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ARAŞTIRMA / RESEARCH

Screening results of psychomotor development of children at inpatient unit of a training hospital in Turkey

Türkiyede bir araştırma hastanesinde yatan hasta servisindeki çocuklarda psikomotor gelişimin tarama sonuçları

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Abstract

Purpose: This study aimed to assess the psychomotor development of inpatient children in the pediatrics clinic and referring the children who have problems.

Materials and Methods: Four hundred twenty children between 4-72 months at inpatient unit of the department of Pediatrics at Konya State Research hospital were included in the present study. A child development specialist who was unaware of the history and neurological examination of the cases administered Denver developmental screening test (DDST) II to all children once. Children who were found to be abnormal or questionable were further evaluated by the child and adolescent psychiatrist.

Results: Three hundred forty five (82%) were found to be 'normal', 12 (2.8%) were found to be 'questionable' and 64 (15.2%) cases were found to be 'abnormal' with regard to DDST II. Post evaluation of questionable and abnormal cases by the child and adolescent psychiatrist, 26 cases were referred to special education institutions with the diagnosis of global developmental delay and 2 cases with the diagnosis of pervasive developmental disorder**.**

Conclusion: It is important to apply screening tests for developmental evaluation to each child at inpatient pediatric clinics in order to diagnose developmental delays earlier.

Keywords: Denver developmental screening test, developmental delay, child psychiatry

Öz

Amaç: Bu çalışmanın amacı pediatri servisinde yatan çocuklarda psikomotor gelişimi değerlendirmek ve sorun tespit edilen çocukları tedaviye yönlendirmektir.

Yöntem: Bu çalışmaya yaşları 4-72 ay arasında olan Konya Eğitim Araştırma hastanesi pediatri servisinde yatan 420 çocuk dahil edilmiştir. Çocukların geçmiş öykü ve nörolojik muayenelerini bilmeyen bir çocuk gelişim uzmanı bütün çocuklara Denver Gelişimsel tarama testini (DDST) 2 uygulamıştır. Testin sonucuna göre anormal veya tartışmalı gelişimde olan çocuklar daha ileri değerlendirme için bir çocuk ve ergen psikiyatristine yönlendirilmişlerdir.

Bulgular: Olguların 345 (%82)'i normal, 12 (%2.8)'si şüpheli ve 64 (%15.2)'ü anormal bulunmuştur. Şüpheli ve anormal vakaların çocuk ve ergen psikiyatristi tarafından değerlendirilmesi sonucu, 26 olgu gelişim geriliği ve 2 olgu otizm spektrum bozukluğu tanısıyla özel eğitime yönlendirilmiştir.

Sonuç: Gelişim geriliğinin erken teşhisi açısından pediatri servisinde yatan her çocuğa gelişim testlerinin uygulanması önem arz etmektedir. Gelişim geriliği olan çocukların uygun tedavileri alması açısından erken tanı ve tedavi kritik önem taşımaktadır.

Anahtar kelimeler: Denver gelişimsel tarama testi, gelişim geriliği, çocuk psikiyatrisi

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INTRODUCTION

Psychomotor development includes skills associated with gross and fine motor, social communication, language development, and care for "self". Children with global developmental delay (GDD) are defined as those who are younger than five years of age and have delay in at least two areas of psychomotor development in comparison with their chronological age[1]. The prevalence of GDD is reported to be 1.0-3.0% and it may be associated with Intellectual Disability in later stages of development, although the overlap between those two constructs are not complete[2]. Early detection and referral for appropriate rehabilitation and services are crucial for management. However, the available data suggest that only about half of those children are diagnosed and referred prior to enrollment in primary school[3]. The use of standardized screening tests may help in the identification of children with GDD, although the tendency of clinicians to depend solely on clinical judgement and time constraints in daily practice limit their use[4,5]. Similar problems in the diagnosis have also been reported in clinical practice in Turkey.

Previous studies have shown that the sensitivity of clinical judgment for GDD diagnosis as 30.0%. However, the use of developmental screening inventories and questionnaires may increase this to 70.0-80.0%[6-8]. Developmental screening allows repeated, objective testing according to normative ranges and may help with early diagnosis and referral. The Denver Developmental Screening Test- II (DDST-II), Bayley Scales of Infant Development, and other instruments can be used in clinical practice[9-11]. Underlining the potential importance of those tests as well as the potential importance of earlier recognition for prevention and intervention programs, recent international guidelines suggest regular developmental screening of infants and toddlers via standardized screening tools at 9, 18, and 30 months of age [12-15].

Available data on the clinical utility of standardized screening tests for in and out-patient pediatric samples are scarce. Therefore, the aim of the present study was to screen the psychomotor development of children hospitalized for various disorders and evaluate the utility of DDST-II in identification of GDD as well as Autism Spectrum Disorders/Pervasive Developmental Disorders (ASD/PDD).

MATERIALS AND METHODS

The study was conducted at the inpatient unit of the Department of Pediatrics at the Konya Training and Research Hospital. Children 72 months or younger, hospitalized for various acute diseases and with no history of admittance to the Department of Child and Adolescent Psychiatry for developmental delays/deviations, were eligible for participation to the study. Signs and symptoms of malnutrition and neglect (as defined by physical evaluations and developmental charts), a diagnosis of chronic disease requiring intensive care/ special diets (e.g. phenylketonuria, celiac disease etc.), or malignancy were criteria for exclusion. The study protocol was in accordance with the principles set forth in the Declaration of Helsinki as well as local laws and regulations. Informed consent from parents was procured prior to enrollment of children to the study. The research protocol was approved by the Ethics Committee of Konya Training and Research Hospital (No: 2011/37).

A Child Development Specialist blinded to diagnoses, neurological examinations, and developmental history performed the DDST-II to 421 children. Children classified as having an "abnormal" or "questionable" development were evaluated by the Child and Adolescent Psychiatrist in accordance with the DSM-V criteria. Patients with GDD or ASD/PDDs were referred for rehabilitation and special education services[16].

Measures

Socio-demographic information form

This form was developed by the investigators and included information on age (months), gender, week of delivery, birth weight, place of residence, and parental education.

Denver Developmental Screening Test II

DDST-II screens the development of children from one to seventy-two months of age and allows for early recognition of developmental delays and deviations[10]. Adaptation to Turkish and standardization studies on Turkish children were conducted by Yalaz and Anlar[11,17]. DDST-II allows classification of development as "normal" (i.e. no delay in developmental domains or a one warning sign in a developmental domain), "abnormal" (i.e. delay in at least two developmental domains), and

"questionable" (i.e. delay in one domain as well as a warning sign in another or warnings in at least two developmental domains).

Statistical analysis

SPSS for Windows, version 18.0 (SPSS Inc., Chicago, Illinois, USA) was used for statistical evaluations. The chi-square test was used for analysis of nominal variables. Odds Ratios and pre- and post-test probabilities for ID/GDD and ASD/PDD were calculated. In all comparisons, a p-value of less than 0.05 was considered statistically significant (two-tailed).

Table 1. Sociodemographic data of pediatric patients (4-72 months) hospitalized at the inpatient unit of the Department of Pediatrics

Birth week		
< 37 weeks	35	(8.3%)
≥ 37 weeks	385	(91.6%)
Birth weight (gr)		
< 2500	55	(13.09%)
≥ 2500	365	(86.90%)
Education of mothers		
Illiterate	10	(2.38%)
Primary School	284	(67.6%)
Secondary school	83	(19.7%)
High School	38	(9.04%)
University	5	(1.19%)
Education of fathers		
Illiterate	4	(0.95%)
Primary School	264	(62.8%)
Secondary School	66	(15.7%)
High School	63	(15%)
University	23	(5.4%)
Family type		
Nuclear	275	(65.4%)
Extended	141	(33.57%)
Divorced	4	(0.95%)
Living location		
City	265	(63.09%)
Town	77	(18.33%)
Small town	44	(10.4%)
Village	34	(8.09%)

RESULTS

Four hundred and twenty-one children between the ages of 4 and 72 months hospitalized at the inpatient unit of the Department of Pediatrics in x Hospital were included in the present study. The majority of the patients were males (n=238, 56.7%), and the mean age of the cohort was 19.5 (S.D.=17.1) months. The mean age of the mothers and fathers were 27.2 (S.D.=5.5) and 30.5 (S.D.=5.5) years, respectively. Sociodemographic features of patients are listed in Table 1.

Eleven of the thirty-five children born less than 37 weeks of gestation were developmentally delayed, while 53 of those born on the 37 week or older (n=385) had developmental delay. The OR of children born less than 37 weeks of gestation for GDD was 2.9 (95% CI=1.3- 6.2, p=0.007). When children with a birth weight under 2500 grams were compared, it was found that 20 of the 55 with birth weights of less than 2500 grams had GDD. The number of children with GDD in those with at least 2500 grams of birth weight was 44 (n=365). The OR of GDD in children with a birth weight of less than 2500 grams was 4.2 (95% CI= 2.2- 7.9, p< 0.0001). A lower maternal education was associated with developmental delay as evaluated via DDST-II, while there was no significant relationship between paternal education and developmental delay (Table 2).Developmental delay was found in 50.0% of the children with divorced parents, while the corresponding rates for nuclear and extended families were 12.4% and 19.9%, respectively. Therefore, the OR for children of divorced families having GDD was 5.7 (95% CI=0.8- 41.4, p=0.08) while those for nuclear and extended families were 0.6 (95% CI=0.3-0.9, p=0.03) and 1.7 (95% CI=1.0-2.9, p=0.07), respectively. In the present study, according to DSM 5 criteria [16], two subjects were diagnosed with ASD. Twentysix cases were diagnosed with global developmental delay, according to an evaluation from both the department of pediatrics and child and adolescent psychiatry together, and were guided to special education institutions. Furthermore, 48 cases were still followed up with recommendations to their families about global developmental stages at child and adolescent psychiatry department. The OR for clinically identified GDD in children with abnormal/questionable DDST-II results in the present sample was 362.6 (95% CI= 21.8-6043.5, p<0.0001). The OR for clinically identified ASD was 23.2 (95% CI=1.1-488.0, p<0.04). Sensitivity of DDST-II for ASD in the present sample was 100.0%, while specificity was 82.3%. Sensitivity and specificity for GDD was 100.0% and 87.3%, respectively. When the pre-test probability of GDD was taken as 2.0%, 14.0% of the patients that tested positive were diagnosed with GDD. The probability of ASD in a child testing positive in DDST-II when pre-test probability was taken as 1.0% was found to be 5.0%.

Table 2. Natal and sociodemographic factors associated with developmental delay as evaluated with DDST-II in a sample of hospitalized pediatric inpatients.

DDST-II Test Results				
	Normal	Questionable	Abnormal	p
Birth week				0.014
< 37 wk	24	0	11	
≥ 37 wk	320	12	53	
Birth weight (gr)				0.000
< 2500	32	3	20	
≥ 2500	312	9	44	
Education of mothers				0.002
Illiterate	4	0	6	
Primary School	228	8	48	
Secondary School	71	4	8	
High School	36	0	2	
University	5	0	0	
Education of fathers				0.365
Illiterate	2	0	2	
Primary School	218	10	36	
Secondary School	51	2	13	
High School	53	0	10	
University	20	0	3	
Family type				0.046
Nuclear	235	6	34	
Extended	107	6	28	
Divorced	2	0	2	
Living Location				0.066
City	213	10	42	
Town	67	2	8	
Small town	32	0	12	
Village	32	0	2	

*DDST II: Denver developmental screening test

DISCUSSION

This study aimed to evaluate the developmental status of infants and toddlers hospitalized at the inpatient clinic of the department of Pediatrics, to determine predictors of developmental delay, and the role of DDST-II results in GDD and ASD diagnosis. We found that 2.8% of patients (n=12) had "questionable" development, while 15.2% (n=64) had abnormal development in DDST-II. GDD was significantly associated with pre-term birth, low birth weight, and lower maternal education. Sensitivity of DDST-II for both ASD and GDD was 100.0%, while specificity was 821.3% and 87.3%, respectively.

The prevalence of GDD is not adequately known with little research in community and/or clinical samples[18]. Various studies reported rates of GDD as 7.1% or 8.4%, while the common consensus is a rate similar to that of ID (i.e. 1.0-3.0%, [2])[1,19,20]. The rate of GDD in our sample was 6.1% and this is broadly in accordance with the previously reported results. However, rates may change with sampling methods (i.e. community vs. clinical) and use of differing instruments. Our results may also be affected by the use of DDST-II for screening, and those rates may have changed with use of different instruments (e.g. Ages and Stages Questionnaire, Bayley Scales of Infant Development, and Ankara Developmental Screening Inventory, etc.). Despite this caveat, routine DDST-II screening may be recommended for patients hospitalized in the pediatric services. Ease of use and succinctness may help with this endeavor[10,11,14].

GDD was previously found to be associated with lower birth weight, pre-term birth, and various indices of socioeconomic disadvantage [21-28]. Similar to those results, we found that pre-term birth increased the odds of GDD 2.9 times, while low birth

weight increased it 4.2 times. Lower maternal education was also associated with GDD, while paternal education was not associated with GDD. Previous studies from our country reported that physical and emotional nurturance of children was the main responsibility of mothers, while fathers were mainly focused on securing the family income[29,30]. Our results may support those views. Natal factors may increase the risk of GDD by effecting the developing nervous system, whereas socio-economic disadvantage may reduce environmental sources of stimulation. Alternatively, natal problems and socioeconomic disadvantage may display complex inter-relations and their effects may be difficult to disentangle[31-34].

According to our results, living in a nuclear family may be protective for GDD, while effects of parental divorce and extended families did not reach statistical significance. An extensive literature search suggests that children fare better, on a host of social-psychological, behavioral, and cognitive outcomes, when they spend their entire childhood living with both of their biological parents[35]. Our results also support those views. Data on the effects of parental divorce and extended households on children's development is inconclusive[36,37].

Our results should be evaluated within their limitations. Firstly, the results are valid for children hospitalized for acute disorders at the inpatient service of the study center and may not be valid for those with chronic disorders, those hospitalized at different hospitals, and/or out-patient as well as community cohorts. Secondly, use of multiple instruments to evaluate psychosocial development of children at the same time may have enriched our results, which may allow comparison of sensitivities and specificities of different instruments. Thirdly, children receiving a diagnosis of ASD were rare in our sample and this may affect ORs and confidence intervals. Despite those limitations, our results suggest that screening the development of pediatric inpatients via DDST-II may afford early recognition and referral of children with GDD and ASDs. Premature children, those with lower birth weight, those from separated/ divorced families, and those with lower maternal education levels may be targeted in early detection and intervention programs. Integration of developmental screening in pediatric out- and inpatient services may prove valuable in terms of earlier detection.

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