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# **PARENTS' PERCEPTION TOWARD INFANTS' TEETHING IN DUBAI, UNITED ARAB EMIRATES**

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## ABSTRACT

### Parents' Perception Toward Infants' Teething in Dubai, United Arab Emirates

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**Background:** Teething is a normal physiological phenomenon of the continuum of dental development during which the tooth moves from its intraosseous position within the jaw until it reaches the oral cavity. It begins around six months of age with the lower primary central incisors' eruption and is completed by three years. Many parents assume the certainty of the presence of signs and symptoms associated with teething.

**Aims:** This study aimed to assess parental knowledge and beliefs regarding the teething process and investigate parental practices to alleviate symptoms associated with teething in Dubai, United Arab Emirates (UAE).

**Materials and Methods:** A cross-sectional survey conducted using a self-administered questionnaire distributed to parents in Dubai, UAE. The questionnaire contained three sections eliciting demographic characteristics and assessing parents' knowledge, beliefs, and practice regarding teething. The chi-square test was used to analyse relationships (knowledge, beliefs, and practices) and (demographic characteristics). Kolmogorov-Smirnov test was used to measure the

normality of the scores. A p-value of less than 0.05 was considered significant in all statistical analyses.

**Results:** Overall, 323 participants were included in the final analysis, with the majority of the participants being females (mothers) aged 30-39 years old (39.6%). Increased drooling, desire to bite, gum irritation, fever, and sleep disturbance were the most reported symptoms of teething stated by 282 (87.3 %), 279 (86.4 %), 278 (86.4 %), 277 (85.8%), and 264 (81.7%) of the parents, respectively. Most of the participants, 194 (61%) reported that their child was moderately distressed. Around (39.9%) of the participants reported that their child distress lasted for more than a week. Our study found that (57.9%) and (36.8%) of parents received their advice regarding managing teething symptoms from relatives and pediatricians, respectively. The level of knowledge about teething was significantly associated with the participants' age with the middle age group having a better knowledge. ( $p$ -value= 0.045).

**Conclusions:** Most of the parents had misconceptions about the signs that typically occur during teething. A common lack of knowledge about teething among parents should encourage dental healthcare providers to educate parents and other healthcare providers regarding the teething process and the management of its potential sign and symptoms.

## DEDICATION

My research work is heartily dedicated to my parents, who taught me the value of academic learning ever since I was a child and with care, devotion, and sacrifices, earnestly grew me up. I would not have been where I am now without you.

I specially dedicate my research work to my husband and my sister. I thank you for your presence forever. For your indissoluble support and prayer, you both deserve special mention. Thanks for being here for me all the time.

My dedication will be incomplete without my daughters **Fatima** and **Hoor**. You are my angels and motivation.

I also dedicate my research work to my primary supervisor **Dr Anas AlSalami** who encouraged and guided me to complete my research work. I also dedicate my research to my friends, who are a precious gift for me. Thank you so much for your valuable support throughout the journey that means the world to me.

## **DECLARATION**

I hereby declare that the contents of the thesis, **“PARENTS’ PERCEPTION TOWARD INFANTS’ TEETHING IN DUBAI, UAE”** are a product of my own research. I further declare that this work has not been submitted for the award of any other diploma/degree. There is no conflict of interest with any other entity or organization. The university may take action if the information provided is found inaccurate at any stage.

**Name: Sarah Fahad Almatrouk**

Signature

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If oceans turn into ink and all trees become pens, even then, the praises of “ALMIGHTY ALLAH” cannot be expressed. He who created the courteous and knows even what is there in it, hidden or evident which is beneficent for the human; and who bestowed upon the intellectual ability and wisdom to search for its secrets. Countless salutations be upon the Holy Prophet MUHAMMAD (S.A.W.W), the city of knowledge, who has enjoined upon his ‘UMMAH’ to seek knowledge from cradle to grave.

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## ABBREVIATIONS

- (ISMP)** - Institute for Safe Medication Practices
- (FDA)** - Food and Drug Administration
- (OTC)** - Over the Counter
- (MS)** - Mutans Streptococci
- (ECC)** - Early Childhood Caries
- (AAPD)** - American Academy of Pediatric Dentistry
- (MHRA)** - Medicines and Healthcare products Regulatory Agency
- (HHV-6)** - Human Herpesvirus-6
- (MBRU-IRB)** - Mohammed Bin Rashid University-Institutional Review Board
- (MBRU)** - Mohammed Bin Rashid University of Medicine and Health Sciences
- (DDH)** - Dubai Dental Hospital
- (STROBE)** - Strengthening the Reporting of Observational Studies in Epidemiology
- (UAE)** - United Arab Emirates
- (OPD)** - Outpatient Department
- (NSAID)** - Non-Steroidal Anti-Inflammatory Drug
- (DPF)** - Dental Practitioner Formulary
- (CPS)** - Canadian Pediatric Society
- (NHS)** - National Health Service
- (ADA)** – American Dental Association

## 1. INTRODUCTION

Teething is a normal physiological process of dental development in which the tooth moves from its intraosseous position within the jaw until it reaches the oral cavity <sup>1</sup>. Carpenter (1987) defined the tooth eruption as the tooth's movement from its pre-eruptive position in the jaw to the eruptive position in the oral cavity <sup>2</sup>.

The period of deciduous teeth eruption differs among children. It begins around six months of age with the eruption of the lower primary central incisors' in most children and is completed approximately by three years <sup>3</sup>.

It had been reported that there is a direct relationship between the eruption of the teeth and physical disturbance related to teething, such as inflammation of the mucous membrane overlying the tooth, pain, ear rubbing on the side of tooth eruption, facial flushing, sleep disturbance, excessive drooling of saliva and loss of appetite <sup>4</sup>. Nevertheless, fever, diarrhoea, seizures, and bronchitis were found not to be related to teething but might be related to daytime tiredness <sup>5</sup>. Some infants may experience more than one symptom while others may experience one or none <sup>3</sup>.

There are different approaches that parents can follow to manage and relieve teething symptoms. For instance, chewing on a hard object like chilled teething ring, a frozen fruit or vegetable, the use of topical anaesthetic agents containing choline salicylate or powders containing benzocaine, and analgesics such as paracetamol could help decrease the pain <sup>4</sup>. It is essential to differentiate between the scientific facts and parent's beliefs regarding teething to avoid misdiagnosis and improper management of the illnesses <sup>4</sup>.

Some parents opt for extremely risky types of treatment methods to resolve problems associated with teething, such as lancing the overlying gingival tissue, applying necklaces, rubbing the gingiva with various animal extracts, and applying heavy metal salts <sup>6,7</sup>.

Other extreme measures to control teething symptoms may include blistering, placing leeches on the gums, using cautery to the back of the head <sup>4</sup>. Others believe that providing antibiotics and analgesics would relieve teething issues' signs and symptoms <sup>8</sup>. Several studies reported that there is a lack of knowledge and improper practices among parents regarding the management of teething <sup>2,7,8</sup>. There have been report about poor perceptions of teething in the Gulf Cooperation Council (GCC) region <sup>9</sup>. While, anecdotally, this level of knowledge and practice is known to exist in United Arab Emirates (UAE), there are no scientific studies investigating this matter in this multicultural country to the best of our knowledge. Therefore, it is appropriate to conduct this study to assess parental knowledge and beliefs regarding the teething process and to investigate parental practices to alleviate symptoms associated with teething in Dubai, UAE.

## 2. LITERATURE REVIEW

### 2.1 Eruption Physiology and Process

“Eruption” and “emergence” of teeth describe two different processes <sup>10</sup>. In eruption, the forming tooth shifts from its initial position in the jaw to its functional position in the oral cavity in an axial direction <sup>11, 12</sup>. Tooth emergence can be described as the initial appearance of any portion of the tooth crown reaching the oral cavity through the gingiva <sup>11, 13</sup>.

The eruption process begins well before the associated tooth emerges, and it continues until the erupting tooth is in a usual functional location <sup>11</sup>.

#### 2.1.1 Stages of Tooth Development

Embryologically, the teeth originate from the neuroectoderm <sup>14</sup>. Tooth development occurs in four stages: initiation stage, bud stage, cap stage, bell stage, and the maturation stage. In the initiation stage, the dental lamina attaches the developing tooth bud to the epithelial layer of the mouth. Localized cell proliferation in the dental laminae during the bell stage forms a round or oval swelling, the buds of the tooth which develop into the mesenchyme. In the cap stage, every ectodermal tooth bud deep surface is invaginated by mesenchyme named the dental papilla, which gives rise to dentin and dental pulp. The ectodermal covering shape over the papilla is referred to as an enamel organ as it creates future enamel. The crown's hard tissue, including enamel and dentin, will be developed during the maturation stage.

In the foetus, tooth development starts around 28 days, but mineralization takes place within 14 weeks in utero. Also, the dental eruption takes place when the formation and mineralization of the crown are almost complete, but before the roots are developed completely<sup>14</sup>.

### 2.1.2 Stages of Tooth Eruption in Primary Teeth

The deciduous tooth eruption process may be divided into three specific stages, which are pre-eruptive tooth movement, eruptive tooth movement, and post-occlusal tooth movement<sup>10</sup>. Firstly, the pre-eruptive movement of the tooth includes the early part of tooth formation when the dental follicle expands before partial root development is complete<sup>15, 16</sup>. Secondly, the eruptive tooth movement is the active eruption process<sup>16</sup>.

Although the root part of the tooth has yet to be formed, the tooth germ will start to emerge three-dimensionally from its bone crypt<sup>15, 16</sup>. Also, bone remodelling for the primary teeth during these phases may not be too obvious, as the tooth germ is typically not covered entirely with a thick alveolar bone. Nevertheless, a bone in the crypt fundus is remodelled continuously to form a socket that holds the erupting tooth<sup>17</sup>, while the roots take shape<sup>15, 16, 18</sup>.

Moreover, the enamel epithelium is thickened and fused with oral epithelium as the erupting tooth reaches the oral mucosal surface epithelium<sup>10</sup>. The rate of eruption starts to increase upon the emergence of the deciduous teeth<sup>18</sup>. This is the period of pre-occlusal tooth movement when the tooth begins to burst into occlusion. Bone develops at the base of the crypt during this phase, and the root of the tooth continue to take form.

Continuous remodelling of connective tissues around the tooth forms the periodontium, which holds the erupted tooth in a functional position upon maturation<sup>18, 19</sup>. Finally, the post-occlusal

movement of the tooth is the movement of the tooth that maintains the emergence tooth position while the jaw develops and compensates for the occlusal and proximal wear of the tooth <sup>15, 17, 20</sup>.

### 2.1.3 Four Possible Mechanisms for Eruption

Ten Cate acknowledged that the cycle of tooth eruption is not correctly understood and identified four possible mechanisms for tooth eruption that were investigated, which are like root forming and elongation, hydrostatic pressure, bony remodelling, and tractions of the periodontal ligaments <sup>16</sup>.

#### 2.1.3.1 Root Forming and Elongation

Root elongation may impact the underlying bone and occlusally push the erupting tooth into the oral cavity <sup>19</sup>. Clearly, there must be a solid base apical to the developing teeth to sustain the intensity or pressure of the elongating masses of the root digging into the alveolar bone <sup>16</sup>. However, some scientists have indicated that the mechanism of eruption cannot be root elongation since rootless teeth still erupt<sup>16, 20</sup>. Many researchers noted that the eruption force is connected to the intensity that occurs with the root's elongation, which implies that the eruption force is correlated with the root extension <sup>21</sup>.

#### 2.1.3.2 Hydrostatic Pressure

Hydrostatic pressure is another potential mechanism for tooth eruption due to the apical vascular system to the tooth germ has a higher pressure than outside the germ. Thereby, Interstitial fluid pressure will force the bell-shaped tooth germ into the oral cavity occlusally <sup>22</sup>. Van Hassel and McMinn tested the hydrostatic theory using dogs and found that tissue pressure apical to the erupting tooth is greater than occlusally and to produce an eruptive force in theory <sup>23</sup>.

### 2.1.3.3 Bony Remodelling

Bone remodelling is the process where bone is formed apical to the erupting dental germ, which helps in the projection of the dental germ occlusally. In contrast, osteoclastic activity occur coronal to the erupting dental germ, allowing the eruption path<sup>10</sup>.

However, several researchers reported that the tooth follicle is the critical element in the eruption cycle<sup>18</sup>. Furthermore, Marks and Cahill's study revealed that the dental follicles are essential in the teething process<sup>24</sup>. Also, Wise (2009) states that tooth eruption requires dental follicle, alveolar bone resorption in the base of the bony crypt for an eruption path, and alveolar bone formation<sup>25</sup>. Gorski *et al.* claimed that without follicles, the teeth do not erupt<sup>19</sup>. Finally, the dental follicle tends to be essential for the development of bone remodelling cells.

### 2.1.3.4 Traction of Periodontal Ligaments

There is sufficient evidence to show that the periodontal ligament, originating from the dental follicle provides the necessary force for the eruption<sup>20</sup>. It is postulated that fibroblasts which formed from dental follicle provide the force needed for an eruption in the connective tissues<sup>10</sup>. Moreover, the inclined fibroblasts showed that they contract and probably pull out the erupting tooth during an eruption<sup>20</sup>. An early paper by Ten Cate *et al.* addressed the role of fibroblasts in periodontal ligament remodelling<sup>26</sup>.

Several studies have demonstrated how fibroblasts play a role in phagocytosis during remodelling as there is an increased fibroblastic activity during tooth eruption<sup>20</sup>. Berkovitz studied Ten Cate's theory and found that there was no proof that one theory could explain the tooth eruption entirely and that the eruption would possibly be a multifactorial process<sup>1</sup>.

#### 2.1.4 Factors Affecting Tooth Eruption

Tooth eruption is an essential aspect of human development and growth and can be influenced by several factors<sup>27</sup>. For instance, it can represent the human body's overall growth<sup>28</sup>. The tooth eruption can be affected by factors such as genetics, hormones, racial-geographical variations, food measures, and gender differences<sup>29</sup>.

Genetic pre-programming was suggested as a tooth emergence process because many genes involved in tooth growth and eruption have been identified in a study<sup>17</sup>. Some studies found that eruptions occur later for children below standard height and weight in the same age groups than those within the normal range. Other studies found that primary tooth eruption is more related to a child's weight after birth than the weight at birth<sup>27</sup>. Several studies demonstrated that there is a connection between malnutrition in early childhood and primary teeth eruption<sup>13, 30</sup>.

Children of higher socioeconomic backgrounds were found to have earlier tooth eruption than children of lower socioeconomic classes as they have better health and nutrition. Also, pituitary growth and thyroid hormones affect tooth eruption<sup>31</sup>. Leache *et al.* found that children with growth deficits found that children with a delayed growth resulting from a growth hormone deficiency or low genetic height had delayed tooth eruption<sup>32</sup>.

There is a disparity in tooth eruption between different races. In African and American-African children, the teeth erupt earlier than those in Asians and Caucasians<sup>33</sup>.

#### 2.2 Eruption Sequence

Globally, the time and sequence of eruption vary<sup>34</sup>. The eruption of the teeth is one of the essential phases in the development; thus, the timing of tooth eruption is always a concern to most parents

<sup>34</sup>.

In addition, the emergence of the first tooth in the oral cavity of a new-born is considered a significant milestone for physical and psychological transition in the child's and the parents' life<sup>35</sup>.

Eruption of primary teeth is systematically serial and age-related, accompanied by permanent teeth eruption<sup>34</sup>. Generally, the age of teething varies among children, as the first teeth begin to erupt and referred to the milk teeth when the child is about 6 to 9 months old<sup>3</sup>. Usually, the full set of 20 of primary teeth came into the mouth by the age of three years<sup>13</sup>. Primary and permanent teeth mostly erupt in pairs<sup>3</sup>. Moreover, the mandibular teeth normally erupt before than maxilla teeth, with the central incisors starting at the age of 6-8 months, second with lateral incisors, first molars and canines are preceded by the second molars<sup>36</sup>.

According to Tinsley 2019, lower primary incisors appear at about 5-7 months, and the maxillary incisor teeth erupt around 6-8 months, but the maxillary lateral incisors erupt at 9-11 months, the lower lateral incisors also erupt at about 10-12 months, and the back primary first molars erupt at about 12-16 months and primary canine at 16-20 months<sup>37</sup>.

In a study of children from Saudi Arabia, teeth eruption was delayed compared to children from the Caucasus while children in Iceland displayed a similar mean primary teeth age as those of the Scandinavian children<sup>24, 38</sup>. Oziegbe (2008) showed that the eruption of deciduous teeth was not related to gender<sup>39</sup>. There was a general trend in the current study for teeth to erupt earlier in boys in both jaws, and only the canine and the second molar were statistically important<sup>34, 39</sup>. As well as other researchers have recorded earlier eruptions among boys, such as Al-Jasser and Bello, Tanguay *et al.*, and Holman and Jones<sup>24, 40, 41</sup>.

The explanation for earlier primary teeth eruption in boys may be due to accelerated growth, as Meredith stated in the first trimester of gestation <sup>42</sup>. In comparison, Magnusson revealed a significant earlier tooth eruption in girls compared to boys <sup>43</sup>. Research by Soliman *et al.* (2011) and Vejdani *et al.* (2016) illustrated that boys were found to lag behind girls in the emergence of all primary teeth excluding the first molar <sup>27, 44</sup>.

### **2.3 Sign and Symptoms Associated with Teething**

Primary teeth emergence was considered a turning point in the growth of infants <sup>45</sup>. Children's primary teeth eruption may be distressing for the child and the parents <sup>3</sup>. There is a substantial variability in the presence or absence and the frequency of teething-related symptoms. Some infants may experience a variety of symptoms. While, others may experience none or only one symptom <sup>46</sup>.

There is controversy regarding the direct relationship between tooth eruption and systemic symptoms. Some researchers linked primary tooth eruption with local and systemic symptoms such as irritability, gingival irritation, increased salivation, fever, sleep disruption, crying, diarrhoea, appetite loss, facial flushing, ear rubbing on the side of the erupting tooth, and increase biting and thumb sucking <sup>6, 14, 47</sup>.

Nevertheless, other studies failed to find a direct correlation between teething and systemic symptoms such as fever, irritability, diarrhoea, and rash or infection <sup>47-49</sup>.

Several authors claimed that undiagnosed primary herpetic gingivostomatitis (caused by Herpes Simplex Virus-HSV) maybe the main cause for systemic symptoms during the teething process <sup>50</sup> while others found no association between HSV and teething <sup>51</sup>. However, it is ambiguous whether the local and systemic disruptions of teething in infants are related to the process itself or other

developmental cause and there is not enough clinical evidence that suggests that teething cause-specific signs or symptoms <sup>52</sup>.

Some authors in the past related tooth eruption to infant mortality, as reported by Francois Rachin early in the 17th century. Teething contributed to infant mortality, seizures, diarrhoea, fever, and other medical conditions, according to these reports <sup>5,53</sup>. Also, in 1839 in England and Wales, 5016 deaths were reported due to teething <sup>54</sup>. On the other hand, Illingworth, in 1975 stated "teething produces nothing but teeth." <sup>55</sup>.

Most of the parents have misconceptions about teething signs and symptoms <sup>56-58</sup>. Unfortunately, the unpredictable phases of development and growth make the analysis of teething research particularly difficult. One example is the normal development of salivary glands at the age of two to three months when the child's salivary glands begin functioning, decreased swallowing capabilities leading to excessive drooling. Also, finger sucking can stimulate salivation which can be misinterpreted as a sign of teething <sup>49,59</sup>.

At around 4-6 months of age, When the primary teeth are about to erupt, mothers' antibodies that the young children rely on begin to decrease, as they develop the antibodies that are not yet enough to protect them from infection <sup>60</sup>.

In addition, infants begin to crawl and place in their mouths unclean items to alleviate pain and discomfort that can introduce pathogens into their bodies that may contribute to gastrointestinal problems such as virus and bowel infection, diarrhoea, vomiting, with increases in body temperature <sup>59-61</sup>. Moreover, high interleukin 1 b (IL-1 b) and interleukin-8 (IL-8) levels were associated with potential diarrhoea, as noted by Shapira *et al.* <sup>62</sup>. Thereby diarrhoea and vomiting may not generally be associated with a tooth eruption but may result from the child's attempts to decrease discomfort and pain.

A study by Markman reported that diarrhoea is caused by swallowing an excessive amount of saliva which then loosens the stools <sup>14</sup>. Stapleton and Flores (1989, 2000) attributed diarrhoea to teeth eruption rather than infection <sup>63, 64</sup>. Additionally, Sodemann *et al.* (1996) reported 80% reduction in seeking advice from a professional healthcare provider if the mother believed that diarrhoea was caused by teething <sup>65</sup>.

Studies have shown that pyrexia could be caused by bacterial and viral agents <sup>66</sup>. Pyrexia has been identified in children as a rectal temperature equal to or above 38°C as mentioned by Appenzeller *et al.* and Baraff <sup>67, 68</sup> or an oral temperature equal to or above 37.8°C <sup>66</sup>.

Jaber and Cohen <sup>56</sup> reported a statistically significant increase in temperature starting three days before the tooth eruption, with the highest temperature recorded on the eruption day. The same finding was also reported by Galili *et al.* <sup>49</sup> and Carpenter <sup>60</sup>. Moreover, Macknin *et al.* <sup>52</sup> and Kiran <sup>69</sup> reported a high fever frequency as a dental symptom, but no irritability or diarrhoea cases were reported.

Although teething related fever was in general considered to be low grade, 22% of parents believed that fever over 38°C and 6% of parents that fever over 39°C could occur due to teething solely, in the absence of other symptoms <sup>5</sup>. However, Wake *et al.* <sup>48</sup> found no association between teething, body temperature, or any other symptoms, including drooling, sleep problems, diarrhoea, or rash. Bennet and Brudno <sup>70</sup> interestingly concluded that fever results from human teething virus in the process of primary tooth eruption responsible for the main and subclinical infection at the beginning of a lifespan. Furthermore, The HT virus persists latently in the alveolar crypt until it is activated by eruptive action, causing fever and local signs and symptoms such as gingival inflammation, bleeding, and pain <sup>46</sup>.

However, the tooth's protrusion through the bone does not lead to this pain; instead, the dental follicle, which is a rich source of eicosanoids, cytokines, and growth factors, is responsible for the localized inflammatory response and pain <sup>4</sup>.

During the teething process, cytokines level such as interleukins (IL-1 $\alpha$ , IL-1 $\beta$ ) and tumour necrosis factors  $\alpha$  [TNF $\alpha$ ] will increase. These factors are known to induce fever <sup>71,62</sup>. Baraff (2003) stated that fever plays a role in relieving the infection <sup>68</sup>. Fever was found to be strongly associated with human metapneumovirus by Peiris *et al.* (2003), who reported that 7% of all febrile babies over two years old with a temperature above 38°C are expected to develop pneumonia <sup>72</sup>.

Gingival irritation was the most prevalent sign of teething, as reported by Cunha *et al.* <sup>73</sup>, Baykan *et al.* <sup>74</sup>, and Shapira *et al.* <sup>62</sup> demonstrated a correlation between gingivitis and the occurrence of other symptoms around an erupting tooth. Again, gingivitis is followed by elevated inflammatory cytokines in the crevicular gingival fluid <sup>75</sup>. When the primary molar teeth start to erupt, the jaw's pain may be felt in the cheek and ear, leading the child to rub his/her cheek or pull on their ear. Nonetheless, ear pulling could be a sign of an ear infection <sup>46</sup>.

## **2.4 Management of Teething**

There is no justification for any aggressive treatment of teething symptoms <sup>76</sup>. Caregivers have used several approaches to relieve discomfort and soreness associated with teething <sup>77</sup>.

Parental perceptions and beliefs in the signs and symptoms related to teething can interfere with accurate diagnosis and management of a range of severe illnesses such as a chemical burn, overdose, and toxicity due to the prolonged and long-term use of various drugs <sup>77</sup>. Therefore, there is a need to differentiate between facts and false beliefs relevant to teething <sup>4</sup>.

### 2.4.1 Historical Management of Teething

The historical management of teething could, for the most part, be defined as barbaric according to contemporary clinical standards. There were many and varied historical remedies used to relieve teething associated signs and symptoms in the past, including lancing the overlying gingival tissue, putting leeches on the gums <sup>46</sup>, applying necklaces <sup>6, 7, 78</sup>, blistering, bleeding, cautery on the back of the head, rubbing the gingiva with different animal extracts, and prescribing or using heavy metal, salts or opiates <sup>79</sup>. Others suggested hanging viper or wolf teeth around the child's neck <sup>6</sup>. Alternatively, others encourage children to chew on hard stuff like roots or silver spoons if they were wealthy <sup>80</sup>.

#### 2.4.1.1 Baltic Amber Teething Necklaces

Some manufacturers say amber beads release succinic acid absorbed into the skin and give the child an anti-inflammatory and analgesic impact <sup>81</sup>. No evidence that the succinic acid component could be released into human skin from such beads. Additionally, there is no scientific evidence of the anti-inflammatory effects of succinic acid in pain relief. Besides that, these necklaces pose a significant safety risk <sup>81, 82</sup>.

The Canadian Pediatric Society (CPS) and the American Academy of Pediatrics (AAP) have similar safety concerns regarding the use of teeth necklaces/ bracelets and discourage the use of these items <sup>81, 82</sup>.

#### 2.4.1.2 Lancing

The famous surgeon Ambroise Pare invented lancing in the 16<sup>th</sup> century and soon became a professional technique. The operation was done without anaesthesia, which generally involved two incisors at the right angle to each other, overlying the 'difficult' tooth <sup>46</sup>.

### 2.4.1.3 Systemic Medicaments

Over the years, systemic drugs have become popular techniques in managing teething, many of these medications containing opiates and toxins such as lead acetate, mercuries, and bromide <sup>46</sup>. In the 6<sup>th</sup> century, teething treatment included eating or placing a hare's brain on the gum or drinking animal milk, butter, a honey/salt mixture, and hen's grease, and employing charms and amulets <sup>14, 83</sup>. Additionally, purgative and emetic were widely used in the 18<sup>th</sup> and 19<sup>th</sup> centuries leading the infant to have vomiting and diarrhoea. All the treatments mentioned above were deemed inappropriate. Emetic, purgative, and salt can lead to dehydration, honey can lead to tetanus, opiates lead to somnolence and respiratory depression, while lead can cause paralysis, encephalopathy, and seizure; mercury leads to vomiting, diarrhoea, and renal failure. Lastly, bromide leads to hallucination and seizure <sup>14</sup>. Ancient people have also been known to use talisman or other phylactery to manage the teething process <sup>14</sup>.

### 2.4.2 Non-Pharmacological Management

These techniques tend to cool or rub the gingival tissue over the tooth <sup>79</sup> as cooling minimizes inflammation and causes numbing of the gingiva by constricting the dilated blood vessels <sup>84</sup>. In comparison, chewing and gingival massage may alleviate pain by overwhelming the sensory receptors <sup>77</sup>. Steward recommended a sequential treatment approach to teething, from biting on a hard object to topical and systemic medication <sup>85</sup>.

#### 2.4.2.1 Teething Ring

There is a wide variety of teething rings available for children to gnaw. Parents are usually encouraged to closely inspect the packaging for any hazardous substances used in their manufacturing. Solid silicone-based teeth rings are superior to their liquidly filled counterparts as

the extreme temperature can damage plastic material and lead to fluid leakage <sup>46, 84</sup>. Moreover, teething rings should not be wrapped around the child's neck and attached to the infant's clothes as it may lead to strangulation.

Teething rings can temporarily alleviate the pain when the ring is chilled to a cold temperature <sup>3</sup>. Liquid-filled teething rings should be chilled in the refrigerator, not in the freezer. They should not be sterilized in boiling water or in the dishwasher, unless specified by the manufacturer <sup>86</sup>. Recently, manufacturers have stopped using the carcinogen diisononyl phthalate as a softening agent in teething rings and rattles as it was found to leach out <sup>6</sup>.

#### 2.4.2.2 Reassuring

Reassuring the parents of the signs and symptoms of teething may also be one of the most robust ways to make the parents relax as it is a normal physiological process <sup>46</sup>. However, infants with serious systemic disease should be referred immediately to the physician for correct diagnosis and care.

#### 2.4.3 Pharmacological Management

Pharmacological techniques for teething usually include analgesia, anaesthesia, sedation, or a combination of these <sup>6, 84</sup>. Although various medications are available, there is still no strong evidence of teething pain control effectiveness. Most parents tend not to have teething prescription preparation. However, if the local intervention fails to offer relief, there are various successful systemic and topical preparation available <sup>46</sup>.

Topical medication like choline salicylate gels, lidocaine HCL, Powders containing benzocaine, and paracetamol should be used with caution to avoid iatrogenic oral mucosal trauma <sup>6</sup>.

### 2.4.3.1 Topical Agent

This category consists of local anesthetic products (lignocaine-based preparation) and minor analgesics (choline salicylate-based preparation). Several teething gels are available over the counter. However, since most of these gels are benzocaine-based to numb the gum, the current recommendations discouraged them from using them<sup>87</sup>. Many studies<sup>88-90</sup> also warned that children under two years should not use medication containing benzocaine that can lead to a serious and fatal condition called Methemoglobinemia. Roghani (1999) recommended that caregivers not use oral viscous lidocaine as an overdose could lead to seizures, brain injury, and heart problems<sup>87</sup>. Parents should also be advised to wash their hands carefully before applying topical agents directly to the gum's mucous membrane<sup>46</sup>.

#### A. Lignocaine Based Products

Lignocaine hydrochloride is a local anaesthetic absorbed rapidly by mucosa, providing immediate and temporary relief of pain. Anbesol Teething Gel<sup>®</sup>, Dentinox Teething Gel<sup>®</sup>, Calgel<sup>®</sup>, Rinstead<sup>®</sup> Teething Gel<sup>®</sup>, and Woodward's Teething Gel<sup>®</sup> are available Over the Counter (OTC). However, Woodward Teething Gel<sup>®</sup> consists of 30% ethanol (alcohol) that is not recommended for infants. Although no reports can be found of adverse effects from lidocaine containing teething gels, there have been reports of adverse effects from excessive benzocaine and choline salicylate gels<sup>91,92</sup>. However, benzocaine is an ester anaesthetic agent. With 20% concentration, it gives temporary relief of pain<sup>93</sup>. Benzocaine should be cautiously and is not commonly advised because of Methemoglobinemia risk, and it can interfere with a gag reflex and cause the baby to choke<sup>94</sup>. In addition, the use of viscous lidocaine, Herbal or homeopathic products for child teething be avoided due to adverse effects<sup>95-99</sup>. Despite a drug safety notice about the use of benzocaine-containing products in infant dentistry care, the majority of pharmacists in this study would still

have inappropriately prescribed a benzocaine-containing product. Further education is necessary to guarantee that both pharmacists, health care professionals, and customers are aware of the need to avoid benzocaine, viscous lidocaine, and homeopathic drugs to treat infant teething <sup>98</sup>.

## B. Choline Salicylate-Based Products

Salicylates are minor pain relievers and are similar to Lignocaine Hydrochloride, it quickly reaches the mucosal membrane and provides quick pain relief. Their pharmacological advantage over lignocaine-based formulation is that in addition to analgesia, they also have an anti-inflammatory and antipyretic effects. Additionally, choline salicylate is a non-irritating compound <sup>46</sup>. However, the excessive application can cause a chemical burn <sup>100</sup>. Choline Salicylate Dental Gel BP, Bonjela<sup>®</sup>, and Teejel<sup>®</sup> consist of 8.7% choline salicylate with cetalkonium chloride 0.01%, a quaternary ammonium compound <sup>46</sup>. Welbury *et al.* (2015) advised that children over four months of age may use 0.75 ml of gel gently to be massaged in the sore region no more than once every three hours with a maximum of six application each day <sup>3</sup>.

The Medicine Healthcare Products Regulatory Agency (MHRA) contraindicated the use of salicylate as a topical pain reliever in children under 16 years old due to possible salicylate toxicity and risk of Reye's syndrome related to the use of aspirin after viral infection<sup>48</sup>. Besides, choline salicylate is a derivative of aspirin. However, the relation between aspirin and Reye's syndrome is not significant for non-aspirin salicylates <sup>101</sup>.

### 2.4.3.2 Systemic Analgesics

Sugar-free paracetamol elixir is the systemic drug to use because of its analgesic and anti-pyretic effects. Paracetamol dosage recommended by the Dental Practitioner Formulary (DPF) in 3-12 months = 60-120 mg 1-5 years = 120-250 mg <sup>46</sup>. The British National Formulary (BNF)

recommends only a doctor's recommendation to prescribe paracetamol for infants less than three months of age <sup>46</sup>.

Paracetamol's underdoes is ineffective while overdosing can lead to severe hepatocellular necrosis and renal tubular necrosis (PDF) <sup>46</sup>. Infants may experience toxicity at slightly lower plasma paracetamol concentration for some conditions (such as HIV-positive and malnourished infants and enzyme-inducing drugs such as carbamazepine), and this should be kept in mind when recommending or prescribing paracetamol <sup>46</sup>.

Ibuprofen suspension can be offered to children over one year of age, but it is not recommended to relieve teething symptoms<sup>46</sup>. Ibuprofen is a typical NSAID that produces analgesic, antipyretic and anti-inflammatory effects <sup>102</sup>. Moreover, ibuprofen is more effective in pain and fever than paracetamol, but it causes more severe adverse reactions in children<sup>103, 104</sup>. In addition, ibuprofen provides a longer duration of action and less frequent dosing (for every 6-8 hours vs. paracetamol every 4 hours) <sup>105</sup>.

#### 2.4.3.3 Alternative Holistic Medicine

Alternative non-pharmacological holistic medicine such as acupressure requires the parent to apply pressure to certain skin points, providing immediate pain relief. Aromatherapy using specific oils (such as diluted clove oil, tea tree oil, or even olive oil) is not recommended for infants, and homeopathy have been suggested as relievers from teething symptoms. Alternatively, chamomile oil may be used in the infant's bedroom in an aromatherapy diffuser <sup>46</sup>. None of these approaches have shown the efficacy of teeth pain control <sup>46, 106</sup>, and problems can occur when used in combination with traditional analgesics, e.g., garlic interferes in paracetamol pharmacokinetics <sup>106, 107</sup>. Teetha<sup>®</sup> and Boots Homeopathic Teething Granules<sup>®</sup> contain 6c potency of Chamomilla. One

sachet should be poured into the infant's mouth every 2 hours, up to a maximum of six doses in 24 hours <sup>46</sup>.

#### 2.4.4 General Advice Regarding Medication

Only sugar-free medication should be prescribed for teething. Medicine, like teething drugs, should never be applied to foods or feeding bottles, as the dose consumed cannot be adequately regulated by parents. Furthermore, the active drug ingredient may interact adversely with foodstuffs. Also, drugs should be kept out of children's reach to reduce overdose risk <sup>46</sup>.

#### 2.4.5 Practices That Are Not Recommended

The addition of honey, sugar, or jam to the feeding bottle, or dipping a pacifier in honey or jam, and giving a feeding bottle at bed do not relieve pain. They are highly cariogenic and should be discouraged as they increase the risk of dental caries, pain, and infection as the teeth are bathed in sugar and even at a low concentration <sup>3</sup>. The parents should be advised that frequent application of alcohol as a topical anaesthetic on an infant's mucous membrane is not recommended and may lead to hypoglycaemia because of the low body weight of a child <sup>46</sup>.

### 2.5 Parental Perception About Teething

Awareness and knowledge in society regarding the facts and myth of teething are essential. Parental knowledge and expertise in managing signs and symptoms differ across nations. Studies done in Australia and Poland in 1999 and 2016 found that most parents had false beliefs and inadequate knowledge about signs and symptoms of teething and different practices were used <sup>5</sup>. Moreover, a Brazilian study in 2013 suggested that the health team, particularly dentists, should focus more on instructive and practical evidence-based recommendations to enhance teething's parental awareness <sup>36</sup>.

Another study about the mothers' experience of their infants' teething at three different settings in Uganda and South Africa in 2004, reported that most parents believed in conventional practices and home remedies and had little awareness and poor attitude about teething management <sup>108</sup>. These studies were also done in Uganda and South Africa, emphasizing the importance of knowledge regarding how mothers understand teething and how giving practical advice would enhance their knowledge <sup>108</sup>. A cross-sectional study of 60 mothers presenting to a child clinic in Enugu (Nigeria) in 2011 showed that the symptoms associated with teething are unknown and might lead to delayed treatment, increased morbidity, and infants' death <sup>109</sup>.

A further study published in 2015 in the department of pediatric health and childhood in Nigeria shows a low level of knowledge and attitude about teething that may seriously affect teething management, and adequate oral health education is required during pregnancy <sup>110</sup>.

Another cross-sectional study done in Ethiopia in 2018 found that most mothers had insufficient knowledge about teething and should be educated by dentists and professionals in correcting the traditional beliefs about teething <sup>2</sup>. In addition, other cross-sectional studies conducted in Udaipur in India 2012 and Bangladesh 2012 showed the same findings that parents should be well-informed and educated about the teething process and the appropriate handling of teething complications by dental health care providers <sup>4, 35</sup>.

A study done in Jordan in 2009, involving 1,500 parents, showed a widespread lack of awareness and expertise. The former study also concluded that parents should be aware and educated about the teething process and the proper treatment by dental health care professionals <sup>77</sup>. Another study in Egypt in 2017 revealed that most mothers have insufficient knowledge about teething issues and had used inappropriate treatment <sup>111</sup>. A study conducted by Elbur *et al.* in Saudi Arabia in 2015 to assess parental awareness and practice to alleviate teething disturbance showed the parents

have misconceptions and weak knowledge about teething <sup>8</sup>. Another study published in Jazan University in Saudi Arabia in 2019 had the same finding. It concluded that educational intervention is essential to upgrade parents' knowledge and improve their management in treating teething disturbance <sup>112</sup>.

Educational measures are needed to educate parents to understand better the signs and symptoms attributed to teething and when and where to obtain medical consultation and adequate use of medications to alleviate pain or treat teething-related symptoms rationally. To the best of our knowledge, no studies have been conducted in Dubai or entire UAE to investigate the parents' perceptions regarding teething and its associated signs and symptoms.

### **3. AIM**

This study aimed to assess the parents' perception, knowledge, and beliefs regarding the teething process and investigate parental practices to alleviate symptoms associated with teething in Dubai, UAE.

#### **3.1 Specific Objectives**

1. To assess parents' knowledge about the teething process
2. To assess parents' beliefs about teething-associated signs and symptoms
3. To investigate parental practices in managing teething problems
4. To evaluate the correlation between parental demographical data and their knowledge, beliefs, and practices regarding teething

## 4. MATERIALS AND METHODS

### 4.1 Study Design

This study design was a cross-sectional observational design. It followed the guidelines published by “Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement,” 2007<sup>10</sup>.

### 4.2 Study Population

The study population was a convenience sample. Parents with children younger than three years old who visited the Dubai Dental Hospital (DDH) that met the inclusion criteria were recruited upon signing the consent form. If both parents were present during their visit, the questionnaire was given to both parents separately.

### 4.3 Sample Size Calculation

The formula gives the Cochran sample size calculation:

$$n = z_{\alpha/2}^2 \frac{p(1-p)}{d^2}$$

Where  $p$  is the proportion of parental belief,  $d$  is the precision of the estimate, and  $z_{\alpha/2}$  is the quantile of the 95% confidence interval. Considering a relative precision of 20% for 'p.' Assuming a maximum permissible limit of 20% for  $p$ , and an estimated parental belief proportion from Gauri *et al.*, article 33.2%, then the calculated precision will be  $(20/100) * 33.2 = 0.20 * 33.2 = 6.64$  <sup>4</sup>.

This means that we will be able to detect a 'p' (proportion) of 26% or more than half of the value of relative precision on either side of 'p' → +/- 7%: 26% to 40%. If we wanted to estimate the proportion  $p$  of parental belief within five percentage points with 95% probability, then the formula gives the value for  $n$  as  $1.96 * 1.96 * 0.332 * (1 - 0.332) / (0.07 * 0.07) = 17$ .

Using 20% as a non-response rate, the sample size calculation needed was expected to be 208. Finally, it was determined that any sample between (173 to 208) can give a good precision (power at least 80%) to estimate parental belief.

#### **4.4 Sampling Technique**

All eligible parents who visited the Dubai Dental Hospital between the period of 1<sup>st</sup> October 2019 - 30<sup>th</sup> March 2020, and fluent in either Arabic or English language were invited to the study.

#### **4.5 Inclusion and Exclusion Criteria**

##### **4.5.1 Inclusion Criteria**

- a. Parents of children older than six months and younger than three years (teething period)
- b. Parents who consented to participate in this study.

#### **4.5.2 Exclusion Criteria**

- a. Any parent that worked in the dental or medical field
- b. Parents of medically compromised and special needs children

#### **4.6 Data Collection and Questionnaire**

The questionnaire and the consent form link in Microsoft Forms® were provided as a QR Code with the parents. The questionnaire was checked for completeness and that all the questions were answered.

Our information sheet and informed consent clearly stated that the collected data was intended to be used for research purposes and possibly published in dental journals and presented at scientific conferences. All the anonymous collected data can be shared upon request to the primary investigator upon completing the study. The data is to be stored for five years after the final publication to be shared upon request.

This questionnaire was adapted with minor modifications from the questionnaire used in the study: “Parental beliefs about children’s teething in Udaipur, India: a preliminary study” survey by Kakatkar *et al.* (2012) <sup>4</sup>, a written permission was obtained for using the questionnaire in our study (*Appendix 2*). The Internal consistency of the questionnaire was evaluated by Cronbach’s Alpha and found to be greater than 70%.

The questionnaire consisted of three sections,

4.6.1 Section I: Comprised of five questions about parents’ and their children’s demographic characteristics, which included: Parents` age, gender, and education, the number of children, and age of the youngest child.

4.6.2 Section II: Contained four questions that determined parents' general knowledge about children’s teething and fourteen questions that assessed their beliefs about teething-

associated signs and symptoms.

4.6.2 4.6.3 Section III: Contained two questions that investigated parents' practices in managing teething-associated problems.

Responses to sections II and III were structured using the Likert Scale “agree,” “disagree,” and “don't know” options. Participant's ages were classified as 20-29, 30-39, or  $\geq 40$  years. The number of children was classified as one, two to four, or more than four. The youngest child's age was classified as 6-11 months, one to two years, and two to three years. An information fact page link about evidence-based teething sign and symptoms, ways to soothe a teething baby, and FDA statement on the numbing gels or teething tablets safety was provided to parents that was adapted from American Dental Association (ADA) webpage after completing the survey <sup>113</sup>.

#### **4.7 Pilot Survey**

A self-administered structured questionnaire adapted from Kakatkar *et al.*<sup>4</sup> study developed in English was translated into Arabic and back translated to assure accuracy and aid comprehension by the study population. This questionnaire's feasibility and clarity were then tested with a group of 25 parents attending the Dubai Dental Hospital. Feedback from these survey results was considered to reframe and improve the clarity of the questionnaire.

## 4.8 Study Timeline

**Table 1: Estimated Study Timeline**

<b>Date</b>	<b>Details</b>
January, 2019	The study's topic was selected
April, 2019	A research proposal was written and submitted
July, 2019	Ethical Approval was obtained by MBRU-IRB
September, 2019	Piloting
October, 2019 – March, 2020	Data collection
July, 2020	Data analysis
October, 2020 – December, 2020	Discussion and conclusion

## 4.9 Ethical Considerations

This study was conducted in full conformance with principles of the “Declaration of Helsinki,” Good Clinical Practice (GCP), and within the laws and regulations of the UAE/Dubai Healthcare City (DHCC). An Informed Consent form was given to the parents to participate in this survey (See Appendix I). Ethical approval was obtained from the Mohammed Bin Rashid University- Institutional Review Board (MBRU-IRB-2019-019) at Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU).

## 4.10 Statistical Analysis

The questionnaire's collected data will be transferred to computer spreadsheets to be analysed using the computerized Statistical Package for Social Sciences (SPSS) for Windows. Descriptive statistics were used to summarize the sample. The chi-square test analysed relationships between

dependent (knowledge, beliefs, and practices) and independent variables (demographic characteristics). Percentage, tendency, and dispersion were performed as descriptive statistics for categorical and continuous data, respectively. The score of knowledge, belief of signs and symptoms, and management score were calculated by coding “1” for each correct item and 0 for the incorrect answers. Kolmogorov-Smirnov test was used to measure the normality of the scores. Kruskal-Wallis test was used to compare the score between age group and education level. Mann-Whitney test was used to compare the scores between genders. A *p*-value of less than 0.05 was considered significant in all statistical analyses.

## 5. RESULTS

In this study, out of a total of 400 surveys distributed, a total of 323-questionnaire surveys were completed giving a response rate of (80.75%).

### 5.1 Characteristics of the Participants

The demographic data analysis (**Table 2**) illustrates that most of the participants were females (mothers) (86.4%) with an age range between 30–39-year-old (39.6%), almost half of the study population had 2-4 children in the family (44%). The demographics showed that (65.9%) of the parents had either a bachelor's or master's degree. The child's age was less than 1 year (23.5%) of the study participants.

<b>Items</b>	<b>n (%)</b>
<b><i>Age of the parents</i></b>	
20-29	96 (29.7)
30-39	128 (39.6)
≥ 40	99 (30.7)
<b><i>Parent's Gender</i></b>	
Male	44 (13.6)
Female	279 (86.4)
<b><i>Highest Education Level</i></b>	
Postgraduate\Bachelors	213 (65.9)
Intermediate\post-school diploma	64 (19.8)
High school certificate	38 (11.8)
No high school Certificate	8 (2.5)
<b><i>Number of Children</i></b>	
1	72 (22.3)
2 – 4	142 (44)
> 4	109 (33.7)
<b><i>Age of the Youngest Child</i></b>	
6-11 months	76 (23.5)
1-2 years	68(21.1)
2-3 years	179 (55.4)

**Table 2: Demographic characteristics of the sample of the study**

## **5.2 Parental Knowledge About Teething**

Of all the interviewed parents, 239 (74 %) believed that the first baby's tooth emerged around 6-7 months of age, and the lower central incisors were accepted to be the first teeth to appear in the mouth by 259 (80.2 %) of the parents. Moreover, 191 (59.1%) of the participants agreed that tooth eruption is completed within two years, and 135 (41.8%) considered that delayed tooth eruption could be a sign of systemic disease, these findings are demonstrated in (**Table 3**).

Overall, 64.5% of parents answered all the questions correctly when asked about their teething process knowledge. The mean score of knowledge among the parents participating in this study was 2.55 ( $\pm 1.04$ ) out of a total of four.

**Table 3: Distribution of items of knowledge**

<b>Items</b>	<b>Options</b>	<b>n (%)</b>
<b>Teeth start to appear in mouth around 6-7 months of age</b>	Do not know	22 (6.8)
	Disagree	62 (19.2)
	Agree	239 (74)
<b>The first teeth that appear are lower central incisors (front teeth)</b>	Do not know	23 (7.1)
	Disagree	41 (12.7)
	Agree	259 (80.2)
<b>The completion of the appearance of all baby teeth occurs around the age of 2 to 3 years old</b>	Don't know	55 (17)
	Disagree	77 (23.8)
	Agree	191 (59.1)
<b>Delay appearance of teeth indicates a possible underlying problem</b>	Do not know	65 (20.1)
	Disagree	123 (38.1)
	Agree	135 (41.8))

### **5.3 Signs and Symptoms Believed to be Triggered by Teething**

Increased drooling was viewed by 282 (87.3 %) as a sign of teething. Similarly, the desire to bite was viewed as a sign in 279 (86.4 %), gum irritation was chosen as a sign by 278 (84.4 %). Fever selected by 277(85.8%), and sleep disturbance, chosen by 264 (81.7%) were the most reported signs and symptoms of teething. Among the current study sample, 61.8% had correct beliefs about the signs and symptoms related to teething, with the mean calculated belief score of 6.73 ( $\pm 1.84$ ) out of a maximum of 11, these findings are demonstrated in (Table 4).

**Table 4: Distribution of beliefs about teething-associated signs and symptoms**

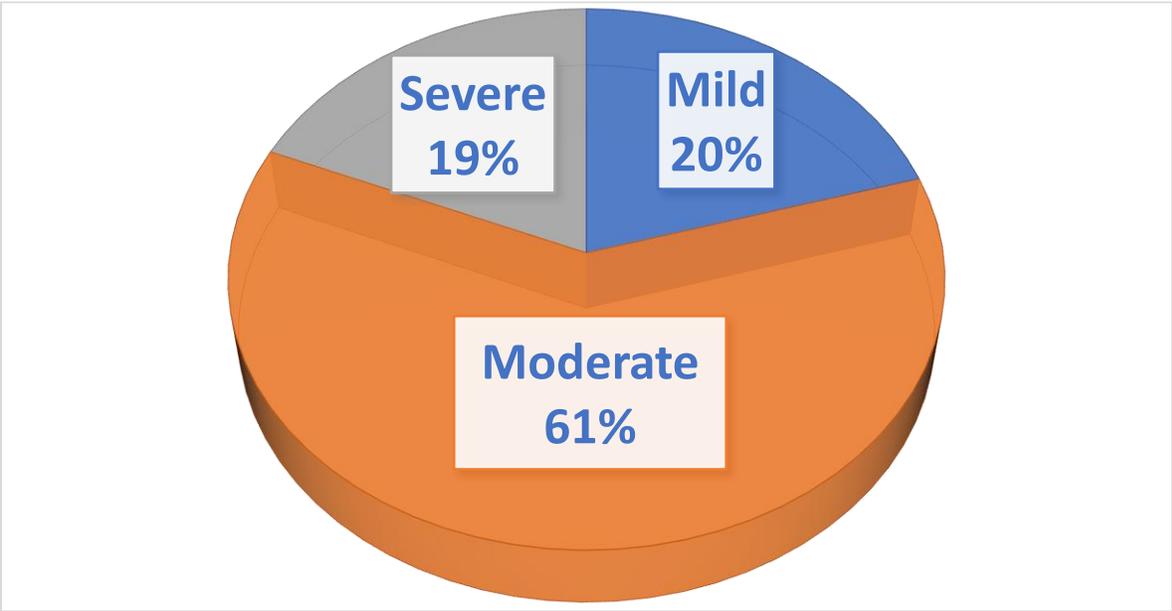
<b>Signs and symptoms of teething</b>	<b>Agree n (%)</b>	<b>Disagree n (%)</b>	<b>Don't know n (%)</b>
<b>Fever</b>	277 (85.8)	37 (11.5)	9 (2.8)
<b>Diarrhoea</b>	240 (74.3)	55 (17)	28 (8.7)
<b>Sleep disturbance-wakefulness*</b>	264 (81.7)	44 (13.6)	15 (4.6)
<b>Loss of appetite*</b>	257 (79.6)	41 (12.7)	25 (7.7)
<b>Gum irritation*</b>	278 (86.4)	21 (6.5)	24 (7.4)
<b>Desire to bite*</b>	279 (86.4)	25 (7.7)	19 (5.9)
<b>Increased drooling*</b>	282 (87.3)	19 (5.9)	22 (6.8)
<b>Runny nose</b>	98 (30.3)	169 (52.3)	56 (17.3)
<b>Skin rash</b>	32 (9.9)	226 (70)	65 (20.1)
<b>Vomiting</b>	49 (15.2)	214 (66.3)	60 (18.6)
<b>Ear problems</b>	164 (50.8)	114 (35.3)	45 (13.9)

\* Evidence-bases common associated signs and symptoms with teething.

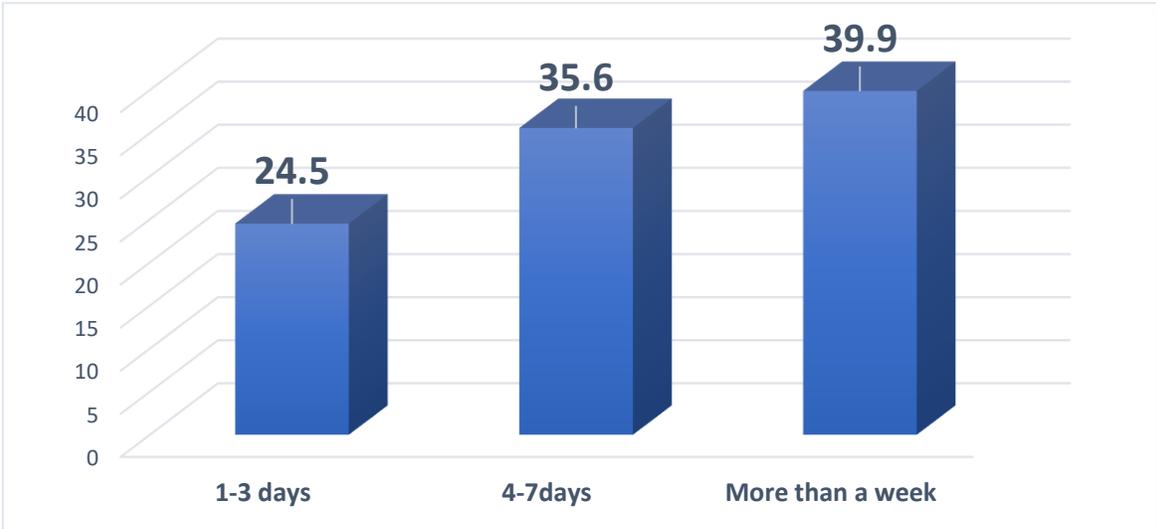
#### **5.4 The Occurrence and Duration of Distress During the Teething Process**

The majority of the participants, 194 (61%), reported that their child was moderately distressed. In comparison, 66 (20%) of the participants reported their children had mild distress, and only 60 (19%) of the participants reported their children having severe distress during the teething process, these findings are demonstrated in **(Figure 1)**. Additionally, 129 (39.9%) of the participants reported that their child distress lasted for more than a week, while 115 (35.6%) reported the distress lasting for 4-7 days, and only 79 (24.5%) of the participants reported the children having

distress for 2-3 days, these findings are demonstrated in (Figure 2).



**Figure 1: Distribution of the severity of teething distress**



**Figure 2: Duration of the teething process distress**

## 5.5 Useful Practices in Resolving the Teething-associated Symptoms

Almost 109 (34%) of the participating parents agreed with the use of bottle feeding or nursing at night as a soothing aid for the teething symptoms. In comparison, 92 (28.5%) of the parents reported using systemic analgesics, and 63 (20%) rubbed the gums with topical analgesics.

Additionally, 55 (17%) and 31 (10%) of parents allowed their child to bite on chilled objects and gave fluids to prevent dehydration, respectively. A total of (68.2%) of the participants were found to practice the correct management for teething symptoms, with a mean management score of 3.41 ( $\pm 1.1$ ) out of a maximum score of 5. These results are demonstrated in (Table 5).

**Table 5: Distribution of management teething problem**

Items	Options	n (%)
<b>Allow the child to bite on a chilled object. *</b>	Agree	55 (17)
	Disagree	10 (3.1)
	Do not know	258 (79.9)
<b>Allow bottle feeding or nursing at night</b>	Agree	109 (33.7)
	Disagree	22 (6.8)
	Do not Know	192 (59.5)
<b>Use systemic analgesics (pain killers) *</b>	Agree	92 (28.5)
	Disagree	15 (4.6)
	Do not know	216 (66.9)
<b>Apply topical analgesics (pain killers) to the gums</b>	Agree	63 (19.5)
	Disagree	8 (2.5)
	Do not know	252 (78)
<b>Give the child fluids to prevent dehydration*</b>	Agree	31 (9.6)
	Disagree	27 (8.4)
	Do not know	265 (82)

\* Associated evidence-based practices in teething management

### 5.5.1 The Correlation Between the Source of Advice Received on the Management of Teething Symptoms

Our study found that 187(57.90%) and 119(36.80%) parents received their advice regarding managing teething symptoms from relatives and paediatricians, respectively. Moreover, 32 (9.9%), 29 (9.0%), 21 (6.5 %), and 14 (4.3%) of the parents received this information from the dentist, internet and social media, pharmacist, and nurse independently. The results revealed that pharmacist and internet and social media, had a significant negative effect on parents' practices on the management of teething symptoms with a (P-value= 0.012) and (P <0.01), respectively according to their mean level of practices shown in (**Table 6**). Parents showed a poorer management when their perceived their advice from these two resources.

**Table 6: The correlation between the source of advice received on the management of teething symptoms**

Source of Advice	Response	n (%)	Mean (SD)	P-value
Internet and Social media	Yes	29 (9.0)	2.6 ( $\pm$ 1.08)	<0.01
	No	294 (91)	3.48 ( $\pm$ 1.07)	
Nurse	Yes	14 (4.3)	3.07 ( $\pm$ 0.916)	0.145
	No	309 (95.7)	3.42 ( $\pm$ 1.10)	
Pharmacist	Yes	21 (6.5)	2.85 ( $\pm$ 1.01)	0.012
	No	302 (93.5)	3.44 ( $\pm$ 1.100)	
Relative	Yes	187 (57.9)	3.45 ( $\pm$ 1.02)	0.558
	No	136 (42.1)	3.33 ( $\pm$ 1.199)	
Paediatrician	Yes	119 (36.8)	3.48 ( $\pm$ 1.11)	0.241
	No	204 (63.2)	3.35 ( $\pm$ 1.09)	
Dentist	Yes	32 (9.9)	3.12 ( $\pm$ 1.33)	0.270
	No	290 (89.8)	3.44 ( $\pm$ 1.07)	

## 5.6 The Correlation Between Parental Demographical Data and Their Knowledge, Beliefs, and Practices Regarding Teething

The scores of knowledge, belief, and practice regarding teething were significantly associated with the participants' age as shown in **Table 7**. Higher level of education was associated with a high degree of accurate beliefs (P-value= 0.002). Older age ( $\geq 40$ ) parents and parents with low educational degrees demonstrated a greater understanding of the methods that are considered useful for teething management with (P-value < 0.001) and (P-value= 0.045) respectively. In contrast, gender had no significant effect on management practice as the numbers are not equally distributed.

**Table 7: The evaluation of the correlation between parental demographical data and their knowledge**

<b>Items</b>	<b>Knowledge (out of 4)</b>	<b>Belief (out of 11)</b>	<b>Practice (out of 5)</b>
<b>Age</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>
20 – 29	2.32 ( $\pm 1.11$ )	6.55 ( $\pm 2.1$ )	2.86 ( $\pm 1.82$ )
30 – 39	2.70 ( $\pm 0.95$ ) *	7.09 ( $\pm 1.81$ ) *	3.62 ( $\pm 1.06$ )
$\geq 40$	2.56 ( $\pm 1.05$ )	6.45 ( $\pm 1.51$ )	3.66 ( $\pm 1.01$ ) *
<i>P-value</i>	<b>0.045</b>	<b>0.007</b>	<b>&lt; 0.001</b>
<b>Gender</b>			
Male	2.66 ( $\pm 1.08$ )	7 ( $\pm 1.87$ )	3.45 ( $\pm 1.04$ )
Female	2.553 ( $\pm 1.031$ )	6.69 ( $\pm 1.83$ )	3.34 ( $\pm 1.11$ )
<i>P-value</i>	<b>0.427</b>	<b>0.254</b>	<b>0.959</b>
<b>Education</b>			
Postgraduate/BSc.	2.61 ( $\pm 1.05$ ) *	6.92 ( $\pm 1.88$ ) *	3.32 ( $\pm 1.12$ )
Intermediate/Diploma	2.42 ( $\pm 0.95$ )	6.63 ( $\pm 1.65$ )	3.67 ( $\pm 1.0$ )
High school certificate	2.53 ( $\pm 1.06$ )	6.32 ( $\pm 1.54$ )	3.37 ( $\pm 0.99$ )
No high school certificate	2.25 ( $\pm 1.28$ )	4.5 ( $\pm 1.85$ )	3.75 ( $\pm 1.58$ ) *
<i>P-value</i>	<b>0.516</b>	<b>0.002</b>	<b>0.045</b>

## 6. DISCUSSION

This study is, to the best of the authors' knowledge the first of its kind in Dubai and entire UAE to assess parental perception of teething in children. During infancy and childhood, several changes occur in the infant's oral environment, with the teething process being one of the earlier ones<sup>4</sup>. Parents play a paramount role in managing children's health issues and behavior to teething between four months and three years<sup>4</sup>. Observational studies that investigate parents' perception and knowledge in managing children's health problems could contribute to a better understanding of children's potential behaviour, and subsequently, could contribute to better advice to parents and treatment application in pediatric dentistry. In the current study, the parents' knowledge, beliefs, and practices regarding children's teething were assessed.

### 6.1 Participants

Demographical data showed that most of the participants are in the middle age group (30-39 years). The higher percentage of females among those interviewed reflects that the vast majority of the pediatric patients who attended the Dubai Dental Hospital (DDH) came along with their mothers; which in turn proves that mothers are the children's primary caregivers in most cases<sup>8</sup>. In addition, this study found that parents in the middle age group (30-39 years) had better knowledge. This could probably be justified by the higher number of children they had, as most of them had 2-4 children. In comparison, the younger parents have the lowest knowledge of the teething process. Therefore, age might play a vital role as it was found to be significantly associated with parental knowledge in the current study. These results are consistent with those of a study conducted by Kakatkar *et al.* found that parents in the middle age group (25-30 years) and higher number of children in the family demonstrated a better level of knowledge (p-value <0.05)<sup>4</sup>. Another study

conducted by Ahmed *et al.* in Sudan 2020 found that mothers' knowledge was assisted with the number of children in the family, level of education, and residence <sup>110</sup>. In comparison, the study conducted in Ethiopia found that knowledge is associated with age and residence <sup>114</sup>. Also, Owais *et al.* study found that knowledge was associated with the mother's age <sup>77,4</sup>.

In addition, the demographic data of the participants showed that most of the study population attained university-level of education, similarly with other studies<sup>77</sup>. Parents with higher education and middle age group had a higher degree of the accurate belief about teething with a p-value of 0.002 and 0.007, respectively. In contrast, those parents with no high school certificate had the lowest score of belief about teething. However, this finding was not statistically significant. More than half of the participants (59%) in the current study agreed that teeth completion occurs around the age of 2 to 3 years, a lower percentage than what was reported by Kakatkar *et al.* and Elbur *et al.* studies in which the percentage was found to be 76% and 69%, respectively <sup>4,8</sup>. In comparison, 42% considered that delayed eruption may be related to other health problems, which is almost the same as Kakatkar *et al.* study <sup>4</sup>.

Overall, 64.5% of the parents participating in our study answered all the questions related to the teething process's knowledge correctly. These results were higher compared to a study done by Elbur *et al.* in Taif Saudi Arabia <sup>8</sup>. In this study, only 18.5 % of all the participants responded correctly to all questions designed to assess their teething knowledge. In contrast, 71.4% of parents answered all questions correctly in India's study <sup>4</sup>.

## **6.2 Sign and Symptoms**

It was reported by Macknin *et al.* (2000) that symptoms of teething were only significantly more common in the 4 days before the emergence of the tooth, on the day of the emergence, and 3 days

after it, so this 8 day window was established as the teething period<sup>52</sup>. A study conducted by Wake *et al.* (1999) reported that 90% of parents believed that teething symptoms appear between 3 to 11 months and disappear between 1 year to 3 years<sup>5</sup>. Furthermore, the study suggested that the duration of symptoms ranged from less than 1 day to 3 months depending on the tooth type (molars were the most tooth to cause symptoms while canines were the least ones)<sup>5</sup>.

The parents in the current study reported that 61% of their children had moderate symptoms. Additionally, parents reported that in 40% of the children, the symptoms lasted for two days. In agreement with many other studies, the present study showed that local symptoms such as increased salivation, desire to bite, and gum irritation were the most frequent teething symptoms<sup>112, 115</sup>.

During primary tooth eruption, fever is caused by the human teething virus responsible for the primary infection in the child's life<sup>70, 115, 117</sup>. Fever was reported by 86% of our study's respondents as a teething symptom, similar to the research done by Elbur *et al.* study, Saudi Arabia (2015)<sup>8</sup>. Comparatively, the percentage of parents reporting fever as a symptom in our study was higher than the what was reported in other studies,<sup>4, 5</sup>. In contrast, Uti *et al.* recorded a higher percentage of fever (90%) than the percentage documented in the current study<sup>53</sup>.

Diarrhoea is not a common symptom associated directly with teething. However, inadequate personal and environmental hygiene practice and placement of contaminated objects in the child's mouth may play an essential part in rising the incidence of diarrhoea in this age group. In the current study, 75.3% of the parents in our study attributed diarrhoea to teething, which is similar to a previous study by Owais *et al.* (2010)<sup>77</sup>. In contrast, this percentage was much higher than what was reported by Wake *et al.* study<sup>5</sup>. However, studies in India and Saudi Arabia reported a higher prevalence of diarrhoea as a symptom than our study, 87.5 % and 83%, respectively<sup>4</sup>.

Moreover, Barlow *et al.*<sup>116</sup> reported that parents assumed that diarrhoeas related to teething, with a percentage of 47.6%.

Although there are side effects of teething, the actual relationship between teething and systemic issues remains unclear<sup>118-121</sup>. A child with a substantially high temperature ( $> 39^{\circ}\text{C}$ ) should be referred for a further medical investigations as this is not attributed to teething<sup>5, 52</sup>. Moreover, fever, irritability, and loss of appetite can be caused by (HHV-6) herpetic primary infection (primary herpetic gingivostomatitis) that is prevalent in children at the teething age<sup>84</sup>.

Sleep disturbance is another commonly reported issue associated with teething; the majority of the parents (82%) participating in our study believed that sleep disturbance is caused by the teething process. Owais *et al.*, Carpenter, and Cunha *et al.* all reported similar findings, but less than Barlow *et al.* study (86.7%) and more than both Wake *et al.* (78%) and Kakatkar *et al.* study (48.2%)<sup>4, 5</sup>.

Other symptoms that were wrongly related to teething were ear problems reported by 50.8% of our study's participants, runny nose reported by (30.3%) and vomiting reported by 15.2%. A meta-analysis conducted by Massignan *et al.* found that the most frequent localized sign of teething sign was inflammation of the gum or gingival redness, mostly in the posterior teeth where the most frequent general symptoms during the eruption of the primary tooth are, irritability and drooling were the most observed followed by decreased appetite, sleeping problems, rhinorrhoea, fever, diarrhoea, rash, and vomiting<sup>122</sup>.

### **6.3 Management**

It is observed from the literature review, and parents report that pain is a common teething symptom. Dental follicles which represent a rich source of cytokines and growth factors, which are responsible for localized inflammatory response and discomfort, while tooth protrusion

through the bone does not cause this pain <sup>4</sup>, hence pain as a symptoms of teething could be attributed to the dental follicle rather than movement of the tooth itself in the eruption path.

Despite the uncertainty about teething pain per se, most parents preferred to use a combination of non-pharmacological and pharmacological management, including both topical and systemic agents <sup>79</sup>. Wake *et al.* reported that (76%) of parents used some form of medication, most commonly paracetamol (60%) <sup>5</sup>. However, in the current study, (28.5%) of parents used systemic analgesics. In two other studies, nearly (47.2%) and (61%) of the participants agreed to the use of systemic analgesics to relieve teething pain, respectively <sup>35, 112</sup>.

In the current study, (20%) of the participant parents rubbed the gum with a topical analgesic. Nevertheless, other studies reported different percentages ranging from 45.6 - 69.6% <sup>77</sup>.

In our study, only (17%) of parents agreed that allowing the child to bite on a chilled object will alleviate pain associated with teething. This is compared to a much higher percentage of parents (88% ) in Taif, Saudi Arabia <sup>8</sup>. Additionally, other authors found that (91.4%) of parents agreed on allowing a child to bite a chilled item to alleviate teething pain <sup>111</sup>.

Using cold objects induces localized vasoconstriction that decreases the child's inflammation. It will enable children to bite on them and help relieve pain and discomfort by applying pressure on the gum <sup>46</sup>. In contrast, pharmacological treatment may be limited to certain situations with careful monitoring <sup>94</sup>.

As for the provision of fluids to prevent dehydration during teething, only 10% of the participants in our study responded positively to that, which was dramatically lower than the percentages reported in other studies namely: Elbur *et al.* (87.6%), Hadadi *et al.* (80%), Kakatkar *et al.* (70%), and Owais *et al.* (61%) <sup>4,8,77,112</sup>.

Around (34.4%) of our study's parents allowed bottle feeding or nursing at night, which was slightly less than other previous studies <sup>8</sup>. On the other hand, other authors reported that only (11.3%) of parents allowed bottle feeding at night. Using the bottle at night is associated with early childhood caries that can lead to many consequences that affect the child and their parents, such as high treatment cost, hospitalization, loss of school days, and diminished ability to learn <sup>122,123</sup>.

A total of 68.2% of participants in the current study demonstrated a correct practice for teething management. Additionally, this study showed that older age participants demonstrated a better practice in teething management. They might have been more exposed to life and have more experience and have got the opportunity to raise more children. Also, participants with a lower degree of education demonstrated a greater understanding of the methods that are considered useful for teeth management. This could be explained by the fact that maybe parents with higher educational degrees seek knowledge independently and might use inaccurate resources available on the internet, while parents with low education would seek the advice of professionals (P-value was  $< 0.001$  and  $P < 0.045$ , respectively).

Infant teething proves to be one of the most common concerns to both the parents and healthcare professionals. For parents, particularly new parents who have limited experience with signs of teething and how to ease their child's pain, teething may be a challenging and irritating time for them.

In the current study, results showed that most of the parents received their advice regarding the management of teething symptoms from a relative (57.9%) or a pediatrician (36.8%). Whereas Wake *et al.* reported that most of the parents (62%) received their advice from nurses, and (54%) of the parents got their direction from friends and mothers <sup>5</sup>.

Additionally, less than 10% of the parents received their information from dentists, the internet, social media, pharmacist, and nurses independently in the current study. Additionally, pharmacist advice and the internet and social media had a significant adverse effect on the parents' management of teething symptoms with P-values of 0.012 and <0.01, respectively, when the source of advice was correlated to their practices in teething management, and those who received their information from these two sources had a significantly lower score of practice.

Increasingly, parents search on the internet to find information on questions of infant health problems and specific treatment <sup>124</sup>. Social media is recognized as a useful health education resource, but inaccurate information may not achieve the expected results <sup>125</sup>.

A survey in Qassim Province in Saudi Arabia in 2018 found that 64% of participants used the internet and social media to search for information related to oral health due to the availability and ease of using social media <sup>125</sup>. Also, nearly similar results were reported in Scotland, as 68.4% of participants used the internet, while in the USA, it was found to be around 80% in 2011<sup>126</sup>.

Sim and colleagues (2007) have shown that 94% of parents found that information received from the internet was useful <sup>127</sup>. However, many studies illustrated that online health information could be imperfect and unreliable with variable quality (Buhi *et al.* 2010) <sup>128</sup>. More than 80% of parents search the internet considered that the data they had found is useful and has improved their understanding of the health-related issue <sup>128</sup>.

Despite a lack of evidence about the efficacy of these drugs for the management of teething, OTC medicines are widely recommended for a baby on websites. And the majority of them recommend using acetaminophen, ibuprofen, and/or teething gels for pain relief <sup>124</sup>. Also, Trajanovska *et al.*

(2010) have found that parents rarely inquire for advice from a health care provider for the use of OTC drugs to relieve the effects of child teething <sup>129</sup>.

Most of the websites have detailed knowledge on teething. As defined by the AAP , the use of gum massage and chewing on a cold item was suggested through most websites <sup>124</sup>.

Even though the websites may not substitute the need for the advice of a healthcare professional, high-quality, accurate information can complement the education and guidance on children's development and behaviour during a clinical visit. Eleven out of 16 websites urged parents to contact their primary care provider if they were unsure of the exact way to manage teething symptoms <sup>124</sup>.

Further research on the possible use and implications of social media applications in dental awareness is required. However, social media is growing increasingly, and there could be ample opportunities for dental-related awareness programs <sup>130</sup>.

Since many parents are not sure of which of the OTC drugs are the best and most effective to alleviate children's pain, community pharmacists are sometimes asked to make recommendations. There is a range of benzocaine-containing OTC topical anaesthetic products on the market for infant teething treatment. A limited understanding of their possible threats to the infant population has resulted in improper use and has resulted in several methemoglobinemia cases <sup>131</sup>.

Initially, in 2002, the Institute for Safe Medication Practices (ISMP) did not recommend using high-dose topical benzocaine due to the risk of methemoglobinemia on its use. In 2009, the American Association of Poison Control Centres reported approximately 100 cases of methemoglobinemia. In March 2011 and May 2018, the Food and Drug Agency (FDA) Adverse Event Reporting System found 21 cases associated with the use of OTC benzocaine gel or liquid

products, with the majority of cases affecting a child of less than two years of age. As a result, the FDA issued a Drug Safety Communication in April 2011, recommending against the use of all benzocaine-containing infant products except for the use or advice by a dental professional<sup>95-98, 131, 132</sup>.

## 7. CONCLUSIONS

In this UAE sample of parents attending Dubai Dental Hospital, it can be concluded that:

- 1) There is a wide gap in knowledge, beliefs, and misconceptions of parents about the ascribed signs and symptoms and practices used to manage infant teething problems.
- 2) Middle age and more educated parents (especially females) had more accurate teething knowledge and beliefs; however, older parents with lower education knew the best management practice when it came to teething. This could have implications with respect to the management of childhood illness.
- 3) It was found that most parents received their advice regarding teething's symptoms management from their relatives and pediatricians. However, pharmacists and the internet/social media had a significant adverse effect on their management practices.

### 7.1 Recommendations

- It is time to review our long-held cultural myths and beliefs about teething, acknowledge that there is good evidence that tooth eruption is not strongly associated with significant symptoms, and start to manage the issues beginning in early infancy through toddlerhood more effectively.
- Considering the results obtained, it is recommended that greater emphasis should be placed on providing more instructive and scientific evidence-based guidelines by the healthcare team,

especially the pediatricians who see the infants at an early age and can provide anticipatory guidance to the parents during the teething process.

- In addition, educational programs are urgently required to enhance parents' education, knowledge, and practice regarding the infant teething process. Parents should be supported with guidance about how and from whom to get the correct and evidence-based information on treating the teething symptoms.

## **7.2 Limitations**

- Like any other epidemiological study, this observational research has recall bias that is a systematic error caused by differences in the accuracy or completeness of the recollections retrieved ("recalled") by study participants regarding their experience with their child's teething process from the past. However, strategies were implemented to reduce the recall bias, including careful selection of the research questions and participants with children within the teething age (below three).
- In this study, we did not explore the medications parents have used to manage their child's teething symptoms, neither topical nor systemic.
- In this study, we had an unequal female (mother) to male (father) ratio; thus, we could not evaluate and compare the level of knowledge and practices between parents of the same child.

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## 9. APPENDICES

### Appendix I: Arabic and English Consent Form

#### Consent Form

**Title of the study:** Parents' Perception Towards Infants' Teething in Dubai, UAE.

**Principal Investigator:** **Dr Sarah Almatrouk** Department of Pediatric Dentistry, Hamdan Bin Mohammed College of Dental Medicine, Building 34, Dubai Healthcare City, Dubai, UAE. Telephone: 0521265521.

Please take your time to review this information form, and feel free to consult with or discuss this study with your dentist, colleagues, family, friends, and/or physician before deciding whether or not to participate. If you have any questions regarding the study or any related issues, we encourage you to ask the principal investigator, as listed above. This consent form may contain words that you do not understand. Please ask the research staff to explain any words or information you do not clearly understand.

#### **Purpose of the study**

This study is being conducted by the Hamdan Bin Mohammed College of Dental Medicine, Department of Pediatric Dentistry; to evaluate parents' beliefs and attitude towards teething in Dubai, UAE.

#### **Study procedures**

You will be asked to fill out a survey to assess your beliefs and management towards teething. The answers will be kept anonymous as each form is identified with a number instead of your name.

No treatment will be provided to, or denied from, your child as a result of your participation in this study. You may stop participating in this study at any time. However, if you decide to stop participating, we encourage you to talk to the research staff first.

### **Risks and discomforts**

There are no recognized risks or discomforts that may be caused to your child by participation in the study.

### **Benefits**

There may or may not be a direct benefit to your child from participating in this study. We hope the information we collect will help us and parents to better understand the sign and symptoms associated with “Teething” and how manage it in children. Your answer to the questionnaire may be helpful to increase the awareness and knowledge about the Teething process.

### **Cost/Payment**

There is no cost to you for participating in the study and you will receive no payment or reimbursement for any expenses related to taking part in this study.

Alternatives, you should feel no obligation to participate in the study.

### **Confidentiality**

All information obtained from this study is confidential and will remain so. Information gathered in this study may be published or presented in public forums; however, your name and other identifying information will not be used or revealed. In any published data, your identity (and your child’s) will be protected and treated as confidential according to the Personal Health Information Act of UAE. To protect your identity, every participant will be given a Study Number instead of their name in all documents related to the study. All information obtained from this study will be used strictly for research purposes only. If the study information is used in any subsequent investigation, your consent will be taken.

Hamdan Bin Mohammed College of Dental Medicine Research Ethics Committee may review study records for purposes of quality assurance only. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law.

All records relating to this study will be kept in a secure, locked area and only those persons identified will have access to these records. If any of your child's medical/research records need to be copied to any of the above, his/her name and all identifying information will be removed. No information revealing any personal information such as your/your child's name, address or telephone number will leave the HBMCDM.

### **Voluntary participation / Withdrawal from the study**

Your decision to allow your child to participate in the study is voluntary. You may refuse to give consent for child to participate in the study or withdraw from it at any point in time. If the research staff feels that it is in your child best interest to withdraw her/him from the study, they will remove you without your consent.

We will tell you about any new information that may affect your child health, welfare, or willingness to stay in this study.

### **Questions**

Please feel free to ask questions regarding the study or anything related to it that requires further clarification.

## Statement of Consent

I have read this consent form. I have had the opportunity to discuss this study with Dr. Sarah Almatrouk and/or her research staff. I have had my questions answered in a language I understand. All risks, benefits, costs, and alternatives regarding this study have been thoroughly explained to me. I believe that I have not been unduly influenced by any research team member to participate in the study by any statements or implied statements. Any relationship I or my child may have with the research team has not affected my decision to participate. I understand I will be given a copy of this consent form after signing it.

I understand my and my child's participation in the study is voluntary and I may choose to withdraw my child from it at any point in time. I freely agree to participate in this research. I understand that any information regarding my child's identity will be kept confidential, but that confidentiality cannot be guaranteed. I authorize the inspection of any of my records related to this study by the Hamdan Bin Mohammed College of Dental Medicine Research Ethics Board for quality assurance purposes. By signing this consent form, I have not waived any of the legal rights that I or my child have as a participant in a research study.

I, the undersigned, attest that the information in the participant Information and Consent Form was accurately explained to, and apparently understood by, the participant or the participant's legally acceptable representative and that the consent to participate in this study was freely given by the participant or the participant's legally acceptable representative.

Parent/legal guardian's signature: \_\_\_\_\_

Date: \_\_\_\_\_ (day/month/year)

Parent/legal guardian's printed name: \_\_\_\_\_

# نموذج الموافقة

عنوان الدراسة: قياس ادراك أولياء الأمور تجاه تسنين أطفالهم.

الباحث الرئيسي: الدكتورة ساره المتروك قسم طب أسنان الأطفال، كلية حمدان بن محمد لطب الأسنان، مبنى 34، مدينة دبي الطبية، دبي، الإمارات العربية المتحدة، هاتف: 0521265521.

يرجوا مراجعة نموذج المعلومات وعدم التردد في التشاور مع طبيب أسنانك وزملائك وعائلتك وأصدقائك و / أو طبيبك أو مناقشة هذه الدراسة معهم قبل اتخاذ قرار بشأن المشاركة أم لا. إذا كان لديك أي أسئلة بخصوص الدراسة أو أي مسائل ذات صلة بها، فإننا نشجعك على سؤال الباحث الرئيسي، كما هو مذكور أعلاه. قد يحتوي نموذج الموافقة هذا على كلمات لا تفهمها. يرجى مطالبة طاقم البحث بتوضيح أي كلمات أو معلومات لا تفهمها بوضوح.

## الغرض من الدراسة

تجري هذه الدراسة من قبل كلية حمدان بن محمد لطب الأسنان، قسم طب أسنان الأطفال لتقييم ادراك أولياء الأمور وموقفهم تجاه التسنين.

## إجراءات الدراسة

سيُطلب منك أيضاً ملء استبيان لتقييم ادراكك تجاه تسنين طفلك. تبقى الإجابات سرية حيث يتم تعريف كل نموذج برقم بدلاً من اسمك.

لن يتم تقديم أو رفض أي علاج لطفلك نتيجة لمشاركتك في هذه الدراسة. يمكنك التوقف عن المشاركة في هذه الدراسة في أي وقت. وعلى أي حال، إذا قررت التوقف عن المشاركة، فإننا نشجعك على التحدث إلى فريق البحث أولاً.

## المخاطر والمتاعب

لا توجد مخاطر أو متاعب معترف بها قد تحدث لطفلك من خلال المشاركة في الدراسة.

## الفوائد

قد لا يكون هناك فائدة مباشرة لطفلك من المشاركة في هذه الدراسة. نأمل أن تساعدنا المعلومات التي نجتمعها نحن وأولياء الأمور في فهم العلامات والأعراض المرتبطة بـ "التسنين" بشكل أفضل وكيفية علاجها عند الأطفال. قد تكون إجابتك على الاستبيان مفيدة لزيادة الوعي العام.

لا يوجد أي تكلفة عليك للمشاركة في الدراسة ولن تتلقى أي مدفوعات أو تعويض عن أي نفقات تتعلق بالمشاركة في هذه الدراسة. البدائل، يجب ألا تشعر بأي التزام بالمشاركة في الدراسة.

## السرية

جميع البيانات الشخصية التي تم الحصول عليها من هذه الدراسة سرية وستظل كذلك. يجوز نشر المعلومات التي تم جمعها في هذه الدراسة في مجلات علمية؛ ومع ذلك، لن يتم استخدام أو الكشف عن اسمك وأي معلومات تعريفه أخرى. في أي بيانات منشورة، سيتم حماية هويتك (وهوية طفلك) ومعاملتها على أنها سرية وفقاً لقانون المعلومات الصحية الشخصية لدولة الإمارات العربية المتحدة. لحماية هويتك، سيتم منح كل مشارك رقم دراسة بدلاً من اسم المشارك في جميع الوثائق المتعلقة بالدراسة. يتم

استخدام جميع المعلومات التي تم الحصول عليها من هذه الدراسة لأغراض البحث فقط. إذا تم استخدام معلومات الدراسة في أي تحقيق لاحق، فسيتم الحصول على موافقتكم.

قد تقوم لجنة الأبحاث الأخلاقية بكلية حمدان بن محمد لطب الأسنان بمراجعة السجلات الدراسية لأغراض ضمان الجودة فقط. على الرغم من الجهود المبذولة للحفاظ على سرية معلوماتك الشخصية ، لا يمكن ضمان السرية المطلقة. قد يتم الكشف عن معلوماتك الشخصية إذا كان ذلك مطلوبًا بموجب القانون.

سيتم الاحتفاظ بجميع السجلات المتعلقة بهذه الدراسة في مكان آمن ومغلق ولن يتمكن من الوصول إلى هذه السجلات إلا الأشخاص الذين تم تحديدهم في بيان الموافقة.

#### **المشاركة الطوعية / الانسحاب من الدراسة**

قراركم بالمشاركة في الدراسة هو قرار طوعي. يمكنك رفض للمشاركة في الدراسة أو الانسحاب منها في أي وقت.

سنخبرك عن أي معلومات جديدة قد تؤثر على صحة طفلك أو فائدته أو استعداده للبقاء في هذه الدراسة.

#### **الأسئلة**

لا تتردد في طرح أي سؤال متعلق بالدراسة أو أي شيء متعلق بها الذي يتطلب مزيداً من التوضيح.

## بيان الموافقة

لقد قرأت نموذج الموافقة هذا ولقد أتيت لي الفرصة لمناقشة هذه الدراسة مع الدكتورة ساره المتروك و / أو طاقم بحثها. لقد تمت الإجابة على أسئلتى بلغة أتفهمها. وقد تم شرح المخاطر والفوائد والتكاليف والبدائل المتعلقة بهذه الدراسة بدقة وأعتقد أنني لم أكن متأثراً بشكل لا لزوم له من قبل أي عضو في فريق البحث للمشاركة في الدراسة بأي بيانات أو بيانات ضمنية. ليس لدي أي علاقة مع فريق البحث قد تؤثر على قراري بالمشاركة. وأدرك أنني سأحصل على نسخة من نموذج الموافقة هذا بعد التوقيع عليه. وأدرك أن مشاركتي في الدراسة طوعية وقد أختاران انسحب من مشاركتي في هذه الدراسة في أي وقت. أوافق بحرية على المشاركة في هذا البحث.

أدرك أن أي معلومات تتعلق بهويتي ستبقى سرية ، ولكن لا يمكن ضمان هذه السرية. أصرح بفحص أي من سجلاتي المتعلقة بهذه الدراسة من قبل مجلس أخلاقيات الأبحاث بكلية حمدان بن محمد لطب الأسنان لأغراض ضمان الجودة.

بالتوقيع على نموذج الموافقة هذا، لا أتنازل عن أي من الحقوق القانونية التي أمتلكها كمشارك في دراسة بحثية.

أنا، الموقع أدناه، أشهد المعلومات الواردة في استمارة معلومات المشترك ونموذج الموافقة قد تم شرحها وفهمها بوضوح من قبل المشارك أو ممثل المشارك المقبول قانونياً وأن الموافقة على المشاركة في هذه الدراسة تم منحها مجاناً من قبل المشارك أو ممثل المشارك المقبول قانونياً.

توقيع ولي الأمر / الوصي القانوني:

التاريخ: ..... (يوم / شهر / سنة)

اسم ولي الأمر / الوصي القانوني: .....

## Appendix 2: Approval to use the Questionnaire

Reply Reply All Forward

Tue 19/02/2019 07:07



Dr. Gauri Kakatkar <gaurikaks@yahoo.co.in>

Re: Permission to use your questionnaire

To: Anas AlSalami

Flag for follow up.

You replied to this message on 23/02/2019 02:59.

Dear Anas,

It's my pleasure, u can use the questionnaire, but it would be good if could modify the questions slightly before using them.

Regards

Dr. Gauri

[Sent from Yahoo Mail on Android](#)

On Mon, 18 Feb 2019 at 17:35, Anas AlSalami  
<[anas.alsalami@mbru.ac.ae](mailto:anas.alsalami@mbru.ac.ae)> wrote:

Dear Dr Kakatkar,

Hope this email finds you well,

I am writing to you to kindly get your permission to use the questionnaire used in your published paper titled "Parental beliefs about children's teething in Udaipur, India: a preliminary study" published in Brazilian Oral research Journal in 2012.

Looking forward hearing your positive response,

Regards,

Anas

## Appendix 3: Ethical Approval Letter



25 September 2019

**Dr Sarah Almatrouk**  
**Resident - Pediatric Dentistry**  
**HBMCDM**

**RE: MBRU-IRB-2019-019**

Dear Dr Sarah,

Thank you for submitting to the Board the study titled "Parents perception towards infant teething in Dubai, UAE" for full review. The Board has reviewed the same at its meeting of 24 September 2019 and has approved the application.

The study can now commence. Any change in protocol must be notified to the Board.

For any questions, please contact the Institutional Review Board [irb@mbru.ac.ae](mailto:irb@mbru.ac.ae).

Thank you for your interest in MBRU's IRB.

Yours Sincerely,

**Essa Kazim, FRCS**  
**Chairman, MBRU-IRB**



## Appendix 4: English and Arabic Questionnaires

### A. English Questionnaire

## Parents' Perception Towards Infants' Teething Survey

Table 1: Demographic profile of the study population.

<i>Variable</i>	<i>Answer</i>
<b><u>Age (years)</u></b>	
20-29	
30-39	
≥40	
<b><u>Gender</u></b>	
Male	
Female	
<b><u>Your highest Education degree</u></b>	
Postgraduate\Bachelors	
Intermediate\post-school diploma	
High school certificate	
No high school Certificate	
<b><u>Number of Children</u></b>	
1	
2-4	
>4	
<b><u>Age of the youngest child</u></b>	
Less than 1 years	
1-2 years	
2-3 years	

Table 2: Knowledge of Teething.

Questions	Agree	Disagree	Do not Know
1.On average, babies’ teeth start to appear in the mouth around 6-7 months of age			
2.The first teeth to appear in the mouth are lower central incisors (front teeth)			
3.The completion of the appearance of all baby teeth in the mouth occurs around the age of 2 years			
4.Excessive delay in the appearance of baby teeth in mouth may indicate an underlying problem			

Table 3: Sign and Symptoms of teething

Signs and symptoms of teething	Agree	Disagree	Do not know
Fever			
Diarrhoea			
Sleep disturbance-wakefulness			
Loss of appetite			
Gum irritation			
Desire to bite			
Increased drooling			
Runny nose			
Skin rash			
Vomiting			
Ear problems			

Table 4:

<b>During your child's teething process, how distressed was he/she?</b>	
<b>Mildly</b>	
<b>Moderately</b>	
<b>Severely</b>	

Table 5:

<b>On average, how long did this distress last?</b>	
<b>1-3 days</b>	
<b>4-7 days</b>	
<b>More than a week</b>	

Table 6: Management of teething problems

<b>How would you help to relieve your child's teething symptoms?</b>	<b>Agree</b>	<b>Disagree</b>	<b>Do not know</b>
<b>Allow the child to bite on a chilled object</b>			
<b>Allow bottle feeding or nursing at night</b>			
<b>Use systemic analgesics (pain killers)</b>			
<b>Apply topical analgesics (pain killers) to the gums</b>			
<b>Give the child fluids to prevent dehydration</b>			

Table 7:

<b>Where did you receive your advice about teething management from? (Choose one or more)</b>	
<b>Internet and social media</b>	
<b>Nurse</b>	
<b>Pharmacist</b>	
<b>Your relatives and friends</b>	
<b>Pediatrician/family physician</b>	
<b>Dentist/Pediatric dentist</b>	
<b>Other</b>	

## B. Arabic Questionnaire

# قياس إدراك أولياء الأمور تجاه تسنين أطفالهم

الجدول 1: احصائيات السكان (ملف ديموغرافي)

الجواب	الاختيارات
	<b>العمر</b>
	29-20
	30-39
	$\geq 40$
	<b>الجنس</b>
	ذكر
	أنثى
	<b>أعلى درجة تعليميه خاصه بك</b>
	دراسات عليا/ بكالوريوس
	متوسط/ دبلوم ما بعد المدرسة
	شهادة المدرسة الثانوية
	بدون شهادة المدرسة الثانوية.
	شهادة بالمجال الطبي
	<b>عدد الأطفال</b>
	1
	2-4
	$>4$
	<b>عمر أصغر طفل</b>
	أقل من سنه

	2-1 سنه
	3-2 سنه

الجدول 2: معلومات عن التسنين

لا أعلم	لا أوافق	أوافق	
			1- يبدأ أول ضرس لبني بالظهور في الفم من عمر 6 الي 7 أشهر.
			2- أول اسنان تبدأ بالظهور هي الاسنان الأمامية السفلية (القواطع الوسطى السفلية)
			3- تكمل الأسنان اللبنية بعمر السنتين.
			4- التأخير في ظهور الأسنان في الفم قد يشير الى وجود مشكله صحية.

الجدول 3: علامات وأعراض التسنين عند الأطفال

علامات وأعراض التسنين عند الأطفال	أوافق	لا أوافق	لا أعلم
(حمى) الحرارة المرتفعة			
اسهال			
اضطراب النوم			
فقدان الشهية			
احمرار اللثة وانتفاخها			
(القيء) ترجيع			
زيادة في افراز اللعاب			
رشح الأنف			
الطفح الجلدي			
مشاكل بالجهاز التنفسي			
(شد الأذنين) مشاكل بالأذن			

الجدول 4:

خلال مرحلة التسنين، الي أي حد كان يعاني طفلك من الأعراض؟	قليلًا	بشكل معتدل	جدا

الجدول 5 :

كم من الوقت استمرت هذه الأعراض؟	
	أيام 1-3
	أيام 4-7
	أكثر من أسبوع

الجدول 6: حل مشكله التسنين

لا أعلم	لا أوافق	أوافق	كيف تساعدین في تخفيف أعراض تسنين طفلك؟
			استخدام العضاضة (الحلقات المطاطية)
			السماح باستخدام الرضاعة في الليل
			استخدام المسكنات الموضعية على اللثة
			استخدام خافض الحرارة (مسكنات الألم)
			إعطاء الطفل سوائل لمنع الجفاف

الجدول 7:

من اين حصلت على النصائح حول كيفية تخفيف آلام التسنين عند الأطفال؟	
	الأتترنت والسوشيال ميديا
	الممرضة
	الصيدلاني
	الأقارب والأصدقاء
	طبيب الأطفال / طبيب الأسرة
	طبيب الأسنان / طبيب أسنان الأطفال
	اماكن اخرى

**The End...**