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ASSESSING MATERNAL KNOWLEDGE GAPS AND RISK FACTORS FOR EARLY CHILDHOOD CARIES IN SAUDI ARABIA

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Abstract

Background: Early Childhood Caries (ECC) is a significant public health issue in Saudi Arabia, with prevalence rates ranging from 27.3% to 73% across various regions. Mothers play a crucial role in influencing children's oral health behaviors through their knowledge and attitudes, yet gaps in this knowledge can lead to inadequate preventive care and increased caries. **Objective**: This study aimed to assess maternal knowledge and awareness of ECC and its associated risk factors among mothers in Saudi Arabia. **Methods**: A cross-sectional study was conducted between July 2024 and January 2025, involving 604 mothers of children aged 3-5 years living in Saudi Arabia. Participants completed a survey assessing their knowledge of ECC, dental hygiene practices, and awareness of risk factors. Sample size was calculated to ensure representativeness, resulting in 384 respondents.
Results: The mean age of participants was 35.9 years, predominantly female (81.1%), with a significant representation from the Western region (73.5%). While 66.9% reported brushing their children's teeth twice daily, a notable 64.2% only sought dental visits in response to pain. Awareness regarding sugary drinks as a risk factor was high (69.2%); however, only 39.4% demonstrated a high knowledge level about ECC. Additionally, there was a concerning lack of awareness about the timing of tooth eruption (55.3%) and bacterial transmission (34.8%). Statistically significant relationships were found between knowledge and factors such as gender, residential region, occupational status, and educational level.
Conclusion: Findings indicate significant gaps in maternal knowledge and awareness regarding ECC and its risk factors, highlighting the need for targeted educational initiatives. A majority of mothers expressed a desire for enhanced public awareness campaigns. Addressing these knowledge deficiencies

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is critical for improving preventive behaviors and ultimately reducing the prevalence of ECC in Saudi Arabia's children. Future efforts should focus on developing comprehensive educational programs tailored to the cultural context to foster proactive dental care habits among parents.

Keywords: Early Childhood Caries, Knowledge, Awareness, Saudi Arabia.

Introduction:

Oral diseases constitute some of the most prevalent public health concerns, affecting people of all ages [1]. The presence of one or more carious (non-cavitated or cavitated lesions), missing (cavitated or cavitated), or filled tooth surfaces in one or more primary teeth in children 71 months of age or fewer is known as early childhood caries (ECC) [2]. Infants and preschool children are highly susceptible to dental caries, making the role of carers crucial in maintaining their oral health. Carers impact children's dental health through their knowledge, attitudes, and decisions regarding diet and dental care [3]. Despite this, few studies have explored parents' oral health knowledge in developing countries, highlighting the need to enhance their understanding. Inadequate knowledge and awareness among parents often lead to dental caries in their children due to a lack of early preventive care [4]. In Saudi Arabia, Early Childhood Caries (ECC) is notably widespread, with prevalence rates ranging from 27.3% to 73% across different regions [5]. Since children under five spend most of their time with their parents, particularly mothers, parental knowledge and behaviors significantly influence their oral health maintenance [6]. A study has been published on the knowledge, attitude, and behavior of parents regarding early childhood caries prevention of preschool children in the western region of Saudi Arabia. Nassar, A. A. et al reported that 644 parents in western Saudi Arabia, mostly mothers (87%) aged 31-59, revealed key insights into early childhood caries (ECC) prevention. While 98.9% knew the importance of brushing with fluoride toothpaste and 96.7% understood limiting candy consumption, significant gaps existed. Only 51.4% recognized early caries signs, and 32% were aware of bacterial transmission through item-sharing. Although 98.1% wanted more ECC information and supported school-based education, 42.4% only took their children to the dentist for pain or trauma. Fathers were less informed than mothers about ECC risks, and low-income families were less likely to seek early dental treatment [7]. A study conducted between September and November 2019 involved 355 participants, focusing on children aged 6 to 9 years (mean age 7.26 years). The sample included 209 boys and 146 girls. Most parents had a bachelor’s degree or higher, and most families reported a monthly income of 15,000 SAR or more. The average family size was five members, and the majority of families were married. Basheer, B. et al, revealed that 82.5% of the children had caries in their permanent teeth, and 52.1% had caries in their deciduous teeth. Oral hygiene practices showed that 55.8% of the children received help from their guardians while brushing. However, a significant number of children did not use dental floss (83.9%), mouthwash (96.1%), or miswak (94.1%). Additionally, 49% of the children had not visited a dentist in the previous year, while 30% had visited 1-2 times, and 20% had visited 3-5 times. The study found a significant relationship between diet and caries prevalence. High carbohydrate consumption, frequent snacking, and sugar intake before bedtime were strongly linked to higher caries rates, particularly in deciduous teeth. Additionally, more frequent dental visits were associated with lower caries prevalence [8] In 2024, a survey was conducted in Taif Province, Saudi Arabia about knowledge, attitudes, and barriers of mothers regarding early childhood caries. The result has shown that 57.63% of mothers acknowledged that poor dental health could impact a child's learning ability, while 20.13% were unsure (p=0.02). About 55.55% agreed that a child's first dental visit should be within six months

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after milk teeth appear, but 28.81% were unsure about this timing (p=0.03). Additionally, 22.22% of the mothers did not know the location of the nearest dental center [9]. Various studies conducted in Saudi Arabia have shown a significantly high rate of tooth decay in early childhood [10]. However, there is a gap in the maternal knowledge of mothers about early childhood caries and associated risk factors in oral health, highlighting the need for educational initiatives to promote oral health [11]. Early childhood caries (ECC) is a common condition among preschool-aged children in Saudi Arabia. Dental caries can lead to a variety of problems for children. These problems include functional, social, psychological, physical, and aesthetic issues that have an impact on the kids' overall health. Therefore, the children's quality of life may be compromised by early childhood caries (ECC) [12]. Different parts of the country have reported prevalence rates of ECC ranging from 27.3 to 73%. Prior studies have indicated that parents do not have enough knowledge about the best practices for oral health care for their children [5]. Another study indicates that dental caries is highly (83%) prevalent among preschool and primary school children in Saudi Arabia [13]. important to identify knowledge gaps to educate parents and improve outcomes. This review aimed to assess the level of knowledge and awareness regarding early childhood caries and associated risk factors among mothers in Saudi Arabia.

Objectives: To assess knowledge and awareness levels regarding Early childhood caries and associated risk factors among Mothers in Saudi Arabia.

Materials and Methods:

Study design and setting: This is a cross-sectional study was conducted between July-December 2024 in Saudi Arabia. The research included Saudi adults aged 18 and above, who were selected from individuals who completed the questionnaire in July-August 2024.

Inclusion and Exclusion Criteria:
The inclusion criteria included parents with children aged 3-5 or younger. parents living in Saudi Arabia. Exclusion criteria were Parents who do not have children or have children older than 3-5 years. Parents living outside Saudi Arabia

Sample size:
The sample size calculation was performed to guarantee that the minimum number of participants required would be a representative sample of the entire population. The sample size was established utilizing the Raosoft sample size calculator. With a confidence interval (CI) of 95%, a margin of error of 5%, and an indicator percentage of 0.50, the resulting sample size was determined to be 384.

Method for data collection and instrument (*Data collection Technique and Tools)*:
The survey instrument was a self-administered anonymous questionnaire in Arabic. Consisted of 26 questions in main three sections. Section one contained Demographic features. The second section asked Knowledge questions like Type of toothbrush, dental acid, and others. while the third section includes Awareness questions. Dental students collect the information using Google.

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Scoring system:
In all, 26 statements served to assess the participants' attitudes and degree of knowledge. 6 statements for demographics, 7 for knowledge, and 11 for awareness. One point is given for correct answers, and zero points are given for incorrect answers or “I don't know”. For scoring, we utilized Likert scales (Dichotomous, Three-Point, and Quality Scales) The maximum score was 23 and divided as follows: The original Bloom's cut-off points, 80.0%-100.0%, 60.0%-70%, and 59.0%, The participants divided into three groups based on their scores.
knowledge score varied from 0 to 7 points and was classified into three levels as follows: those with a score of 3 or below (3) were classified as having a low level of knowledge, those with score 4 as having a moderate level of knowledge, and those with scores 5 or above as a high level of knowledge.
Awareness scores varied from 0 to 11 points and were classified into three levels as follows: those with a score of 6 or below (6) were classified as having a low level of awareness, those with scores between 7 and 8 as having a moderate level of awareness, and those with scores 9 or above as having a high level of awareness.

Pilot test:
The questionnaire was distributed to 30 individuals and asked to fill it. This was done to test the simplicity of the questionnaire and the feasibility of the study. Data from the pilot study was excluded from the final data of the study

Analyzes and entry method:
The data had been entered into the device using the "Microsoft Office Excel Software" Windows (2021). The collected data was subsequently transmitted to the Statistical Package of Social Science Software (SPSS) application, version 25 (IBM SPSS Statistics for Microsoft Windows, Version 25.) for statistical analysis.

Results:
Table (1) displays various demographic parameters of the participants with a total number of (604). The mean age of 35.9 years, with a standard deviation of 11.6 years, indicates a relatively balanced representation across age groups, with the largest proportion (32.5%) falling within the 35 to 45 age range. This demographic could suggest a population approaching peak career development, which is particularly relevant for studies focused on professional engagement or health outcomes related to work-life balance. Gender representation is significantly skewed, with females comprising 81.1% of participants, suggesting a need for gender-focused analysis in future interpretations of the data. The dominant residential region is the Western region, accounting for 73.5%, which may reflect cultural or economic factors specific to that area. Additionally, the participants' occupational status reveals a diverse employment landscape, with a notable 36.1% employed and a substantial 30.8% not employed, highlighting potential areas for intervention or support. The educational attainment is predominantly at the bachelor’s level (52.0%), pointing toward a generally well-educated cohort. Lastly, the income distribution, with 25.8% earning more than 15,000 Saudi riyals, may influence socioeconomic

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assessments and health resource allocation within this demographic.

Table (1): Sociodemographic characteristics of participants (n=604)

Parameter		***No.***	***Percent (%)***
Age (Mean: 35.9, STD: 11.6)	25 or less	140	23.2
	26 to 34	138	22.8
	35 to 45	196	32.5
	More than 45	130	21.5
Gender	Female	490	81.1
	Male	114	18.9
Residential region	Northern region	28	4.6
	Southern region	30	5.0
	Central region	32	5.3
	Eastern region	70	11.6
	Western region	444	73.5
Occupational status	Student	132	21.9
	Employee	218	36.1
	Retired	68	11.3
	Not employed	186	30.8
Marital status	Single	142	23.5
	Married	394	65.2
	Divorced	54	8.9
	Widowed	14	2.3
Educational level	Primary school	4	.7
	Middle school	24	4.0
	High school	110	18.2
	Diploma	80	13.2

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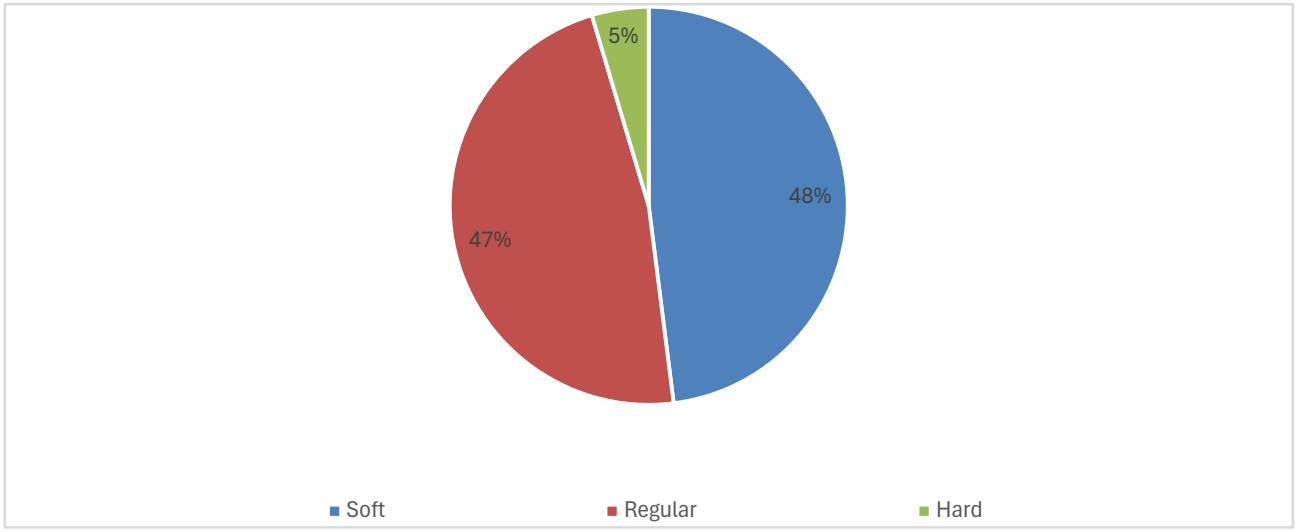
	Bachelor's degree	314	52.0
	Postgraduate degree	62	10.3
	Uneducated	10	1.7
Monthly income	Less than 1000 Saudi riyal	98	16.2
	1000 – 5000	78	12.9
	5001 – 10000	108	17.9
	10001 – 15000	164	27.2
	More than 15000 Saudi riyal	156	25.8

As shown in figure 1, The data presents a survey regarding the types of toothbrushes used by respondents, revealing insightful preferences and potential implications for oral health practices. Among the 604 total participants, 48.0% (290 individuals) reported using soft toothbrushes, which are generally recommended by dental professionals for their efficacy in plaque removal while minimizing the risk of gum irritation. A close second, 47.3% (286 respondents) indicated they opt for regular toothbrushes, likely appreciating a balanced approach between comfort and cleaning efficacy. Conversely, a mere 4.6% (28 individuals) reported using hard toothbrushes.

Figure (1): Illustrates type of toothbrush used among participants.



As illustrated in table (2), The data presented highlights several significant gaps in maternal knowledge regarding early childhood caries risk factors and dental hygiene practices. A notable finding is that most mothers (66.9%) reported brushing their teeth twice daily; however, approximately 26.8% brush only once, underscoring a potential risk for inadequate oral hygiene. Interestingly, while 48.0% of

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respondents prefer using soft toothbrushes, a substantial proportion still rely on hard or regular brushes, which may contribute to dental trauma, particularly in children. Additionally, the infrequent dental visits reported by 64.2% of mothers—attending only when pain is present—raises concern about the proactive management of oral health. Despite recognizing the correlation between dental hygiene practices and caries, 44.4% attribute tooth decay primarily to not brushing, with a notable percentage (34.8%) not utilizing any dental aids.

Table (2): Parameters related to maternal knowledge gaps and risk factors for early childhood caries (n=604).

Parameter		***No.***	***Percent (%)***
What type of toothbrush you use?	Soft	290	48.0
	Regular	286	47.4
	Hard	28	4.6
Are you using any of these dental aids?	mouthwash	210	34.8
	dental floss	132	21.9
	water floss	70	11.6
	free sugar gum	46	7.6
	none	146	24.2
How many times you brush your teeth per day?	once a day	162	26.8
	twice a day	404	66.9
	once a week	18	3.0
	occasionally	20	3.3
How often do you visit the dentist?	once a year	88	14.6
	twice a year	84	13.9
	when there is pain only	388	64.2
	never	44	7.3
The reasons of tooth caries	bacteria	176	29.1
	not brushing your	268	44.4

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	teeth		
	frequency of sugar consumption	160	26.5
At what age can a child brush his/her teeth by himself/ herself?	3 years	324	53.6
	6 years	228	37.7
	8 years	36	6.0
	10 years	16	2.6
How often do you change your toothbrush?	once per 3 months	246	40.7
	once per 6 months	260	43.0
	Annually	98	16.2

As shown in figure (2), The data presented indicates the frequency with which individuals change their toothbrushes, revealing varied hygiene practices among respondents. Notably, 246 participants, accounting for approximately 40.5%, reported changing their toothbrush once every three months, aligning with dental health recommendations for maintaining optimal oral hygiene. In contrast, 260 individuals, representing around 42.5%, indicated that they change their toothbrush once every six months, suggesting a significant portion of the population may not adhere to the ideal three-month timeframe. Moreover, 98 respondents, roughly 16%, admitted to changing their toothbrush annually.

Figure (2): Illustrates rate of changing toothbrushes among participants.

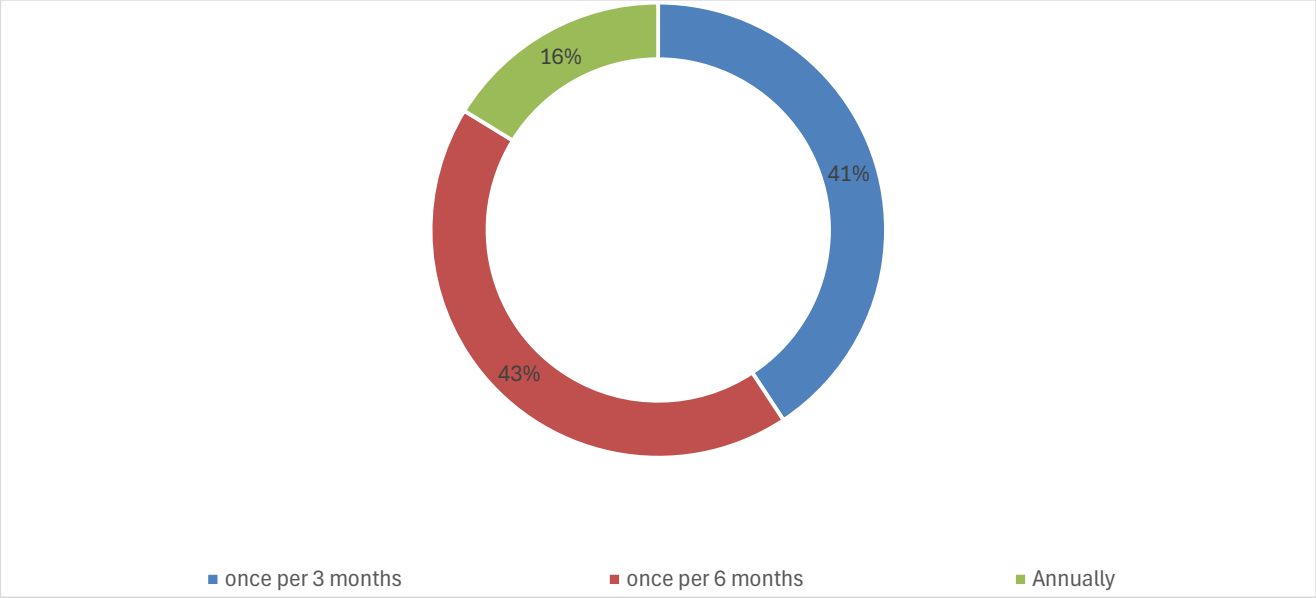

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Table (3) reveals insights into mothers' awareness levels regarding early childhood caries and the associated risk factors among a significant sample of 604 participants. Notably, a substantial majority of mothers (69.2%) confirmed the consumption of sugary drinks and foods, which is a primary risk factor for dental caries. Conversely, awareness of the timing of teeth eruption appears modest, with only 55.3% of mothers knowledgeable about this important milestone. While the prevalence of dental restorations is high (77.2%), indicating recognition of dental issues, a striking 93% of respondents advocate for enhanced public awareness campaigns about childhood caries, underscoring a recognition of the shortcomings in existing educational outreach. Furthermore, while most mothers (88.1%) advise their children to brush post-sugar consumption, a concerning number (58.9%) do not routinely check their children's teeth for changes, suggesting an area for intervention.

Table (3): participants' awareness levels regarding early childhood caries and associated risk factors among mothers (n=604).

Parameter		***No.***	***Percent (%)***
Do you consume sugary drinks and foods?	No	186	30.8
	Yes	418	69.2
Do you know the time of teeth eruption?	No	270	44.7
	Yes	334	55.3
Do you have a restoration?	No	138	22.8
	Yes	466	77.2
Do you believe there is a need for a more public awareness campaign regarding childhood caries?	No	42	7.0
	Yes	562	93.0
Did your child receive advice from his dentist about oral hygiene?	No	242	40.1
	Yes	362	59.9
Do you advice your child to brush his teeth after consuming sugary foods?	No	72	11.9
	Yes	532	88.1
Are you using the same spoon to taste the food and feed the child?	No	314	52.0
	Yes	290	48.0
Are you using same toothbrush with your child?	No	564	93.4
	Yes	40	6.6

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Dose your child drink milk from a sippy cup at bedtime?	No	354	58.6
	Yes	250	41.4
It is best to use toothpaste with fluoride when brushing a child's teeth?	No	154	25.5
	Yes	450	74.5
Parents checking their child's teeth every month for changes or spots?	No	356	58.9
	Yes	248	41.1

The data presented in Table 4 elucidates the knowledge levels of mothers regarding early childhood caries (ECC), revealing a nuanced understanding of this critical public health concern. Notably, only 39.4% of mothers demonstrated a high knowledge level, which underscores a significant knowledge gap that may impact preventive strategies and intervention effectiveness. Conversely, the nearly equal distribution of moderate (30.1%) and low (30.5%) knowledge levels suggests a pressing need for targeted educational initiatives tailored to improve maternal awareness of ECC risk factors.

Table (4): Shows knowledge of early childhood caries (ECC) and its associated risk factors among mothers score results.

	Frequency	**Percent**
High Knowledge Level	238	39.4
Moderate knowledge level	182	30.1
Low knowledge Level	184	30.5
Total	604	100.0

The data presented in Table 5 reveals significant insights into the awareness of early childhood caries (ECC) among mothers, highlighting a concerning trend in public health education. With only 29.8% of mothers demonstrating a high level of awareness regarding ECC and its associated risk factors, there exists a substantial knowledge gap that could potentially jeopardize children's dental health. Notably, the moderate awareness level, accounting for 47.7%, suggests that while some understanding is present, it may not be sufficient to drive proactive preventive measures. Conversely, the 22.5% of mothers showing low awareness.

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Table (5): Shows awareness of early childhood caries (ECC) and its associated risk factors among mothers score results.

	Frequency	**Percent**
High level of awareness	180	29.8
Moderate awareness level	288	47.7
Low awareness level	136	22.5
Total	604	100.0

Table (6) shows that knowledge level of early childhood caries has statistically significant relation to gender (P value=0.006), residential region (P value=0.029), occupational status (P value=0.001), and educational level (P value=0.001). It also shows statistically insignificant relation to age, marital status, and monthly income.

Table (6): Relation between knowledge level of early childhood caries and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=604)***	***P value****
		High knowledge level	**Moderate or low**		
Gender	Female	206	284	490	0.006
		86.6%	77.6%	81.1%	
	Male	32	82	114	
		13.4%	22.4%	18.9%	
Age	25 or less	58	82	140	0.925
		24.4%	22.4%	23.2%	
	26 to 34	52	86	138	
		21.8%	23.5%	22.8%	
	35 to 45	78	118	196	
		32.8%	32.2%	32.5%	
	More than 45	50	80	130	

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		21.0%	21.9%	21.5%	
Residential region	Northern region	8	20	28	0.029
		3.4%	5.5%	4.6%	
	Southern region	8	22	30	
		3.4%	6.0%	5.0%	
	Central region	8	24	32	
		3.4%	6.6%	5.3%	
	Eastern region	22	48	70	
		9.2%	13.1%	11.6%	
	Western region	192	252	444	
		80.7%	68.9%	73.5%	
Occupational status	Student	62	70	132	0.001
		26.1%	19.1%	21.9%	
	Employee	100	118	218	
		42.0%	32.2%	36.1%	
	Unemployed	52	134	186	
		21.8%	36.6%	30.8%	
	Retired	24	44	68	
		10.1%	12.0%	11.3%	
Marital status	Single	66	76	142	0.202
		27.7%	20.8%	23.5%	
	Married	146	248	394	
		61.3%	67.8%	65.2%	
	Divorced	22	32	54	
		9.2%	8.7%	8.9%	
	Widowed	4	10	14	

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		1.7%	2.7%	2.3%	
Educational level	Primary school	0	4	4	0.001
		0.0%	1.1%	0.7%	
	Middle school	4	20	24	
		1.7%	5.5%	4.0%	
	High school	38	72	110	
		16.0%	19.7%	18.2%	
	Diploma	26	54	80	
		10.9%	14.8%	13.2%	
	Bachelor's degree	128	186	314	
		53.8%	50.8%	52.0%	
	Postgraduate degree	36	26	62	
		15.1%	7.1%	10.3%	
	Uneducated	6	4	10	
		2.5%	1.1%	1.7%	
Monthly income	Less than 1000 Saudi riyal	34	64	98	0.249
		14.3%	17.5%	16.2%	
	1000 – 5000	40	68	108	
		16.8%	18.6%	17.9%	
	5001 – 10000	26	52	78	
		10.9%	14.2%	12.9%	
	10001 – 15000	66	98	164	
		27.7%	26.8%	27.2%	
	More than 15000 Saudi riyal	72	84	156	
		30.3%	23.0%	25.8%	

P value was considered significant if ≤ 0.05.

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Table (7) shows that awareness level of early childhood caries and risk factors has statistically significant relation to age (P value=0.0001), residential region (P value=0.001), occupational status (P value=0.0001), marital status (P value=0.039), educational level (P value=0.0001), and monthly income (P value=0.007). It also shows statistically insignificant relation to gender.

Table (7): Awareness level of early childhood caries and sociodemographic characteristics.

Parameters		***Awareness level***		***Total (N=604)***	***P value****
		High level of awareness	**Moderate or low**		
Gender	Female	152	338	490	0.174
		84.4%	79.7%	81.1%	
	Male	28	86	114	
		15.6%	20.3%	18.9%	
Age	25 or less	30	110	140	0.0001
		16.7%	25.9%	23.2%	
	26 to 34	24	114	138	
		13.3%	26.9%	22.8%	
	35 to 45	64	132	196	
		35.6%	31.1%	32.5%	
	More than 45	62	68	130	
		34.4%	16.0%	21.5%	
Residential region	Northern region	2	26	28	0.001
		1.1%	6.1%	4.6%	
	Southern region	10	20	30	
		5.6%	4.7%	5.0%	
	Central region	8	24	32	
		4.4%	5.7%	5.3%	
	Eastern region	10	60	70	

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		5.6%	14.2%	11.6%	
	Western region	150	294	444	
		83.3%	69.3%	73.5%	
Occupational status	Student	24	108	132	0.0001
		13.3%	25.5%	21.9%	
	Employee	80	138	218	
		44.4%	32.5%	36.1%	
	Unemployed	48	138	186	
		26.7%	32.5%	30.8%	
	Retired	28	40	68	
		15.6%	9.4%	11.3%	
Marital status	Single	38	104	142	0.039
		21.1%	24.5%	23.5%	
	Married	130	264	394	
		72.2%	62.3%	65.2%	
	Divorced	8	46	54	
		4.4%	10.8%	8.9%	
	Widowed	4	10	14	
		2.2%	2.4%	2.3%	
Educational level	Primary school	2	2	4	0.0001
		1.1%	0.5%	0.7%	
	Middle school	4	20	24	
		2.2%	4.7%	4.0%	
	High school	26	84	110	
		14.4%	19.8%	18.2%	
	Diploma	14	66	80	

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		7.8%	15.6%	13.2%	
	Bachelor's degree	118	196	314	
		65.6%	46.2%	52.0%	
	Postgraduate degree	10	52	62	
		5.6%	12.3%	10.3%	
	Uneducated	6	4	10	
		3.3%	0.9%	1.7%	
Monthly income	Less than 1000 Saudi riyal	20	78	98	0.007
		11.1%	18.4%	16.2%	
	1000 – 5000	24	84	108	
		13.3%	19.8%	17.9%	
	5001 – 10000	20	58	78	
		11.1%	13.7%	12.9%	
	10001 – 15000	60	104	164	
		33.3%	24.5%	27.2%	
	More than 15000 Saudi riyal	56	100	156	
		31.1%	23.6%	25.8%	

P value was considered significant if ≤ 0.05.

Discussion:

Early childhood caries is a severe type of dental caries seen in children younger than six years. It is characterized by the involvement of smooth surfaces of primary teeth shortly after eruption. Additionally, it advances quickly, leading to significant negative effects on oral health and the quality of life of the child [14]. Although there has been an overall decrease in the prevalence of caries, ECC continues to pose a significant health challenge for infants and toddlers. The aetiology of ECC is intricate and multifactorial. It arises from a complex interplay of factors, including the use of sweetened pacifiers, on-demand nursing, poor oral hygiene, elevated levels of Streptococcus mutans, caregivers' education and dental knowledge, family dynamics, and socio-economic factors [15]. Infants and young children are especially susceptible to dental caries. Caregivers are crucial for the health of young children as they primarily influence their health-related behaviors and healthcare decisions [16].

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Consequently, examining caregivers' knowledge, attitudes, beliefs, and the obstacles they face in pursuing dental care for their children is essential for enhancing children's overall health and well-being [17]. Thus, we aimed in this study to evaluate the knowledge and awareness of early cildhood caries (ECC) and its associated risk factors among mothers in Saudi Arabia.

Our study on maternal knowledge gaps and risk factors for early childhood caries (ECC) in Saudi Arabia reveals critical deficiencies in awareness and understanding among mothers regarding dental health practices for their children. Despite a majority (66.9%) reportedly brushing their children's teeth twice daily, a significant proportion still only brushes once, indicating potential inadequacies in oral hygiene practices. This finding aligns with the research by Anand N. Patil et al. [18], which demonstrated that 42.1% of parents felt that children should be assisted when brushing their teeth, pointing to a need for improved parental engagement in oral hygiene. Moreover, a concerning 64.2% of mothers in our study visit the dentist only when experiencing pain, reflecting a reactive rather than proactive approach to dental care. This lack of regular dental visits mirrors findings from A BaniHani et al. [19], where only 38.3% of mothers were aware of the recommended dental check-up within six months of their child's first tooth eruption, and 58% did not clean their child's mouth after this event. Similar findings were also reported by Shivaprakash et al.[20] highlighting a pattern of insufficient early dental care among parents. While most mothers in our study (69.2%) acknowledged sugary food and drink consumption as a fundamental risk factor for tooth decay, only 55.3% were aware of the timing of teeth eruption. Al-Dahan et al. [21] demonstrated a similar trend, where 94.6% of surveyed parents recognized the negative impact of sugar on dental health, yet the same percentage admitted to frequently purchasing sweetened foods for their children. Additionally, 54.2% provided their children with juice or sweetened liquids from bottles, illustrating a substantial disconnect between knowledge and dietary behavior. Alarmingly, only 39.4% of mothers in our study reported a high level of knowledge about ECC, while just 29.8% showed awareness of its risk factors. This reflects the results of Al-Omiri et al. [22], where only 32% of parents had knowledge about dental caries. Similarly, a study by Dhull et al. [23] revealed that 77.8% did not agree that caries-causing bacteria could be transferred from mother to child, highlighting a widespread lack of understanding regarding pediatric dental health. Furthermore, the shared tendency to use common utensils was corroborated by findings from Togoo et al. [24], who noted that many parents failed to recognize the implications of such practices in caries transmission. Interestingly, a study conducted by Saied-Moallemi Z et al. [25] indicated that 75% of mothers recognized the significance of dental disease compared to other health concerns. This contrasts with our findings, where only 39.4% demonstrated solid knowledge about ECC. Furthermore, research by Peterson et al. [26] and Neupaul P et al. [27] confirmed that a majority of parents understood that dental caries stem from sweets and candy, yet our data indicate a significant gap in the practical application of this knowledge. Additionally, a study conducted by Salama et al. [28] found that approximately 85% of mothers knew that a sugary diet is risky for dental caries, which contrasts with the 44% identified in Oredugba et al.'s [29] Nigerian study. Our findings also indicate that 60.9% of mothers were aware that fluoride has beneficial effects in caries prevention, as reported by Chala et al. [30]. Finally, Babu et al. [31] and Mubeen and Nisar [32] reported that 59% and 55.5% of mothers in India and Pakistan, respectively, had a positive attitude regarding their children's oral health. The present study emphasizes the critical

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need for targeted educational initiatives to bridge these knowledge gaps. A substantial 93% of mothers expressed support for enhanced public awareness campaigns to address their understanding of dental health practices. This aligns with the findings from Gussy et al. [33], which indicated higher awareness in mothers living in Australia, emphasizing the need for effective educational strategies tailored to local contexts. Therefore, it is imperative to implement strategies that foster proactive dental care behaviors among parents, ensuring healthier futures for their children's dental health.

Conclusion:

In conclusion, this study underscores significant knowledge gaps among mothers in Saudi Arabia regarding early childhood caries (ECC) and its associated risk factors. Despite a majority expressing awareness of the importance of brushing and limiting sugary intake, only a small percentage demonstrated a high understanding of early caries signs and the implications of practices like sharing utensils. The findings revealed that 64.2% of mothers only visit the dentist reactively, emphasizing the need for a shift toward proactive oral health care. Moreover, factors such as education level, occupation, and regional differences significantly influenced maternal knowledge and awareness. There is an urgent need for targeted educational programs tailored to address these gaps and promote preventive measures. The overwhelming support among mothers for increased awareness campaigns indicates a willingness to engage in their children's oral health. Implementing effective strategies can enhance parental knowledge and ultimately improve child dental health outcomes in Saudi Arabia.

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Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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Conflict of interests

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability

All data associated with this study are present in the paper.

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