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Evaluation of the Quality of the Pictorial Book 'Dana and Dentistry' from Preschool Children's viewpoint

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Abstract

Background: Pictures can be useful in children's learning processes; and they strengthen their thinking and imagination. It is possible to teach new concepts to children using pictorial books. The pictorial book 'Dana and Dentistry' has been designed by a pedodontist with the assistance of a painter. The present study aimed to qualitatively evaluate the pictures in this book from the target group's viewpoint, i.e., the preschool children.

Methods: Seventy-nine 4–6-year-old children participated in this study. After viewing the pictures in each chapter of the book, they replied to the related questions on a pictorial checklist by color painting. The data were analyzed with SPSS 23.0. Binomial tests and ANOVA were used for statistical analyses. Statistical significance was set at $P<0.05$.

Results: In the present study, 48.1% and 51.9% of the children were females and males, respectively. The mean score of the total 18 questions on the checklist was 16, and the mean of the correct responses to each question was >60%, which was significant (P=0.0001).

Conclusion: From children's viewpoints, the pictorial book 'Dana and Dentistry' has been designed well to teach various dental subjects to children.

Key Words: Dentistry, Pictorial book, Preschool children.

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1- INTRODUCTION

Scientific subjects for children are to be designed in formats commensurate with their age, mental development, and maturation. Children above 5 years of age learn through some plays and tools, including playing with dolls, drawing pictures, painting, and reading storybooks. It is easy for children 5–7 years of age to access the internet, and it is useful to design and present scientific subjects for them through digital media (1). The website 'stakeholders.ofcom.org.uk' is a rich source of information for children, which is available in the form of digital media. In the International Health Research Institute, adequate information is available on children's health in the form of brochures, toys, games, DVDs, and websites. The information presented is of diverse varieties and qualities, but it is not provided freely (2). Pictorial books are an essential source of language, concepts, and new lessons for children. Research indicates the nature of interactions between the parents and children during the book-reading process (3). Pictures are used mainly to impart knowledge, but besides children's thinking, imagination, and esthetic abilities develop under the effect of the painting art (4). However, the brain mechanisms that are affected by telling stories to children have not been elucidated (5). The 5–6-year-old children's cognitive development is in the pre-operational stage. The child can extend the story to the individuals in his/her real life, discuss with them and express his/her opinion (6). Presenting information in the form of pictures, compared to other forms suitable for adults, can significantly affect children's learning. Such a difference is due to the lack of the development of the word and conceptual systems in children (7). Pictorial books change the readers' knowledge levels in an artistic and solely visual manner by creating a pleasant feeling (8).

Studies have revealed the beneficial effects of pictorial stories on the acceptance of dental treatment by pediatric patients, some of which are mentioned below:

According to a study carried out by Grazia Cagetti et al., in 2015, visual support plays an important role in accepting dental procedures, such as fissure sealants and restorative treatments in 6 to 12-year-old children with autism spectrum disorder (9).

Another study was performed on 13 to 17-year-old children with an autism spectrum disorder, which revealed the improved acceptance rate of dental visits in children when an understandable picture was shown before the dental procedure (10).

Vafaie et al. also assessed the effect of pictorial stories on the pain perception and behavioral aspects of children aged 6-7 years. They concluded that pictorial stories could significantly decrease pain perception and increase the tolerance of children's dental procedures (7).

The pictorial book 'Dana and Dentistry' has been designed by a group consisting of a pedodontist and a skillful painter for children in 18 chapters with 131 pictures in a preliminary stage.

The present study aims to evaluate a pictorial book which attempts to impart basic and applied dentistry concepts in only a pictorial format. Other available pictorial books have used too much written language, and have been designed for patients with autism, auditory problems, etc. However, the present study evaluated the effect of pictures on healthy children who form the majority of patients referring to dental clinics. With easy-to-understand pictures, the book is useful for children 4–6 years of age, who are approaching the age at which permanent teeth erupt; and they must visit a dentist for clinical examinations and preventive dental procedures.

Therefore, the chief aim of the study was to evaluate the pictorial book by children 4–6 years of age concerning the clarity of the pictures, so that the necessary modifications can be made in pictures in future research to convey the intended message.

2- MATERIALS AND METHODS

The present descriptive-analytical study was carried out on seventy-nine 4 to 6-year-old children with no history of dental procedures, selected from three kindergartens in Kerman, Iran, in 2019 after gaining consent from their parents. A two-stage systematic cluster sampling technique was used to select the subjects. The sample size was calculated using the Cochrane method with odds of 50% for correct responses, a 10% absolute error rate, and a sampling error rate of 5%. A pictorial checklist was designed with 18 questions to determine whether the pictures clearly conveyed their message to the children. Eight pedodontists evaluated the validity of the checklist based on the content validity index, during which two questions and two responses were revised. The internal reliability of the checklist was calculated by Cronbach's alpha, and its time reliability was evaluated by the re-test method. The intraclass correlation coefficient value was acceptable, i.e., >0.74, indicating high reliability.

Each child viewed the pictures in each chapter and replied to each chapter's question by painting one of the two pictures designed for that chapter. If at least 60% of the children painted the correct picture after viewing the pictures in each chapter, the images in that chapter were confirmed; otherwise, the pictures were deemed to require revision. In this way, the target group of the pictorial book, i.e., children, can help the designers of the book revise the pictures in the book.

The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences under the code IR.KMU.REC.1397.357.

Fig. 1 presents one of the questions on the checklist related to chapter 6 of the book.

Fig. 1: The pictorial question designed for Chapter 6 of the book, which is related to the space maintainer. 'The space maintainer takes the place of Dana's tooth. Paint it blue.'

2-1. Statistical analysis

Multivariate ANOVA was used to analyze the reciprocal effect of age and gender on the responses to the questions on the checklist. A two-statement test was used to analyze the rate of >60% correct responses to each question on the checklist.

3- RESULTS

The demographic data of 79 children in the present study showed a significant relationship between their age and gender (P=0.035). Therefore, the gender distribution was not homogenous in different age groups (**Table 1**).

The cumulative effect of children's age and gender in the qualitative assessment of the pictorial book was evaluated, which showed no significant effect (P>0.05). Therefore, it was concluded that the designed pictorial book is suitable for all the age groups and both genders evaluated in the present study, with no age and gender limitation (**Table 2**).

Therefore, the overall score on the checklist was not significantly related to age and gender (P>0.05). The mean score (out of 18) on the checklist was not significantly related to age and gender (**Table 3**).

Table-1: The frequencies of children in terms of age and gender

Age (year)	Boy (No.)	Girl (No.)	Total	P-value
4	15	9	24	0.035
5	10	20	30	
6	16	9	25	
Total	41	38	79	

Table-2: Comparison of the overall scores of children on the checklist in terms of age and gender

Changes source	Degree of freedom	Sum of squares	Mean of squares	Test statistics	P-value
Age	2	1.5622	0.78110	0.82	0.446
Gender	1	0.8864	0.88643	0.93	0.339
Age*gender	2	0.1145	0.05725	0.06	0.942
Error	73	69.8611	0.95700		
Total	78	72.1519			

Evaluation of mean scores in the three age groups in terms of gender showed that correct response to the checklist questions increased with aging; but the difference among age groups was not significant statistically (P=0.0510). In addition, girls had provided more correct responses to the questions than boys; however, the difference was not significant (P=0.0375) (**Fig. 2**).

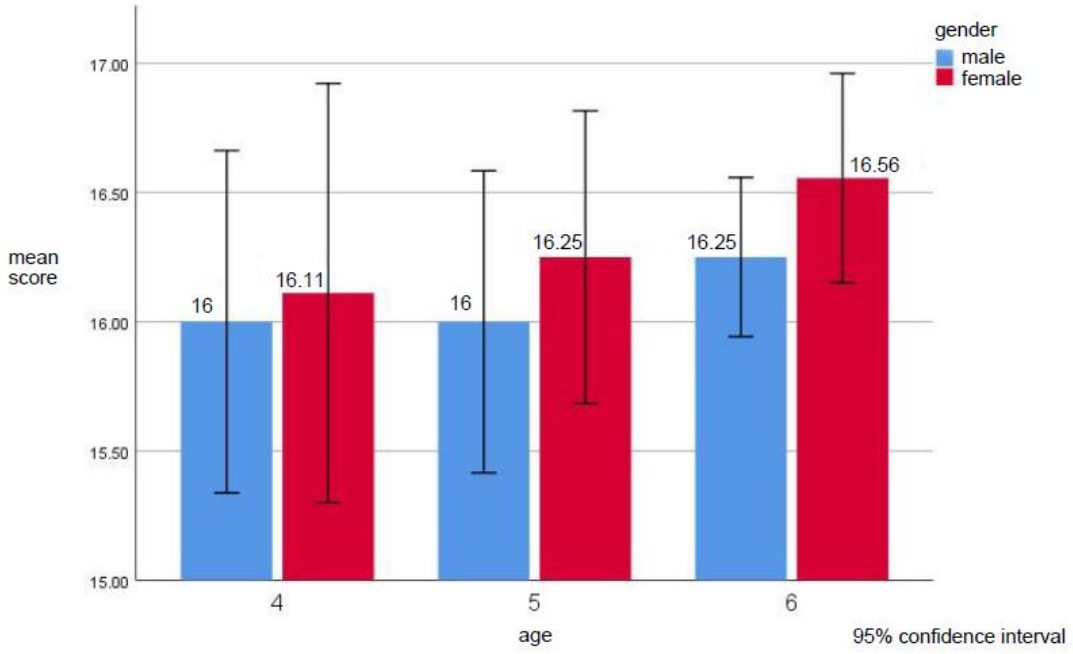

Fig. 2: The frequencies of mean scores in terms of children's age and gender.

A cut-off point of >60% of correct response for each question on the checklist was established to confirm the question and the relevant chapter in the pictorial book 'Dana and Dentistry.' In the present study, the frequency of correct responses to each question on the checklist was significantly over 60% (P=0.001) (**Table 4).**

Table-4: A >60% correct response rate to each question on the checklist

Checklist question number	Response				Zero conditional mean assumption	P-value
	Correct	Percentage	Wrong	Percentage		
1, 7, 11, 16	77	0.975	2	0.0269	≥0.06	0.0001
2, 17	76	0.962	3	0.04		
3	75	0.949	4	0.1		
4	72	0.911	7	0.089		
5, 13, 14, 18	79	1	0	0		
6	71	0.899	8	0.104		
8	51	0.654	28	0.354		
9, 10, 12, 15	78	0.987	1	0.013		

4- DISCUSSION

The pictorial book 'Dana and Dentistry' shows the most important daily dental routines of children in the form of stories with Dana as the main character, in 18 chapters only consisting of pictures related to each other. The target groups are children, parents, and the community. The book has no written part and is especially suitable for preschool children. In the present study, the designed pictures of the book were shown to preschool children, and the book was qualitatively evaluated based on their responses to a researcher-made pictorial questionnaire. The present study showed that all the 18 chapters of the book, being simple and in accordance to the principles of painting, are designed very well. Evidently, the pictures received good scores from children. In each chapter, >60% of children provided a correct response for the question of the chapter. This confirms that the designers have achieved their goals in designing the book; so they can introduce the book virtually and in a printed format. It appears that the authorial group book has been successful in narrating a comprehensible story for children in the form of simple related pictures. On the other hand, the present study showed that understanding these pictures does not depend on age and gender, and it is expected that children at all age groups will be interested in the book, with no gender differences. In the present study, the children were 4–6 years of age, consistent with studies by Nabuo Masataka et al. (11) and Dalia O Kamel et al. (12); however, the age groups were different in studies by Vafaei et al. (7), Christy et al. (13), and Rajindar Kaur et al. (14). One of the reasons for such a difference is the book's subject and its design. Besides, this age group was selected in the present study because these children attended kindergartens and could answer the questions, during which it was necessary for children to paint images. On the other hand, it was necessary for the children to cooperate well in the absence of their parents in the kindergartens' calm atmosphere and play an active and positive role in executing this study.

The purpose of the book, evaluated in the current study, was to teach routine and daily dental subjects to children, including tooth eruption, dental treatment steps in children, and trauma. Studies by Vafaei et al., Witrian et al. (10), Widati et al. (15), and Gagetti et al. (9) dealt with dental subjects; however, none of the studies above dealt with routine children's dental problems in the form of a pictorial book. Vafaei et al. evaluated the pictorial book complied by Nicola Smee, which was on 'Freddi's first dental visit'. The book is about a child who visits a dental office for the first time in his life for dental examination and treatment; it undergoes local anesthesia and a restorative procedure, and finally leaves the office with a smile on his face.

In a study by Widati et al. (15), children with hearing problems received oral hygiene instructions using a pictorial book for one hour daily, and finally, their awareness of oral hygiene measures was evaluated using a researcher-made questionnaire with 10 questions. The pictures used by Wibisono et al. (10) consisted of 32 pictures of the waiting room, the dentist, the dental assistant, a unit, and dental equipment. Grazia and Cagetti (9) evaluated the effect of visual support on the acceptance rate of dental procedures in consecutive sessions, including examination, professional prophylaxis, fissure sealants, and, if necessary, restorative procedures. The study participants consisted of 89 children with autism in the 6 to 12-year age group. The designed images were intended to make the children familiar with dental procedures during eight psychological sessions (two sessions weekly for a month). The book's subject was different from that used in studies by Retnewati et al .(6) and Christy et al .(13). The former study dealt with kind and healthy behaviors, and the latter dealt with education concerning sexual abuse.

From software and digital perspectives, the pictorial book used in the present study is similar to that in studies by Zaror et al . (16) and Gilavand et al .(17). However, the study by Zaror et al .only dealt with trauma, and the software used has been designed for healthcare providers and dentists. In contact, the software 'Dana and Dentistry' has been designed for children and parents. Besides, the study by Gilavand et al .(17) is a part of 'Khadem' software, which deals with first aid education, and the target group consists of junior and senior school students; and is mostly an educational program designed to be included in an educational curriculum. Furthermore, contrary to the pictures of the software 'Dana and Dentistry', which are paintings, the pictures in the two software programs above are real pictures related to the aims of the programs. Concerning the method used to evaluate the 'Dana and Dentistry' software, the present study is similar to the study by Zaror et al. (16), in which the dental Trauma Tracker software was evaluated. Both studies played the images of the software to their target groups and attempted to use the images and revise them to increase the knowledge of the target group. However, the difference was that the target group in the study by Zaror et al. installed the software and used it, but the target group in the present study only watched the images. Such a difference between these two studies is due to the difference in the ages of the two target groups.

One of the limitations of the present study was the lack of children's ability in answering the written checklist questions. To solve this problem, the children were included in this study watched the pictures in 18 chapters and painted their responses on the checklist.

It is suggested that the pictures be evaluated from the parents' perspectives, too, which will be carried out qualitatively in subsequent studies. It is also suggested

that the effect of this book on decreasing children's anxieties in dental environments be evaluated. The researchers who designed the book hope that children will enjoy the pictures after its final approval and presentation in the Bazar application. After they install it on their Android cellphones, they will increase their knowledge about dentistry and experience less anxiety during their dental visits, which will lead to maximum cooperation with the dentist.

5- COCLUSION

The present study showed that the pictorial book 'Dana and Dentistry' successfully presented the dental procedures routinely performed for children in the form of pictures with no written section in the book. The drawn pictures were clear from the children's perspective, and were understandable independent of the age and gender of the audience.

6- CONFLICT OF INTEREST

None.

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