



# Evaluation of Preoperative Anxiety in Turkish Paediatric Patients and Validity and Reliability of the Turkish Modified Yale Preoperative Anxiety Scale

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## Abstract

**Objective:** Preoperative anxiety has been related with postoperative behaviour changes, and it is characterised by subjective feelings. The modified Yale Preoperative Anxiety Scale (mYPAS) is a tool, which indicates preoperative anxiety in children older than 2 years. The objective of this study was to investigate factors affecting the level of preoperative anxiety after conduct validity and reliability of the Turkish version of mYPAS.

**Methods:** After obtaining approval from the ethics committee, 330 children aged 5–16 years were included in the study. Relationships between possible anxiety factors and anxiety levels were evaluated after validity and interrater reliability of the Turkish version.

**Results:** The intraclass correlation coefficient between the three observers was 0.9949 (95% confidence interval [CI]: 0.9939–0.9958) for the playroom assessments and 0.9952 (95% CI: 0.9942–0.9960) for the operating room assessments. The anxiety level was significantly lower in premedicated patients ( $p < 0.001$ ). There was a negative correlation between age and anxiety level ( $p < 0.001$ ,  $r = -0.350$ ).

**Conclusion:** The Turkish version of mYPAS has high validity and reliability and is suitable for use in the paediatric population of our country. Premedication significantly decreased preoperative anxiety, and younger patients tended to have higher anxiety level. For the 5–12 years age range, the level of anxiety decreased with age. More clinical studies are needed to investigate factors that contribute to preoperative anxiety.

**Keywords:** General anaesthesia, paediatric anaesthesia, preoperative anxiety, the modified Yale Preoperative Anxiety Scale

## Introduction

Preoperative anxiety is characterised by subjective feelings of nervousness, irritability, sadness, and unhappiness. Studies have shown that preoperative anxiety negatively affects children both psychologically and physiologically (1-3). Preoperative anxiety is observed in 60%–80% of children undergoing anaesthesia and surgery and is associated with adverse behavioural changes such as nightmares, separation anxiety, eating disorders, heightened fear of doctors, and undesired consequences, such as increased need for analgesics (2-6). In addition to behavioural symptoms, preoperative anxiety may activate the stress response, leading to changes in levels of serum cortisol and the inflammatory response (7, 8).

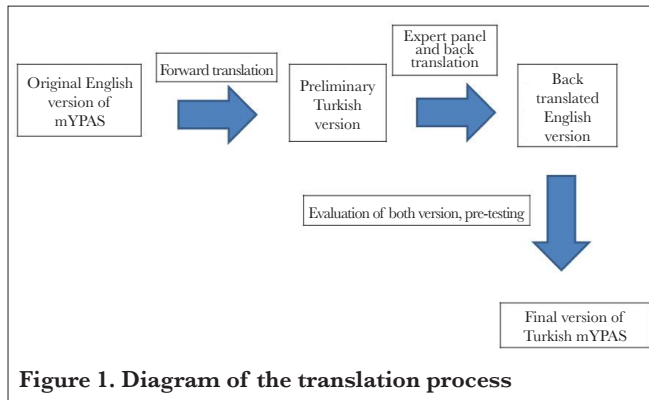
The Yale Preoperative Anxiety Scale (YPAS) was developed in 1995 as a tool for assessing preoperative anxiety in children. It was modified in 1997 (mYPAS) and has since been used in many studies in various health-related fields, such as anaesthesia, surgery, paediatrics, and dentistry (9-16).

Studies conducted in Turkey to measure and evaluate preoperative anxiety in children are limited. The aim of this study was to evaluate the validity and reliability of the Turkish version of the mYPAS and investigate factors associated with levels of preoperative anxiety in paediatric patients aged 5–16 years.

## Methods

Before conducting the study, ethical approval was obtained from the Mersin University Clinical Research Ethics Committee (23 March 2017; no. 2017/75). The study included 330 paediatric patients who underwent elective and emergency surgeries in the university hospital between April 1, 2017 and April 1, 2018. The patients' preoperative anxiety was assessed using the Turkish version of the mYPAS before surgery was performed in the paediatric surgery, otorhinolaryngology, urology, ophthalmology, plastic surgery, orthopaedics, thoracic surgery, and neurosurgery departments.

The mYPAS version used in the study was translated from English to Turkish in accordance with the World Health Organization (WHO) recommendations for scale and survey translation (Figure 1). The scale was first translated into Turkish by a healthcare professional whose native language is Turkish, after which it was translated back into English by a native English speaker. The final translation was checked for consistency with the original document, and the final Turkish



### Main Points:

- Preoperative anxiety is observed in 60%–80% of children undergoing surgery and is associated with adverse behavioural changes and increased need for analgesics.
- Our study demonstrates that the Turkish version of the mYPAS is a valid and reliable instrument for the assessment of preoperative anxiety in paediatric patients.
- Sedation is very useful to reduce preoperative anxiety.
- We observed that younger age was weakly correlated with higher anxiety level.

**Table 1. The Final Turkish Version of the Modified Yale Preoperative Anxiety Scale**

Aktivite	Skor
Etrafiyla ilgili, meraklı, oyuncaklarıyla oynayan, bir şeyler okuyan (veya yaşına uygun diğer aktiviteler); oyuncaklarını almak için bekleme odası veya operasyon odasında dolaşabilir veya ebeveyne gidebilir; ameliyathane ekipmanlarına doğru yönelebilir	1
Etrafiyla ilgisiz, oyun oynamayan, yere bakan, elleri ve parmaklarıyla oynayan, parmağını emen; beklerken ebeveyne çok yakın oturabilir.	2
Oyuncaktan ebeveyne doğru odaklanmamış bir şekilde yönelen, amaçsız hareketler; çığınca/ abartılı hareketler ya da oyunlar; kıvranan, koltukta hareketli; induksiyon sırasında maskeyi itebilir ya da ebeveyne sarılabılır.	3
Aktif olarak uzaklaşmaya çalışan, ayakları ve kollarıyla iten, uzaklaşmak için tüm vücudunu kullanabilir; bekleme odasında odaklanmadan koşuşturan, oyuncularla ilgilenmeyen, umutsuzca sarılarak ebeveynden ayrılabilir.	4
<b>Konuşma</b>	
Okuyan (bu sırada aktivite ile ilişkili olarak konuşmayabilir), soru soran, yorum yapan, bir şeyler mırıldanan, gülen, sorulara kolaylıkla yanıt veren fakat genelde sessiz, sakin; çocuk sosyal durumlarda konuşmak için çok küçük veya yanıt verirken oyuna fazla dalmış olabilir	1
Yetişkinlere bebek konuşması şeklinde veya sadece kafasını sallayarak yanıt veren	2
Sessiz, yetişkinlere cevap vermeyen	3
Sızlanan, homurdanan, şikayet eden veya sessizce ağlayan	4
Ağlayan veya hayır diye bağırın	5
Ağlayan, yüksek sesle çığlık atan (maske uygulanırken duyulabilecek şekilde)	6
<b>Duyusal durum</b>	
Belirgin şekilde mutlu, gülümseyen veya oyuna konsantre	1
Nötral, belirgin bir yüz ifadesi olmayabilir	2
Endişeli, üzgün veya gözlerde yaşarma	3
Sıkıntılı, ağlayan, aşırı derecede üzgün, gözleri kocaman açılmış olabilir	4
<b>Uyarılma durumu (derecesi)</b>	
Dikkatli, etrafını gözleyen, anestezistin kendisine ne yaptığını izleyen	1
Çekingem, hareketsiz ve sessiz oturan, parmağını emen veya yüzü devamlı ailesine dönük	2
Tetikte, çevresine hızlıca bakınan, seslerden ürkebilen, açılmış gözler, gergin vücut	3
Panikle sızlanan, ağlayabilir; etrafındakileri itebilir; kaçmaya çalışabilir	4
<b>Ebeveyn ile ilişki</b>	
Meşgul bir şekilde oynayan, bir şey yapmadan oturan, yaşa uygun davranışlar, ebeveyne ihtiyaç duymayan; eğer ebeveyn iletişim başlarsa onunla iletişime geçebilir	1
Aile üyelerine yakınlaşan (kendisi ile ilgilenmeyen ebeveyne yaklaşarak konuşabilir), rahatlık ve huzur arayan, ebeveynlerden teselli bekleyen	2
Ebeveynlerine sessizce bakan, belirgin olarak olayları (etrafındaki hareketleri) izleyen, temas veya rahatlık aramayan, teselli beklemeden ancak teselli gösterilirse karşılık veren veya sarılan	3
Ebeveynlerini belli mesafede tutan, aktif olarak ebeveyn ile temastan kendini geri çeken, ebeveyni itebilir veya çaresizce ebeveyne yapışır ve gitmesine izin vermez	4

version was evaluated by five researchers regarding its suitability for the Turkish language and Turkish culture. A paediatric psychiatry specialist and a measurement and assessment specialist assisted with this stage. Before beginning data collection for the study, a pilot trial of the scale was carried out by three different researchers with 10 patients. The final Turkish version of the mYPAS is presented in Table 1.

After finalizing the Turkish version of the scale, scoring was performed independently by three different observers during two evaluations, one in the playroom where patients and their parents waited before surgery and the other in the operating room. The first evaluation with the scale was performed in the playroom before the children received any sedation. The patients were then taken to the operating room by the surgeon and the anaesthesiologist. Parents were allowed to accompany the child as far as he/she was in the playroom but were not

admitted to the operating room. Anxiety levels were re-evaluated in the operating room.

The patients and/or their parents were informed in detail about the study, and their consent was obtained before anxiety level assessments. In addition to the patients' demographic data, factors that may affect their anxiety levels were recorded, including the presence of comorbidities, history of previous surgery, the department performing the surgery, whether the surgery was elective or emergent and whether the patient received premedication.

Patients who did not provide informed consent and those with problems communicating with their parents, anxiety disorder, complaints of pain before surgery, and postoperative visual analogue scale pain scores over 3 were excluded from the study.

Age (years)	9.82±3.6
<b>Gender (%)</b>	
Female	119 (36%)
Male	211 (64%)
<b>Patients with comorbid disease</b>	
Yes	83 (25%)
No	247 (75%)
<b>Previous surgery</b>	
Yes	128 (39%)
No	202 (61%)
<b>Emergent/elective surgery</b>	
Emergent	61 (18%)
Elective	269 (82%)
<b>Premedication</b>	
Yes	104 (32%)
No	226 (68%)

	ICC	CI (95%)
Preoperative holding area	0.9949	0.9939-0.9958
Operating room	0.9952	0.9942-0.9960

CI: confidence interval; ICC: intraclass correlation coefficient

	Preoperative holding area	Operating room
1 <sup>st</sup> observer	0.959	0.956
2 <sup>nd</sup> observer	0.956	0.962
3 <sup>rd</sup> observer	0.955	0.959

### Statistical analysis

The demo version of Statistical Package for the Social Sciences 16.0 (SPSS Inc.; Chicago, IL, USA) was used in the data analyses. For descriptive statistics, continuous variables were expressed as mean and standard deviation and categorical variables as number and percentage. Cronbach's alpha was calculated to determine reliability, and intraclass correlation coefficient (ICC) was used as a validity index. Relationships between continuous variables were evaluated with the Pearson correlation analysis. Student's t test was used to evaluate differences between two groups, while the chi-square analysis was used for pairwise comparisons of categorical variables.  $P < 0.001$  was accepted as statistically significant in statistical analyses.

ICC is one of the most commonly used methods for evaluating agreement between measurements of continuous variables made by multiple observers (17). The ICC value should be at least 0.70 to conclude that there is adequate interrater agreement. Values higher than 0.95 indicate excellent interrater reliability. Agreement between the observers in our study (ICC) was evaluated using the raw scores recorded separately in each category, and correlations between anxiety level and other surgical parameters were evaluated using scores calculated from data obtained from the scale. Total score on the mYPAS ranges from 23.33 to 100, with higher scores indicating higher level of anxiety.

### Results

The mean age of the 330 patients included in the study was  $9.82 \pm 3.62$  years (Table 2). The ICC between the three observers was 0.9949 (95% confidence interval [CI]: 0.9939–0.9958) for the playroom assessments and 0.9952 (95% CI: 0.9942–0.9960) for the operating room assessments (Table 3).

Cronbach's alpha coefficients of the assessments performed in the playroom and operating room were 0.959 and 0.956 for the first observer, 0.956 and 0.962 for the second observer, and 0.955 and 0.959 for the third observer (Table 4).

Surgery was elective for 82% and emergent for 18% of the patients. The operating department was paediatric surgery

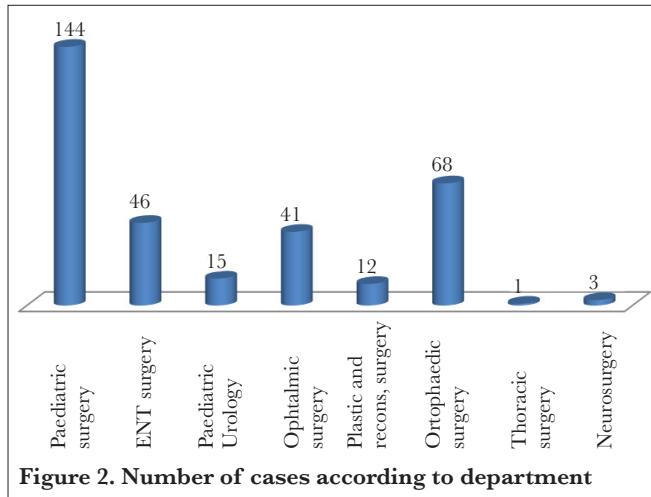


Figure 2. Number of cases according to department

Premedication	Preoperative holding area	Operating room	p
Yes	66.31±19.68	42.37±9.58	<0.01
No	43.27±15.60	52.26±21.57	

mYPAS: the modified Yale Preoperative Anxiety Scale

	mYPAS score (mean± standard deviation)	p
<b>Gender</b>		
Female	50.96±21.25	0.770
Male	50.29±19.41	
<b>Presence of comorbid disease</b>		
Yes	50.14±20.29	0.836
No	50.66±20.03	
<b>Previous operation</b>		
Yes	48.72±21.09	0.192
No	51.68±19.35	
<b>Emergent/elective surgery</b>		
Emergent	54.09±21.94	0.125
Elective	49.72±19.57	

mYPAS: the modified Yale Preoperative Anxiety Scale

in 114, orthopaedics in 68, otorhinolaryngology in 46, ophthalmology in 41, urology in 15, plastic and reconstructive surgery in 12, neurosurgery in 3 and thoracic surgery in 1 of the surgeries (Figure 2).

After confirming validity and reliability, evaluation to identify factors associated with anxiety revealed a negative correlation between age and anxiety level ( $p < 0.001$ ). However, it was found to be a weak correlation ( $r = -0.350$ ).

While 104 (32%) of the paediatric patients brought to the playroom before surgery received premedication in the company of their family before being taken into the operating room, 226 (68%) of them had not received any sedative agents as premedication. The premedicated patients had significantly lower anxiety levels ( $p < 0.001$ ). The mean playroom anxiety score of the premedicated patients was  $66.31 \pm 19.68$ , while that of patients who were not premedicated was  $43.27 \pm 15.60$  (Table 5).

Of the patients evaluated in the study, 119 (36%) were females and 211 (64%) were males. When anxiety levels were compared by gender, there was no significant difference between the anxiety levels of female and male patients ( $p > 0.001$ ) (Table 6).

Of the patients included in the study, 83 (25%) had a comorbid disease, while 128 (39%) had history of previous surgery. Presence of comorbidities, history of previous surgery or emergency/elective surgery showed no significant association with levels of preoperative anxiety in children ( $p > 0.001$ ) (Table 6).

## Discussion

Assessing preoperative anxiety is the first step in prevention and management, and many scales have been developed for this purpose to date. This study evaluated the validity and reliability of the Turkish version of the mYPAS, which was evaluated in another study before, an instrument commonly used to measure state anxiety in young children (18). The results of our analyses demonstrate that the scale has high validity and reliability and is suitable for use in Turkish paediatric population. After establishing the validity and reliability of the scale, we evaluated whether factors such as age, gender, presence of comorbid disease, history of previous surgery, elective/emergency surgery, or premedication affected anxiety levels in patients aged 5–16 years. Our findings showed that premedication significantly reduced preoperative anxiety, while there was a weak negative correlation between age and anxiety level. Gender, comorbidities, history of previous surgery, and emergency/elective status were not associated with levels of preoperative anxiety.

The original English version of the mYPAS has been adapted into many languages and evaluated for validity and reliability in children aged 2–12 years. These versions have been shown to be reliable if used by experienced researchers (19-21). In our study, a Turkish version of the scale was created in accordance with the WHO guidelines, and its validity and reliability were assessed by applying it twice, first in the playroom and then in the operating room, by a team of three independent observers consisting of two researchers and one anaesthesiologist.

Of the patients included in our study, 32% received premedication in the presence of their families between the first and second assessments. Comparison of premedicated and non-premedicated children showed that anxiety levels were significantly lower in the premedicated patients. Similarly, numerous studies have shown that premedication significantly reduces preoperative anxiety and prevents postoperative behavioural disorders (22-25). However, other studies do not recommend preoperative premedication because of its possible side effects and additional cost and workload (26, 27).

When we examined the relationship between age and preoperative anxiety levels, we observed that younger age was weakly correlated with higher anxiety level. Consistent with our findings, many similar studies have reported a significant relationship between age and preoperative anxiety (8, 28, 29).

In this study, there was no statistically significant relationship between gender and the preoperative anxiety levels of paediatric patients. It was previously reported that patient gender was not associated with levels of anxiety (8).

There were no statistically significant differences in preoperative anxiety levels based on the presence of comorbid diseases or history of previous surgery in our patient group. An earlier study showed that prolonged time between hospital admission and surgery, being hospitalised more than 5 times and previous negative hospital experiences were associated with higher levels of preoperative anxiety in children (8).

Chundamala et al. (30) showed that having the mother and/or father present with the child during anaesthesia induction reduced anxiety for both the parent and child. However, Manyande et al. (31) determined in a 2015 review of 28 studies including 2681 patients that the presence of the mother and/or father with the child during the induction of anaesthesia did not reduce children's anxiety. In a study comparing premedication and parental presence during anaesthesia induction, it was found that parental presence reduced preoperative anxiety in children when practiced routinely but was not superior to sedative premedication or other distraction techniques (24). In another study evaluating the effects of mo-

tivation and maternal presence during anaesthesia induction on preoperative anxiety in children, Caldwell-Andrews et al. (32) reported that many mothers who want to be with their children during induction had high anxiety levels and that this resulted in high anxiety levels in their children due to the influence of parental anxiety. Furthermore, every operating room may not be suitable for allowing parents to enter. In our study, parents were not admitted to the operating room with any of the patients. Only the anaesthesiologist and surgeon accompanied the children from the playroom to the operating room.

Over the years, researchers have investigated the effects of various interventions used to prevent or alleviate preoperative anxiety in children and thereby, minimise postoperative behavioural changes. These include sedative premedication, music therapy, parental presence during anaesthesia induction and behavioural preparation programs. Literature shows that although techniques that distract children or make them feel safer can reduce anxiety, the benefits of such methods may be limited (30). Current articles emphasise that individual approach within a standard preparation program should be preferred to reduce anxiety in children (33).

One limitation of our study is that we did not assess parental anxiety, which can influence the levels of preoperative anxiety in paediatric patients. In addition, we did not evaluate the scale in comparison with other scales. Finally, we could not evaluate anxiety levels based on department due to the small number of patients included from some surgical departments.

## Conclusion

Our study demonstrates that the Turkish version of the mYPAS has high validity and reliability in the assessment of preoperative anxiety levels in paediatric patients. Sedation is beneficial in reducing preoperative anxiety. More clinical studies are needed to investigate other factors that cause anxiety.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Mersin University (23 March 2017; no. 2017/75).

**Informed Consent:** Written informed consent was obtained from patients relatives who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – M.A.; Design – M.A.; Supervision – M.A.; Resources – M.A., S.T.; Materials – M.A., S.T.; Data Collection and/or Processing – G.O.T., M.A., S.T.; Analysis and/or Interpretation – M.A., S.T., G.O.T.; Literature Search – M.A., S.T., G.O.T.; Writing Manuscript – M.A., S.T., G.O.T.; Critical Review – M.A., G.O.T.



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