

Pain Perception in Children towards Dental Anesthesia – A Survey

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ABSTRACT

Aim: To study the effects of pain perception in children towards dental anesthesia and to evaluate the factors associated with pain perception in children and its effects on the overall dental treatment. **Background:** Local anesthetic injection is considered as one of the most anxiety-provoking procedures in dentistry, which may result in the development of avoidance behavior in children that is often exaggerated with severe anxiety and fear. Pain perception in children towards local anesthesia is often the reason for not visiting the dentist, mainly due to its association with needle puncture despite its use to eliminate pain during a dental procedure. This study provides information on the factors commonly associated with pain perception in children towards dental anesthesia and its effects on the treatment progress. **Materials and Methods:** A questionnaire-based study was done among 100 participants who took part in the survey. The participants consist of pediatric patients ranging from 5 to 12 years of age. All the participants were provided with a list of 12 questions related to their pain perception towards dental anesthesia. Data was collected and statistical analysis was done. **Results:** Based on the results, 65% of the participants have been to a dentist previously and 58% of them enjoy going to the dentist. Awareness of dental anesthesia is seen in 55% of the participants with 49% of them have been anesthetized before. 95% viewed anesthetic injection as painful with 85% think that the pain is severe. Dental anesthesia is the main factor eliciting dental fear as stated by 88% of them and 73% suggest that they would react negatively towards dental anesthesia. Post-anesthetic problems were experienced by 67% of the participants, 3% have had allergic reactions following dental anesthesia. **Conclusion:** Based on the findings in this study, it can be concluded that pain perception in children towards dental anesthesia has significant effect on the overall dental treatment, in which behavioral management is often incorporated for such patients. A dentist should take into consideration the patient's point of view towards dental treatment and factors that may elicit dental anxiety especially in children.

Keywords: Pain, Children, Perception, Anesthesia, Fear

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Anesthesia is considered to be one of mankind's greatest discoveries in various medical fields including dentistry, as it is essential for delivering an effective, comfortable dental care. On the other hand, dental anesthesia is also known to be one of the major sources of fear and anxiety among dental patients ranging from children, adolescents and even adults. Administration of dental anesthesia is often associated with pain, which later develops into avoidance behavior by the patients.¹ Other than the sound and sensation from drilling, the sight of anesthetic needle is said to be one of the factors that elicits fear and anxiety in a dental patient, which eventually becomes a reason for them to not visit the dentist.

In most cases, patients would normally show negative response towards dental anesthesia, which involves lack of cooperation and hysterical behavior during the dental treatment, making it difficult for the dentist to perform the treatment properly.^{2,3} However, it is said that not all fearful children exhibit behavior problem as fear is often associated with perceived lack of control and pain perception, which may result from the child's awareness of the dental problem and previous painful experience.^{4,5,6} A study done by Colares et al. reported about 14.4% prevalence of dental fear and anxiety, which are mainly associated with dental injections.^{7,8} Control of pain is said to be a critical part in a dental procedure as it is important for a dentist to ensure the patient's comfort throughout a dental treatment in order to develop a sense of trust and relaxation in the patient.

Procaine was widely used by various dentists and physicians prior to the introduction of lidocaine known as "Xylocaine" in the 1950s, which became one of the most widely used anesthetic agent today.^{9,10} The terms "anesthesia" and "anesthetic" were first suggested by a Boston physician called Oliver Wendell Holmes on 21st November 1846 in his letter to William T. G. Morton.^{12,13,14} in order to describe the painless condition as "anesthesia" while the agent which causes the sleep-like state as "anesthetic" agent.¹⁵

MATERIALS AND METHOD

A questionnaire-based study was done among 100 participants who took part in the survey. The participants consist of pediatric patients ranging from 5 to 12 years of age. All the participants were provided with a list of 12 questions related to their pain perception towards dental anesthesia. Data was collected and statistical analysis was done.

Table 1: Survey questions on pain perception in children towards dental anesthesia with selection of answers

PAIN PERCEPTION IN CHILDREN TOWARDS DENTAL ANESTHESIA	
No.	Questions and Answers
1.	Have you been to a dentist before? ▪ Yes ▪ No
2.	Do you like going to the dentist? ▪ Yes ▪ No
3.	Are you aware of dental anesthetic injection? ▪ Yes ▪ No
4.	Do you think anesthetic injection is painful? ▪ Yes ▪ No

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PAIN PERCEPTION IN CHILDREN TOWARDS DENTAL ANESTHESIA	
No.	Questions and Answers
5.	Have you been anesthetized before? <ul style="list-style-type: none"> ▪ Yes ▪ No
6.	How would you rate the pain of dental anesthesia? <ul style="list-style-type: none"> ▪ Non-painful ▪ Mild ▪ Moderate ▪ Severe
7.	Which of the following factors concern you the most when visiting the dentist? <ul style="list-style-type: none"> ▪ Dental anesthesia ▪ Sound and sensation of a dental drill ▪ Dental office setting ▪ Sight of a dentist
8.	Were you informed about every step in a dental procedure prior to it being performed? <ul style="list-style-type: none"> ▪ Yes ▪ No
9.	How would you describe your reaction towards dental anesthesia? <ul style="list-style-type: none"> ▪ Good ▪ Moderate ▪ Bad
10.	Would you still visit the dentist following your awareness towards dental anesthesia? <ul style="list-style-type: none"> ▪ Yes ▪ No
11.	Have you experienced any post-anesthetic problems such as lip biting before? <ul style="list-style-type: none"> ▪ Yes ▪ No
12.	Have you experienced any allergic reaction following an anesthetic injection? <ul style="list-style-type: none"> ▪ Yes ▪ No

RESULTS AND EXPLANATION

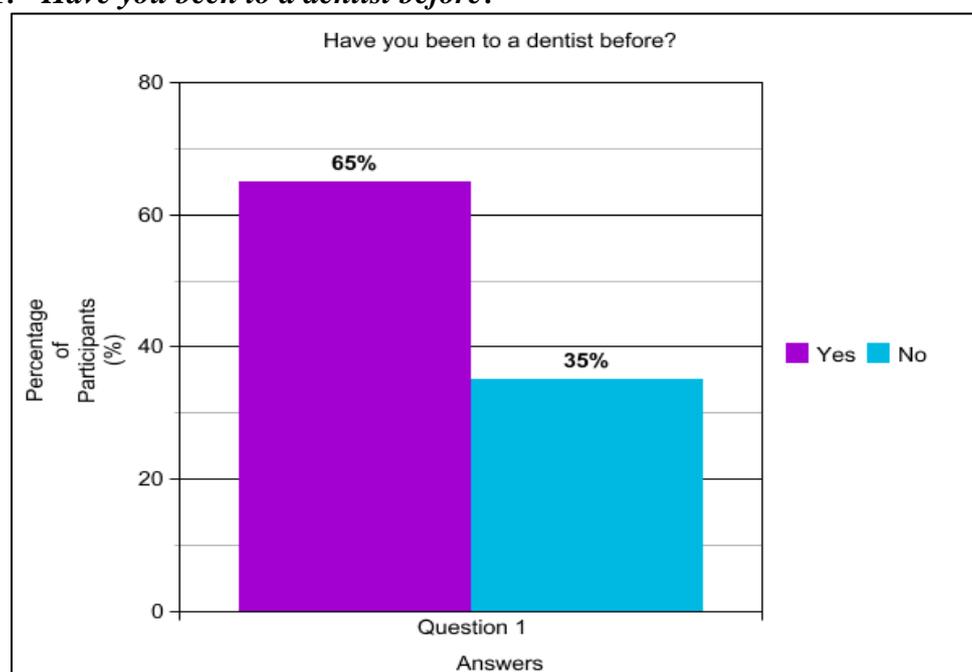
Table 2: Results on pain perception in children towards dental anesthesia

No.	Question	Response	Percentage (%)
1.	Have you been to a dentist before?	Yes	65
		No	35
2.	Do you like going to the dentist?	Yes	58
		No	42
3.	Are you aware of dental anesthetic injection?	Yes	55
		No	45
4.	Do you think anesthetic injection is painful?	Yes	95
		No	5
5.	Have you been anesthetized before?	Yes	49
		No	51
6.	How would you rate the pain of dental	Non-painful	2
		Mild	5

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No.	Question	Response	Percentage (%)
	anesthesia?	Moderate	8
		Severe	85
7.	Which of the following factors concern you the most when visiting the dentist?	Dental anesthesia	88
		Sound and sensation of dental drill	7
		Dental office setting	2
		Sight of a dentist	3
8.	Were you informed about every step in a dental procedure prior to it being performed?	Yes	87
		No	13
9.	How would you describe your reaction towards dental anesthesia?	Good	2
		Moderate	25
		Bad	73
10.	Would you still visit the dentist following your awareness towards dental anesthesia?	Yes	23
		No	77
11.	Have you experienced any post-anesthetic problems such as lip biting before?	Yes	67
		No	33
12.	Have you experienced any allergic reaction following an anesthetic injection?	Yes	3
		No	97

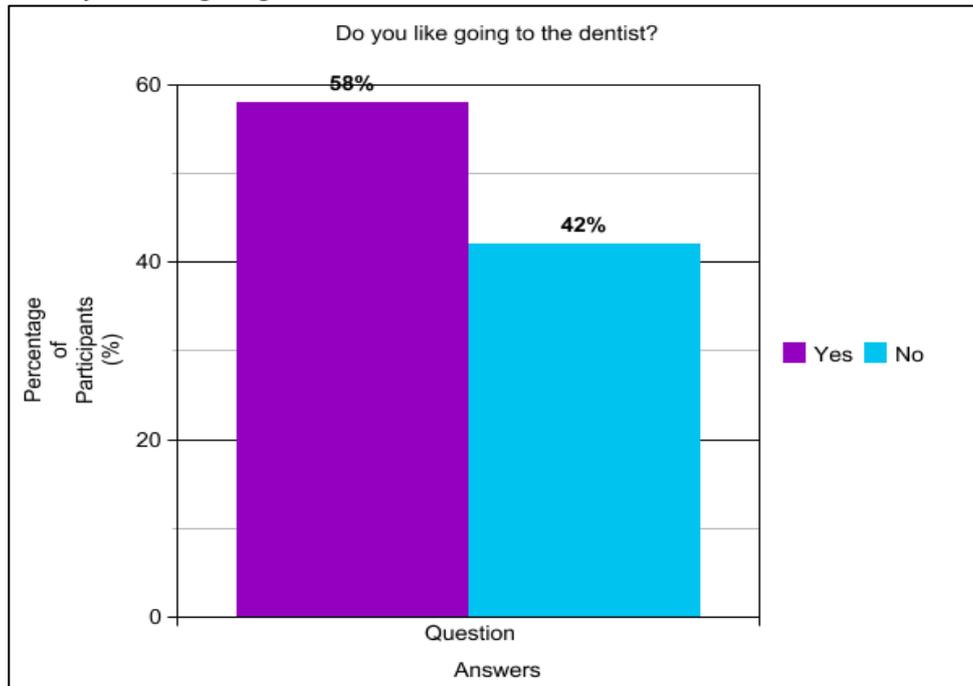
Figure 1: “Have you been to a dentist before?”



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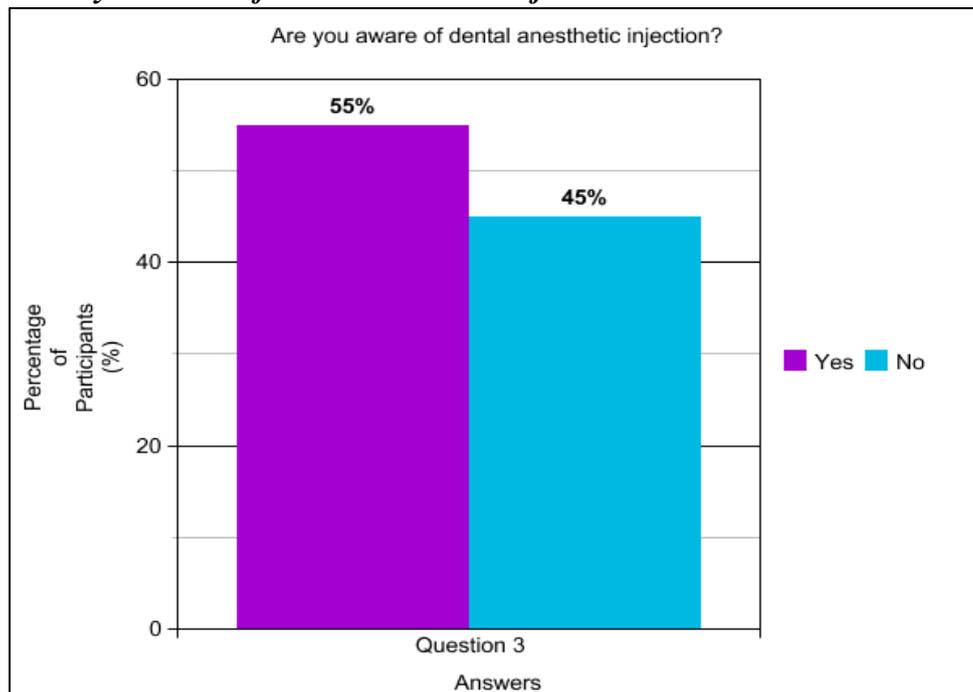
The result in Figure 1 reveals that 65% of the participants have been to a dentist before while the remaining 35% have no dental experience previously.

Figure 2: “Do you like going to the dentist?”



Regarding their dental experience, 58% of them said that they like going to the dentist while the remaining 32% stated otherwise.

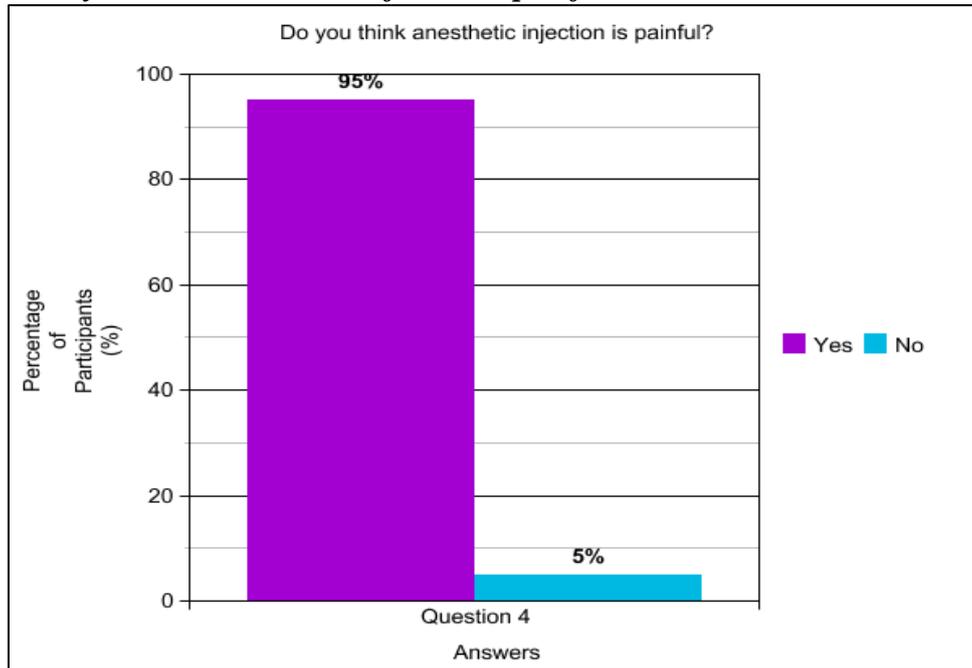
Figure 3: “Are you aware of dental anesthetic injection?”



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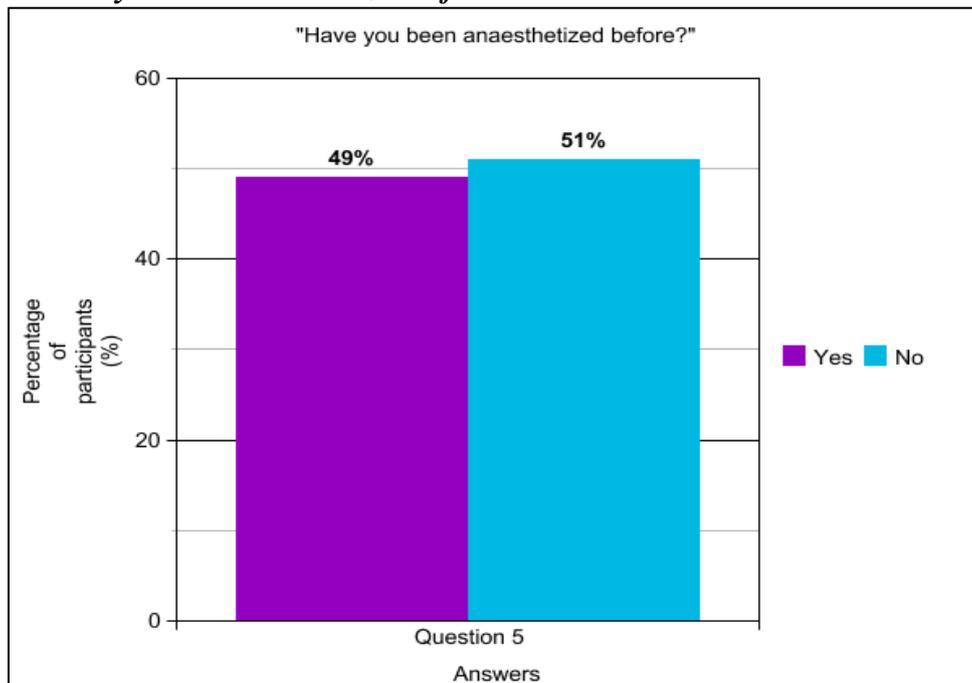
The result in Figure 3 shows that awareness of dental anesthesia can be seen in 55% of the participants, which may be due to past experience or information from other sources. However, the slightly lesser 45% of them are unaware of dental anesthetic injection.

Figure 4: “Do you think anesthetic injection is painful?”



It can be seen in Figure 4 that dental anesthesia is often viewed as painful as described by 95% of the participants and only 5% of them think that dental anesthesia is not painful.

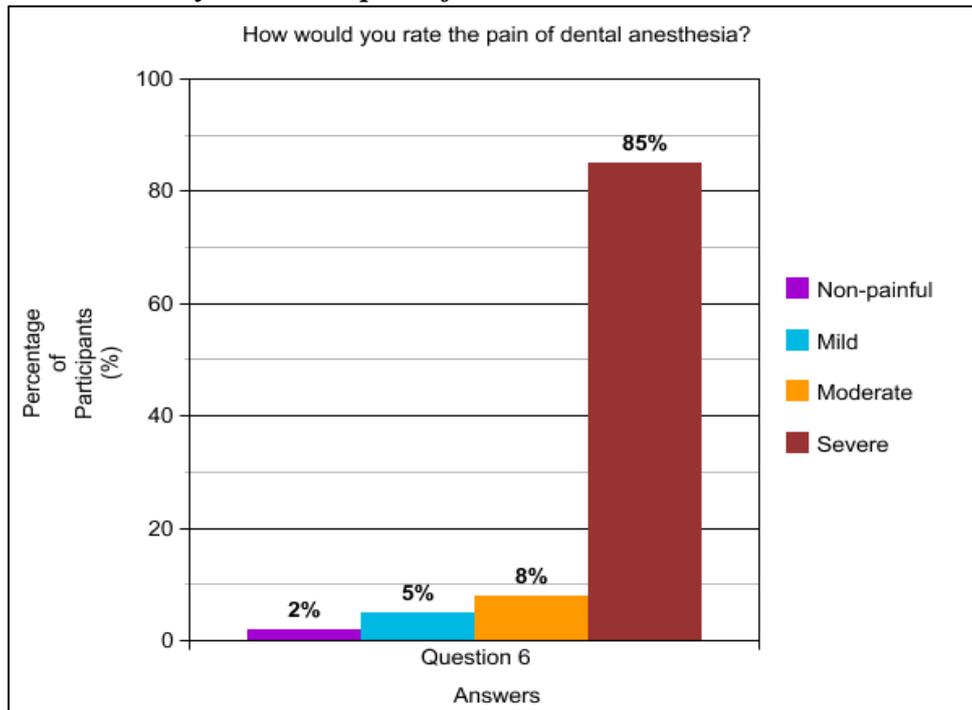
Figure 5: “Have you been anesthetized before?”



It can be seen that 49% of the participants have been anesthetized before, while a smaller portion of 51% among the participants have never been anesthetized previously.

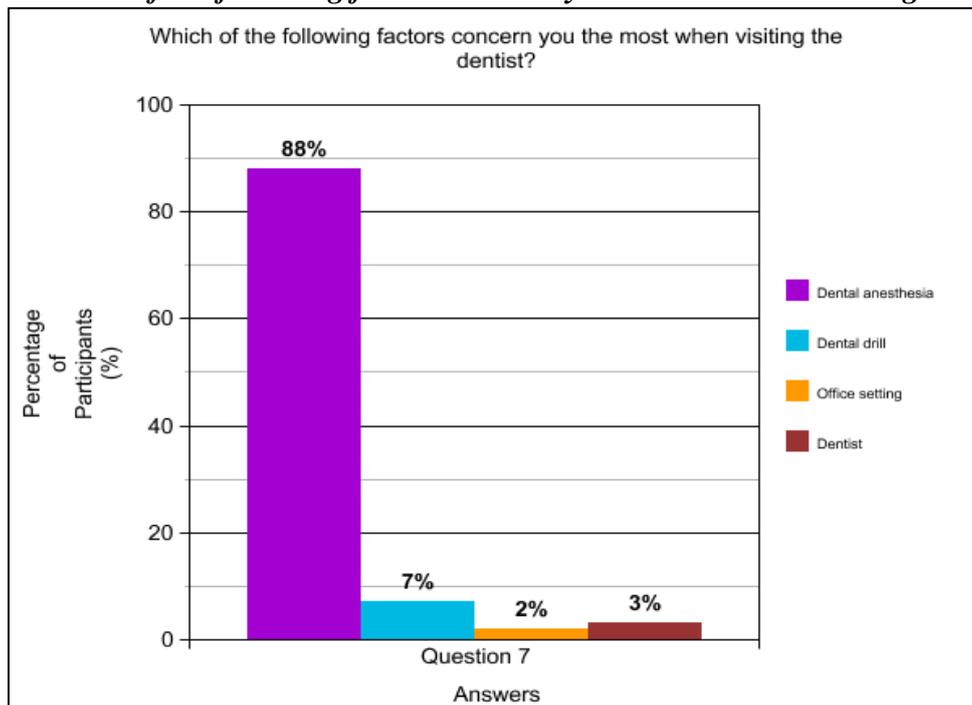
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Figure 6: “How would you rate the pain of dental anesthesia?”



Since dental anesthesia is often associated with pain, 85% of the participants rated the pain of anesthetic injection as “severe”, following which 8% of them think the pain is “moderate”. Pain of dental anesthesia is considered to be bearable by the remaining patients as 5% of them think of it as only “mild” pain and the other 2% view it as non-painful.

Figure 7: “Which of the following factors concern you the most when visiting the dentist?”

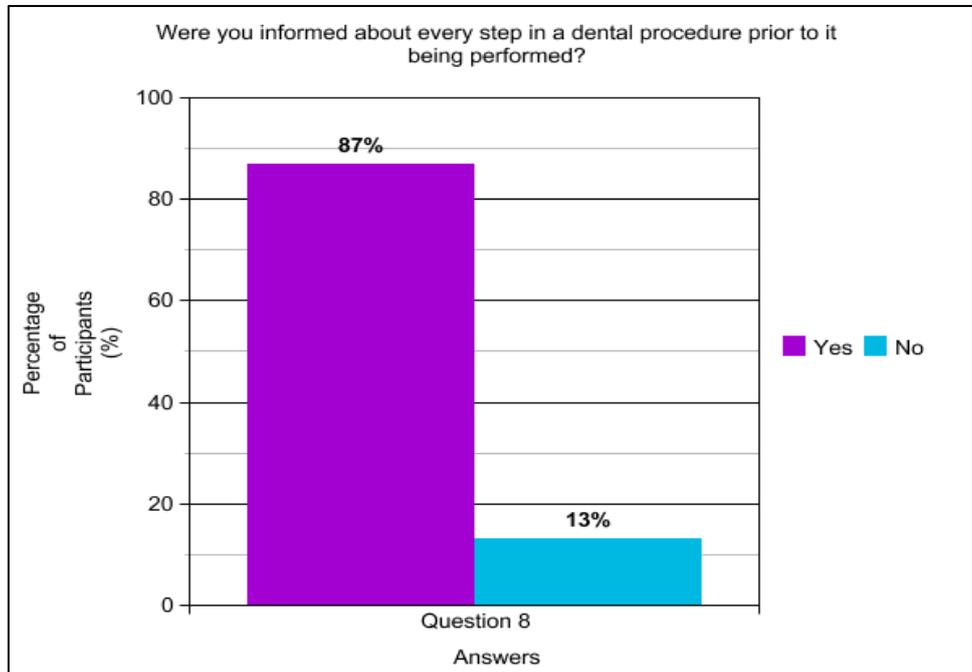


It can be seen in Figure 7 that 88% of the participants had chosen dental anesthesia as the factor that concerns them the most when visiting the dentist, followed by the sound and

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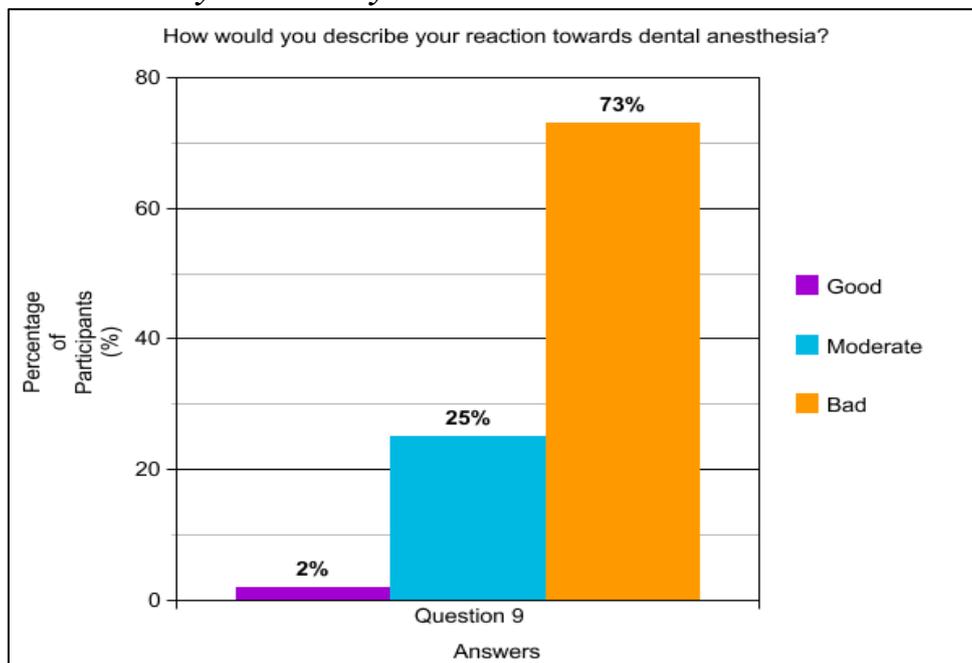
sensation from drilling as selected by 7% of them. Sight of a dentist is also considered as a factor eliciting fear and anxiety according to 3% of the participants and the remaining 2% of them are mainly anxious by being in the dental office itself.

Figure 8: “Were you informed about every step in a dental procedure prior to it being performed?”



Based on Figure 8, it can be observed that 87% of the participants are aware of the steps in a dental treatment that results in increased pain perception in these patients as compared to 13% of them who are not aware of the treatment being carried out.

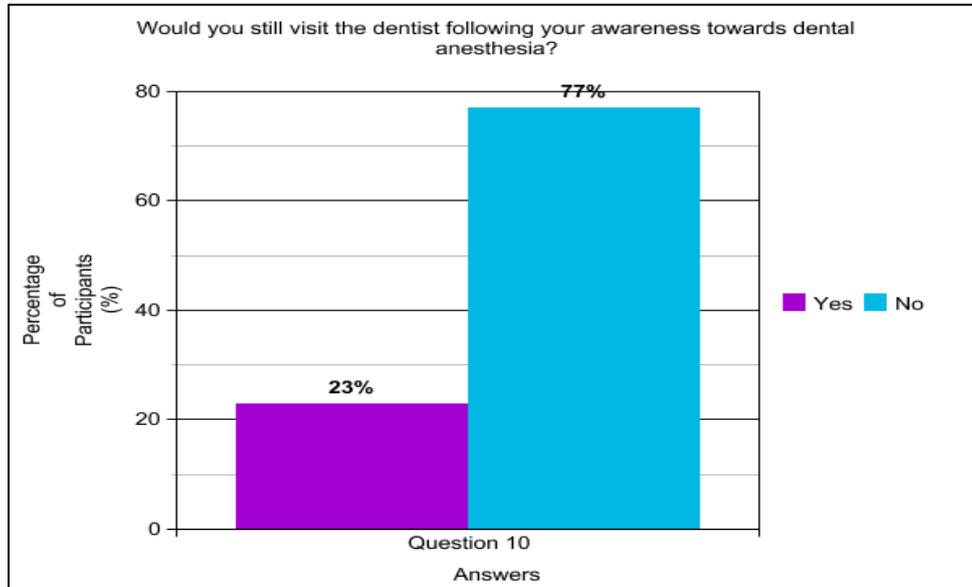
Figure 9: “How would you describe your reaction towards dental anesthesia?”



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Most of the participants rated their reactions towards dental anesthesia as negative or bad as 73% of them agreed that they would end up crying at the sight of dental anesthesia, while 25% of them would react moderately and only 2% of them would most probably show positive reaction towards dental anesthesia.

Figure 10: “Would you still visit the dentist following your awareness towards dental anesthesia?”



As a result of patient’s awareness towards dental anesthesia, 77% of the participants had refused to visit the dentist for future treatment while the remaining 23% suggest that they would still visit the dentist despite their knowledge about anesthetic injection.

Figure 11: “Have you experienced any post-anesthetic problems such as lip biting before?”

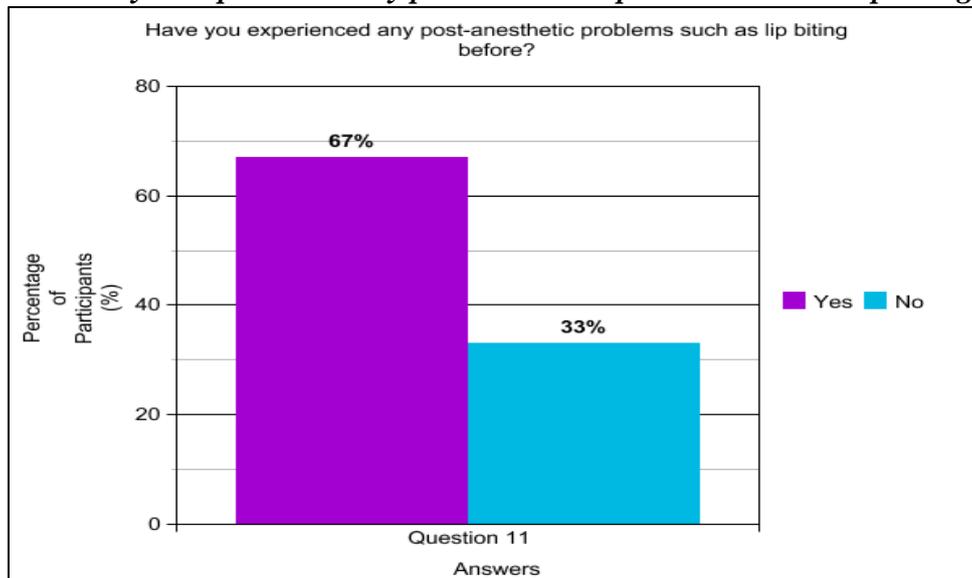
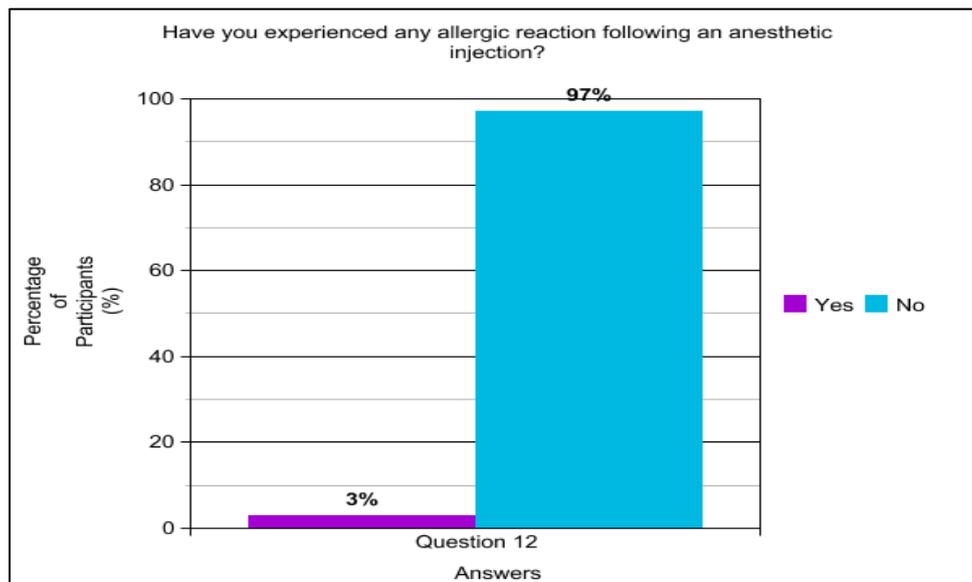


Figure 11 shows that 67% of the participants have experienced post-anesthetic problems such as lip biting in their previous treatment and 33% of them have never encountered such problems before.

Figure 12: “Have you experienced any allergic reaction following an anesthetic injection?”



According to the patient’s history, only 3% of them have experienced allergic reactions following an anesthetic injection while most of the participants (97%) have never experienced any form of allergy after being anesthetized in their previous dental treatment.

DISCUSSION

Based on **Figure 1**, 65% of the participants have experienced going to the dentist previously while the remaining 35% have never been to a dentist before. A survey done by Delta Dental Plans Association (DDPA) reported that patient’s unwillingness to visit the dentist due to fear and anxiety could be associated with the same trait as their parents. According to DDPA, approximately 48% of the parents are anxious or nervous about the idea of going to the dentist, which was found to be almost similar to the result of 47% seen in their children.²¹

Divided opinions can be seen among the participants on the idea of visiting the dentist in **Figure 2**, where 58% of them said that they like going to the dentist while the remaining 32% stated otherwise. In comparison, a study from the European Journal of Dentistry stated that 54% of the children in the survey enjoy going to the dentist, followed by 14% who stated the opposite and 15% of them who are afraid of going to the dentist. A study by Maha AlSarheed reported that most of the children (64%) aged 9-12 years in the study enjoyed going to the dentist and only 11% of them seemed to not like their experience at the dentist.¹⁹

The result in **Figure 3** suggests that 55% of the participants are aware of dental anesthetic injection and 45% of them are unaware of dental anesthetic injection. A study by Maha AlSarheed in Riyadh, Saudi Arabia reported that 76% of the children in the study aged 9-12 years old have been to a dentist prior to the study being conducted.¹⁹

Based on **Figure 4**, 95% of the total participants view anesthetic injection as painful and only 5% of them think that dental anesthesia is not painful. A study by Ritu Jindal and colleagues on child’s anxiety reported that maximum level of anxiety is usually seen in a child during the third and fourth visits to the dentist, in which invasive and restorative treatments involving the use of dental anesthesia may be carried out.²³

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It can be said that patients who have viewed dental anesthesia as painful even before the treatment tend to exaggerate their response following an anesthetic injection. The result shown in **Figure 5** suggests that 49% of the participants have been anesthetized before, while smaller portions of 51% among the participants have never been anesthetized previously which can be correlated with results in **Figure 6** where 85% of the participants rated the pain of anesthetic injection as “severe”, following which 8% of them think the pain is “moderate”. It can be seen that the pain of dental anesthesia is considered to be bearable by the remaining patients as 5% of them think of it as only “mild” pain and the other 2% view it as non-painful.

It was mentioned earlier that dental anesthesia is considered to be one of the factors that may elicit fear and anxiety among dental patients, which explains the result obtained in **Figure 7** where 88% of the participants had chosen dental anesthesia as the factor that concerns them the most when visiting the dentist, followed by the sound and sensation from drilling as selected by 7% of them. Sight of a dentist is also considered as a factor eliciting fear and anxiety according to 3% of the participants and the remaining 2% of them are mainly anxious by being in the dental office itself.

A cross-sectional study by Colares et al. involving 970 children between 5 to 12 years of age states that dental anesthetic injection is the main factor that is commonly associated with dental fear and anxiety in children.⁷ Another similar study done by Delta Dental Plan Association (DDPA) stated that the main concern of a dental patient as chosen by 54% of the participants is the pain of dental treatment, followed by 28% of them who are more concerned about the treatment duration, 25% for the additional treatment requirement and 17% of the participants do not like the sight of a dentist.²¹ In addition, a study by Maha AlSarheed further confirmed this result by stating that dental fear in children is often associated with anesthetic injection (74%), followed by extraction (31%), dental drill (27%), restoration (14%) and dental instruments (12%).¹⁹

According to the data obtained in **Figure 8**, most of the participants are aware of every step in a dental procedure as mentioned by 87% of them. However, 13% of them disagreed by stating that they are not informed about every step in a dental treatment prior to it being performed. A report by the American Academy of Pediatric Dentistry (AAPD) stated that dental fear may develop from the perceived lack of control or possibility of pain during the dental treatment, especially when the child is aware of the dental problem and its treatment procedure or pain experience from previous dental treatment.²⁴

It can be seen in **Figure 9** that most of the participants rated their reactions towards dental anesthesia as negative or bad as 73% of them agreed that they would end up crying at the sight of dental anesthesia, while 25% of them would react moderately and only 2% of them would most probably show positive reaction towards dental anesthesia. Behavior management is an important component in the treatment of a pediatric patient as it helps to develop a sense of trust between the patient and dentist, which contributes to the success of the treatment.

Following their awareness towards dental anesthesia, **Figure 10** reveals that 77% of the participants had refused to visit the dentist for future treatment while the remaining 23% suggest that they would still visit the dentist despite their knowledge about anesthetic injection. According to Dr. Keith Libou (Chief Clinical Officer at Delta Dental of New

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Jersey), children's willingness to visit the dentist could be affected as a result of bad dental experience, which may last throughout childhood and even into adulthood.¹⁹

The result in **Figure 11** states that 67% of the participants have experienced post-anesthetic problems such as lip biting in their previous treatment and 33% of them have never encountered with such problems before. Self-inflicted soft tissue injuries such as lip biting is considered to be one of the common complications that occur during the period of post-operative analgesia, having 3% to 16% rate of occurrence among children including physically and mentally handicapped individuals.²¹

Based on the patient's history in **Figure 12**, only 3% of them have experienced allergic reactions following an anesthetic injection while most of the participants (97%) have never experienced any form of allergic reaction after being anesthetized in their previous dental treatment. A study done in the United States involving pediatric dentists who were also members of the American Academy of Pediatric Dentistry (1997) reported that 98% of the practitioners stated that most of their patients did not experience any side effects following anesthetic injection while the other 2% mentioned that approximately 1-3% of their patients have experienced post-anesthetic side effects, which include allergic reactions such as urticaria, angioedema and nausea.²⁵

CONCLUSION

In dentistry, countless ideas have been brought forward over the years to ensure a painless delivery of dental care to every individual regardless of their age. Based on the results obtained from this study, it can be concluded that dental anesthesia is still considered to be a source of fear and anxiety among children, which normally results in avoidance behavior of the patients. The results in this study are consistent with the previous studies done in this field. A dentist should take into consideration the patient's point of view towards dental treatment and factors that may elicit dental anxiety especially in children.

It can be seen that most children express a form of dental fear and anxiety during a dental visit that can be overcome by a dentist who is capable of identifying the factor that could elicit the fear and anxiety in a patient and provide various ways to comfort for the patient throughout the dental treatment.

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Conflict of Interest

The authors of this study confirm that there is no conflict of interests in the publication of this paper.

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