Original Investigation / *Özgün Araştırma*

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Determination of Family Perceptions Regarding Antibiotic Use in Children and Evaluation of Affecting Factors

Çocuklarda Antibiyotik Kullanımına İlişkin Aile Algılarının Belirlenmesi ve Etkileyen Faktörlerin Değerlendirilmesi

Elif Güdeloğlu[1](İD), Ayşe Elif Uysal[2](İD), Tuğba Bedir Demirdağ[1](İD), Volkan Medeni[3](İD), Meltem Polat Temizhan[1](İD), Hasan Tezer[1](İD), Anıl Tapısız[1](İD)

[1] *Division of Pediatric Infectious Diseases, Department of Pediatrics, Gazi University Faculty of Medicine, Ankara, Türkiye*
[2] *Department of Pediatrics, Gazi University Faculty of Medicine, Ankara, Türkiye*
[3] *Department of Public Health, Gazi University Faculty of Medicine, Ankara, Türkiye*

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Abstract

Objective: Inappropriate and excessive use of antibiotics has emerged as a major global public health issue as a result of the their use in the prevention and treatment of infections. In this study, it was aimed to determine the antibiotic perceptions of parents with the Parental Perception on Antibiotics (PAPA) scale and investigate related factors.

Material and Methods: The study comprised a total of 484 participants. In this study, a survey form comprising 15 questions was utilized as data collection tool. The survey consisted of 10 questions aimed at gathering information on the demographic and socioeconomic characteristics of the family and an additional five questions focused on their health-related characteristics. Additionally, the PAPA scale, which comprises 31 statements, was also employed.

Results: A total of 484 parents completed the questionnaires, indicating a response rate of 100%. Of the participants, 75% were mothers. Mean score for knowledge and beliefs was found to be 25.3, with a range of 10 to 50. The average score for behaviors was 23.5, with a range of 5 to 25. Mean score for seeking information was 23.2, with a range of 7 to 35. The adherence score had a mean of 20.1, with a range of 5 to 25. Additionally, the awareness score regarding antibiotics resistance was found to be 12.9, with a range of 4 to 20. The aggregate score amounted to 107, with the minimum score being 31 and the maximum score being 155. A satisfactory level of antibiotic awareness was observed. The behaviour of not using unnecessary antibiotics was

Öz

Giriş: Enfeksiyonların önlenmesi ve tedavisinde antibiyotiklerin kullanılmasının bir sonucu olarak, antibiyotiklerin uygunsuz ve aşırı kullanımı önemli bir küresel halk sağlığı sorunu haline gelmiştir. Bu çalışmada, Ebeveynlerin Antibiyotik Algısı (PAPA) ölçeğiyle ebeveynlerin antibiyotik algılarını belirlemek ve ilgili faktörleri araştırmak amaçlanmıştır.

Gereç ve Yöntemler: Çalışmaya toplam 484 katılımcı dahil edilmiştir. Bu çalışmada, veri toplama aracı olarak 15 sorudan oluşan bir anket formu kullanılmıştır. Anket, ailenin demografik ve sosyoekonomik özelliklerine ilişkin bilgileri toplamayı amaçlayan 10 sorudan ve sağlıkla ilgili özelliklerine odaklanan beş sorudan oluşmuştur. Ayrıca, 31 maddeden oluşan PAPA ölçeği de kullanılmıştır.

Bulgular: Toplam 484 ebeveyn anketi doldurmuş olup yanıt oranı %100 olarak belirlenmiştir. Katılımcıların %75'i annelerdir. Bilgi ve inançların ortalama puanı 10 ile 50 arasında değişen bir aralıkta 25.3 olarak bulunmuştur. Davranışlar için ortalama puan 23.5 olup aralık 5 ile 25 arasındadır. Bilgi arama için ortalama puan 23.2 olup aralık 7 ile 35 arasındadır. Uyum puanı ortalama 20.1 olup aralık 5 ile 25 arasındadır. Ayrıca, antibiyotik direnci ile ilgili farkındalık puanı 12.9 olup aralık 4 ile 20 arasındadır. Toplam puan 107 olup en düşük puan 31, en yüksek puan 155 idi. Antibiyotik farkındalığı konusunda tatmin edici bir düzey gözlemlenmiştir. Gereksiz antibiyotik kullanmama davranışı, ebeveynlerinin eğitim düzeyi daha yüksek olan, çocukları bir yıl içinde dört veya daha fazla solunum yolu enfeksiyonu geçiren, çocukları bir yıl içinde dört veya

Correspondence Address/Yazışma Adresi

Elif Güdeloğlu

Division of Pediatric Infectious Diseases,
Department of Pediatrics,
Gazi University Faculty of Medicine,
Ankara, Türkiye

E-mail: drelif55@hotmail.com

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more prevalent among those whose parents had a higher level of education, whose children had four or more respiratory tract infections in one year, whose children needed four or more antibiotic treatments in one year, and who resided in urban areas.

Conclusion: It is advisable to implement measures aimed at improving parental attitudes towards antibiotics. Prioritizing the intervention for groups with comparatively lower perception scores is recommended. Further research is necessary to determine additional factors associated with the perception of antibiotics.

Keywords: Proper antibiotic use, parental awareness, antibiotic resistance, preventive health

daha fazla antibiyotik tedavisi gören ve kentsel alanlarda yaşayan kişilerde daha yaygındır.

Sonuç: Ebeveynlerin antibiyotiklere karşı tutumlarını iyileştirmeye yönelik önlemlerin alınması tavsiye edilir. Algı puanları nispeten düşük olan gruplara müdahaleye öncelik verilmesi önerilir. Antibiyotik algısıyla ilişkili ek faktörleri belirlemek için daha fazla araştırma yapılması gerekmektedir.

Anahtar Kelimeler: Doğru antibiyotik kullanımı, ebeveyn farkındalığı, antibiyotik direnci, koruyucu sağlık

Introduction

Misuse and overuse of antibiotics in humans and animals has increased antibiotic resistance all over the world. The increase in antibiotic resistance has been identified as a global health problem and is now recognized as one of the most important problems by governments (1). Antibiotic resistance makes it difficult to cope with infectious diseases and accelerate the developments in medicine. Rational use of antibiotics is critical in increasing survival, preventing complications, and shortening the severity and duration of the disease (2). According to the 2016-2018 Antibiotic Consumption Report of the World Health Organization, the defined daily dose per 1000 people in Türkiye in 2016 was announced as 38.18 and it was determined that it is one of the countries with the highest antibiotic use (3).

Childhood is one of the periods when antibiotics are used frequently. Respiratory tract infections are the most common cause of antibiotic use in children. Respiratory tract infections occur on average 6-8 times a year in children, and the causative agent is mostly viruses (4). It has been stated that especially the overuse and misuse of antibiotics is more common in children (5). Although antibiotics have no effect on viral agents, especially in children, they are often used inappropriately to treat viral infections such as upper respiratory tract infections (6). Various studies have revealed common misconceptions among parents, especially about the treatment of pediatric respiratory diseases (7). The health system of the countries, the education of the physician, the sociodemographic and economic determinants of the parents, the knowledge and attitude of the parents about the use of antibiotics are the factors that affect the inappropriate use of antibiotics in children (8).

Parental Perception on Antibiotics Scales (PAPA). PAPA Scale is a 5-point Likert-type scale developed by Alumran et al. in 2014, consisting of five subscales and 31 items (9). In 2023, a validity and reliability study of the PAPA scale, which is used to measure parents' perceptions of antibiotics, was conducted in Turkish by Ergin A. and colleagues (10). Irrational antibiotic use is a significant public health issue worldwide, leading to antibiotic resistance, increased side effects, and economic burden. Parents' perceptions of antibiotics play a critical role in children's antibiotic use, and there are not enough studies conducted in Türkiye using a validated and reliable scale to measure this perception.

In this study, it was aimed to determine the antibiotic perceptions of parents with the PAPA scale and investigate related factors.

Materials and Methods

Participants were recruited from families visiting the pediatric infectious disease outpatient clinic at Gazi University. Four hundred and eighty-four participants participated in the study. Informed consent was obtained from the participants for the study. As data collection tool, a 15-question survey form, consisting of 10 questions inquiring about the family's demographic and socioeconomic characteristics and five questions about their health-related characteristics, and the PAPA Scale, which consists of 31 statements, were used. The questionnaires were directly filled in by the parents through the doctor who examined the patients applying to the Gazi University Pediatric Infection outpatient clinic. The study was conducted in accordance with the Declaration of Helsinki and the principles of Good Clinical Practice.

The PAPA Scale, which comprises of 31 items and five subscales, was created by Alumran et al. in 2014 (9). It is a 5-point Likert-type item-based scale. The responses to these items are classified into five categories: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Alternatively, they can also be classified into five categories: Never, Rarely, Sometimes, Frequently, and Always.

The subscales consist of Knowledge and Beliefs with a total of 10 items, Behaviors with five items, Information Seeking with 7 items, Adherence with 5 items, and Awareness of Antibiotic Resistance (AAR) with 4 items. The scale comprises 24 items that are scored in reverse. The responses provided to the items are rated on a Likert scale ranging from strongly disagree (scored as 1) to totally agree (scored as 5).

The individual's antibiotic perception score is determined by aggregating the scores acquired from each item.

An elevation in the score derived from the scale signifies an improved perception of antibiotics in the individual.

The PAPA Scale has a range of scores between 31 and 155 points. The subscales of Knowledge and Beliefs, Behaviors, Seeking Information, Adherence, and AAR have a range of scores that can be obtained. Specifically, the lowest and highest scores for each subscale are as follows: Knowledge and Beliefs range from 10 to 50, Behaviors range from 5 to 25, Seeking Information ranges from 7 to 35, Adherence ranges from 5 to 25, and AAR ranges from 4 to 20.

SPSS 25.0 (IBM Corporation, Armonk, New York, United States) was used to analyze the variables. Cronbach's alpha values were examined to evaluate the survey's reliability. The Shapiro-Wilk-Francia test and the Levene test were used to determine if the single variable data were in accordance with the normal distribution. The Mann-Whitney U test and the Monte Carlo findings were used to compare the quantitative variables of the two independent groups to one another. Kruskal test, Wallis H. In order to compare more than two independent groups with one another using quantitative variables, Monte Carlo findings were used in a post-hoc analysis using Dunn's test. The variables were compared using Spearman's rho correlation test. Quantitative data is shown as n (%) in the tables, while categorical variables are represented as median (1st Quartile/3rd Quartile). p value was considered to be less than 0.05, and the variables were analyzed with a 95% confidence level.

Results

A total of 484 parents participated in the study and completed the questionnaires, resulting in a 100% response rate. Seventy-five percent of the participants in the study were mothers. A majority of 59.5% of the children did not exhibit any chronic disease. The majority of the participants, specifically 69.4%, resided in an urban area. Over the past year, 41.3 percent of the study participants either avoided using antibiotics or used them only once for upper respiratory tract infections. Table 1 displays detailed demographic characteristics of the participants involved in the study. Results of

Table 1. Distribution of participants' sociodemographic and clinical characteristics

		n (%)
Age	0-3 year	136 (28.1)
	4-9 year	152 (31.4)
	>10 years	196 (40.5)
Child sex (female)		288 (59.5)
Degree of Relationship (mother)		364 (75.2)
Mother's age	<30 years	116 (24)
	30-39 years	252 (52.1)
	>40 years	116 (24)
Mother's education status	Primary school	180 (37.2)
	High school	124 (25.6)
	University	180 (37.2)
Mother's disease presence (yes)		56 (11.6)
Father's age	<35 years	128 (26.4)
	35-44 years	244 (50.4)
	>45 years	112 (23.1)
Father's education status	Primary school	140 (28.9)
	High school	148 (30.6)
	University	196 (40.5)
Father's disease presence (yes)		32 (6.6)
Total child count	1	124 (25.6)
	2	164 (33.9)
	3 and above	196 (40.5)
Child's chronic disease presence (yes)		196 (40.5)
Presence of healthcare relative (yes)		124 (25.6)

Table 1. Distribution of participants' sociodemographic and clinical characteristics (continue)

		n (%)
Living area (city)		336 (69.4)
Income status	Expense > Income	136 (28.1)
	Expense = Income	232 (47.9)
	Income > Expense	116 (24)
Number of having airway infection in a year	0-1	180 (37.2)
	2-3	196 (40.5)
	4 and above	108 (22.3)
Times of using antibiotics	0-1	200 (41.3)
	2-3	176 (36.4)
	4 and above	108 (22.3)

the assessment of internal consistency for subgroups of the PAPA scales questionnaire, which was conducted through the utilization of Cronbach's alpha changes 0.71-0.87. The Cronbach alpha reliability coefficient is a measure of the internal consistency of responses to a set of questions. The reliability of the questions in the AAR subgroup surveys is high, as evidenced by the Cronbach alpha confidence coefficients exceeding 70%. The majority of the parents provided accurate responses to queries related to antibiotics knowledge. A majority of the participants (48.7%) expressed strong agreement and agreement towards the assertion that antibiotics are necessary for treating a sore throat.

Inquiries pertaining to safety produced a greater degree of consensus among the participants. The results showed that 60.3% of respondents strongly agreed or agreed with the statement that inadequate doses of antibiotics can lead to the development of antibiotic resistance in certain germs.

The statement "I think doctors prescribe too many antibiotics" was met with disagreement by the majority (96.7%) of respondents. Correlation analysis did not reveal any statistically significant relationship between mean age, mother age, father age, and total number of children and the subgroup questionnaires (Table 2).

Tables 3a-3b display the analyses that assess the correlation between variables that have been grouped together and the questionnaires completed by subgroups. Upon evaluating all subgroups of the questionnaire, it was observed that certain variables, namely the educational attainment of the mother and father, the presence of chronic illness in the child, and the frequency of using four or more antibiotics within a year, exhibited significant differences. No correlation was found between the mean age, mother age, father age, and total number of children and the subgroup questionnaires or total point. Table 4a-4b displays the analyses that assess the correlation between variables that have been grouped together and the overall point total. All variables, except for maternal age, chronic disease of the mother or father, relative health care in the family, and income status, were found to have a significant impact on the total score.

Table 2. Descriptive statistics of participants' sociodemographic and survey scores

	Mean (SD)	Median	(Min-Max)	(Q1/Q3)
Child age (month)	86.6 (63.03)	72	(2-216)	(30/144)
Mother's age (year)	34.6 (6.49)	34	(23-50)	(30/39)
Father's age (year)	38.98 (7)	38	(25-58)	(34/43)
Total child count	2.4 (1.29)	2	(1-8)	(1/3)
Knowledge and beliefs point	25.3 (8.42)	25	(10-46)	(19/31)
Behaviors point	23.58 (2.19)	24	(10-25)	(23/25)
Seeking information point	23.25 (4.63)	24	(11-33)	(21/27)
Adherence point	20.17 (4.38)	21	(7-25)	(18/24)
Awareness about antibiotics resistance	14.98 (2.98)	15	(7-20)	(14/16)
Total point	107.27 (10.33)	107	(82-132)	(101/113)

SD: Standart deviation, Min: Minimum, Max: Maximum, Q1: 1st quartile, Q3: 3rd quartile.

Table 3a. Comparison results of grouped variables based on survey subdimensions

	Subgroup Codes	Knowledge and Beliefs	p	Behaviors	p	Seeking Information	p	Adherence	p	AAR	p
		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)	
Age			**0.017**[k]		**0.015**[k]		**0.003**[k]		0.061[k]		0.063[k]
0-3 years	A	24 (30/44)	P(A vs. C)= 0.012	24 (18/20)	P(A vs. B)= 0.010	24.5 (22/24)	P(A vs. B)= 0.014	21 (23/29)		16 (14/17)	
4-9 years	B	24 (30/41)	P(B vs. C)= 0.021	25 (20/20)	P(B vs. C)= 0.015	23 (20/24)	P(B vs. C)= 0.007	20.5 (21/27)		15 (14/16)	
10 years and above	C	27 (29/39)		24 (20/20)		24 (21/24)		21 (20/29)		15 (13/16)	
Child sex			0.208[u]		0.117[u]		**0.041**[u]		0.212[u]		0.870[u]
Female		25 (28.5/41)		25 (20/20)		24 (21/24)		21 (21/29)		15 (14/16)	
Male		25 (30/39)		24 (19/20)		24 (21/24)		21 (22/28)		15 (14/17)	
Degree of relationship			**<0.001**[u]		0.974[u]		0.179[u]		0.488[u]		0.703[u]
Mother		26 (28/40)		24 (20/20)		24 (21/24)		21 (21/29)		15 (14/16)	
Father		23 (32/41)		24.5 (19/20)		23.5 (20/24)		21 (21/30)		15 (13/18)	
Mother's age			**0.011**[k]		**0.035**[k]		0.464[k]		0.618[k]		0.143[k]
<30 years	A	28 (28/39)	P(A vs. B)= 0.004	25 (20/20)	P(A vs. B)= 0.039	23 (21/24)		20 (23/28)		15 (13/16)	
30-39 years	B	23 (29/42)		24 (19/20)	P(B vs. C)= 0.034	24 (21/24)		21 (21/29)		15 (14/17)	
>40 years	C	27 (30/40)		25 (20/20)		24 (20/24)		21 (22/30)		15 (14/17)	
Mothers's education status			**<0.001**[k]		**<0.001**[k]		**0.008**[k]		**<0.001**[k]		**<0.001**[k]
Primary school	A	21 (28/36)	P(A vs. B)< 0.001	24 (19/20)	P(A vs. C)< 0.001	25 (21/24)	P(A vs. C)= 0.003	19 (21/26)	P(A vs. C)< 0.001	15 (12/16)	P(A vs. C)< 0.001
High school	B	27 (29/41)	P(A vs. C)< 0.001	24 (20/20)	P(B vs. C)= 0.003	24 (21/24)		21 (19/29)	P(B vs. C)< 0.001	15 (13/16)	P(B vs. C)< 0.001
University	C	29 (34/45)	P(B vs. C)= 0.004	25 (20/20)		23 (21/24)		22 (25/30)		16 (14/18)	
Mother's disease presence			**0.091**[u]		0.305[u]		**0.001**[u]		0.759[u]		0.702[u]
Yes		25 (30/47)		24.5 (20/20)		25 (23/26)		21 (22/29)		15 (14/16)	
No		25 (29/40)		24 (19/20)		24 (21/24)		21 (21/29)		15 (14/17)	
Father's age			0.087[k]		**0.022**[k]		0.751[k]		0.065[k]		**0.011**[k]
<35 years	A	24.5 (29/42)		25 (20/20)	P(A vs B)= 0.005	23.5 (21/23.5)		21.5 (23.5/29.5)		16 (14/17)	P(B vs. C)= 0.005
35-44 years	B	24 (30/41)		24 (19/20)		24 (21/24)		21 (21/28)		15 (13/16)	
>45 years	C	27.5 (29/37.5)		24.5 (19.5/20)		24 (20.5/24)		20 (21/29.5)		15.5 (14.5/17.5)	

Table 3a. Comparison results of grouped variables based on survey subdimensions (continue)

	Subgroup Codes	Knowledge and Beliefs	p	Behaviors	p	Seeking Information	p	Adherence	p	AAR	p
		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)	
Father's education status			**<0.001**^{k}		0.075^{k}		**0.007**^{k}		**<0.001**^{k}		**0.001**^{k}
Primary school	A	21 (27/36)	P(A vs. B)< 0.001	24 (19/20)		23 (20/24)	P(A vs. B)= 0.018	21 (22/27)	P(A vs. C)< 0.001	15 (12/16)	P(A vs. B)= 0.018
High school	B	27 (29/38)	P(A vs. C)< 0.001	24 (20/20)		25 (21/24)	P(B vs. C)= 0.002	20 (20/29)	P(B vs. C)< 0.001	15 (14/17)	P(A vs. C)< 0.001
University	C	30 (33/45)	P(B vs. C)= 0.001	25 (20/20)		24 (21/24)		21 (24/30)		16 (14/18)	
Father's disease presence			0.766^{u}		0.755^{u}		0.074^{u}		**0.049**^{u}		0.928^{u}
Yes		26.5 (29.5/40.5)		24 (18/20)		25 (22.5/26)		19 (16/28.5)		15 (14/16.5)	
No		25 (29/41)		24 (20/20)		24 (21/24)		21 (22/29)		15 (14/16)	

^{k} Kruskal Wallis H test (Monte Carlo), Post Hoc: Dunn's test, ^{u}Mann Whitney U test (Carlo).
Q1: 1st quartile, Q3: 3rd quartile - A, B, and C are the relevant group codes, vs.: Versus.

Discussion

The Turkish version of the PAPA Scale was found to be a valid and reliable measurement tool for assessing the antibiotic perceptions of mothers and fathers. The subscales—"Knowledge and Beliefs," "Behaviors," "Seeking Information," "Adherence," and "Awareness About Antibiotic Resistance"—were named in the same way as the original scale.

Studies that compare antibiotic perception levels across different populations remain limited. Our findings indicate that the average scores were 25.3 (range= 10-50) for knowledge and beliefs, 23.5 (range= 5-25) for behaviors, 23.2 (range= 7-35) for seeking information, 20.1 (range= 5-25) for adherence, and 12.9 (range= 4-20) for awareness about antibiotic resistance. The total score ranged from 31 to 155, with an average of 107, indicating a notable level of antibiotic perception among participants.

Alumran et al. used the PAPA Scale to assess parental perceptions of antibiotics among those with children under 12 years old. Their findings showed lower perception levels compared to our study (11). This difference could be attributed to cultural variations, increased health awareness due to public campaigns in Türkiye, and changes in antibiotic prescription policies. Our study further highlight that individuals with higher education levels, those whose children experience frequent respiratory infections (four or more annually), those whose children require frequent antibiotic treatments (four or more per year), and those residing in urban areas exhibit greater awareness of antibiotic use and resistance.

Although knowledge and attitudes regarding antibiotics and antibiotic use have generally been found to be moderate in various studies, attitudes and behaviors related to health and disease are significantly influenced by cultural factors, healthcare infrastructure, and socioeconomic status. For instance, research from the United States indicates a decline in unnecessary pediatric antibiotic use in outpatient settings, yet inappropriate prescribing remains a challenge (12). Similarly, an online survey on public attitudes toward upper respiratory infections and antibiotics underscores the need for enhanced public education to curb unnecessary antibiotic use (13).

In Italy, a survey assessing public knowledge, attitudes, and experiences regarding antibiotic use concluded that awareness about proper antibiotic use and resistance must be strengthened (14). Moreover, a study examining the factors influencing pediatric antibiotic prescriptions found that parental education and socioeconomic status significantly impact prescribing patterns, reinforcing our study's finding that parental education influences antibiotic perceptions (15).

A study in Greece evaluating parental knowledge, attitudes, and practices regarding antibiotic use for children's respiratory infections revealed that many parents hold incorrect beliefs about the necessity and use of antibiotics (16).

Table 3b. Comparison results of grouped variables based on survey subdimensions

	Subgroup Codes	Knowledge and Beliefs	p	Behaviors	p	Seeking Information	p	Adherence	p	AAR	p
		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)		Median (Q1/Q3)	
Total child count			**0.003**[k]		0.098[k]		0.200[k]		**0.001**[k]		**<0.001**[k]
1	A	22 (30/45)	P(A vs. B)= 0.020	25 (19/20)		24 (21/23)		21 (23/28)	P(A vs. C)= 0.006	15 (14/18)	P(A vs C)< 0.001
2	B	25 (30/40)	P(A vs. C)= 0.001	25 (20/20)		25 (21/24)		21 (22/30)	P(B vs. C)< 0.001	16 (14/18)	P(B vs C)< 0.001
3 and above	C	27 (28/39)		24 (19/20)		24 (20/24)		20 (20/27)		15 (13/16)	
Child's disease presence			**<0.001**[u]		**<0.001**[u]		0.169[u]		**0.002**[u]		**0.055**[u]
Yes		27 (29/38)		23 (19/20)		24 (21/24)		20 (20/28)		15 (13/17)	
No		23 (30/44)		25 (20/20)		24 (21/24)		21 (23.5/29)		16 (14/16)	
Presence of healthcare relative			**<0.001**[u]		**0.002**[u]		0.063[u]		**0.002**[u]		**<0.001**[u]
Yes		22 (33/48)		25 (20/20)		24 (21/25)		22 (23/30)		16 (14/19)	
No		27 (29/39)		24 (19/20)		24 (21/24)		21 (21/28)		15 (14/16)	
Living area			**<0.001**[u]		0.174[u]		**0.013**[u]		0.331[u]		**0.038**[u]
City		24 (30/41)		24 (19/20)		24 (21/24)		21 (21/29)		15 (14/17.5)	
Rural		30 (26/38)		25 (20/20)		25 (21/25)		21 (23/28)		15.5 (14/16)	
Income status			**<0.001**[k]		**0.002**[k]		0.680[k]		**<0.001**[k]		**<0.001**[k]
Expense > Income	A	28 (28/39)	P(A vs. C)= 0.005	24 (19/20)	P(A vs. C)= 0.003	24 (21/24)		20 (22/27)	P(A vs. C)< 0.001	14.5 (13/16)	P(A vs. B)= 0.020
Expense = Income	B	25 (29/41)	P(B vs. C)< 0.001	24 (19/20)	P(B vs. C)= 0.001	24 (21/24)		20 (20/29)	P(B vs. C)< 0.001	15 (14/16)	P(A vs. C)< 0.001
Income > Expense	C	23 (31/45)		25 (20/20)		23 (21/24)		22 (25/30)		16 (14/19)	P(B vs. C)= 0.001
Number of having airway infection			**<0.001**[k]		**<0.001**[k]		0.596[k]		**0.001**[k]		0.293[k]
0-1	A	24 (30/44)	P(A vs. C)< 0.001	25 (20/20)	P(A vs. B)< 0.001	24 (21/24)		21 (23/30)	P(A vs. C)< 0.001	15 (14/16)	
2-3	B	23 (30/41)	P(B vs. C)< 0.001	24 (19/20)	P(A vs. C)< 0.001	24 (21/24)		21 (21/28)	P(B vs. C)= 0.003	15 (13/16)	
4 and above	C	29 (24/35)		23 (19/20)		23 (21/24)		19 (19/28)		15 (14/17)	
Times of using antibiotics			**<0.001**[k]		**<0.001**[k]		0.101[k]		**<0.001**[k]		**<0.001**[k]
0-1	A	21.5 (30/47)	P(A vs. B)< 0.001	25 (20/20)	P(A vs. B)< 0.001	24 (21/25)		22 (24/30)	P(A vs. B)< 0.001	16 (14/18)	P(A vs. B)< 0.001
2-3	B	25 (28.5/38.5)	P(A vs. C)< 0.001	24 (19/20)	P(A vs. C)< 0.001	25 (22/24)		20 (20/27.5)	P(A vs. C)< 0.001	14.5 (12.5/16)	P(B vs. C)= 0.001
4 and above	C	28 (28/36)		23 (19/20)		23 (21/24)		20 (20/28)		15 (14/17)	

[k] Kruskal Wallis H test (Monte Carlo), Post Hoc: Dunn's test, [u] Mann-Whitney U test (Carlo).
Q1: 1st quartile, Q3: 3rd quartile - A, B, and C are the relevant group codes, vs.: Versus.

Table 4a. Comparison results of grouped variables based on total scores

	Subgroup Codes	Total Point Median (Q1/Q3)	p
Age			**0.045**[k]
0-3 years	A	108 (109/130)	
4-9 years	B	106 (103/124)	P(B vs C)= 0.018
10 years and above	C	108 (107/121)	
Child sex			**0.004**[u]
Female		108 (107/126)	
Male		107 (107/123)	
Degree of relationship			**0.002**[u]
Mother		108 (104/124)	
Father		106 (109/124)	
Mother's age			0.083[k]
<30 years	A	108 (104/123)	
30-39 years	B	106 (105/127)	
>40 years	C	109 (109/121)	
Mother's education status			**0.001**[k]
Primary school	A	109 (104/117)	P(A vs. C)< 0.001
High school	B	107 (104/126)	P(B vs C)= 0.033
University	C	106 (117/134)	
Mother's disease presence			0.822[u]
Yes		108 (108/130)	
No		107 (107/124)	
Father's age			**0.011**[k]
<35 years	A	108.5 (107.5/128)	P(A vs. B)= 0.013
35-44 years	B	106 (105/124)	
>45 years	C	108.5 (107.5/120)	
Father's education status			**<0.001**[k]
Primary school	A	109 (104/115)	P(A vs. C)< 0.001
High school	B	109 (109/120)	P(B vs. C)< 0.001
University	C	104 (115/133)	
Father's disease presence			0.950[u]
Yes		107.5 (104.5/124)	
No		107 (107/124)	

[K] Kruskal Wallis H test (Monte Carlo), Post Hoc: Dunn's test, [U] Mann-Whitney U test (Carlo).
Q1: 1st quartile, Q3: 3rd quartile - A, B, and C are the relevant group codes, vs: Versus.

This underscores the importance of tools like the PAPA Scale, which can help identify misconceptions and guide targeted educational interventions.

Versporten et al. conducted research across 17 Eastern European countries, highlighting how variations in antibiotic use are linked to national economies, healthcare accessibility, antibiotic sales policies, and education levels. These disparities make it challenging to standardize antimicrobial resistance strategies and policies (17).

Our study is the first in Türkiye to assess parental awareness of antibiotic use in children using the PAPA Scale. This research provides valuable insights into how parental knowledge, attitudes, and behaviors shape antibiotic use, offering a foundation for future educational and policy initiatives aimed at reducing inappropriate antibiotic consumption. Given the rising global concern about antibiotic resistance, our findings emphasize the urgent need for targeted awareness campaigns and evidence-based policy interventions to promote responsible antibiotic use.

Table 4b. Comparison results of grouped variables based on total scores

	Subgroup Codes	Total Point Median (Q1/Q3)	p
Total child count			**0.009**[k]
1	A	106 (113/130)	P(A vs. B)= 0.013
2	B	110 (108/123)	P(B vs. C)= 0.006
3 and above	C	107 (104/120)	
Child's disease presence			0.058[u]
Yes		108 (104/119)	
No		107 (108.5/129.5)	
Presence of healthcare relative			0.104[u]
Yes		106 (113/138)	
No		108 (104/123)	
Living area			**<0.001**[u]
City		106.5 (109/125)	
Rural		109 (104/120)	
Income status			0.097[k]
Expense > Income	A	109 (104/119)	
Expense = Income	B	107 (103/124)	
Income > Expense	C	108 (115/133)	
Number of having airway infection			**<0.001**[k]
0-1	A	106 (113/130)	P(A vs. C)< 0.001
2-3	B	107 (109/126)	P(B vs. C)< 0.001
4 and above	C	112 (101/118)	
Times of using antibiotics			**<0.001**[k]
0-1	A	106.5 (113/134)	P(A vs. C)< 0.001
2-3	B	107.5 (103.5/120)	P(B vs. C)= 0.002
4 and above	C	110 (104/119)	

[K] Kruskal Wallis H test (Monte Carlo), Post Hoc: Dunn's test, [u] Mann Whitney U test (Carlo).
Q1: 1st quartile, Q3: 3rd quartile - A, B, and C are the relevant group codes, vs.: Versus.

Conclusion

In conclusion, it is recommended that efforts be made to enhance parents' perceptions regarding antibiotics. Groups with lower perception scores should be given priority in the intervention. Additional investigation is required to ascertain additional variables linked to the perception of antibiotics.

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