Behavior Problems in Preschoolers with Developmental Language Disorder

Gelişimsel Konuşma Bozukluğu Olan Okul Öncesi Çocukların Davranış Problemleri

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ABSTRACT

Objective: Children with developmental language disorder (DLD) are prone to numerous adverse outcomes throughout their lives. The aim of the study was to investigate risk factors and behavior problems in children aged 1.5 to 5 years with DLD in a low/middle-income country.

Material and Methods: This case-control study included 101 preschoolers (54 children with DLD and 47 children with typical development (TD)). A developmental pediatrician evaluated each child's development using the Ages and Stages Questionnaire. Children Behavior Checklist and Beck Depression Inventory were completed by mothers. Socio-demographic information and screen parameters were obtained using a researcher-developed form.

Results: Risk factors for DLD were identified as less frequent reading books with parents, consanguineous marriage, and having a family member with language disorders. Preschoolers with DLD had more behavior problems (except sleep and somatic problems) than preschoolers with TD ($p<0.050$). The risk factors for behavior problems of preschooler with DLD in the multivariable regression model included: ages of parents and children, paternal education, lack of having their own room, and maternal depressive symptoms.

Conclusion: Consistent with the findings of this study, consanguineous marriage, family history of language disorders, and infrequent reading of books with parents were associated with the development of DLD. Attention should be given to behavioral problems in preschool children with DLD. Maternal depressive symptoms, lower paternal education, younger father, and lack of having their own room can be highlighted factors for behavior problems of children with DLD. Parents play a crucial role in shaping behavior and language development during the preschool period.

Key Words: Behavior problems, Developmental language disorder, Preschool period

ÖZ

Amaç: Gelişimsel konuşma bozukluğu (GKB) tanısıyla izlenen çocuklar, yaşamları boyunca birçok olumsuz durumla karşılaşabilirler. Çalışmanın amacı, düşük/orta gelirli bir ülkede yaşayan 1.5-5 yaş arası GKB olan çocukların davranış problemlerini ve GKB risk faktörlerini araştırmaktır.

Gereç ve Yöntemler: Bu vaka-kontrol çalışmasına, okul öncesi yaş grubundaki 101 çocuk (GKB tanısı olan 54 çocuk ve tipik gelişim gösteren (TD) 47 çocuk) dahil edildi. Her çocuğun gelişimi Erken Gelişim Envanteri kullanılarak gelişimsel pediatri uzmanı tarafından değerlendirildi. 1.5- 5 Yaş Çocukları İçin Davranış Değerlendirme Ölçeği ve Beck Depresyon Envanteri anneler tarafından dolduruldu. Sosyo-demografik özellikler ve ekran parametreleri, araştırmacılar tarafından geliştirilen anketle kaydedildi.

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Bulgular: Ebeveynlerle birlikte az kitap okunması, akraba evliliği ve ailede konuşma bozukluğu olan bir bireyin olması GKB açısından muhtemel risk faktörleri olarak saptandı. GKB tanısıyla izlenen okul öncesi çocukların, tipik gelişim gösteren çocuklara nazaran daha fazla davranış problemlerine sahip oldukları görüldü (uyku ve somatik problemler dışında) ($p<0.05$). Çoklu regresyon modelinde, çocukların yaşları, ebeveynlerin yaşları, babanın eğitim durumu, çocukların kendi odalarının olması ve annenin depresif belirtileri GKB tanısıyla izlenen çocukların davranış problemleriyle ilişkili bulundu.

Sonuç: Çalışmanın bulguları doğrultusunda, akraba evliliği, ailede konuşma bozukluğu olan bireylerin olması ve ebeveynlerle daha az kitap okunması GKB gelişimiyle ilişkili bulunmuştur. GKB tanısıyla izlenen okul öncesi çocuklarda, davranış problemleri açısından dikkatli olunmalıdır. Anne depresyonu, baba eğitiminin düşük olması ve çocuğun kendine ait odasının olmaması GKB olan çocukların davranış problemlerinde öne çıkan risk faktörleri olabilir. Okul öncesi dönemde davranış şekillenmesinde ve dil gelişiminde ebeveynler önemli bir rol oynamaktadır.

Anahtar Sözcükler: Davranış problemleri, Gelişimsel konuşma bozukluğu, Okul öncesi dönem

INTRODUCTION

Developmental language disorder (DLD) is characterized by delays or difficulties in the development of receptive and/or expressive language skills, including learning, understanding, and using language, without cognitive delay and not accompanied by genetic, neurological, or other neurodevelopmental disorders (1). It is the most common neurodevelopmental disorder in childhood, with approximately 20% of children experiencing language delay in the early years of language acquisition (2). About 10% of preschool children have developmental language disorder (3).

Developmental language disorder, which is an important public health problem, is associated with low academic achievement (4), learning difficulties, and working in a low-skilled job in the future, and leading to economic burden (5). In addition, it has been shown that, children with DLD may also experience difficulties in social interaction and are at risk of psychosocial adjustment problems, behavior, and emotional social problems (6,7).

We are aware that DLD does not draw attention that it merits given its negative consequences according to other neurodevelopmental disorders like autism spectrum disorder, attention-deficit/hyperactivity disorder, and dyslexia, especially in low/middle-income countries (LMIC) (8,9). And, we know that culture, socioeconomic status, and linguistic difference can affect language development and risk factors of DLD(10). Therefore, studies from different cultural backgrounds are necessary to identify risk factors of DLD and to increase awareness of DLD. In our country, the risk factors and the adverse consequences of DLD were less studied (7). The aim of this article was to investigate risk factors and the relationship between DLD and behavior problems in preschool children in a LMIC.

MATERIALS and METHODS

Study Design and Participants

This case-control study was conducted at the Developmental Pediatrics Department of Mersin City and Training and Research Hospital between January and March 2023. The participants were included in the study after obtaining written consent from parents on a voluntarily basis. Inclusion criteria in the study group; (i) children who exhibited a delay in the communication domain according to the Ages and Stages Questionnaire-3 (ASQ-3), (ii) willingness to participate in the study, and (iii) aged between 1.5 to 5.5 years. The exclusion criteria were: (i) presence of neurological, genetic, hematological, endocrinological, or psychiatric diseases, (ii) presence of delays in more than one developmental domain based on developmental evaluation, (iii) lack of willingness to participate in the study, and (iv) sensory impairments such as hearing or vision problems. Following the inclusion criteria, 54 children were included in the study group. During study, all parents with a child diagnosed with DLD participated in the study. Parents of 61 children, who applied to general pediatric outpatient clinics, wanted to participate in the study and showed typical development in the developmental evaluation using the Age and Stages Questionnaire -3 (ASQ-3), were invited to the study. Ten parents declined participation due to time constraints, and four children were excluded due to chronic diseases. Consequently, a total of 47 children were included in the control group.

Evaluation Tools

A questionnaire was prepared by the researchers specifically for the study. It included sociodemographic data such as age, sex, parental age, working status of parents, parental education, birth order, reading book with parents weekly, family income, the number of siblings, history of language disorder in the family, screen parameter such as child's screen time, the types of screens they use (TV, tablet, computer, phone) and why the parent uses the screen. Family income was categorized into two groups: low family income (below or equal to the minimum wage) and high family income (above the minimum wage).

Maternal depressive symptoms were assessed with the Beck Depression Inventory (BDI). BDI was developed by Beck et al.(11). The validity and reliability study for Turkish was carried out by Hisli (12). Higher scores indicate more depressive symptoms.

The development of each child included in the study was evaluated using the Turkish version of the Ages and Stages Questionnaire-3 (ASQ-3) (13). ASQ-3 is a developmental screening tools for children aged 0-6y. ASQ-3 has 19 age-specific sub-questions that assess children's development

in terms of communication, gross motor skills, fine motor skills, problem-solving, and personal-social skills. Children who score below the threshold values in at least one area are screened with a developmental delay, while those who score above the threshold values in every area are considered typical development (TD) (14). Children whose communication scores were below the threshold values of communication and the scores of other developmental areas were in the normal range were defined as DLD.

Child behavior checklist for ages 1.5 to 5 years (CBCL/1.5–5)

In this study, the CBCL/1.5–5 was completed by mothers to evaluate the behavioral problems of the participants (15,16). CBCL/1.5-5' subscales are (i) emotionally reactive, (ii) anxious/depressed, (iii) somatic complaints, (iv) withdrawn, (v) sleep problems, (vi) attention problems, and (vii) aggressive problems. The amount of withdrawn, emotionally reactive, anxious/depressive, and somatic complaints carve out the score of internalizing problems. The sum of aggressive scores and attention problems creates the score for externalizing problems. The sum of the scores of internalizing, externalizing, sleeping problems, and other problems constitutes the total problems. Higher scores indicate more behavioral problems.

Treatment and follow-up of all children diagnosed with DLD were sustained by a developmental pediatrician.

Statistical Analysis

The normality of continuous variables was assessed using the Shapiro-Wilk test. For the comparison of two independent groups, the Mann-Whitney U test and Independent Samples t-test were used. Covariate Analysis was applied to compare variables affected by age and the weekly number of reading books. Spearman's Rho Correlation coefficients were calculated to examine the linear relationship between continuous variables. Multiple Linear Regression models were constructed with variables that could affect problem scores. Statistically significant models were obtained using backward elimination method. Data analysis was performed using TIBCO Statistica software.

RESULTS

As a result, the study included a total of 101 children, with 54 children in the DLD study group and 47 children in the TD control group. The mean age of the study and control groups were 2.76±1.01 years (mean±SD) and 3.32± 1.24 years (mean ±SD), respectively (p= 0.021). Among the study group, 66.7% (n=36) were male, while in the control group, 53.2% were male (p=0.167). In the study group, 11.1% (n=6) of mothers described premature birth; this rate was 10.6% (n=5) in the control group (p=0.939). Comparing the study group to the control group, it was found that the number of weekly reading books with parents was significantly lower in the study group (p=0.013).

Table I: Descriptive sociodemographic parameters and screen parameters

	Studied group	Control group	p
Maternal age, years*	30.93±6.89	30±4.33	0.946
Maternal education level, years†	12 (8-12)	12 (8-12)	0.811
Employed mother ‡	7 (13)	10 (21.3)	0.626
Paternal age, years*	35.35±7.43	32.98±5.64	0.133
Paternal education level years†	10 (7.75-12)	12 (8-14)	0.196
High family income ‡	20 (42.6)	18 (33.3)	0.634
Having a bedroom ‡	17 (31.5)	19 (40.4)	0.407
Consanguineous marriage ‡	18 (33.3)	7 (14.9)	0.032
Having a family member with language disorder ‡	25 (46.3)	6 (12.8)	<0.001
Number of siblings†	2 (1.75-2)	2 (1-2)	0.527
Order of Birth †	2 (1-2)	2 (1-2)	0.603
Viewing of TV, hrs, daily†	1 (0-3)	2 (0.5-2)	0.246
Viewing of phone, hrs, daily†	1 (0-3)	1 (0-2)	0.191
Viewing of tablet, hrs, daily†	0 (0-0)	0 (0-0)	0.636
Viewing of computer, hrs, daily†	0 (0-0)	0 (0-0)	0.921
Total screen time hrs, daily†	3.5 (1-6)	2.5 (2-4.5)	0.338
Number of reading book with parents weekly†	0 (0-2)	2 (0-7)	0.013

***p:** Mann Whitney U test, Independent Samples t test, ***:** mean±SD, **†:** median (IQR), **‡:** n (%)*

Table II: Compare behavior problems among children with Developmental Language Disorder (studied group) and children with typical developing (control group)

CBCL1.5/5 Subscales	Studied group	Control group	p
Emotionally reactive	5 (2-7)	2 (1-4)	0.002
Anxious/depressed	7 (4-8)	4 (2-6)	0.001
Somatic complaints	3 (2-5)	2 (1-4)	0.819
Withdrawn	4.5 (2.75-7)	2 (1-4)	<0.001
Sleep problems	5 (2.75-6)	3 (2-5)	0.438
Attention problems	4 (3-6)	3 (1-4)	0.001
Aggressive problems	17 (9-23.5)	9 (4-13)	<0.001
Internalizing problems	19.5 (14-24)	12 (7-16)	<0.001
Externalizing problems	21.5 (12-31)	11 (8-16)	<0.001
Total problem score	62.5 (44.75-76)	31 (21-43)	<0.001

*Median (IQR), **p:** Covariance Analysis (age and number of reading books)*

Consanguineous marriage and having family members with language disorder were more common in the study group (p=0.032, p<0.001, respectively). No statistically significant differences were observed in other sociodemographic data and screen parameters between the two groups (Table I).

The median daily screen time of children in the study group was: 3.5 hrs. (IQR:1-6), the median daily screen time of children

Table III: Correlation of behavior problems and sociodemographic factor, maternal depressive symptoms, screen time

CBCL1.5-5 y subscales	Maternal BDI	Total screen time	Maternal age	Maternal education level	Paternal age	Paternal education level
Studied group						
Internalizing problems	.200	-.006	-.196	-.124	-.236	-.273*
Externalizing problems	.444**	.141	-.223	-.288*	-.198	-.322*
Total problem score	.391**	.040	-.248	-.274*	-.253	-.389**
Control group						
Internalizing problems	.400**	-.024	-.159	-.086	-.170	-.123
Externalizing problems	.357*	-.006	-.066	-.282	-.050	-.160
Total problem score	.396**	-.039	-.142	-.166	-.132	-.116

p: *Spearman Rho Correlation* *******p<0.05,* ********p<0.01*

Table IV: Multiple Linear Regression of risk factor of behavior problems of preschoolers' with Developmental Language Disorder

	Standardized Coefficients	95.0% Confidence Interval for B		t	p
	Beta	Lower Bound	Upper Bound		
Total problems score					
R^2:0.479 F:7.199 p<0.001					
(Constant)		77.36	135.28	7.39	<0.001
Age	0.28	1.20	11.99	2.46	0.018
Number of Reading a book, weekly	-0.21	-4.34	0.06	-1.96	0.056
Having a bedroom	-0.19	-20.61	1.71	-1.70	0.095
Paternal age	-0.43	-2.11	-0.66	-3.87	<0.001
Paternal education level	-0.28	-2.96	-0.34	-2.53	0.015
BDI	0.30	0.16	1.03	2.77	0.008
Internalizing problems score					
R^2:0.294 F:6.925 p<0.001					
(Constant)		22.38	44.68	6.04	<0.001
Age	0.37	0.96	5.04	2.95	0.005
Paternal age	-0.39	-0.71	-0.16	-3.13	0.003
Paternal education level	-0.35	-1.19	-0.23	-2.96	0.005
Externalizing problems score					
R^2:0.427 F:5.841 p<0.001					
(Constant)		18.71	46.57	4.71	<0.001
Age	0.21	-0.32	4.83	1.76	0.084
Having a bedroom	-0.30	-12.54	-1.30	-2.48	0.017
Maternal age	0.41	0.00	1.29	2.03	0.048
Paternal age	-0.65	-1.54	-0.34	-3.17	0.003
Paternal education level	-0.28	-1.38	-0.12	-2.40	0.020
BDI	0.46	0.20	0.63	3.88	<0.001

p: *Multiple Linear Regression,* ***BDI:*** *Beck Depression Inventory*

in the control group was: 2.5 hrs. (IQR: 2-4.5) (p=0.338). In both groups, the majority of the families described that children watched the screen for leisure time (study group 61.1%, control group 66%).

After adjusting for age and the weekly number of books read as covariate variables, the subscales of CBCL 1.5-5 for the study group were found to be significantly higher than those of the control group, except for sleep problems and somatic complaints (Table II).

In the study group, the maternal Beck score was (mean±SD): 13.93±12.1, in the control group maternal BDI was (mean±SD): 9.28±7.13 (p= 0.06). It was found that the mothers' BDI was positively correlated with behavioral problems in both groups. Parental age, parental education, and the number of siblings were negatively associated with behavioral problems only in the study group (Table-III).

Through Backward regression analysis in the study group, the mother's BDI score was found to be related to the children's total problem score and externalizing score, and the father's age, and education level were found to be associated with internalizing, externalizing, and total problems. The child's age was also found to be associated with internalizing and total problems. Maternal age and having their own room were associated with externalizing problems (Table IV).

DISCUSSION

The current study successfully investigated the risk factors and behavior problems in children with DLD, compared to healthy control groups. Additionally, the study evaluated the probable risk factors of behavior problems in children with DLD in a low/middle-income country.

Both biological and environmental factors are related to development of DLD. Consanguineous marriage and having a family member with language disorder were found as biological risk factors in line with previous studies and our experience (17,18). The relationship between male sex and DLD remains a subject of debate, and this study did not find a significant difference in DLD prevalence between males and females (17, 19).

Environmental factors play important role for language development and they can be used as protective factors for DLD (17). Environmental factor such as maternal depressive symptoms, reading books with parents, and screen time have been shown to influence language development (20). The screen time and maternal Beck score in the studied group were higher than the control groups. But there was not found any statistical difference between the two groups likely due to the small sample size. However, the study did find a significant association with less frequent reading of books with parents and DLD. The meta-analysis made by Dowdall et al. showed that regardless of parental education, reading a book with parents had a positive effect on language development in line with the study (21). And they demonstrated that book-sharing intervention was effective in promoting language development (21).

Approximately 10% of preschoolers experience clinically significant mental health problems, including socio-emotional and behavior problems (22). This study revealed a higher prevalence of behavior problems among preschoolers with DLD compared to those with typical development, suggesting that DLD itself may be a risk factor for behavior problems during the preschool period. The link between language and behavior is well-established (6). We know that children who live in a LMIC and having DLD are at risk of not getting their developmental potential (23). Therefore, evaluating language development is particularly important for children in these contexts.

Previous studies have also highlighted parenting and parental characteristics as risk factors influencing the persistence of behavior problems into adulthood (20, 24, 25). The study made by Toseeb et al. (26) demonstrated that positive early language and communication environment were related to fewer externalizing behavior problems of children with DLD. Early language and communication environments contain positive home environment like numbers of toys, books and positive parent interaction. Valera-Pozo et al. (25) showed that family involvement was inversely related to internalizing behavior of children with DLD.

Maternal depressive symptoms, lower paternal education, and younger fathers were identified as potential risk factors for behavior problems in children with DLD, in our study. Maternal depressive symptoms were positively associated with externalizing and total problems, paternal age and education were inverse associated with externalizing and internalizing behavior problems in children with DLD. Several studies found a strong association between maternal mental health with child behavior development (27,28). Maternal depression is a communication environmental risk factor (20). According to the mother involvement, the effect of father involvement on children's developmental outcomes has been less studied. The family investment model posits that parents with higher education may invest more money, resources, and more quality time in their children than parents with lower education (29). A study by Jeong in low/middle-income countries found that parental education is associated with supporting child development and positively influences both parents' parenting practices (30). Another study made in LMIC shown that maternal and paternal education independently associated with childhood development and they found the most heterogeneity between paternal education and child development (31). And lower paternal education and younger parental age are inversely associated with socioeconomic status and parenting skills (32).

The surprising finding was having own room was a protective factor against externalizing problems. This finding may be attributed to socioeconomic level and overcrowding, as observed in previous experiences (33). Lower family income was associated with lower quality of home environment and higher parental stress; overcrowding was related to externalizing problems in line with the current study (33,34).

The study had limitations that need to be acknowledged. It was a case-control study with a small sample size, which limits the generalizability of the findings. Although each participant (studied and control group) were evaluated by a developmental pediatrician, the overall sample size was small. While the study identified infrequent reading books with parents as a risk factor for DLD, the duration of activities such as playing games with parents or co-viewing screen time was not investigated. Paternal age and paternal education were identified as potential risk factors for behavior problems; however, paternal mental health was not included in the study. The use of the Ages and Stages Questionnaires (ASQ-3) as a screening instrument limited the ability to make definitive assessments regarding the developmental status of the children. Despite these limitations, the study successfully draw attention to the risk factors of DLD and behavior problems of children with DLD in a LMIC. The study filled out the gap of topics; DLD and behavior problems of preschoolers in LMIC.

In conclusion, healthcare professionals should consider recommending reading books with parents as a protective factor against DLD. Father's age, maternal mental health, and education of father can be investigated for the intervention of behavior problems in children with DLD. Large-scale and longitudinal studies are necessary to gain a comprehensive

understanding of DLD and its negative consequences in low/middle-income countries.

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