green berg) and frequency were graded by instructors of the rehabilitations centers.

Among the classifications of the severity of drooling, Thomas-Stonell and Greenberg in 1988 four defined five grades (1) (Table 1).

**Table 1.** Drooling severity classification according to ThomasStonell and Greenberg.

Grade	Description
1	Dry, no drooling
2	Mild: humid lips only
3	Moderate: humid lips and chin
4	Severe: clothing begins to be affected
5	Profuse: clothes, hands and objects are wet

To check the reliability of the questionnaire, also 63 questionnaires were already completed by parents of the children (test-retest).

Questionnaires of disability types and diagnosis, muscle tone and Vineland Social Maturity Scales of children were completed respectively by pediatrician and expert occupational therapists and psychologists of rehabilitations centers.

Evaluation of oral health and medications' adverse effects were evaluated by a dentist and physician.

## Sampling:

The target population was the disabled children affiliated to Tabriz Welfare Learning centers and the required sample size was taken 138 people considering the previous studies and assuming the  $\alpha= 95\%$ ,  $P= 10\%$  and  $D = 0/05$ . ( $N = Z^2 \times P \times (1-P) / D^2$ ). The cluster sampling was done by selecting two out of the nine centers in the city by random numbering.

## Entrance criteria:

- 1) Ages above 3 and below 16
- 2) Existence of physical problems (cerebral palsy), mental retardation problems or both.

## Exclusion criteria:

Due to this being considered as a descriptive study and lack of specific criteria in the literature, some cases of people taking drugs affecting saliva or causing dental problems were eliminated from the study. Also, some cases were excluded because of ethical issues and unconditional freedom of patients.

## Special terms:

- 1) Drooling: the loss of water content of the mouth and dehydration.
- 2) Type of disability: considering the etiology of disability categorized as cerebral palsy (mental and physical), mental (unknown causes), autism, micro cephalic Down syndrome.
- 3) Vineland Social Maturity: communication skills and social skills rate gained from Vineland Social Maturity Scales.
- 4) Muscle tone: divided into normal and abnormal types (Hypotonic - Hypertonic - Athetoid and Mixed).

## Data analysis:

Descriptive statistics included means, standard deviations, frequencies, and related charts.

Statistical analysis for our qualitative and ordinal data included *Kappa* and *Spearman correlation* tests to examine the relationship between drooling and other factors (muscle tone, and

social maturity scores) were used. The operation was performed using the statistical software SPSS version 13.

**Ethical considerations:**

This study is not having any conflict with specific ethical or moral issues in previous studies. However, the clients were informed and the written consent was obtained. And it was confirmed by Tabriz University of Medical Science and Faculty of Rehabilitation’s Research Committee.

**RESULTS**

Among the 176 disabled children with the average age of 7.82(SD: 3.6) and social maturity average of 44 (SD=22. 6), 112 of them were boys (average age of 8.07) and remaining 64 were girls (average age of 7.39). Etiology of the disability in terms of its frequency in the studying population is shown in chart 1.

According to the drooling questionnaires 63 of the individuals were suffering from drooling while 113 people were not. To check the reliability of the questionnaire, the questionnaires were filled out by 63 mothers of the clients, values of 0.97 and <0.01 obtained respectively for r and p. Drooling intensity distribution is presented in chart 2.

Among all the subjects, 131 had normal muscle tone, 45 had abnormal tone and among them 29 patients had drooling.

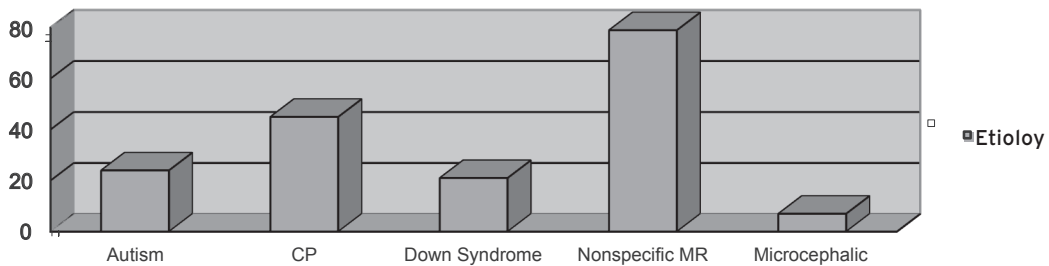
Age and social maturity of subjects in both with and without drooling groups were compared by Mann Whitney test and the results are presented in Table 2.

Relationship between drooling and muscle tone was assessed by chi-square test and cross-table test output shows that there are significant relationships between variables, drooling, and muscle tone ( $p < 0.01$ ,  $df = 1$ ,  $X^2 = 21.59$ ). The relationship between gender and drooling was assessed by this method but there was no significant relation between these two variables ( $p > 0.05$ ,  $df = 1$ ,  $X^2 = 1.63$ ).

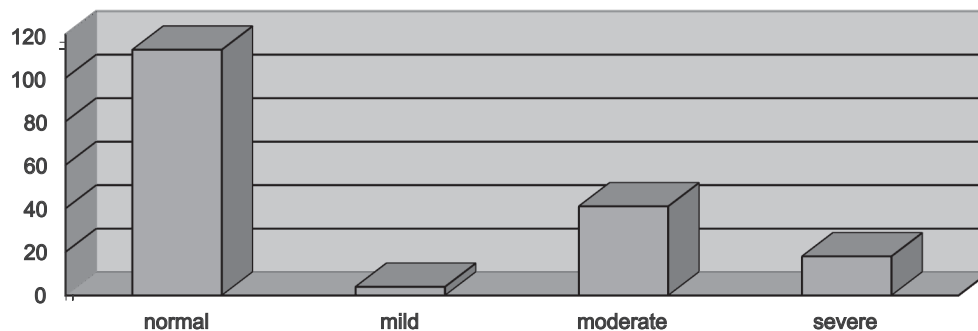
**DISCUSSION**

79.35% of the study population incurred to drooling and two groups chronological age difference is very small ( $p < 0.95$ ), and so there isn’t significant relationship between the gender and drooling that match with Lyslvth and colleagues findings (19). Probability of low social maturation in children with drooling was higher ( $p < 0.01$ ). The direct effects of drooling in social interactions and improving of family and caregivers interactions

**Chart 1:** The Frequency of pathologies on the sample group



**Chart 2:** Drooling intensity distribution:



**Table 2.** Age and social maturity of subjects in both groups with and without drooling were compared by Mann Whitney test.

variable	group	mean	standard deviation	Z	p
Age	With drooling	7.95	3.95	-.06	0.95
	Without drooling	7.75	3.39		
Social maturity	With drooling	29.08	16.6	-6.4	0.01
	Without drooling	52.31	21.23		

can influence development of their social skills. And also the low social maturation interactivity can decrease children's opportunities and abilities for learning and controlling the mouth water loss. These findings are consistent with the expectations and assumptions of the study.

In this study the possible causal relationship between social maturity and drooling couldn't be established, but clearly there is an inverse relationship between these two factors. More structured studies will be useful to have a better and detailed understanding of this relation.

This study expressed that the modification and treatment of this problem improves human relationships and social interactions and ultimately increases learning opportunities and enhances the life quality evidently (5; 11). The average age of the children in both groups showed little differences so we can ignore the effect of age on oral skills.

On the other hand, along with other factors that can be effective in controlling the saliva of children with disabilities is inability to coordinate muscle tone normally.

At this study 29 children out of 46 with abnormal muscle tone (63.04%) had drooling according to different studies (20), but 46.03% of total sample had a runny mouth and abnormal muscle tone. Considering that the other learning and cognitive motor problems can affect oral muscle control and skills, muscular control had an important role in runny mouth. Because about 53.97% of clients had no muscular ton problems, cognitive and learning factor impacts could be illustrated more but in previous studies prevalence of drooling in neuromuscular problems were established (4; 20). However from therapeutic planning

view focusing in motor learning and neurologic problems of these children in rehabilitation centers may improve their socializations (5; 11).

In this study, the totally high drooling prevalence (79.35%) especially in moderate severity determines the importance of problems in nursing, child care and education. And also it can be an important and missed opportunity for enhancing life quality of children and their care givers. By using these results it can be estimated that in children population of Educational and Rehabilitation Centers one of the important decrement factors of life quality and educational opportunities could be due to drooling problem. So training and facilitating proper control of saliva loss of these patients would have positive results and can improve their level of independence and so quality of life.

### Suggestions

Obviously this is study only shows the importance of the problem, and data of prevalence and possible cause's correlations. Research for developing appropriate therapeutic intervention and strategies is necessary to complete this study.

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