

# The Effect of the Parents' Socio-Economic Status on the Treatment Process With the Orthopedic Approach in Developmental Dysplasia of the Hip

## Gelişimsel Kalça Displazisinde Ebeveynlerin Sosyo-Ekonomik Durumunun Ortopedik Yaklaşımla Tedavi Sürecine Etkisi

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### Abstract

**Background:** Developmental dysplasia of the hip (DDH) is a common multifactorial pediatric disease. Physical examination and ultrasonographic findings are used in the screening. The severity of DDH in 0-6 month-old infants is determined by Graf classification. The severity of DDH and the age of the patient before treatment have been shown to be among the main factors determining the success rate. Socio-economic conditions of the parents also affects the success rate of Pavlik harness treatment. In this study, socio-economic and socio-cultural factors that affect the treatment success of Pavlik harness method were aimed to be determined.

**Materials and Methods:** The study was carried out on 66 infants with DDH between the ages of 0-6 months who admitted to the orthopedics and traumatology outpatient clinic between 2018-2020. Interviews were conducted with the families of the infants using the questionnaire technique.

**Results:** All of the patients were given care by their mothers. It has been observed that there is a relationship between the education level and the success of the Pavlik harness. Also, income level of the household, living in rural and urban areas are also associated with Pavlik harness treatment.

**Conclusions:** Education level, place of residence and monthly income, which are effective on health literacy, have an impact on the skill level required for Pavlik harness usage.

**Key Words:** Developmental dysplasia of the hip, Treatment, Health literacy, Health inequality.

### Öz

**Amaç:** Gelişimsel kalça displazisi (GKD) yaygın bir multifaktöriyel pediatrik hastalıktır. Taramada fizik muayene ve ultrasonografik bulgular kullanılır. 0-6 aylık bebeklerde GKD şiddeti Graf sınıflaması ile belirlenir. GKD'nin şiddeti ve hastanın tedavi öncesi yaşının başarı oranını belirleyen ana faktörler arasında olduğu gösterilmiştir. Ebeveynlerin sosyo-ekonomik koşulları da Pavlik bandaj tedavisinin başarı oranını etkiler. Bu çalışmada Pavlik bandaj yönteminin tedavi başarısını etkileyen sosyo-ekonomik ve sosyo-kültürel faktörlerin belirlenmesi amaçlanmıştır.

**Materyal ve Metod:** Çalışma 2018-2020 yılları arasında ortopedi ve travmatoloji polikliniğine başvuran 0-6 aylık GKD'li 66 bebek üzerinde gerçekleştirildi. Bebeklerin aileleri ile anket tekniği kullanılarak görüşmeler yapılmıştır.

**Bulgular:** Hastaların tamamına anneleri tarafından bakım verilmiştir. Eğitim düzeyi ile Pavlik bandajın başarıları arasında bir ilişki olduğu görülmüştür. Hanehalkının gelir düzeyi, kırsal ve kentsel alanlarda yaşama durumu da Pavlik bandaj tedavisi ile ilişkilidir.

**Sonuç:** Sağlık okuryazarlığı üzerinde etkili olan eğitim düzeyi, yaşanan yer ve aylık gelir, Pavlik bandaj kullanımı için gereken beceri düzeyi üzerinde etkilidir.

**Anahtar Kelimeler:** Gelişimsel kalça displazisi, Tedavi, Sağlık okuryazarlığı, sSağlıkta eşitsizlik.

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## Introduction

Developmental dysplasia of the hip (DDH) is a common pediatric disorder that presents in different forms (1). Its etiology is multifactorial, including genetic and intrauterine factors (2,3). Its incidence varies 10-25/1000 in Turkey (4). Initial DDH examination is based on clinical examination with Ortolani and Barlow maneuver and Galeazzi test (5). USG is the gold standard radiologic method for the diagnosis of DDH (2,3). USG results are reported according to Graf classification (2,6). The main goal of DDH therapy is to achieve a concentric reduction to ensure normal development of the proximal femur and acetabulum (7). Abduction orthosis method is the gold standard in the treatment of DDH in infants aged 0-6 months (1). The Pavlik harness is the most popular dynamic splint (9). The success rate of the Pavlik harness method has been reported to be 95-100% (10,11). The Graf method is divided into four types as Type 1, Type 2, Type 3 and Type 4 (1). It has been reported that the success rate of Pavlik harness treatment decreases as the grade in the Graf classification increases and the patient's age increases. Hips that cannot be reduced with the Pavlik harness method are treated with open and/or closed reduction procedures (12).

Health and disease issues cannot be considered separately from social factors such as gender, education, occupation, geographical region, nutrition and income distribution (13). In addition to medical methods, the success of treatment is also seriously affected by the conditions of the people (14). Similarly, low health literacy, which refers to situations such as missing appointments in the treatment of diseases, inadequacy in drug treatment, inability to identify drugs by their appearance and inability to follow tests and referrals that has been found to have significant effects on treatment success (15). Low health literacy increases the rates of hospitalization and use of expensive emergency services (16). In the treatment of DDH, social factors may also be effective on the treatment process. In particular we wanted to evaluate the effects if factors such as parents' education level, income level and the number of people living at home on DDH treatment. In this study, socio-economic and socio-cultural factors that affect the treatment success of Pavlik harness method were aimed to be determined.

## Materials and Methods

The study was carried out in accordance with the declaration of helsinki principles after the approval of the ethics committee (Harran University Faculty of Medicine ethical committee; numbered HRU/21.09.25 dated 26.04.2021.). 66 patients with DDH were included in this retrospective study which was carried out with patients who applied to the orthopedics and traumatology outpatient clinic between 2018-2020. DDH was present in 105 hips of 66 patients, 39 (59.09%) bilateral, 15 (22.72%) in the left hip, and 12 (18.18%) in the right hip. Care was taken to ensure that the bilateral DDHs included in the study had the same degree of hip dysplasia according to the Graf classification.

In 43 (65.15%) of 66 babies were Type 2B and 23 (34.84%) were Type 2C. Interviews were conducted with the families of infants between the age of 0-6 months. The patients did not have any comorbidities or norologic disorders. Patients with Type 2B and Type 2C dysplasia according to Graf classification were included. Patients with Type 3 and Type 4 dysplasia degrees were excluded from the study. In addition, the parents who refused to be interviewed although they were appropriate for the study were not included in the study.

After physical examination of the infants admitted to the hospital, the degree of DDH was determined according to Graf classification by USG examination. Babies diagnosed with DDH were treated with the Pavlik harness method which lasted for 6 weeks. At the beginning of the treatment, all parents were informed about the application of the Pavlik harness. After 6 weeks of Pavlik harness treatment, 35 (53%) of these patients were treated successfully, while 31 (47%) underwent further treatment methods. 26 (74.28%) patients had Type 2B and 9 (25.71%) patients had Type 2C dysplasia in 35 patients who treated successfully with Pavlik harness. Further treatment techniques were used for 31 patients whose treatment with the Pavlik harness method was unsuccessful. 17 (54.83%) had Type 2B and 14 (45.16%) had Type 2C dysplasia in these group. 19 (54.28%) patients treated successfully with Pavlik harness method were bilateral, 16 (45.71%) were unilateral, 20 (64.51%) of 31 patients who had further treatment methods after Pavlik harness method were bilateral, 11 (35.48%) were unilateral.

As the severity of DDH increases in Graf classification, the probability of successful treatment using the Pavlik harness method decreases (17). However, in our study, it was observed that some of the patients with the same degree of dysplasia according to the Graf classification were successfully treated with the Pavlik harness method and some of them needed further treatment techniques. This suggests that the family's health literacy is also effective in the success of the Pavlik harness method. The main purpose of the study is to investigate whether the health literacy of the infants' families is effective on the treatment success of DDH with the Pavlik harness method. In the second part of the study, interviews were conducted with the parents of 66 infants with DDH, using the questionnaire technique, in order to determine the socio-cultural and socio-economic conditions of the families that affect the health literacy.

The data obtained from the questionnaires were analyzed with SPSS 21.0. Analyzes were carried out on the variables of income status, place of residence and educational status of mothers who care for babies which are effective on health literacy. Descriptive perspective as a method that includes information about the current situation of interest and desired to be researched during the evaluation phase of the research and describing (summarizing) the researched population is preferred (18).

**Results**

The main results of this study are: Firstly, if the number of children in the family is low and the family live in city, the success of the Pavlik harness treatment is high. Secondly, if the number of people living in the house is high and the income level of the family is low, the success of the Pavlik harness treatment is low. Thirdly, as the education level of the mother increases, the success of the Pavlik harness treatment increases. The survey was conducted to determine the relationship between the socio-economic status of the families of infants with DDH and the success of treatment. The occupations of the mothers and fathers were studied and 1 (1.5%) of the mothers was a worker and 1 (1.5%) was an agricultural worker (paid employee) and 1 (1.5%) were farmer (unpaid worker for family farm) while 63 (95.5%) of the mothers were housewives. Of the fathers, 33 (50%) were workers, 3 (4.5%) were agricultural workers (paid workers), 7 (10.6%) were farmers, 15 (22.7%) were self-employed, 4 (6.1%) were tradesmen, 3 (4.5%) were soldiers, teachers and doctors. It was observed that 1 (1.5%) of the fathers was unemployed. However, looking at their income, it is understood that 22 of the families do not have a regular income. Considering the number of children that significantly affects the quality of care for their children, 6 of the families (9.1%) stated that they had 1 child, 13 (19.7%) stated that they had 2 children, 39 (59.1%) had 3, 4 or 5 children and 8 (12.1%) stated that they had 6, 7, 8 or 9 children. It was seen that families generally had many children. When the number of households is considered, it is seen that 11 (16.7%) of the

families have 3 and 4 people living in the house, and 5 to 12 people are living in 55 households (83.3%). When the relationship between the success of the treatment and the number of children is examined, it was seen that the success of the treatment with the Pavlik harness method decreases when the number of children in the family exceeds 4. Similarly, increases in the number of people living in the household also affect the success of treatment. In our study, it is seen that the success of treatment decreases as the number of people living in the household increases.

During the interviews, it was determined that all babies were given care by their mothers. When the treatment success of the Pavlik harness method was compared with the educational status of the mothers, it was determined that the educational status of the mother affected the success of treatment. It was determined that 20 (30.3%) of the mothers of the babies included in the study were illiterate. 1 (1.5%) mother was literate, 28 (42.4%) were primary school graduated, 14 (21.2%) were secondary school graduated, 2 (3%) were high school graduated, 1 (1.5%) had a bachelor's degree. While the 5 children of 20 mothers who were determined to be illiterate in the study were treated with the Pavlik harness method, the children of 15 of these mothers had surgical operations. When the Graf classification of these babies were evaluated, it was seen that 5 patients whose treatment was successful were classified as Graf Type 2B. Of the 15 patients in whom the Pavlik harness method was unsuccessful (successful with the further treatment methods), 9 were Type 2B and 6 were Type 2C (Table 1).

**Table 1.** Treatment Status by Mothers' of the Patients Educational Status

Educational status of the mothers		Graf Type		Total
		Type 2B	Type 2C	
illiterate	Pavlik harness treatment	5	0	5
	Further treatment	9	6	15
	Total	14	6	20
Literate	Pavlik harness treatment	1		1
	Total	1		1
Primary school	Pavlik harness treatment	11	5	16
	Further treatment	8	4	12
	Total	19	9	28
Secondary school	Pavlik harness treatment	7	3	10
	Further treatment	0	4	4
	Total	7	7	14
High school	Pavlik harness treatment	1	1	2
	Total	1	1	2
Bachelor's degree	Pavlik harness treatment	1		1
	Total	1		1
Total	Pavlik harness treatment	26	9	35
	Further treatment	17	14	31
	Total	43	23	66

Considering the income status of the families, 22 (33.3%) families do not have a regular income, 10 (15.15%) were between 2200-2800 TL, 27 (40.90%) were between 2850-3500 TL, 7 (10.6%) stated that they had an income between 4000-8000 TL. It was seen that 16 of 22 patients who stated

that the household did not have any income were unsuccessful in the Pavlik harness method and only 6 were successful in this method. When the relationship between income status and treatment status according to Graf classi-

cation was determined, it was observed that 7 of the patients who failed the Pavlik harness method and did not have any income were Graf type 2B (Table 2).

**Table 2.** Treatment Status by Income

Treatment Status by Income		Graf Type		Total
		Type 2B	Type 2C	
Does Not Have Regular Income	Pavlik harness treatment	5	1	6
	Further treatment	7	9	16
	Total	12	10	22
2200-2800 TL	Pavlik harness treatment	7	0	7
	Further treatment	2	1	3
	Total	9	1	10
2850-3500 TL	Pavlik harness treatment	11	6	17
	Further treatment	8	2	10
	Total	19	8	27
4000-8000 TL	Pavlik harness treatment	3	2	5
	Further treatment	0	2	2
	Total	3	4	7
Total	Pavlik harness treatment	26	9	35
	Further treatment	17	14	31
	Total	43	23	66

Considering residence of the families, 23 (34.8) of them live in the village, 8 (12.1%) in the district, and 35 (53%) in the city center. It was determined that 21 of 23 families living in the village failed in the Pavlik harness method. 2 babies with successful treatment were Graf type 2B. While 11 patients of the failed with Pavlik method were type 2B, 10 were type

2C. 5 of 8 parents living in the district were treated successfully and 3 of them underwent further treatment. While 28 of 35 patients living in the city center treated with the Pavlik harness method, 7 of them underwent further treatment method. Among the patients living in the city center, 8 patients Graf Type 2C class were successfully treated (Table 3).

**Table 3.** Treatment Status by Residence

Treatment Status by Residence		Graf Type		Total
		Type 2B	Type 2C	
Village	Pavlik harness treatment	2	0	2
	Further treatment	11	10	21
	Total	13	10	23
District	Pavlik harness treatment	4	1	5
	Further treatment	2	1	3
	Total	6	2	8
City	Pavlik harness treatment	20	8	28
	Further treatment	4	3	7
	Total	24	11	35
Total	Pavlik harness treatment	26	9	35
	Further treatment	17	14	31
	Total	43	23	66

**Discussion**

Health literacy affects the prevention and treatment process of diseases in terms of the ability to dialogue on medical issues, read health information, follow charts and use medical tools (19). There is increasing evidence that the health of individuals with low health literacy is adversely affected (20). It has been reported that individuals with incomppliance to medical advice and/or instructions have low rates of benefiting from health services as well as high rates of health care

costs, medical errors, and mortality (21). In addition, it has been found that the probability of hospitalization in patients with low health literacy is higher than patients with adequate health literacy skills (22). The use of the Pavlik harness

which is the main treatment tool for DDH patients aged 0-6 months. It is also a medical device that requires a certain level of health literacy. It is thought that the skill level of the family may be effective in the use of the harness and may decrease the treatment success rates (23). Graf type 2 hips are more likely to improve without treatment than type 3 and type 4 (1). However, type 2B hips have been reported to be at risk of residual dysplasia despite treatment (24). There is a risk of transforming type 2C hips into type 3 and type 4 hips [24]. As DDH severity increases in Graf classification, the probability of Pavlik harness treatment decreases (17). Although it was predicted that type 2B hips should provide a higher level of treatment success compared to type 2C hips in our study, it was determined that 17 babies with type 2B

grade and 14 babies with type 2C grade had undergone further treatment methods. In the context of these results, it is thought that the use of Pavlik harness affects the success of the treatment.

Collaborative parents with sufficient knowledge of DDH are seen as one of the key factors in the use of the Pavlik harness (8). It has been reported that individuals with a low level of education are particularly disadvantaged in following the information and taking responsibility in the treatment process (21). In health literacy scales, a relationship was found between education level and health literacy (26). In the study conducted by Chou et al. (27) it was shown that there is a relationship between the health status of the infants and the educational status of the mother. In our study, it was determined that 20 of the mothers who care for the babies were illiterate and 15 of these patients had further treatment. 9 of these babies whose mothers were illiterate were Graf type 2B class and it was thought to be a factor affecting the success of Pavlik harness treatment. In this study, it was determined that every increase in education level increases the success rates in Pavlik harness treatment. As the education level of the mothers increases, the inability to treat type 2B patients decreases. As a result, it was determined that the success of Pavlik harness treatment increased as the education level of the mothers increased.

One of the factors that are effective in understanding the diseases and maintaining the appropriate treatment is the economic situation of the patient (28,29). In our study, it was determined that 16 of 22 people who stated that they did not have a regular income had a further treatment method. The fact that 7 of these patients were type 2B suggests that there is a relationship between income status and Pavlik harness treatment success. The increase in the economic status of the family also increases the improvement rate of type 2C classification. It is seen that the success of treatment is less in children especially in the lower income group. Similarly, it has been determined in the literature that there is a relationship between living in rural areas and living in an urban area, understanding the cause of their illness, going to check-ups regularly and using treatment method regularly (30). It was observed that 7 of 35 babies living in the city center had further treatment method where 21 patients of 23 families living in the village had further treatment. While 11 of the 21 infants living in the village who underwent further treatment methods are type 2B, 10 are type 2C. When a comparison is made between the places of residence, the probability of treatment with the Pavlik harness method increases for patients living in the city center. Even if the babies living in the village have Graf classification Type 2B, the chance of treatment decreases.

**Limitations of Study:** The main limitation of the study is related to low sample size and therefore the results of our study should be confirmed with larger series. Second limitation is that type 3 and type 4 hips were not included in the study. The effect of the socio-economic status of the family

on these groups could not be revealed. Third limitation is that other parameters affecting treatment success were not evaluated. In current study, fourth limitation is that the variables of education, income and settlement which are shown to be related to health literacy in the literature, are discussed. However, language, religion, ethnic identity, etc. which are shown to be effective in health literacy were not considered. Further comprehensive studies are needed to evaluate these variables. Although the sample group of 66 people in our study is insufficient in terms of understanding all the effects of health literacy in the treatment process of DDH and making definite decisions, it will lead the studies to be done in the future. More comprehensive studies in this area will contribute to the realization of the treatment process of DDH in faster and less costly ways.

### Conclusion

Although the families are informed about the use of the Pavlik harness and the treatment process of DDH before the treatment starts in the clinic while some of the babies with the same DDH severity according to Graf classification were treated with Pavlik bandage and some of them needed advanced treatment methods. Therefore, it is thought that the health literacy of the families has important effects on the success of the treatment. In the context of the data obtained in the study, it is thought that education status, income status and settlement which are among the important factors affecting health literacy, have important effects on the treatment success of the Pavlik bandage method. Although the Pavlik bandage method is the gold standard in the treatment of DDH, it is seen that the family's health literacy also has a significant impact. Therefore, it is thought that increasing the level of health literacy of the family will contribute significantly to the treatment of DDH. In order to provide effective and easy treatment, it is necessary to increase the health literacy of families and to develop comprehensive information and follow-up processes.

**Ethical Approval:** Ethics committee approval was gained from Harran University Faculty of Medicine ethical committee numbered HRU/21.09.25 dated 26.04.2021.

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