Official Dental Journal of Suez Canal University
DENTAL SCIENCE Updates
Print ISSN 2636-3836
Online ISSN 2636-3844
www.dsujournals.ekb.eg
DSU — Vol. 6, No. 2, September (2025) — PP. 315:328

AWARENESS OF MOTHERS TOWARDS ORAL HYGIENE OF THEIR PRESCHOOL CHILDREN IN ISMAILIA CITY-EGYPT: A CROSS-SECTIONAL STUDY

Mohamed Hassan Alscharief [1*], Mohamed Sherief Mohamed Salah El Din Hassan Farag [2], Reham Ahmed Osama Elnemr [3]

DOI: 10.21608/dsu.2025.350485.1281
Manuscript ID: DSU-2501-1281

KEYWORDS

Preschoolers, Knowledge, Attitude, oral health, practices, Mother's awareness

• E-mail address: Mohamed_alscharief@dent.suez.edu.eg

1. Postgraduate student at the Department of Pediatric Dentistry, Preventive Dentistry and Dental Public Health, Faculty of Dentistry, Suez Canal University, Ismailia, Egypt
2. Professor of Pediatric Dentistry, Preventive Dentistry and Dental Public Health, Faculty of Dentistry, Suez Canal University, Ismailia, Egypt
3. Lecturer of Pediatric Dentistry, Preventive Dentistry and Dental Public Health, Faculty of Dentistry, Suez Canal University, Ismailia, Egypt

ABSTRACT

Background and Aim: Appropriate oral wellness is essential for proper physical growth and social development with self-trust and early attention being given for preschool age children oral health is crucial to avoid later dental problems. Maternal knowledge, attitude, and practices (KAP) regarding this issue is a cornerstone in proper implantation of dental hygiene aspects and also to transfer such attitude and practices to their offspring. Therefore, evaluating mothers' oral health-related behaviors, attitudes, and knowledge was the current study's goal. **Methods:** A cross-sectional survey was conducted using a questionnaire administered to 250 mothers of preschool children aged 3 to 5 years. These children were enrolled in both public and private schools in Ismailia City, Egypt, and were accompanied by their mothers. Data collection involved interviews using systematic forms. **Results**: Over half of the participants (53.2%) demonstrated inadequate practices. Additionally, 46% showed only a fair attitude, and 39.2% of the mothers lacked sufficient knowledge regarding their children's oral hygiene. **Conclusion**: The findings indicate that many mothers have inadequate knowledge and practices related to their children's dental hygiene, contributing to a widespread prevalence of poor oral health behaviors.

INTRODUCTION

Preschoolers represent a kind and innocent sector of the population and their dental health is prioritized as it influences the future generations dental hygiene state [(1)]. The habits that child learns and practices in childhood forms the foundation upon which their entire life depend and this affects their health and all other aspects of their development. Since parents have a significant impact on a child's well-being through intentional instruction and unintentional actions, In order to promote and strengthen the development of the kid, it is critical to evaluate the parental knowledge and behaviors [(2, 3)].

In limited resources countries, most of health care responses are directed toward therapeutic action rather than preventive plans. Lack of preventive dental programs especially among young population add to the economic and medical burden, it is not only due to limited resources but also can be attributed to the poor knowledge and negative attitude of individuals or especially parents in case of young population [(4)].

The elements impacting children's oral hygiene must be understood by authorities in order to enhance it. Studies have demonstrated a relationship between the oral hygiene practices of children and specific demographic attributes, such as the educational and occupational state of parents, the number of siblings in the family, and the composition of the family unit (whether it is a single-parent or two-parent household) [5].

Many past studies have demonstrated the significant impact of parents' knowledge, attitudes, and practices on their offspring's dental wellbeing. Especially mothers being as key role models, significantly influence children's oral health through affecting their wellbeing concepts and perspectives regarding dental hygiene which predicts significantly the children's dental health outcomes. There is proof that mothers' dental health and their kids' dental health are related, and mothers' way of thinking toward their kids' oral wellbeing education and their own oral health knowledge are related, including habits such as brushing teeth and maintaining a balanced diet. The incidence of tooth decay in preschoolers is linked to the oral health behaviors of parents[4,6,7]. Primary preventative activities seem to be critical in this case, and their application is dependent on mothers' understanding of oral health, attitudes, and practices (KAP) [8].

The majority of epidemiological information comes from non-Arab countries while there is a shortage of data concerning Egyptian children's dental health and how it relates to their parents' knowledge, attitudes, and dental hygiene customs in the region. Therefore, this search aims to investigate the mothers attitude, knowledge, and practices regarding the state of their preschoolers' teeth in Ismailia City, besides comparing these aspects with respect to their ages, educational backgrounds, socioeconomic standing, and sources of dental health information.

MATERIALS AND METHODS

Study sample

The current investigation was conducted after obtaining the consent of the Research Ethics Committee (REC) of the Faculty of Dentistry, Suez Canal University (354 /2021). The required number of study samples was estimated with the help of G*power version 3.1.9.6 for Mac OS. It was established that a sample size of at least 200 mothers was required to be sufficient for an effect size of 0.25 and a power of 0.95 (95%) at a significance level of 0.05. By adding a 25% expected nonresponse rate (about 50 samples), 250 mothers were involved totally in the current investigation.

A descriptive questionnaire survey was performed over three months, from March 2023 to May 2023, involving mothers of preschoolers aged 3 to 5 years. The study was carried out in preschool classes (Baby class, Kg-1 and Kg-2 classes) in six randomly selected schools in Ismailia city. The schools and participants were selected using simple random sampling (SRS) applying computer generated random numbers (CGRNs) using Microsoft Excel version 16.96 for Mac OS (Microsoft office 365). Three schools were representatives for private schools (Makka, Amoun, and Almanar) and three were representative for government schools (Alzahraa, Algalaa, and Gawad Hosni). The investigation participants comprised 250 of these schools enrolled-children mothers during the study period (143 from the private schools and 107 from the governmental ones).

A formal approval letter was acquired from the authorities, and a correspondence was dispatched to the chosen school outlining the goals of the investigation and the protocols to be observed while being conducted. It was requested that the school principal notify the children and their parents

about the study, and certain days were selected for the distribution and retrieval of the questionnaire. The study included all the mothers who provided consent. The written consents stated that all acquired data were totally concealed and utilized solely for scientific purposes, and they have the right to fill the questionnaire or not. Mothers who were uncooperative, as well as those of children with physical and mental disabilities and children accompanied by individuals other than their mothers, were all excluded from the study.

Survey form and scoring

The current investigation was executed using a self-administrated questionnaire adopted from previous study of Jain et al. [9], this questionnaire English version was translated into Arabic, and its credibility was examined by blindly translating it back into English using the back-translation technique. The accuracy of the translation was confirmed by specialists in both languages.

The questionnaire comprised of 4 sections. The **first section** included 6 questions about demographic data included: child gender, mother and child age, education level of parents, and the family economic state. The **second section** presents the mothers knowledge towards dental care of those children and consisted of 10 questions, where the scores of 10 and 0 are the highest and lowest, respectively. The **third section** had 6 questions assessing the mothers' attitudes towards their preschool children dental care, using the Likert scale as (1) strongly disagree, or (2) disagree, or (3) undecided, or (4) agree, or (5) strongly agree, where the scores of 6 and 0 are the highest and lowest, respectively. The **fourth section** consisted of 9 questions evaluating these mothers' practices towards their preschool children oral health, where the scores of 9 and 0 are the highest and lowest, respectively,

A scoring system was established to evaluate the questionnaire replies, assigning one point for each correct or favorable answer provided by mothers, where each correct or favorable response scored 1 while the incorrect answers scored 0. The number of correct/favorable responses provided by mothers determined the score [10, 11]. For statistical analysis purpose, the total scores of knowledge, attitude and practices, were assessed on an ordinal scale in accordance to the number of right responses: (**Knowledge** – good: >7, fair: 4–6, poor: <3, **Attitude** – good: >5, fair: 3–4, poor: <2, **Practices** – good: >7, fair: 4-6, poor: <3).

Data analysis

IBM-SPSS version 30.0 for Mac OS (IBM, Inc. Chicago, IL, USA) was employed in analyzing the data. A *p*-value lesser than 0.05 was deemed significant, and a confidence interval of 95% was applied. The answers to each question were determined using descriptive statistics. Inferential statistics in terms of Pearson's correlation coefficient and One-way ANOVA were conducted. To evaluate the internal consistency of the designed tests and determine their reliability, the Cronbach alpha coefficient was computed. Heatmap was generated using PAST statistical software version 4.15.

RESULTS

Demographics data

The questionnaire was filled out by 250 mothers, whose mean age was 31.77 ± 4.9 years. Regarding children's age and gender, we have found that 53.6% of the children were boys while the girls were 46.4% with an average age of 5.13 ± 0.78 years.

Based on mothers' educational levels, 16 mothers (6.4%) had less than a secondary school education,

85 mothers (34%) had completed secondary school, 127 mothers (50.8%) were university graduates, 16 mothers (6.4%) held a master's degree, and only 6 mothers (2.4%) had a PhD. According to the oral health information source, nearly half of mothers 120 (48%) obtained their dental health information from visual media (Figure 1&2).

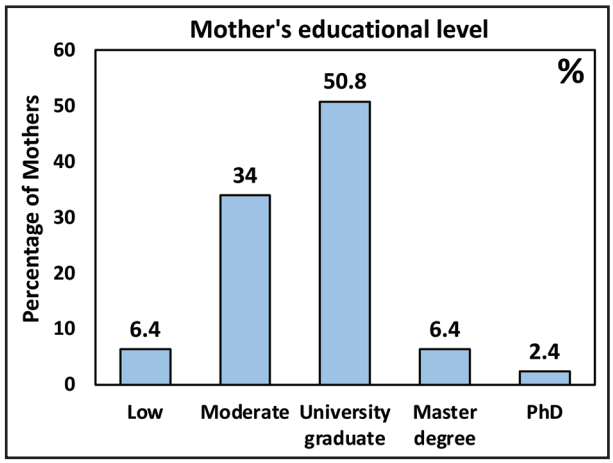

Fig. (1) The mother's education level.

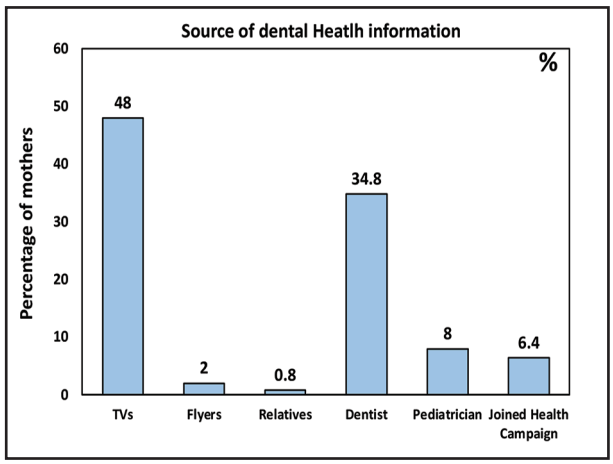

Fig. (2) Source of dental health information among mothers.

Regarding mothers' knowledge

Answers to knowledge questions are presented in table (1). Approximately 114 (45.6%) of the mothers knew the significance of fluoride toothpaste in preventing the progression of dental cavities. 149 (59.6%) of them knew that the predominant dental affliction in children is dental caries and 112 (44.8%) of them knew that chocolates, bakery products, and soft drinks are risky for dental caries, accordingly 126 (50.4%) of them knew that restricting sweets, teeth brushing, regular dental visits and fluoridated toothpaste protects against dental caries. Overall, 129 (51.6%) were aware that the most common cause of bleeding gum is improper brushing and tartar and 48.8% recognized the significance of regular brushing and professional cleaning in gum diseases prevention.

Regarding mothers' Attitude

Questions related to attitude are shown in Table (2). Approximately 81% of mothers believed that regular dental visits for their children are essential, and 72.4% felt that only mothers should be responsible for cleaning their child's teeth. About 72% of them asserted that brushing the children teeth after every meal is essential. Interestingly, 52% of mothers concurred that deciduous teeth do not require significant attention since they are going to fall in the end. In contrast, 81.6% acknowledged the correlation between good dental health and general health, and 80.8% agreed on the primary teeth wellbeing is crucial for children to masticate their food effectively.

Table (1) *Distribution of participants in accordance to the answers they gave to the knowledge questions*

Knowledge question	Answers	Frequency	
		n	%
How many milk teeth are there in a child's mouth?	10	25	10
	12	54	21.6
	20	58	23.2
	28	45	18
	I don't Know	68	27.2
Does the toothpaste contain fluoride?	Yes	145	58
	No	24	9.6
	I don't Know	81	32.4
What is the role of the fluoride in the toothpaste?	Prevent tooth decay	114	45.6
	Prevents gum problems	24	9.6
	Give freshness	41	16.4
	I don't Know	71	28.4
What is the most common dental disease in the child?	Tooth decay	149	59.6
	Bleeding gums	24	9.6
	Discolored tooth	36	14.4
	don't know	41	16.4
Which of the following food items can lead to tooth decay?	Chocolates	91	36.4
	Bakery products	5	2
	Soft drinks	16	6.4
	All of the above	112	44.8
	I don't Know	26	10.4
Which of the following do you think prevents the tooth decay?	Restricting sweets	29	11.6
	Tooth brushing	28	11.2
	Regular dental visits	20	8
	Fluoridated toothpaste	20	8
	All of the above	126	50.4
	I don't Know	27	10.8
Causes for gum disease?	Improper brushing	23	9.2
	Tartar	47	18.8
	All of the above	129	51.6
	I don't Know	51	20.4
Which of the following do you think prevents the gum disease?	Regular brushing and mouth wash	46	18.4
	Professional cleaning	31	12.4
	All of the above	122	48.8
	don't know	51	20.4
Which of the following can lead to irregular teeth?	Thumb sucking/tongue thrusting/mouth breathing	50	20
	Runs in the family	45	18
	All of the above	101	40.4
	don't know	54	21.6
Can irregularly placed teeth be aligned in the correct position?	Yes	138	55.2
	No	33	13.2
	I don't Know	79	31.6

Table (2) *Distribution of the studied mothers based on the responses they gave to attitude-related inquiries*

Attitude question	Answers	Frequency	
		n	%
It is necessary to take the child for regular dental visits	Strongly disagree	1	0.4
	Disagree	2	0.8
	Undecided	43	17.2
	Agree	141	56.4
	Strongly agree	63	25.2
Cleaning of the child's teeth should be done by mothers	Strongly disagree	1	0.4
	Disagree	15	6
	Undecided	53	21.2
	Agree	125	50
	Strongly agree	56	22.4
It is necessary to clean the child's teeth after every meal	Strongly disagree	0	0
	Disagree	10	4
	Undecided	60	24
	Agree	128	51.2
	Strongly agree	52	20.8
Milk teeth don't require good care even they are going to fall anyway	Strongly disagree	54	21.6
	Disagree	64	25.6
	Undecided	69	27.6
	Agree	39	15.6
	Strongly agree	24	9.6
Good oral health is related to the good general health	Strongly disagree	3	1.2
	Disagree	1	0.4
	Undecided	42	16.8
	Agree	114	45.6
	Strongly agree	90	36
Healthy milk teeth are essential for children to chew the food properly	Strongly disagree	0	0
	Disagree	2	0.8
	Undecided	46	18.4
	Agree	114	45.6
	Strongly agree	88	35.2

Regarding mothers' Practice

Answers to practice questions are presented in Table (3). 64% of children visited a dentist after the emergence of their first milk tooth, and approximately one year after birth. Meanwhile, 15.2% of parents schedule dental appointments for their child biannually. About 15.6% of mothers started brushing their children's teeth shortly following the emergence of the first deciduous tooth, with 94.4% using toothbrushes and 93.2% using toothpaste. Additionally, 32.8% of mothers replace their child's toothbrush every 2-3 months, while 41.2% believe that children should rinse their mouths after eating or drinking; however, only 13.6% provide sugary foods as part of their child's meals.

Table (3) *Distribution of the participants based on their answers to practice inquiries*

Practice	Answer	Frequency	
		n	%
When was the child's first dental visit?	6 months	0	0
	After birth	2	0.8
	After the eruption of first milk tooth	46	18.4
	1 year after birth	114	45.6
	Not yet visited	88	35.2
At what age do you schedule your child's dental appointments?	Only during problems	86	34.4
	Every 6 months	38	15.2
	Every 1 year	10	4
	Not particular	115	46
	Not yet visited	1	0.4
When did you start the process of cleaning your child's teeth?	Soon after first milk tooth eruption	39	15.6
	After 4-6 months after milk teeth eruption	13	5.2
	After all milk teeth eruption	59	23.6
	After first birthday of the child	19	7.6
	Don't remember	120	48
Which of the following aids are used to clean your child's teeth?	Finger	2	0.8
	Toothbrush	236	94.4
	Twig	4	1.6
	Any other	8	3.2
How many times do you brush your child's teeth?	Once in a day	54	21.6
	Twice in a day	65	26
	After every meal	29	11.6
	Not particular	102	40.8
When do you change your child's toothbrush?	Once in 15 days	7	2.8
	Once in a month	34	13.6
	Every 2-3 months	82	32.8
	Once the bristles fray out	61	24.4
	Not particular	66	26.4
What material do you use to clean your child's teeth?	Toothpaste	233	93.2
	Tooth powder	3	1.2
	Any other	14	5.6
Does your child rinse the mouth after eating/drinking?	Yes	103	41.2
	Not particular	29	11.6
	Sometimes	71	28.4
	Don't Know	47	18.8
At what time do you give the sugary food items to your child?	With meals	34	13.6
	In between meals	89	35.6
	Before going to bed	26	10.4
	Not particular	101	40.4

Overall KAP

According to the scoring system, 86 participants (34.4%) exhibited good knowledge, around 66 participants (26.4%) displayed fair knowledge, while 98 participants (39.2%) showed poor knowledge. The overall knowledge assessment yielded an average (±SD) of 4.8±3.0, indicating a fair level of knowledge, typically categorized as such when scores fall between 4 and 6. Regarding attitudes, approximately 40.8% of participants demonstrated a positive attitude, around 46% exhibited a fair attitude, and 13.2% had a poor attitude, resulting in an average (±SD) of 3.9±1, which classifies the overall attitude as fair (defined as a score between 3 and 4). In terms of practice, 1.6% of participants showed satisfactory practice, approximately 35.2% demonstrated fair practice, and 53.2% had poor practice. The overall practice assessment, with an average (±SD) of 3.9±2.2, was also categorized as fair (Table 4).

Table (4) *Overall KAP among the studied mothers:*

	Knowledge	Attitude	Practice
Poor	98 (39.2%)	33 (13.2%)	133 (53.2%)
Fair	66 (26.4%)	115 (46%)	88 (35.2%)
Good	86 (34.4%)	102 (40.8%)	29 (11.6%)

Relationship between the Mother's education background and Knowledge, Attitudes, and Practices

Based on the mothers' educational levels, 16 mothers (6.4%) had a low educational background, 85 mothers (34%) had a moderate education (high school), 127 mothers (50.8%) were university graduates, 16 mothers (6.4%) held a master's degree, and only 6 mothers (2.4%) had a Ph.D. The differences in educational levels among mothers were highly significant ($p< 0.01$), as indicated by the Chi-squared test (see Table 5, Figure 3). The total scores for knowledge, attitudes, and practices significantly increased with the mother's educational level, ranging from low to moderate, to university, master's, and Ph.D. degree holders. Mothers with Ph.D. degrees exhibited the highest significant scores in knowledge (9.0±1.1), attitudes (4.8±1.2), and practices (6.7±2.7). A one-way ANOVA confirmed that the mother's education significantly influenced knowledge, attitudes, and practices.

Table (5) *The Association between level Mother's educational and Knowledge, Attitudes and Practices*

Category	Frequency n (%)	Total scores (mean ±SD)		
		Knowledge	Attitudes	Practices
Less than secondary school	16 (6.4%)	1.8±1.5 c	3.6±1.8 a	2.3±1.0 d
Secondary school	85 (34.0%)	3.1±2.3 c	3.5±1.7 a	2.8±1.2 d
University graduate	127 (50.8%)	5.7±2.9 b	4.1±1.5 a	4.1±2.0 c
Master's degree	16 (6.4%)	8.1±1.5 a	4.2±0.9 a	7.9±1.8 a
PhD	6 (2.4%)	9.0±1.1 a	4.8±1.2 a	6.7±2.7 b
Total	250 (100%)	4.8±3.0	3.9±1.6	3.9±2.2
ANOVA	p-value	<0.001***	0.024*	<0.001***

a,b Means followed by different letters vertically (i.e. in the same column) are significantly different according to Tukey's HSD at0.05 level., **, *** significant at p<0.05, <0.01, <0.001*

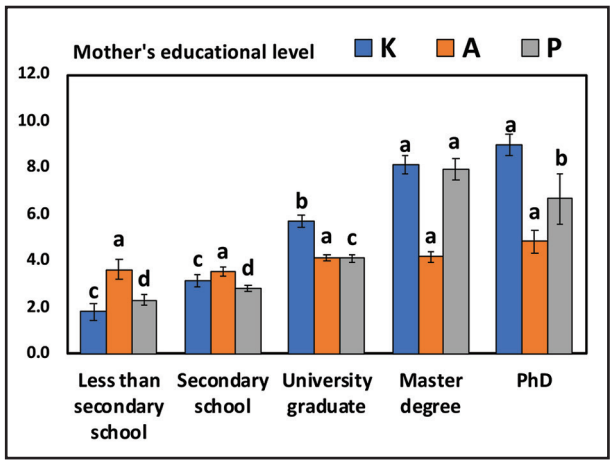

Fig. (3) Heatmap showing the interaction between study variables (questions) based on Pearson's correlation.

Interaction between variables:

The heatmap show the correlation matrix between research variables, where positive correlation is represented by the blue color, negative correlation is expressed by red color while the shaded colors represent significant correlations. The correlation based on linear relationship between variables-based on Pearson's correlation coefficient (Figure, 4).

The overall heatmap of all questions belongs to, Knowledge, attitude, or practice was presented in Figure (4) The school type (1=governmental schools, 2= private schools) showed positive significant correlation with socioeconomic level i.e. private schools have high economic level participants. However, it showed negative significant correlation with K2, K4, A3, P1, P8 of the heat map.

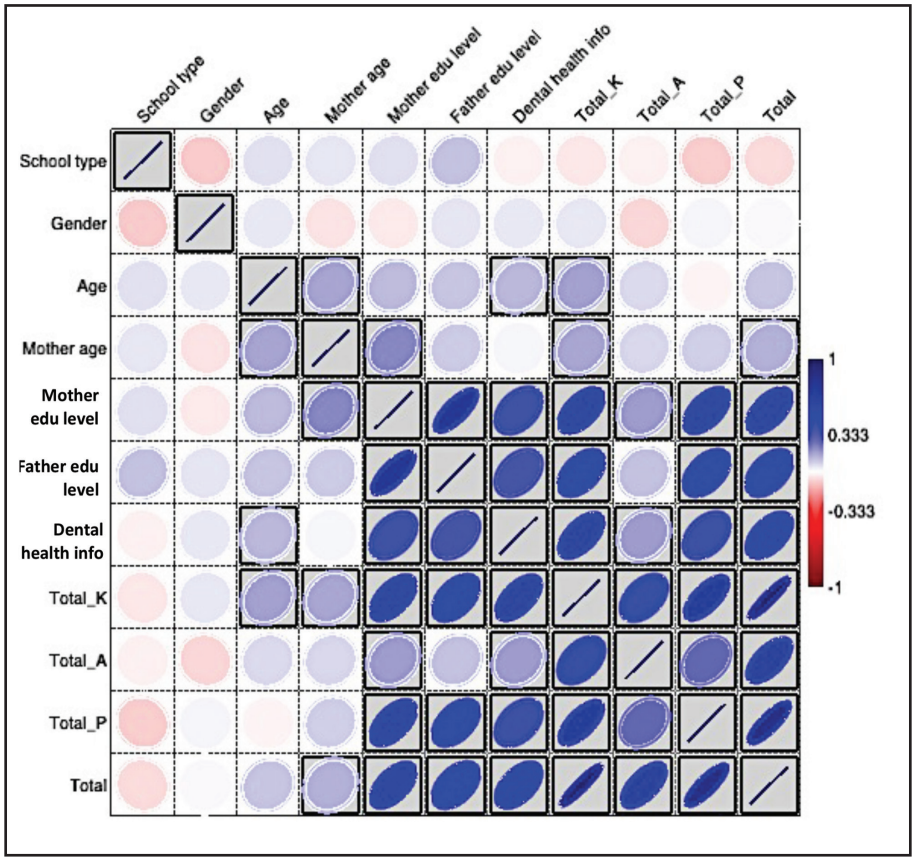

Fig. (4) The association between the level of Mother's education and Knowledge, attitudes and practices. (a,b Bars within K or A, P followed by different letters in the same bar color are significantly different according to Tukey's HSD at 0.05 level).

Moreover, the mother's age was positively and significantly correlated with various knowledge questions (right answered ones). Furthermore, the father's and mother's educational level was strongly positively and significantly correlated with various knowledge, Attitude and Practice question (right answered).

The total of right-answered knowledge scores showed a strongly positively and significantly correlated with Attitude and Practice question (right answered). This is also clear in Heatmap presented in Figure (4).

DISCUSSION

Children regard their parents as a crucial role figure, especially when developing their habits like toothbrushing. Parents must have a firm grasp of the topic and a favorable attitude toward oral health to promote healthy dental hygiene habits in their children. These attitudes and knowledge should be demonstrated through proper oral hygiene routines and diet choices to improve overall dental health [12–16].

Mothers of children between the ages of 5 and 6 were selected as the participants in the study because mothers typically serve as their children primary role figures and generally possess more knowledge about dental hygiene of their children than fathers do [17]. Furthermore, it was believed that children might be at a developmental stage where parental perceptions of oral hygiene practices have an impact, as parents often make decisions on their children's behalf. This aligns with findings from **Sarnat *et al.*** [18]**,** which indicate that a mother's positive attitude towards dental health correlates with improved oral hygiene in her child at this age.

The source of dental health information was evaluated for better targeting and applications in dental education programs. According to the current survey, the two main sources of information about oral health was the television which aligned with the outcomes of a previous investigation performed in **Menoufia** [19]. This demonstrates the profound impact that visual press may have on people's daily lives when national health education initiatives are implemented. Methods for improving the utilization of visual media in oral hygine education must be developed. In the present investigation, only 34.8% of the mothers obtained their knowledge from a dentist, while 48% of them obtained their information from television. This was in contrast to **Wyne *et al.*** [20] who found that the media and dentists account for 34.2% of the Saudi people's oral hygiene knowledge. This shows that providing oral health education by dentists and other healthcare providers, such as pediatricians, for all of their patients in their standard clinical practice is urgently needed.

Most of the parents were knowledgeable of the fluoride presence in toothpastes and were aware of its role. The outcomes of the current study aligned with those of **Gussy *et al.*** [21], **Kamolmatyakul and Saiong** [22], **Franzman *et al.*** [23] who similarly indicated that preschoolers' parents have significant information on the role of fluoride in caries prevention. This is consistent with their primary information sources, which are TV commercials, as the majority of commercials highlight the importance of fluoride. In contrast to other studies as **Moulana *et al.*** [11] and **Suresh *et al.*** [24] which claimed that mothers have insufficient understanding of the same issue. Furthermore, 59.6% of mothers in the current investigation could identify tooth decay and perceive it to be the most prevalent dental health problem impacting children. This aligned with the findings of the previous research [20, 23–25].

The mothers in this study were unaware of the correlation between various types of sugar intake and tooth decay, however only 6.4% of them knew that sugary soft drinks are risky for dental caries. This could be related to that majority of mothers don`t know the ingredients of many food products and possible related caries causative factors.

Although most mothers (81.6%) acknowledged the necessity of regular dental visits, only a small number translated their belief into actual lifestyle practice and this positive attitude was not transmitted into positive practice. This aligned with the findings of the previous research [17, 26, 27]. The reasons for the infrequent dental visits despite the positive attitude toward the same issue could be financial absence of medical insurance, difficulty reaching a dentist, or lacking enthusiasm. These obstacles require assessment by additional research.

A current study has shown that 72.4% of the studied mothers either agree or strongly agree that they themselves should cleanse their children's teeth following each meal. A randomized controlled experiment in UK, mothers of preschoolers who visit an oral health educator had more information and better attitudes regarding their children's dental hygiene [28]. Although we have found positive attitude regarding this issue among the studied mothers but the application is lacking due to lack of their dependence on a trustable source for training and education i.e. dentist.

Similarly, as have been also noticed by **Soliman** [29], the survey participants had a high degree of dental hygiene opinions and knowledge for certain topics; yet, they failed to appreciate the importance of primary teeth. The acquired results align with the findings of **Abu Hamila** [30], **Abduljalil and Abuaffan** [31]. This may be described numerically as 52.8% of participants indicated that milk teeth are insignificant since they will eventually fall anyway, this outcome is corroborated by the investigations of **Abu Hamila** [30], **Chhabra and Chhabra** [32]. Despite a significant proportion of participants recognizing that oral diseases could be avoided by taking preventive actions -as 81.6% acknowledged the correlation between good oral health and overall health and 80.8% of them concurred that well primary teeth are vital for children's proper chewing- there are deficiencies in the implementation of preventive actions.

Regarding mother's attitudes towards their child's first dental visit, we found that 45.6% of the participants in the current study have taken their child to the first dental appointment after the appearance of their first milk tooth and at their first year of life. This was in agreement with **Chala *et al.*** [33]. The AAPD recommends that the initial dental check coincides with the emergence of the first milk tooth and no later than one year of age. This enables the dentist to provide parents with dental hygiene guidance. Additionally, cleaning the gums and brushing the teeth promptly after the first milk tooth appears aids in preventing early childhood caries (ECC) [34].

It is hypothesized that an earlier first visit to the dentist, the higher chance he or she would have to be caries free [35]. Current study showed that most of the studied mothers (80.4%) take their children for dental visits only with the presence of dental problems or even not particular about it, while only 19.2% perform regular visits (every 6 months or per year) which contrasted with the outcomes of **Moulana *et al.*** [11] and **Chan *et al.*** [25].

In this investigation, only 15.6% of mothers initiated brushing their child's tooth once the first primary tooth emerged. In contrast to Gussy et al., who reported that 95% of parents in rural Australia assumed teeth brushing ought to begin upon the appearance of the first tooth. However, more than

90% agreed that toothbrushes and toothpastes are important for dental hygiene. This was similarly to the other researches [11, 25, 36], however not all of them did it regularly and most of the participants fail to identify the importance of timing in sugars intake. Comparable findings were published by **Moulana *et al.*** [11] and **Chan *et al.*** [25]. On the contrary, **Blinkhorn *et al.*** [28] showed that 78% of mothers limited the consumption of sweet foods to mealtimes exclusively.

Surprisingly this poor practice is different from better attitude among 81.6% of the studied mothers whom either agree or strongly agree on the significance of taking the child to the dental appointments on a regular basis. The result conveyed that 40.8% of mothers exhibited a good attitude towards oral care of their children's. This dissociation between attitude and practice is interesting and stresses the need for health education programs to improve knowledge and encourage better healthy practice.

We have found a significant positive correlation between parents' knowledge and their attitude toward oral hygiene, and the same was reported between attitude and practice while the correlation was not statistically significant between knowledge and practice. This is inconsistent with the findings provided by **Soliman** [29], **Alya *et al.*** [33] and **Chala *et al.*** [37]. All of these previous researches have reported significant positive correlation between participants' knowledge and behavior.

It was observed during the current study that the educational level of the mother exhibits a crucial effect on their attitude, knowledge, and practice of their children dental hygiene. Higher educated mothers are more knowledgeable and having better attitude and practice concerning the dental health care and the primary teeth significance. While this couldn't be identified as a direct causation, but it could be explained that higher level of education helps to give the mother the ability to look for better quality of lifer for their children especially regarding their health. This is in accordance with a previous investigation held in Poland stating that mothers with low educational backgrounds have lower level of dental hygiene awareness [31]. Parents with a higher educational background may possess the ability to evaluate suitable sources of information and comprehend that knowledge more thoroughly [38]. Many investigations showed a lack in the parental awareness regarding children's dental health [21, 39].

Limitation of the study:

The main limitation of the current study is small sample size for an epidemiological survey study and the lack of diversity in the studied population. Another limitation of the current study is we recruited only mothers while effect of paternal knowledge, attitude and behavior is out of our analysis. It is important to conduct future research involving both the mothers and the fathers.

CONCLUSION

The current study showed that overall mothers have fair oral health attitude, while knowledge showed poor level in most of mothers and the case was even worse in terms of practice. Considering the evolving societal attitudes, it is crucial to devise effective oral health care programs that target different demographics using specific design strategies tailored to their unique needs. Increasing their level of knowledge should receive more attention since it will influence their attitude toward dental hygiene.

List of abbreviations

AAPD; American Academy of Pediatric Dentistry

ANOVA; Analysis of variance

CGRNs; Computer generated random numbers

ECC ; Early childhood caries

KAP; knowledge, attitudes, and practices

Kg-1,2; Kindergarten level 1 and 2

REC; Research Ethics Committee

SRS; Simple Random Sampling

Declarations

Competing interests

The authors declare that they have no competing interests.

Author contributions

Farag MS, and Elnemr RA designed the work, acquired and analyzed the data, drafted and revised the manuscript. Alscharief MH acquired the data, analyzed the data, and revised the manuscript. All authors read and approved the final manuscript.

REFERENCES

1. Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, et al. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: Global perspective. Int J Paediatr Dent 2019;29:238–248.
2. Duangthip D, Gao SS, Chen KJ, Lo ECM, Chu CH. Oral health-related quality of life and caries experience of Hong Kong preschool children. Int Dent J 2020;70:100–107.
3. Lewis CW. Teeth: Small but Mighty and Mighty Important. A Comprehensive Review of Children's Dental Health for Primary Care Clinicians. Curr Pediatr Rev 2020;16:215–231.
4. Corrêa-Faria P, Paixão-Gonçalves S, Ramos-Jorge ML, Paiva SM, Pordeus IA. Developmental enamel defects are associated with early childhood caries: Case-control study. Int J Paediatr Dent 2020;30:11–17.
5. Shaghaghian S, Zeraatkar M. Factors Affecting Oral Hygiene and Tooth Brushing in Preschool Children, Shiraz/Iran. J Dent Biomater 2017;4:394–402.
6. Van Den Branden S, Van Den Broucke S, Leroy R, Declerck D, Hoppenbrouwers K. Effects of time and socio-economic status on the determinants of oral health-related behaviours of parents of preschool children. Eur J Oral Sci 2012;120:153–160.
7. Corchuelo-Ojeda J, Casas-Arcila A, Soto-Llanos L. Caregivers and oral health of preschool children: the importance of knowledge on oral health in caregivers at community homes. IJHPE 2024;62:256–268.
8. Nassar AA, Fatani BA, Almobarak OT, Alotaibi SI, Alhazmi RA, Marghalani AA. Knowledge, Attitude, and Behavior of Parents Regarding Early Childhood Caries Prevention of Preschool Children in Western Region of Saudi Arabia: A Cross-Sectional Study. J Dent, 2022;10:218.
9. Jain R, Oswal KC, Chitguppi R. Knowledge, attitude and practices of mothers toward their children's oral health: A questionnaire survey among subpopulation in Mumbai (India). J Dent Res Sci Dev 2014;1:40–45.
10. 10. Gupta G, Rao GN, Saha S. Oral Health Knowledge, Attitude and Practices amongst Nursing Students in Lucknow City. J Indian Assoc of Public Health Dent 2008;6:40–44.
11. Moulana SA, Yashoda R, Puranik MP, Hiremath SS, Rahul GN. Knowledge, attitude and practices towards primary dentition among the mothers of 3-5 year old pre-school children in Bangalore city. J Indian Assoc of Public Health Dent 2012;10:83–92.
12. Okada M, Kawamura M, Miura K. Influence of oral health attitude of mothers on the gingival health of their school age children. ASDC J Dent Child 2001;68:379–383.
13. Szatko F, Wierzbicka M, Dybizbanska E, Struzycka I, Iwanicka-Frankowska E. Oral health of Polish three-year-olds and mothers' oral health-related knowledge. Community Dent Health 2004;21:175–180.
14. Grytten J, Rossow I, Steele L. Aspects of the formation of dental health behaviours in early childhood. Dent Health (London). 1989;28:6, 8–10.

15. Blinkhorn AS. Influence of social norms on toothbrushing behavior of preschool children. Community Dent Oral Epidemiol 1978;6:222–226.

16. Hood, Hunter, Hunter, Kingdom. Demographic characteristics, oral health knowledge and practices of mothers of children aged 5 years and under referred for extraction of teeth under general anaesthesia. Int J of Paediatr Dent 1998;8:131–136.

17. Nagarajappa R, Kakatkar G, Sharda AJ, Asawa K, Ramesh G, Sandesh N. Infant oral health: Knowledge, attitude and practices of parents in Udaipur, India Dent Res J (Isfahan) 2013;10:659–665.

18. Sarnat H, Kagan A, Amiram R. The relation between mothers' attitude toward dentistry and the oral status of their children. Pediatr Dent 1984;6:128–131.

19. Salama A, Konsowa E, Alkalash S. Mothers' knowledge, attitude, and practice regarding their primary school children's oral hygiene. Menoufia Med J. 2020;33:11-17.

20. Wyne AH, Chohan AN, Al Rowily FH, Al Shehri B. Oral health knowledge, attitude and practices by parents of the children attending Ksucd clinics. Pak Oral Dent J 2004;24:145–148.

21. Gussy M, Waters E, Riggs E, Lo S, Kilpatrick N. Parental knowledge, beliefs and behaviours for oral health of toddlers residing in rural Victoria. Aust Dent J 2008;53:52–60.

22. Franzman MR, Levy SM, Warren JJ, Broffitt B. Toothbrushing and Dentifrice Use Among Children Ages 6 to 60 Months. Pediatr Dent 2004;26:87–92.

23. Kamolmatyakul S, Saiong S. Oral health knowledge, attitude and practices of parents attending Prince of Songkla University dental hospital. IJHPE 2007;45:111–113.

24. Suresh BS, Ravishankar TL, Chaitra TR, Mohapatra AK, Gupta V. Mother's knowledge about pre-school child's oral health. J Ind Soc of Pedod Prev Dent 2010;28:282–287.

25. Chan SCL, Tsai JSJ, King NM. Feeding and oral hygiene habits of preschool children in Hong Kong and their caregivers' dental knowledge and attitudes. Int J Paed Dent 2002;12:322–331.

26. Sakai VT, Oliveira TM, Silva TC, Moretti ABS, Geller-Palti D, Biella VA, et al. Knowledge and attitude of parents or caretakers regarding transmissibility os caries disease. J Appl Oral Sci 2008;16:150–154.

27. Talekar BS, Rozier RG, Slade GD, Ennett ST. Parental perceptions of their preschool-aged children's oral health. J American Dent Assoc 2005;136:364–372.

28. Blinkhorn AS, Gratrix D, Holloway PJ, Wainwright-Stringer YM, Ward SJ, Worthington HV. A cluster randomised, controlled trial of the value of dental health educators in general dental practice. Br Dent J 2003;195:395–400.

29. Soliman NIE. Oral health beliefs, knowledge, and behavioral attitudes of Egyptian mothers resident in Giza city towards early childhood caries. EDJ 2019;65:917-926

30. Abu Hamila NAAA. Early Childhood Caries And Certain Risk Factors In A Sample Of Children 1-3.5 Years In Tanta. Dent 2013;180:1-7.

31. Abduljalil HS, Abuaffan AH. Knowledge and practice of mothers in relation to dental health of pre-school children. Adv Genet Eng 2016;5:1–7.

32. Chhabra N, Chhabra A. Parental knowledge, attitudes and cultural beliefs regarding oral health and dental care of preschool. Eur Arch Paediatr Dent. 2012;13:76–82.

33. Chala S, Houzmali S, Abouqal R, Abdallaoui F. Knowledge, attitudes and self-reported practices toward children oral health among mother's attending maternal and child's units, Salé, Morocco. BMC Pub Health 2018;18:1-8.

34. American Academy of Pediatric Dentistry. Policy on early childhood caries (ECC): classifications, consequences, and preventive strategies. Pediatr Dent 2018;40:60–62.

35. Al Ghanim, Adenubi, Wyne, Khan. Caries prediction model in pre-school children in Riyadh, Saudi Arabia. Int J Paediatr Dent 1998;8:115–122.

36. Păsăreanu M, Rotaru D, Balan A. the mothers' role in effecting and supervising the early childhood oro-dental hygiene. J Prev Med 2008;16:116–124.

37. Abu Bakar NAF, Mamat Z. Parental Knowledge and Practices on Preschool Children Oral Healthcare in Nibong Tebal Penang, Malaysia. JOJ Nursing & Health Care 2018;7:707–711.

38. Williams NJ, Whittle JG, Gatrell AC. The relationship between socio-demographic characteristics and dental health knowledge and attitudes of parents with young children. Br Dent J 2002;193:651–654.

39. Blinkhorn As, Wainwright-Stringer YM, Holloway P j. Dental health knowledge and attitudes of regularly attending mothers of high-risk, pre-school children. Int Dent J 2001;51:435–438.