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Evaluation of Parents' Perceptions of Antibiotic Use Within the Scope of Rational Drug Use*

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Abstract

Aim: This study aimed to assess parents' perceptions of antibiotic use in children under 14 years of age within the rational drug use framework.

Methods: This descriptive cross-sectional study was conducted from July 1 to September 30, 2025, in Manisa, Türkiye, with 416 parents of at least one child aged 14 years or younger. Data were collected using a descriptive information form and the Parental Perception on Antibiotics Scale. Descriptive statistics, independent samples t-tests, one-way analyses of variance tests, and backward linear regression analysis were performed.

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Results: The mean total PPAS score was 104.31 ± 12.78, indicating a moderate-to-good parental antibiotic perception. Higher scores were observed among parents with higher education, those who were employed, and those whose income exceeded their expenses. Parents with one child and those who had received prior education on antibiotic use had significantly higher total, adherence, and antibiotic resistance awareness scores ($p < 0.05$). Regression analysis showed that education, employment, and avoidance of antibiotics without a physician's recommendation were significant predictors.

Conclusion: Parents' perceptions of antibiotic use are influenced by their sociodemographic characteristics. Parent-focused educational interventions, particularly targeting families with multiple children or lower socioeconomic status, may support rational drug use and inform public health strategies to reduce antibiotic resistance in children.

Keywords: Antibiotic, Parents, Drug Resistance, Rational Drug Use, Children

INTRODUCTION

Rational drug use refers to the appropriate prescribing, dispensing, and consumption of medications, ensuring that patients receive the right drug at the right dose for the right duration while minimizing potential adverse effects and healthcare costs (Sağlık Bakanlığı, 2020; World Health Organization (WHO), 2023). The concept of rational drug use emphasizes not only the correct use of drugs but also the optimization of therapeutic outcomes, prevention of antimicrobial resistance, and promotion of patient safety (Abdallah et al., 2025; WHO, 2023). Rational drug use is particularly critical in pediatric care, as children are more vulnerable to medication errors, adverse drug reactions, and long-term consequences of inappropriate antibiotic exposure (Korppi et al., 2022; Soler Wenglein et al., 2025; Choonara, 2021).

Antibiotics are chemical agents, either produced by microorganisms or synthesized in the laboratory, that inhibit the growth of other microorganisms (Mutagonda et al., 2022). These medications are essential for saving lives and must be used carefully and correctly, administered only under the supervision of trained healthcare professionals, and following all necessary precautions to minimize potential adverse outcomes (Bofarraj et al., 2020; Zahreddine et al., 2018). Misuse, overuse, or improper administration of antibiotics can lead to changes in microorganisms, causing them to lose their effectiveness and develop resistance (Nazir et al., 2025). Excessive or inappropriate antibiotic use is a major factor in the emergence and spread of antimicrobial resistance (Maarouf et al., 2023).

Antimicrobial resistance has been recognized by global and national health authorities as a major threat to public health (Sağlık Bakanlığı, 2020; WHO, 2023). The World Health Organization has stated that antibiotic resistance is a major threat to global public health and national development. Antibiotic resistance is defined as the ability of microorganisms to change over time and no longer respond to antimicrobial drugs, leading to difficulties in treatment, increased spread of disease, and higher rates of severe illness and death (WHO, 2023). The Centers for Disease Control and Prevention (CDC) (2025a) stated that antibiotic resistance occurs when microorganisms develop the ability to overcome the effects of these drugs, making infections more difficult to treat, and in some cases, impossible to treat. In the United States, it is estimated that more than 2.8 million cases of antimicrobial-resistant infections occur each year, and the national cost of treating these infections exceeds 4.6 billion dollars annually (CDC, 2025a). The World Bank estimates that antimicrobial resistance will cause a loss of gross domestic product ranging from 1 trillion to 3.4 trillion dollars by 2030, and an additional 2 trillion dollars in healthcare costs by 2050 (The World Bank, 2017). This situation is more prevalent in low- and middle-income countries than in high-income countries. Changing disease patterns and increasing levels of resistance to antibiotics indicate an urgent global need for expanded research and development efforts, as well as for equitable access to newly developed medicines, vaccines, and treatment options (WHO, 2023).

Excessive and unnecessary use of antibiotics, use of antibiotics in the treatment of viral infections where they are not required, non-adherence to treatment protocols in diseases requiring long-term treatment, lack of knowledge about antibiotic resistance, and insufficient preventive measures, such as hygiene and vaccination, are among the main causes of antibiotic resistance (Sağlık Bakanlığı, 2020). One of the areas in which antibiotics are extensively used in the healthcare sector is pediatrics. During childhood, antibiotics are frequently prescribed for conditions such as upper and lower respiratory tract infections, otitis media, tonsillopharyngitis, and sinusitis; however, a significant proportion of these infections have a viral etiology and do not require antibiotics (Korppi et al., 2022). Unnecessary antibiotic use in children is especially concerning in low- and middle-income countries due to widespread infectious diseases and gaps in hygiene, sanitation, and public health (De Jong et al., 2008; Dyar et al., 2012; Hoa et al., 2011). Factors influencing the inappropriate use of antibiotics in children include excessive prescribing by physicians (Dillen et al., 2024), easy access to antibiotics for self-medication (Bert et al., 2022;

Sun et al., 2025; Qu et al., 2023), parental pressure on physicians to prescribe antibiotics (Arnau-Sánchez et al., 2023; Shamim et al., 2023), and parents' limited knowledge about antibiotics (Albayrak et al., 2021; Naser and Al-Shehri, 2025; Pitaloka et al., 2025). In addition, insufficient knowledge about microbial diseases and the pharmacokinetic and pharmacodynamic properties of different classes of antibiotics underlie the incorrect and inappropriate use of these medications (Romandini et al., 2021; WHO, 2023). Rational drug-use strategies, such as evidence-based prescribing, patient education, and antibiotic stewardship programs, are essential for mitigating these risks (Bofarraj et al., 2020; Hansen et al., 2023; WHO, 2023).

Parents' perceptions and practices regarding medication use significantly impact the management of childhood illnesses (Ahmed et al., 2024; Naser and Al-Shehri, 2025; Paulsamy et al., 2023). Many parents believe that antibiotics can treat viral infections in common childhood illnesses, resulting in unnecessary use (Alnaim, 2024; Yu et al., 2014). In a study conducted in Saudi Arabia among parents of children aged under 14 years, which assessed knowledge, attitudes, and practices related to antibiotic use in children, nearly 70% of participants reported purchasing antibiotics without a prescription. In addition, 50% of the parents stated that they had not received any advice from physicians regarding antibiotic use, while 66.8% reported that their children had been prescribed oral antibiotics once or twice in the past six months, and 26% reported three or more prescriptions during the same period (Al-Ayed, 2019). In a study conducted among 1,459 parents with children under six years of age in the Republic of Srpska, the majority of parents (98.4%) reported that physicians were their primary source of information when deciding on antibiotic use for their children's treatment (Mijović et al., 2022). Studies have indicated that implementing rational drug use principles through caregiver education can significantly reduce unnecessary antibiotic use and improve adherence to treatment guidelines (Abdallah et al., 2025; Ahmed et al., 2024; Binsaleh et al., 2024).

Studies evaluating parents' perceptions of antibiotics for children under the age of 14 in Türkiye remain limited, and most have not examined the influence of sociodemographic factors or children's use of healthcare services on parental perceptions (Albayrak et al., 2021; Güdeloğlu et al., 2025; Kenesarı and Özçakar, 2016; Özdemir and Ergin, 2023; Yiğit and Karagöl, 2022). Furthermore, previous studies rarely examined parental perceptions of antibiotics within the framework of rational drug use or identified independent risk factors for inappropriate perceptions. This study makes a novel contribution by evaluating parents' perceptions of antibiotics, incorporating sociodemographic variables, children's healthcare utilization, and parental views. This may provide evidence-based insights to support targeted public health interventions and inform national antibiotic stewardship policy in Türkiye. The research questions are as follows:

1. Do parents' perceptions of antibiotics differ significantly according to age, gender, educational level, marital status, income level, and the presence of social security?
2. Do parents' perceptions of antibiotics differ significantly based on children's use of healthcare services and views on antibiotic use?
3. Which variables are independent risk factors for parents' perceptions of antibiotics?

1. RESEARCH METHODOLOGY

1.1. Type of Research

This was a descriptive cross-sectional study, meaning that events were assessed at a single point in time (Çaparlar and Dönmez, 2016).

1.2. Population and Sample

The study population consists of mothers and fathers aged 18–65 years, literate, living in the city center of Manisa, and having children aged 14 years or younger. The sample included 416 parents who volunteered to participate in the study. The criterion of having children aged 14 years or younger was chosen because studies on this topic generally focus on parents of children in the primary school age group (Özdemir and Ergin, 2023; Al-Ayed, 2019; Esteireiro et al., 2020). For the sample to be representative of the population, the sample size should be large enough to minimize sampling error (N > 200) (Kline, 2016; Pai and Chary, 2013). Because the total size of the population is not precisely known and its boundaries cannot be clearly defined, the formula proposed by Cochran (1977), which is used when the population is unknown, was applied. The formula and parameters used are as follows:

$$n = \frac{Z^2 * p * q}{e^2}$$

Z: 1.96, representing a 95% confidence level,

p: the expected proportion in the population (0.50 is used when unknown, yielding the maximum sample size),

q: the proportion not expected (1 − p = 0.50),

e: acceptable margin of error (0.05).

Based on these parameters, the calculation results were as follows:

$$n = \frac{(1,96)^2 * 0,5 * 0,5}{(0,05)^2} = 384,16$$

the value was obtained. Accordingly, the minimum sample size required to represent the study population was 385.

An a priori power analysis was conducted using G*Power (v3.1.9.7) software before data collection to determine the statistical power of the t-test, ANOVA, and simple linear regression analyses used in the study (Faul et al., 2007). The analysis was based on a medium effect size (0.30) recommended for social sciences by Cohen (1988), a significance level of $\alpha = 0.05$, and a targeted statistical power of $1-\beta = 0.95$. The calculations indicated that a minimum sample size of 134 was required to test the study hypotheses and to avoid Type II errors. Considering potential losses during data collection, incorrectly completed forms, and reductions in the dataset following outlier analysis, data were collected from 416 participants. This sample size exceeded the minimum recommended by G*Power, indicating that the study achieved high statistical power at a 95% confidence level.

1.3. Inclusion Criteria

Residing in the city center of Manisa

Being between 18 and 65 years of age

Being literate

Having a child aged 14 and/or under

Voluntary participation was allowed in the study.

1.4. Data Collection Tools and Methods

In this study, data were collected using a questionnaire with two sections. The first section included the Descriptive Information Form, which comprised 18 questions addressing participants' sociodemographic characteristics and statements regarding parents' use of healthcare services for their children and their antibiotic use. In the second part of the questionnaire, the Parental Perception on Antibiotics Scale (PPAS), developed by Alumran et al. (2013, 2014) and adapted into Turkish by Özdemir and Ergin (2018), was used to assess parents' perceptions of antibiotics. The scale consists of five sub-dimensions: knowledge and beliefs (10 items), behaviors (5 items), information-seeking (7 items), adherence (5 items), and awareness of antibiotic resistance (4 items), with a total of 31 items. Designed as a 5-point Likert scale, it is scored from 1 (strongly disagree) to 5 (strongly agree), and from 1 (never) to 5 (always). The scale has no cutoff point. Items 3, 7, 8, and 9 are scored normally, whereas the remaining 27 items are reverse scored. The minimum possible score is 31, and the maximum is 155. Sub-dimension scores range from 10–50 for knowledge and beliefs, 5–25 for behaviors, 7–35 for information-seeking, 5–25 for adherence, and 4–20 for awareness of antibiotic resistance. Higher scores indicate better perceptions of the antibiotics. The reliability of this scale has been demonstrated in previous studies. Alumran et al. (2013a) reported a Cronbach's alpha value of 0.78, with sub-dimension alpha coefficients ranging between 0.771 and 0.794. Özdemir and Ergin (2018) reported an overall internal consistency coefficient of 0.79 and values ranging between 0.63 and 0.86 across sub-dimensions (Alumran et al., 2013a; Alumran et al., 2013b; Alumran et al., 2014; Özdemir, 2018; Özdemir and Ergin, 2023). Data were collected between July 1 and September 30, 2025, through face-to-face interviews using convenience sampling due to logistical and resource constraints. Convenience sampling is commonly used in population-based research because it is less costly and time-consuming than other sampling strategies and is relatively faster and easier to implement (Emerson, 2015; Stratton, 2021). While this method is commonly used in survey research, it may introduce sampling bias and limit the generalizability of the findings; therefore, it was considered a limitation of this study.

1.5. Data Analysis

Data obtained through the data collection form were examined based on the inclusion criteria. The eligible data were coded and transferred into Microsoft Excel. SPSS 27 (Statistical Package for the Social Sciences) was used for statistical analyses. Quantitative variables were presented with mean, standard deviation, median, minimum, and maximum values, while qualitative variables were shown using frequency and percentage descriptive statistics. The Shapiro-Wilk test and Box Plot graphics were used to assess the normality of the data distribution. For comparisons between two quantitative groups with normal distribution, the Student's t-test was applied; for comparisons among three or more groups, the One-Way ANOVA test was used, with the Bonferroni test applied to identify the source of differences. To determine the effects of descriptive characteristics on the PPAS scores, a backward linear regression analysis was performed. The results were evaluated at a 95% confidence interval, with statistical significance set at $p<0.05$.

1.6. Ethical Approval

This study was approved by the Bandırma Onyedi Eylül University Non-Interventional Research Ethics Committee on May 23, 2025 (decision number 2025-05/106). Informed voluntary consent was obtained from all participants, and all procedures were performed in accordance with the principles of the Declaration of Helsinki.

2. ANALYSIS

The descriptive characteristics of the participants are given in Table 1.

Table 1: Distribution of Descriptive Characteristics

Variables		n	%
Sex	Female-Mother	260	62.5
	Male-Father	156	37.5
Age	20-29	112	26.9
	30-39	253	60.8
	40 and above	51	12.3
Marrital status	Married	379	91.1
	Single	37	8.9
Education	Primary	38	9.1
	Secondary	197	47.4
	Associate's - Bachelor's	181	43.5
Employment	Yes	275	66.1
	No	141	33.9
Income	Income < Expense	43	10.3
	Income = Expense	239	57.5
	Income > Expense	134	32.2
Social security	Yes	390	93.8
	No	26	6.3
Residence area	Rural area	99	23.8
	Urban area	317	76.2
Number of children	1	176	42.3
	2	202	48.6
	3	36	8.7
	4	2	0.5
Average number of health service visits per year for child/children	None	24	5.8
	1-3	168	40.4
	4-6	155	37.3
	7 and above	69	16.6

According to Table 1, most participants were female (62.5%), aged 30-39 years (60.8%), had secondary school education (47.4%), had two children (48.6%), and reported utilizing health services for their children 1-3 times per year (40.4%).

Table 2 presents the characteristics of parents' antibiotic use for their children.

Table 2: Distribution of Characteristics Related to Antibiotic Use

Expressions		n	%
Have you ever received any training on antibiotic use?	Yes	42	10.1
	No	374	89.9
Would you use antibiotics for your child without a physician's recommendation?	Yes	111	26.7
	No	305	73.3
Do you regularly use the antibiotics prescribed to your child by a physician?	Yes	395	95
	No	21	5

Notably, 89.9% of parents reported having received no prior education on antibiotic use (Table 2). The mean, standard deviation, Cronbach's alpha, skewness, and kurtosis values for the PPAS are presented in Table 3.

Table 3: Internal Consistency and Normality Values of the PPAS

	Items	Mean±SSD	Median (Min-Maks)	Cronbach's Alfa	Skewness	Kurtosis
Knowledge and beliefs	10	32.31±6.28	33 (15-50)	0.682	-0.194	-0.203
Behaviors	5	20.72±2.89	21 (5-25)	0.722	-0.515	1.574
Information seeking	7	19.41±4.87	20 (7-35)	0.634	-0.092	0.788
Adherence	5	17.74±3.61	18 (8-25)	0.565	0.038	-0.541
Awareness of antibiotic resistance	4	14.13±3.76	15 (4-20)	0.693	-0.378	-0.465
Total Score	31	104.31±12.78	105 (66-145)	0.758	-0.341	0.680

When examining the internal consistency of the PPAS, the adherence sub-dimension had a Cronbach's alpha of 0.565, indicating low reliability, whereas the overall scale and other sub-dimensions ranged from 0.634 to 0.758, indicating good reliability (Karagöz, 2014). The PPAS and its sub-dimensions indicated that parents' perceptions of antibiotics were generally moderate to good.

Table 4 presents the comparison of PPAS scores according to parents' descriptive characteristics.

Table 4: Comparison of Parents' Perceptions of Antibiotics Scale According to Descriptive Characteristics

			Knowledge and beliefs	Behaviors	Information seeking	Adherence	Awareness of antibiotic resistance	Total Score
Sex	Female	Mean±SD	32±6.19	20.78±2.89	19.25±4.55	17.63±3.54	14.21±3.71	103.86±12.49
		Median (Min-Maks)	32 (16-46)	21 (10-25)	19 (7-35)	18 (9-25)	15 (4-20)	105 (66-135)
	Male	Mean±SD	32.85±6.4	20.63±2.89	19.69±5.37	17.92±3.73	13.99±3.85	105.08±13.25
		Median (Min-Maks)	33 (15-50)	20 (5-25)	20 (7-35)	18 (8-25)	14 (4-20)	105 (70-145)
	ᵃp		0.181	0.628	0.367	0.435	0.563	0.347
Age	20-29	Mean±SD	32.55±6.03	20.75±3.28	19.91±4.59	18.35±3.88	14.81±3.67	106.38±11.68
		Median (Min-Maks)	33 (17-46)	21 (5-25)	20 (7-35)	18 (8-25)	16 (4-20)	107 (70-130)
	30-39	Mean±SD	32.4±6.57	20.89±2.69	18.98±4.94	17.64±3.5	13.85±3.78	103.75±13.12
		Median (Min-Maks)	33 (15-50)	20 (12-25)	19 (7-35)	18 (9-25)	14 (4-20)	105 (66-145)
	40 ve üzeri	Mean±SD	31.37±5.23	19.86±2.84	20.45±4.98	16.9±3.37	14.00±3.7	102.59±13.08
		Median (Min-Maks)	31 (21-43)	20 (15-25)	20 (7-32)	17 (12-25)	15 (7-20)	103 (79-138)
	ᵇp		0.508	0.070	0.066	0.052	0.074	0.114
Marital status	Married	Mean±SD	32.36±6.35	20.75±2.86	19.31±4.85	17.83±3.54	14.01±3.77	104.26±12.71
		Median (Min-Maks)	33 (15-50)	21 (5-25)	19 (7-35)	18 (8-25)	14 (4-20)	105 (66-145)
	Single	Mean±SD	31.86±5.48	20.43±3.18	20.43±5.1	16.81±4.24	15.3±3.41	104.84±13.67
		Median (Min-Maks)	31 (23-46)	20 (14-25)	21 (7-28)	17 (10-24)	16 (7-20)	104 (74-136)
	ᵃp		0.648	0.522	0.183	0.102	0.067	0.807
Education	Primary	Mean±SD	30.95±5.66	20.47±3.07	19.34±4.99	16.37±3.36	13.24±4.25	100.37±13.71
		Median (Min-Maks)	30 (18-46)	20,5 (12-25)	19 (7-35)	16 (12-25)	14 (4-20)	101 (72-135)
	Secondary	Mean±SD	31.85±6.34	20.56±2.47	19.28±4.7	17.4±3.31	13.38±3.69	102.48±12.37
		Median (Min-Maks)	32 (16-43)	20 (14-25)	20 (7-34)	17 (10-25)	13 (4-20)	104 (66-128)
	Associate's-Bachelor's	Mean±SD	33.1±6.25	20.95±3.25	19.57±5.05	18.4±3.85	15.12±3.5	107.14±12.5
		Median (Min-Maks)	33 (15-50)	21 (5-25)	19 (7-35)	18 (8-25)	16 (4-20)	106 (70-145)
	ᵇp		0.056	0.369	0.848	**0.001****	**0.001****	**0.001****
Employment	Yes	Mean±SD	32.8±6.4	20.87±2.85	19.69±5.15	17.96±3.81	14.36±3.71	105.69±13.18
		Median (Min-Maks)	33 (15-50)	21 (5-25)	20 (7-35)	18 (8-25)	15 (4-20)	105 (70-145)
	No	Mean±SD	31.37±5.94	20.43±2.96	18.87±4.24	17.3±3.16	13.66±3.82	101.63±11.53
		Median (Min-Maks)	32 (16-46)	20 (14-25)	19 (8-34)	18 (11-25)	14 (4-20)	103 (66-130)
	ᵃp		**0.027***	0.142	0.101	0.080	0.070	**0.002***
Income	Income < Expense	Mean±SD	33.3±5.44	20.81±2.69	20.28±4.74	17.77±3.45	14.47±3.95	106.63±11.32
		Median (Min-Maks)	33 (24-46)	21 (14-25)	20 (8-35)	18 (12-25)	15 (4-20)	107 (78-135)
	Income = Expense	Mean±SD	31.62±6.32	20.41±2.8	19.21±4.56	17.25±3.39	13.87±3.78	102.34±12.21
		Median (Min-Maks)	32 (16-49)	20 (10-25)	19 (7-34)	17 (9-25)	14 (4-20)	104 (66-136)
	Income > Expense	Mean±SD	33.25±6.33	21.26±3.04	19.51±5.43	18.6±3.89	14.47±3.63	107.09±13.63
		Median (Min-Maks)	34 (15-50)	21 (5-25)	20 (7-35)	19 (8-25)	15 (4-20)	107 (66-145)
	ᵇp		**0.030***	**0.022***	0.399	**0.002****	0.279	**0.001****
Number of children	1	Mean±SD	32.22±6.34	20.99±3.05	19.28±5.2	18.01±3.77	14.82±3.55	105.33±12.72
		Median (Min-Maks)	32 (15-49)	21 (5-25)	19 (7-32)	18 (8-25)	15 (4-20)	105.5 (66-136)
	2	Mean±SD	32.75±6.25	20.66±2.8	19.54±4.67	17.75±3.5	13.71±3.81	104.42±12.68
		Median (Min-Maks)	33 (16-50)	20 (12-25)	20 (7-35)	18 (10-25)	14 (4-20)	105 (66-145)
	≥3	Mean±SD	30.42±5.91	19.81±2.39	19.34±4.45	16.39±3.21	13.11±3.92	99.08±12.59

		Median (Min-Maks)	31 (17-43)	20 (16-25)	20 (7-27)	16 (12-24)	12 (7-20)	100 (73-124)
${}^{b}p$			0.106	0.070	0.875	**0.043***	**0.003****	**0.023***
Social security	**Yes**	Mean±SD	32.35±6.32	20.75±2.87	19.32±4.84	17.78±3.63	14.12±3.77	104.32±12.87
		Median (Min-Maks)	33 (15-50)	21 (5-25)	19 (7-35)	18 (8-25)	15 (4-20)	105 (66-145)
	No	Mean±SD	31.73±5.7	20.35±3.19	20.85±5.24	17.12±3.24	14.19±3.66	104.23±11.59
		Median (Min-Maks)	30 (24-46)	20.5 (14-25)	21 (7-35)	16.5 (12-25)	15 (4-19)	101.5 (79-135)
${}^{a}p$			0.625	0.492	0.122	0.365	0.925	0.972
Residence area	**Rural area**	Mean±SD	32.12±6.24	20.22±3.09	19.74±4.98	17.26±3.27	13.4±3.85	102.75±13.59
		Median (Min-Maks)	32 (16-46)	20 (5-25)	20 (7-35)	18 (8-25)	13 (4-20)	104 (66-135)
	Urban area	Mean±SD	32.38±6.29	20.88±2.81	19.31±4.85	17.89±3.71	14.35±3.71	104.8±12.49
		Median (Min-Maks)	33 (15-50)	21 (10-25)	19 (7-35)	18 (9-25)	15 (4-20)	105 (66-145)
${}^{a}p$			0.725	0.061	0.449	0.134	0.069	0.162

*ᵃStudent-t Test ᵇOne-Way ANOVA Test **p<0.01*

Significant differences in PPAS scores were observed according to parents' education, employment, income, and the number of children. Higher education, employment, higher income, and having only one child were all associated with higher overall PPAS scores and sub-dimensions related to adherence, knowledge, and awareness of antibiotic resistance ($p < 0.05$).

A comparison of the PPAS scores according to the parents' characteristics related to antibiotic use is shown in Table 5.

Table 5: Comparison of PPAS Scores According to Parents' Antibiotic Use Characteristics

			Knowledge and beliefs	**Behaviors**	**Information seeking**	**Adherence**	**Awareness of antibiotic resistance**	**Total Score**
Have you ever received any education on antibiotic use?	**Yes**	Mean±SD	34±6.43	20.86±2.82	1.,62±4.58	18.95±3.98	15.67±3.3	109.1±12.12
		Median (Min-Maks)	35 (20-46)	21 (14-25)	19.5(11-28)	19 (11-25)	16 (9-20)	111 (86-131)
	No	Mean±SD	32.13±6.24	20.71±2.9	19.39±4.91	17.6±3.55	13.95±3.77	103.78±12.75
		Median (Min-Maks)	32 (15-50)	20 (5-25)	20 (7-35)	18 (8-25)	14 (4-20)	104 (66-145)
	${}^{a}p$	Mean±SD	0.066	0.753	0.774	**0.021***	**0.005****	**0.010***
Would you use antibiotics for your child without a physician's recommendation?	**Yes**	Mean±SD	30.11±6.91	19.83±2.29	18.64±5	16.71±3.87	13.6±4.29	98.89±14.27
		Median (Min-Maks)	30 (15-49)	20 (12-25)	19 (7-35)	17 (9-25)	14 (4-20)	102 (66-132)
	No	Mean±SD	33.12±5.84	21.05±3.02	19.7±4.8	18.11±3.44	14.31±3.53	106.29±11.6
		Median (Min-Maks)	33 (17-50)	21 (5-25)	20 (7-35)	18 (8-25)	15 (4-20)	106 (66-145)
	${}^{a}p$		**0.001****	**0.001****	0.056	**0.001****	0.088	**0.001****
Do you regularly use the antibiotics prescribed to your child by a physician?	**Yes**	Mean±SD	32.38±6.27	20.78±2.86	19.44±4.88	17.78±3.61	14.15±3.75	104.53±12.76
		Median (Min-Maks)	33 (16-50)	21 (5-25)	20 (7-35)	18 (8-25)	15 (4-20)	105 (66-145)
	No	Mean±SD	31.14±6.34	19.62±3.23	18.86±4.92	16.95±3.72	13.62±3.93	100.19±12.69
		Median (Min-Maks)	31 (15-42)	20 (15-25)	20 (7-26)	17 (9-25)	13 (7-20)	103 (70-124)
	${}^{a}p$		0.380	0.072	0.592	0.307	0.527	0.129

*ᵃStudent-t Test, **p<0.01, *p<0.05*

Participants who had received education on antibiotic use scored significantly higher on the total PPAS, as well as on the adherence and awareness of antibiotic resistance sub-dimensions. Participants who administered antibiotics to their child without a physician's recommendation had significantly lower scores on the total scale and on the knowledge and beliefs, behaviors, and adherence sub-dimensions compared to those who had not received such education ($p < 0.05$).

Variables that were significant or nearly significant ($p < 0.200$) in the univariable analyses, including age, education level, employment status, income, region of residence, number of children, history of education on antibiotics, use of antibiotics for their child without a physician's recommendation, and regular use of prescribed antibiotics, were included in a backward linear regression analysis. The model obtained after the seventh step is presented in Table 6.

Table 6: Effects of Descriptive Characteristics on PPAS Scores

Dependent Variable	Independent Variables	ß	t	p	F	Model (p)	R^2
Parents' Perceptions of Antibiotics	Sabit		33.625	**0.001****	13.344	**0.001****	0.115
	Education (primary)	-0.097	-1.939	**0.053**			
	Education (secondary)	-0.158	-3.205	**0.001****			
	Employment (no)	-0.131	-2.774	**0.006****			
	Using antibiotics without a physician's recommendation (no)	0.250	5.344	**0.001****			

Backward linear regression analysis showed that education level, employment status, and giving antibiotics without a physician's recommendation were significant predictors of parents' PPAS scores, together explaining 11.5% of the variance. Having a secondary education and being unemployed were associated with lower scores, whereas not using antibiotics without a physician's recommendation was associated with higher scores ($p < 0.01$).

3. DISCUSSION/CONCLUSIONS AND RECOMMENDATIONS

3.1. Discussion

Approximately 90% of parents of children aged 0–14 had never received education on antibiotic use, and 26.7% had given antibiotics to their children without a physician's advice. Overall, parents' perceptions were moderate to good; however, one in four parents-initiated antibiotics without consulting a physician, highlighting gaps in rational drug use. In Türkiye, 15.7% of parents used antibiotics for every child with a fever, and 28% believed that inappropriate use would not affect outcomes or resistance, assuming new antibiotics could always be developed

(Albayrak et al., 2021). Similarly, Güdeloğlu et al. (2025) found moderate parental perceptions, while studies in Oman (Al Hashmi et al., 2021) and China (Yu et al., 2014) reported widespread misconceptions, including believing antibiotics treat viral infections or shorten illness duration, with many parents self-administering antibiotics. In Macedonia and Kosovo, 40% and 42% of parents, respectively, had moderate knowledge or incorrectly believed self-administered antibiotics did not contribute to resistance (Alili-Idrizi et al., 2014; Imeri et al., 2023), whereas Esteireiro et al. (2020) reported higher knowledge levels (30%). Differences across countries are influenced by national economies, access to healthcare, antibiotic sales policies, and parental education, which can challenge efforts to standardize rational antibiotic use (Bruyndonckx et al., 2021). These findings highlight the importance of implementing educational programs for parents, improving health literacy, and strengthening communication between healthcare professionals and parents to ensure rational drug use (Abdallah et al., 2025; Binsaleh et al., 2024; CDC, 2025b; Sağlık Bakanlığı, 2020; Soler Wenglein et al., 2025; WHO, 2023).

This study showed that parents' awareness of antibiotic use for their children increased with higher education levels. Supporting this, Alnaim (2024) reported a significant association between education and antibiotic knowledge among parents of children aged 0–12, with university-educated parents demonstrating greater awareness. Similarly, Esteireiro et al. (2020) and Mijović et al. (2022) found that higher education was linked to more appropriate antibiotic use and more positive attitudes. Studies from Türkiye by Albayrak et al. (2021), Yiğit and Karagöl (2022), and Güdeloğlu et al. (2025) also reported improved knowledge and more rational antibiotic use among better-educated parents. Overall, these findings suggests that higher education enhances access to health information, improves health literacy and critical thinking, and enables parents to make informed decisions about rational drug use (Albayrak et al., 2021; Alnaim, 2024; Esteireiro et al., 2020).

Parents whose incomes exceeded their expenses scored higher on the total PPAS and its sub-dimensions (knowledge and beliefs, behaviors, and adherence), suggesting that higher socioeconomic status positively influences rational drug use. Similar associations have been reported by Albayrak et al. (2021), Ahmed et al. (2024), and Abdallah et al. (2025). However, Islam et al. (2024) found that lower household income was associated with greater parental knowledge and awareness of antibiotic resistance, and Güdeloğlu et al. (2025) reported no significant effect of income on total scores, possibly due to sample characteristics or a focus on sub-dimensions.

In this study, parents with only one child were found to have greater awareness of antibiotic use compared to those with multiple children. This difference may be due to parents with only one child being able to dedicate more time and attention to their child's health, allowing them to better understand and manage rational drug use. However, Güdeloğlu et al. (2025) reported that the number of children did not have a significant effect on parents' perceptions of antibiotic use. Similarly, a study conducted in Türkiye by Yiğit and Karagöl (2022) examined parents' knowledge and attitudes toward antibiotics and found no significant relationship with the number of children.

Participants who had received education on antibiotic use scored significantly higher on the adherence and awareness of antibiotic resistance sub-dimensions, as well as on the total PPAS. Research indicates that educational interventions on antibiotic resistance are effective for parents. Well-designed awareness programs contribute to rational drug use by enabling parents to make informed decisions, control inappropriate antibiotic use, and support efforts to combat resistance in the context of child health (Abdallah et al., 2025; Hansen et al., 2023; Binsaleh et al., 2024).

In this study, the internal consistency coefficient for the adaptation subscale was found to be relatively low (Cronbach's $\alpha = 0.565$), indicating a minimally acceptable level of reliability (Karagöz, 2014). This value is lower than that reported in the Turkish adaptation study of the scale ($\alpha = 0.75$) conducted by Özdemir (2018). Similarly, in the original validation study conducted by Alumran and colleagues (2013a), the scale demonstrated good internal consistency, with an overall Cronbach's alpha of 0.87 and subscale coefficients ranging between 0.771 and 0.794. The relatively lower reliability coefficient obtained in this study may be associated with differences in sample characteristics, cultural context, or response variability among participants. In addition, it has been reported that Cronbach's alpha is sensitive to the number of items in a subscale, and scales with a limited number of items may yield lower alpha coefficients (Cronbach, 1951; Hair et al., 2018). Furthermore, in exploratory or early-stage research, reliability coefficients in the range of 0.50–0.60 may be considered acceptable (Hair et al., 2018; Fornell and Larcker, 1981). Therefore, although the internal consistency of the adaptation subscale was lower than previously reported values, the finding should be interpreted with caution, and further studies with larger and more diverse samples are recommended to reassess the reliability of this dimension.

Although the regression model identified education level, employment status, and giving antibiotics without a physician’s recommendation as significant predictors of parents’ PPAS scores, the explanatory power of the model was limited ($R^2 = 0.115$). This indicates that only approximately 11.5% of the variance in PPAS scores was explained by the included predictors. Therefore, while these factors are statistically significant, other unmeasured variables, such as health literacy, prior experiences with antibiotics, cultural beliefs, and access to healthcare, may also contribute to parental perceptions of antibiotics. These limitations should be considered when interpreting the results, and future studies are recommended to explore additional psychological, social, and contextual determinants to better understand parents’ attitudes toward antibiotic use.

3.2. Limitations

This study has several methodological limitations. First, due to its cross-sectional design, causal inferences cannot be made. Second, data were obtained from literate parents aged 18–65, residing in the city center of Manisa, who volunteered to participate and had children aged 14 or younger between July 1 and September 30, 2025, which may limit the generalizability of the findings. Third, the use of convenience sampling may have introduced sampling bias. Fourth, reliance on self-reported data could have led to reporting biases. Finally, the explanatory power of the regression model was limited, accounting for only 11.5% of the variance in parents’ PPAS scores, indicating that other unmeasured factors may also influence parental attitudes toward antibiotic use.

3.3.Conclusion

The findings of this study indicate that although parents of children under 14 years of age generally demonstrate a moderate level of antibiotic perception, inappropriate antibiotic use remains common. The use of antibiotics without a physician’s recommendation continues to be a significant issue and represents an important risk factor for the development of antibiotic resistance. Parental antibiotic perceptions were influenced by several factors, including education level, income status, number of children, and prior training related to antibiotic use. Parents with higher socioeconomic status and those who had received education on antibiotics showed more appropriate antibiotic perceptions and higher awareness of antibiotic resistance. In contrast, having more than one child was associated with lower levels of antibiotic resistance awareness, suggesting that increased caregiving demands may negatively affect rational drug use behaviors.

These results emphasize the importance of parent-focused educational interventions should be implemented through national campaigns led by the Ministry of Health and local authorities, supported by short training modules in schools and family health centers, and reinforced with informative content on antibiotic resistance disseminated via social media and mobile platforms. Improving communication between healthcare professionals and patients may promote rational drug use by reducing unnecessary antibiotic use and contributing to efforts to combat antibiotic resistance.

Future research should prioritize the evaluation of targeted educational interventions for parents, particularly those with multiple children or lower socioeconomic status, to enhance antibiotic knowledge and promote rational use. Strengthening communication strategies between healthcare professionals and parents may also provide valuable insights into reducing inappropriate antibiotic use in children. Furthermore, exploring additional psychological, social, and contextual determinants could contribute to a more comprehensive understanding of parental attitudes toward antibiotic use, ultimately informing more effective interventions and public health strategies.

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