

## LEVEL OF KNOWLEDGE AND ATTITUDE TOWARDS EARLY CHILDHOOD CARIES AND INFANT ORAL HEALTH AMONG UNDERGRADUATE NURSING STUDENTS IN PESHAWAR: A CROSS SECTIONAL STUDY

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### Keywords

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### Abstract

**Background:** Infant oral health is the most important part of children health. ECC is considered as any type of missing teeth, tooth decay or unfilled teeth which is a serious issue due to which children can limit their chewing, eating and talking ability.

**Objective:** To determine the level of knowledge and attitude towards early childhood caries and infant oral health among undergraduate nursing students in Peshawar.

**Methodology:** A cross-sectional study was conducted using a validated questionnaire including demographic information, level of knowledge and attitude towards early childhood caries and infant oral health. The sample includes 377 undergraduate nursing students who were selected conveniently from different nursing colleges in Peshawar. The data was analyzed and presented in form of means and SD, frequencies and percentages using SPSS version 23.

**Results:** Out of 377 undergraduate nursing students with the mean age  $22.3 \pm 1.6$ , majority  $f=67(87\%)$  of the female ( $n=77$ ) nursing students have moderate to good level of knowledge followed by  $f=232(77.3\%)$  male nursing students ( $n=300$ ) have moderate to good level of knowledge towards ECC & IOH. Moreover, majority of the  $f=72(93.5\%)$  female nursing students ( $n=77$ ) have positive attitude followed by male ( $n=300$ ) nursing students  $f=277(92.3\%)$  also have positive attitude towards ECC & IOH, respectively.

**Conclusion:** This study concluded that majority of undergraduate nursing students in Peshawar have moderate level of knowledge and showed positive

*attitude towards early childhood caries and infant oral health, which necessitate that nursing students must have infant oral health related education in their curriculum.*

## INTRODUCTION

Oral health (OH) is an essential component of overall health and wellbeing, particularly during early childhood when physical growth and developmental processes are rapid. Early childhood caries (ECC) is one of the most prevalent chronic diseases of childhood worldwide and continues to represent a major public health challenge despite being largely preventable[1]. The 2017 Global Burden of Disease study reported 530 million children worldwide having primary dentition caries[2]. ECC is not only an issue for low income countries but for high income countries as well affecting nearly 49% of preschool children globally [3]. In Asia the prevalence of ECC is higher approx 52% while the US see around 48%, Europe about 43% and Oceania the highest rates, up to 82%[4]. In Saudi Arabia among 644 parents, 51.4% were unaware of early signs of decay such as white lines, only 37% knew about fissure sealants, and just 23% understood how sealants are applied[5]. In refugee camps in Erbil, Iraq, about 59.8% of children experienced ECC, yet a substantial proportion of parents showed only fair knowledge (approx. 58%) and positive attitude (approx. 61%), with practices lagging behind[6]. In India, a prevalence of 44% of ECC has been reported among 8-48-month-old children[7]. In rural south India, the prevalence has been reported to be 40.6% among 0-3-year-old children[8]. In Pakistan, studies show a high burden: in Abbottabad ~40.5% of children aged 3-5 have one or more decayed primary teeth[9]. The economic burden associated with OH problems in children is considerable as well. Canadian reports estimate that in order to treat only one child having ECC, the cost may vary from \$700 to \$3000[10]. In England alone, more than 60,000 children had their teeth extracted due to caries between 2012 and 2013. The overall cost of extracting these teeth was estimated to be £27.6 million[11].

A research study in India found that Nursing Students(NS) were not well-versed with

information on the etiology and prevention of ECC [12]. Bashiru BO et al., reported that among nursing students in Nigeria found positive attitudes towards oral health promotion but a lack of basic knowledge [13]. In China, the overall oral health literacy among nurse is at a moderate to low level. Monthly household income, self-rated oral health, brushing time, use of fluoride toothpaste, and regular oral examination were significantly associated with oral health literacy scores [14]. A study conducted in Turkey, revealed that there is a positive attitude but poor level of knowledge among primary school teachers [15]. Studies conducted in Malaysia and Australia revealed that Majority of the medical students had good knowledge of general IOH but had poor knowledge with regards to the etiology and prevention of ECC [16]. This knowledge deficit has been linked to the lack of formal oral health instruction in undergraduate nursing education, a finding supported by Dolce et al. in USA [17]. In Pakistan, and particularly in Peshawar, there is a paucity of data assessing undergraduate nursing student's knowledge and attitudes regarding ECC and infant oral health. The absence of locally generated evidence limits the ability to assess whether existing nursing curricula sufficiently prepare students to engage in oral health promotion and early childhood caries prevention. To address this gap, the present study was designed to assess the level of knowledge and attitudes regarding early childhood caries and infant oral health among undergraduate nursing students in Peshawar. By identifying areas of strength and deficiency in students' understanding and perceptions, this research aims to provide evidence that may inform curriculum enhancement, targeted educational interventions, and policy-level strategies. Strengthening oral health education within nursing training programs has the potential to improve early preventive practices and contribute to a reduction in the burden of ECC at the community level.

## MATERIALS AND METHODS

### STUDY DESIGN

The study design was a cross-sectional survey which assess the level of knowledge and attitudes towards ECC and IOH among undergraduate nursing students (UNS) in Peshawar, Pakistan.

### STUDY SETTING

The study was conducted in the following nursing colleges;  
Khyber Pakhtunkhwa College of Nursing, Rehman College of Nursing, School of Health Sciences, Hayatabad Institute of Medical Sciences, Farkhanda College of Nursing and NCS College of Nursing, Peshawar.

### STUDY POPULATION

The study population comprised male and female UNS who were enrolled in the above mentioned nursing institutions in Peshawar. Only students in the 3rd and 4th year of the Generic BS Nursing (GBSN) program were included, as these students had prior clinical exposure and were more likely to have encountered infant and child health services.

### STUDY DURATION

The study was conducted over a six-month period from July 2025 to December 2025. This duration allowed sufficient time for institutional permissions, participant recruitment, data collection, and analysis.

### SAMPLE SIZE

The required sample size was calculated using the Raosoft® online sample size calculator. Assuming a total population of approximately 20,000 UNS, a confidence level of 95%, a margin of error of 5%, and a response distribution of 50% (to ensure maximum sample size in the absence of prior prevalence data), the minimum required sample size was determined to be 377 participants.

### SAMPLING TECHNIQUE

A non-probability convenience sampling technique was employed to recruit participants from the selected nursing colleges.

### SAMPLE SELECTION

The study's inclusion criteria stated that all the undergraduate nursing students enrolled with the above mentioned nursing institutions, both male & female UNS, Age group between 18 - 30 years, UNS who has a clinical exposure, UNS of 3<sup>rd</sup> and 4<sup>th</sup> year of GBSN

The following exclusion criteria were excluded those that Students enrolled in non-nursing or other health-related programs, Students diagnosed with neurological, psychiatric, or systemic diseases, Students enrolled in the 1st and 2nd year of GBSN, Students unwilling to participate.

### DATA COLLECTION PROCEDURE

Following approval of the research proposal by the Departmental Research Board (DRB) of Khyber Pakhtunkhwa College of Nursing, formal permission was obtained from the principals of all participating institutions. Eligible students were informed about the aim/objective and procedures of the study, and written informed consent was obtained prior to participation. Through inclusion and exclusion criteria, the agreed-upon participants were evaluated. The following tools were used to gather data;

- A structured and validated questionnaire adapted from Folayan et al. [18]. Was used to collect data regarding demographic information, knowledge regarding ECC and IOH, and attitudes toward infant oral health practices. The knowledge section comprised 15 items with the score ranging from 0 to 15 and were categorized as poor (0-49%), moderate (50-74%), and good ( $\geq 75\%$ ). The attitude section consisted of six statements measured using a 5-point Likert scale ranging from 6 to 30, with higher scores reflecting more positive attitudes toward ECC prevention and infant oral health care.

All participants provided their informed consent before having their data gathered at a time that worked for them. The participant responses were recorded after the researcher had read the questions to them.

### DATA ANALYSIS PROCEDURE

Data was analyzed using the SPSS version 23. Descriptive statistics were used to summarize the

data. Continuous variables were expressed as means and standard deviations, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test, with a p-value of <0.05 considered statistically significant.

#### ETHICAL CONSIDERATIONS

Ethical approval was obtained from the DRB of Khyber Pakhtunkhwa College of Nursing prior to the commencement of the study. Institutional permission was obtained from all participating nursing colleges. Participation was voluntary, and written informed consent was obtained from all respondents. Confidentiality and anonymity were ensured by assigning unique identification codes to

questionnaires and restricting data access to the research team only.

#### RESULTS

The study included 377 participants (n=377), with a mean age of 22.3±1.6 years, ranging from 19 to 28 years. Among them, 79.6% were male (300) and 20.4% were female (f=77). The participants were selected from various professional years, with 50.7% from third year (f=191) and 49.3% from fourth year (f=186). Moreover, the participants from different institution with 16.4% from RCN (f=62), 16.7% from FIN (f=63), 16.7% from KPCN (f=63), 16.7% from HIMS (f=63), 16.7% from SHS (f=63) and 16.7% from NCS (f=63), were almost equally selected respectively. (Table 1)

**Table 1 Demographic information of the participants**

Demographic variables		Mean	SD
Age (Years)		22.3	1.6
		<i>f</i>	%
Gender	Male	300	79.6
	Female	77	20.4
Academic Year	Third Year	191	50.7
	Fourth Year	186	49.3
Name of institutions	Rehman College Of Nursing(RCN)	62	16.4
	Farkhanda Institute of Nursing(FIN)	63	16.7
	Khyber Pakhtunkhwa College of Nursing(KPCN)	63	16.7
	Hayatabad Institute of Medical Sciences(HIMS)	63	16.7
	School of Health Sciences(SHS)	63	16.7
	NCS College of Nursing(NCS-CN)	63	16.7
<b>Total</b>		<b>377</b>	<b>100</b>

Out of 377 participants (n=377), 41.4% of the UNS were received formal training (f=156) towards IOH whereas 58.6% didn't received formal training. Moreover, 37.9% were observed ECC

(f=143) and 62.1% didn't observed ECC (f=234) during their clinical exposure, respectively. (Table 2)

**Table 2 Formal training towards IOH & ECC observation of the participants**

Variables		<i>f</i>	%
Formal training towards IOH	Yes	156	41.4
	No	221	58.6
ECC observation	Yes	143	37.9
	No	234	62.1
<b>Total</b>		<b>377</b>	<b>100</b>

A significant majority of the participants (n=377), 60.7% (f=229) of the participants have moderate level of knowledge while 20.7% (f=78) have poor level of knowledge and 18.6% (f=70) have good level of knowledge towards ECC & IOH among undergraduate nursing students in Peshawar,

respectively. Moreover, significant majority of the participants, 92.6% (f=349) have positive attitude and 7.4% (f=28) have negative attitude towards ECC & IOH among undergraduate nursing students in Peshawar, respectively. (Table 3)

**Table 3 Level of Knowledge towards ECC & IOH of the participants**

Variables		f	%
Level of knowledge	0-49% (Poor knowledge)	78	20.7
	50-74% (Moderate knowledge)	229	60.7
	75-100% (Good knowledge)	70	18.6
Level of attitude	Score >50% (Positive attitude)	349	92.6
	Score <50% (Negative attitude)	28	7.4
Total		377	100

Cross Tabulation between the level of knowledge and different variables towards ECC & IOH revealed that, the level of knowledge towards ECC & IOH was higher 87%(f=67) among female UNS (n=77) as compared to 77.3% (f=232) male UNS (n=300) whereas the level of knowledge towards ECC & IOH were higher among UNS belongs to NCS(f=48), FIN(f=45) & RCN(f=44) as compared to other nursing institutions in Peshawar. Moreover, the level of knowledge towards ECC & IOH were higher among UNS who received formal training (83.9%) as compared to those who didn't

received formal training. Moreover, the level of knowledge towards ECC & IOH were higher among those UNS who (85.2%) observed ECC during their clinical exposure as compared to those who didn't observed ECC during their clinical exposure, respectively.

Chi-square tests revealed a statistically significant associations (P<0.05) between level of knowledge and different institutions, formal training regarding IOH whereas no significant association between level of knowledge and gender, ECC during their clinical exposure (P>0.05). (Table 4)

**Table 4 Cross Tabulation between level of knowledge towards ECC & IOH and different variables**

Variables		Level of knowledge towards ECC & IOH			Total	P Value
		0-49% (Poor knowledge)	50-74% (Moderate knowledge)	75-100% (Good knowledge)		
Gender	Male	68	176	56	300	.148
	Female	10	53	14	77	
	Total	78	299	70	377	
Name of Institution	RCN	12	44	6	62	0.00
	FIN	10	45	8	63	
	KPCN	20	34	9	63	
	HIMS	13	24	26	63	
	SHS	13	34	16	63	
	NCS	10	48	5	63	
	Total	78	229	70	377	
Formal Training	Yes	25	94	37	156	0.03
	No	53	135	33	221	

regarding IOH	Total	78	229	70	377	
ECC during your clinical exposure	Yes	24	85	34	143	0.07
	No	54	144	36	234	
	Total	78	229	70	377	

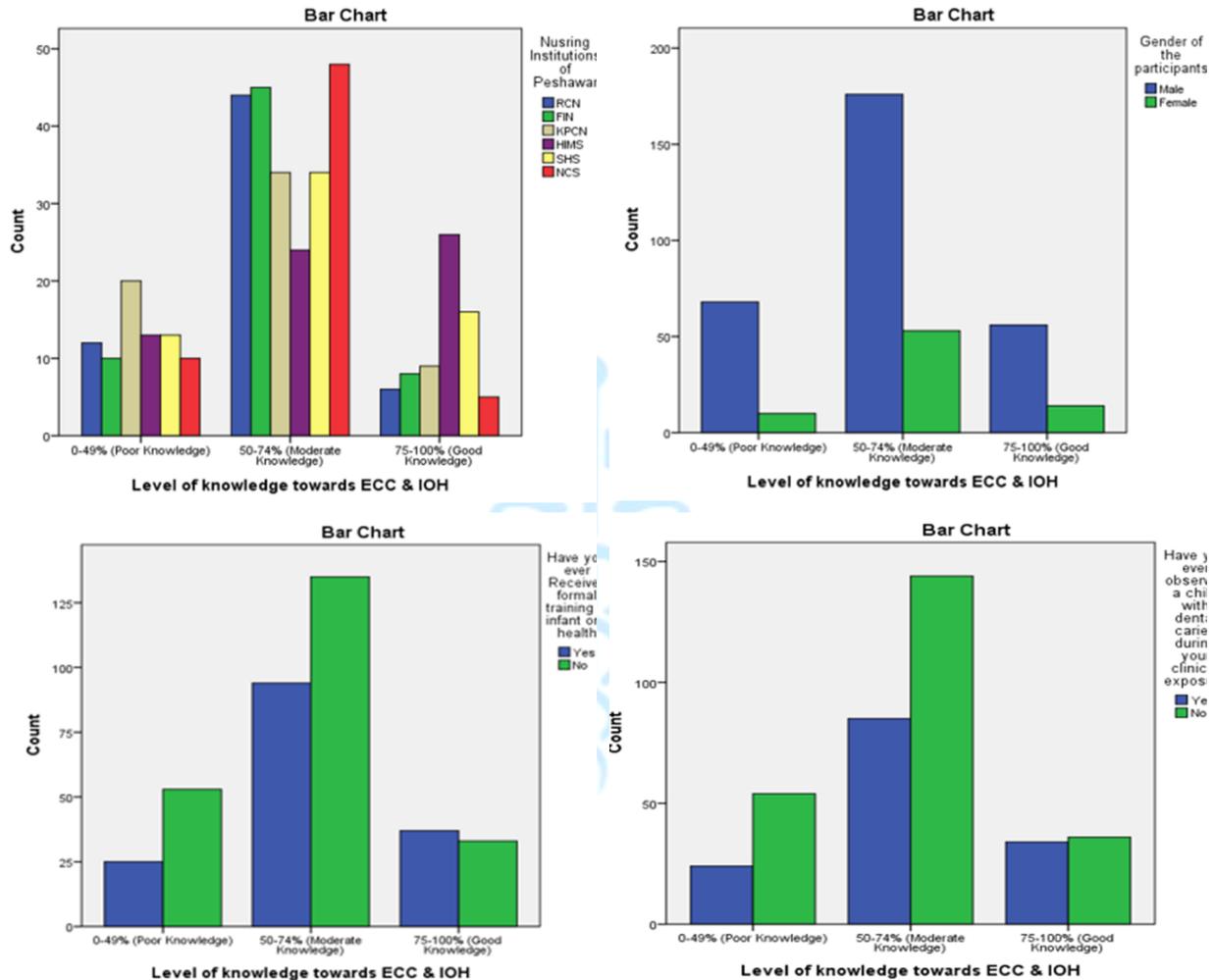


Figure 1 Showing Level of knowledge towards ECC & IOH in relation to different variables

Cross Tabulation between the level of attitude and different variables towards ECC & IOH revealed that, the level of attitude towards ECC & IOH were more positive almost similar among both male 92.3% (f=277) and female 93.5% (f=72) UNS whereas the level of attitude towards ECC & IOH were positive almost similar among all the nursing institutions in Peshawar. Moreover, the level of

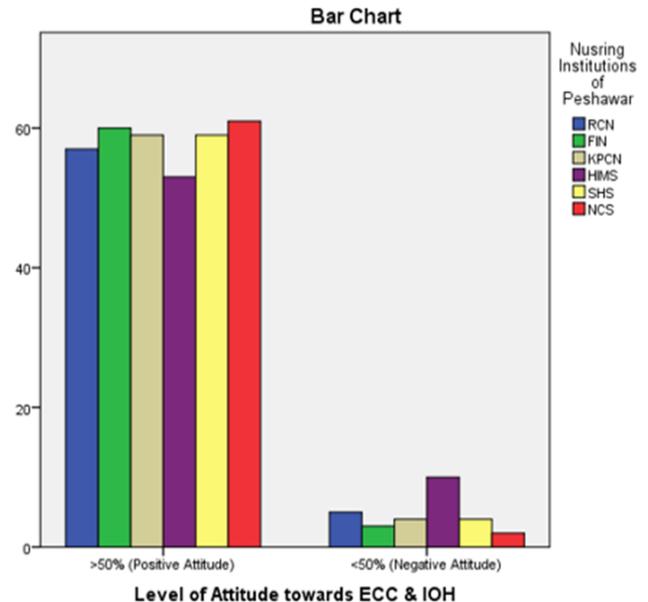
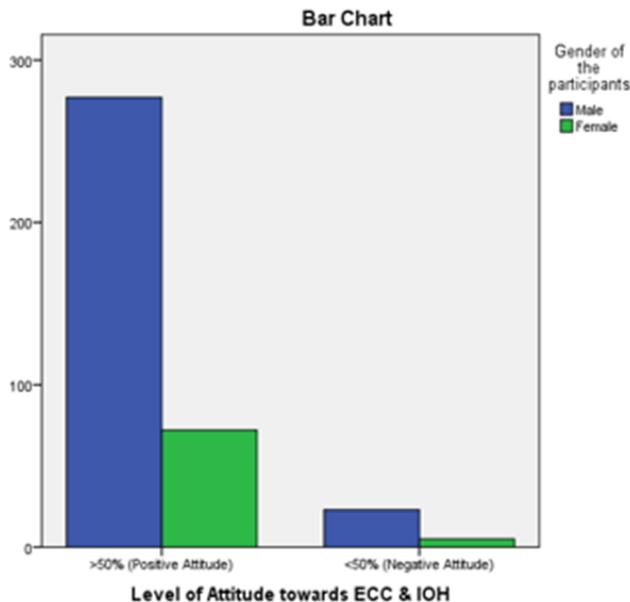
attitude towards ECC & IOH were more positive among UNS who received formal training 90.0% (f=199) whereas those UNS who didn't received formal training 9.95% (f=22) were negative attitude. Moreover, the level of attitude towards ECC & IOH were higher among those UNS who (85.2%) observed ECC during their clinical exposure as compared to those UNS who didn't

observed ECC during their clinical exposure have negative attitude, respectively. Chi-square tests revealed a statistically significant associations ( $P < 0.05$ ) between level of attitude and,

formal training regarding IOH whereas no significant association between level of attitude and gender, different institutions, ECC during their clinical exposure ( $P > 0.05$ ). (Table 5)

Table 5 Cross Tabulation between level of attitude towards ECC & IOH and different variables

Variables		Level of attitude towards ECC & IOH		Total	P Value
		Score >50% (Positive attitude)	Score <50% (Negative attitude)		
Gender	Male	277	23	300	0.7
	Female	72	5	77	
	Total	349	28	377	
Name of Institution	RCN	57	5	62	0.10
	FIN	60	3	63	
	KPCN	59	4	63	
	HIMS	53	10	63	
	SHS	59	4	63	
	NCS	61	2	63	
	Total	349	28	377	
Formal Training regarding IOH	Yes	150	6	156	0.02
	No	199	22	221	
	Total	349	28	377	
ECC during your clinical exposure	Yes	137	6	143	0.06
	No	212	22	234	
	Total	349	28	377	



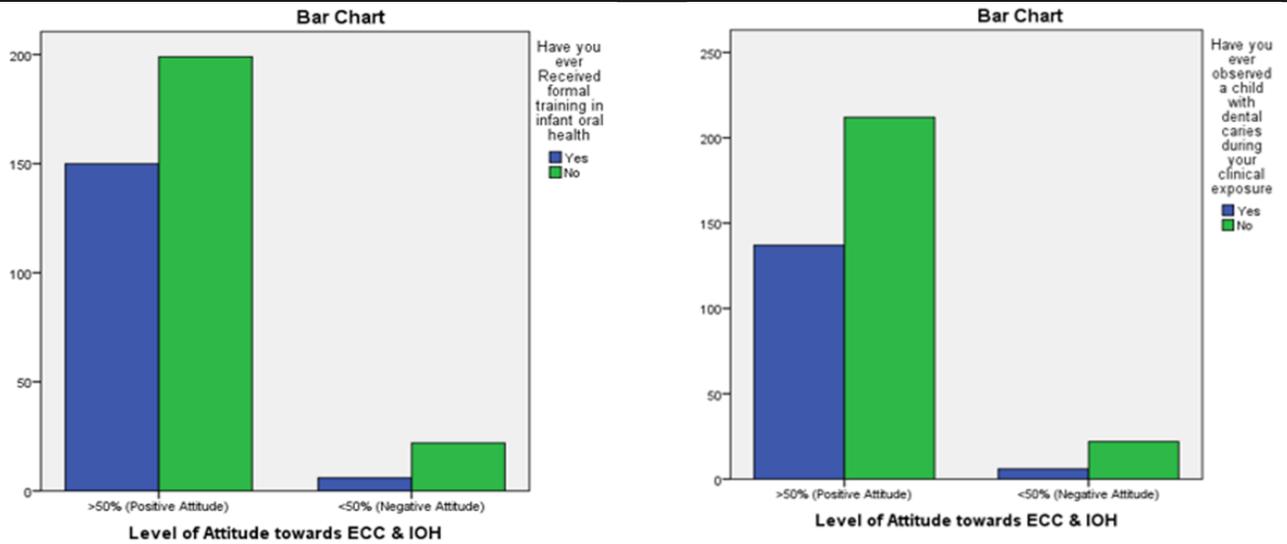


Figure 2 Showing Level of Attitude towards ECC & IOH in relation to different variables

### DISCUSSION

The purpose of our study is to determine the level of knowledge and attitude towards ECC and IOH among undergraduate nursing students in Peshawar. A total of 377 undergraduate nursing students were successfully surveyed, mostly males (79.6%) with a mean age of  $22.3 \pm 1.6$  years with 50.7% Third year students and 49.3% fourth-year students, respectively. Out of 377 NS, majority (58.6%) of the NS didn't received any formal training regarding IOH and 234 (62.1%) were didn't observed ECC during their clinical exposure followed by 41.4% received formal training regarding IOH and 37.9% were observed ECC during their clinical exposure, respectively.

The main finding of this study revealed that the majority of undergraduate NS (60.7%) have a moderate level of knowledge and (92.6%) had a positive attitude toward ECC and IOH. Moreover, the study also revealed that there is a significant association between level of knowledge and different institutions, formal training regarding IOH ( $P < 0.05$ ) whereas no significant association with gender, ECC during their clinical exposure ( $P > 0.05$ ). The study also shows that there is a significant association between level of attitude towards ECC and IOH with formal training ( $P < 0.05$ ) whereas no significant association with gender, institutions, ECC during their clinical

exposure ( $P > 0.05$ ), respectively. Similar study conducted by Leena et al observed that, in a total of 184 nursing students completed questionnaires, for a response rate of 92%. Poor knowledge score was obtained with score of 46% in general oral health, 48% in pediatric dentistry, 43% in dentistry related to systemic disease. 90% of the nursing students believe that oral health care is a high priority and consider treatment in the oral cavity as much important as treatment in other parts of the body, with 80% of nursing students think that it is necessary to obtain oral health curriculum education with appropriate competence level assessment. Approximately 85% would like to obtain more oral health curriculum education and to implement oral health curriculum activities during their training and career[19]. Similar finding revealed by our study, that majority (92.6%) of nursing students showed positive attitude towards ECC and IOH, but showed moderate level of knowledge (60.7%) by majority of nursing students, which necessitate the inclusion of infant oral health education into nursing curriculum.

Al Hatlani et al observed that in a total of 571 medical, dental, and nursing students in a similar kind of study revealed that knowledge of dental

students was highest (score 7.72 out of 10) followed by nursing students (4.79) and medical students (4.43). In view of the inadequate knowledge level of medical and nursing students about IOH when compared to dental students, improvements in medical and nursing education programs are necessary at Qassim University[20]. Similar finding is reported by our study in terms of level of knowledge of nursing students towards ECC & IOH, which revealed that majority of the nursing students (60.7%) have moderate level of knowledge towards ECC & IOH, which must get IOH education during their academic studies.

Deogade et al., revealed that 84.3% of the participants knew how many teeth we have in our mouth. Many of them were not aware of proper brushing method. However, they revealed an adequate knowledge toward the identification of disease and its relation to general health. They also showed knowledge regarding the effect of diet on oral health but 83.1% of them were confused with the identification of tooth decay. Approximately 51.7% of participants were unsure about the number of visits a person should make to a dentist[21]. Same finding is revealed by our study that nursing student have moderate level of knowledge which need improvement to achieve good level of knowledge.

Rosina Bhattarai et al., revealed that majority of respondents had good oral health knowledge including functions of teeth (94.0%), mineral important for tooth formation (98.4%), vitamin necessary for growth and development of teeth (91.2%), dental caries (90.4%), gingival diseases (96.4%) and treatment for malocclusion (90.8%). Almost half of the participants did not know about treatment options for gum disease, consequences of irregular teeth and causes of oral cancer. Majority of the participants showed good attitudes towards oral health with 99.2% giving equal importance to their teeth like their general health. 78.9% of the participants brush twice daily with 98% using toothbrush and toothpaste among whom 65.7% uses soft bristle toothbrushes[22]. In contrast our study disclose that majority (60.7%) of the nursing students have moderate level of knowledge, but showed positive attitude towards ECC and IOH.

## CONCLUSION

This study concluded that more than two third of undergraduate Nursing Students in Peshawar have moderate level of knowledge and showed high positive attitude towards early childhood caries and infant oral health, which necessitate that nursing students must have infant oral health related education in their curriculum. Moreover, formal training regarding infant oral health and gender are the most common risk factors associated with level of knowledge and attitude (except gender) towards early childhood caries and infant oral health among undergraduate Nursing Students in Peshawar.

## LIMITATIONS

We would really like to highlight the shortcomings in this study. This survey became performed at a single geographic area Peshawar involving only nursing students & institutions. Only 377 undergraduate nursing students were decided to survey which is considered a small sample size with lack of postgraduate nursing students & institutions in this study. There was funding issue as well.

**SOURCE OF SUPPORT: Nil**

**CONFLICT OF INTEREST: None**

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