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Perception and Practices of Parents regarding Milk Consumption and its Association with Oral Health among School going Children of Lahore – A Questionnaire based Survey

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ABSTRACT

Objective: To access the perception and practice of parents regarding milk consumption and its benefits as well as its association with oral health among school-going children of Lahore. **Study Design:** Questionnaire-based descriptive cross-sectional survey. **Settings:** de' Montmorency College of Dentistry, and the participating schools Lahore Pakistan. **Duration:** 1st January 2022 to 10th May 2022. **Methods:** With the approval of the Institutional Review Board (IRB) Committee of de 'Montmorency College of Dentistry and the participating schools. Data was collected using in-hand questionnaires administered during scheduled parent-teacher meetings. The chi-Square test was used to compare milk consumption and other variables. **Results:** In the present study, 89.1% children had regular milk drinking habits. The most preferred source of milk was buffalo (45.4%), followed by cow (42.3%) and goat (7.9%). There was no statistically significant difference between male and female students regarding habit and amount of milk consumption. Parents of government school-going children are keener regarding oral cavity cleaning after milk consumption. Two third of the participants were aware of the term lactose intolerance. There was a statistically significant difference between the views of parents of private and public-school-going children regarding the association of milk with dental caries. **Conclusion:** The majority of children consume milk regularly. Awareness of parents about milk nutrition and lactose intolerance was adequate. Parents should be educated about the different sources of milk and their benefits. Regular oral cavity cleansing should be recommended after drinking sweetened or unsweetened dairy.

Keywords: *Awareness, Dietary guidelines, Lactose intolerance, Milk consumption, Oral health, Parents, Sweetened milk.*

INTRODUCTION

Milk drinking in young adults and children has long been associated with good growth and health. This concept led to Bogin's "milk hypothesis," which states that children should be breastfed exclusively for the first six months of their lives. However, nonhuman milk ingestion after that age may enhance growth in subsequent years.[1]

Milk has many physiological benefits. It contains 18 of the 22 essential nutrients and has been suggested by a large number of dietary standards and nutritionists all over the world.[2] Milk is a major source of nutrients for newborns, children and adults and plays a significant role in growth.[3] Adults should consume three servings of milk daily, as per recommendations of the American Heart Association/American College of Cardiology. However, adults should drink at least three cups of fat-free milk daily, as suggested by the current Dietary Guidelines for Americans.[4]

Fortified milk has added nutrients like vitamin D and calcium, which improves bone health.[2] Pasteurized milk is heated to a specific temperature to kill pathogens

making it safe for consumption.[5] Both fortified and pasteurized milk are widely recommended for ensuring nutritional safety.[2] On the other hand, fresh milk is typically unprocessed may carry higher risks of bacterial contamination if not properly handled or boiled.[6] Whole milk provides a higher concentration of vitamins A and D as well as essential fatty acids compared to lower fat milk.[3]

Studies done in Scotland and New Guinea reported better growth in children who had milk in addition to their regular diet.[7] Fewer milk consumption and growth studies are available for low- and middle-income nations. However, a handful of surveys done in Kenya and Vietnam, as well as cross-sectional studies in Cambodia and Uganda, provided more recent evidence supporting milk's positive role in children's growth.[8] Studies have also shown that milk has been associated with a higher risk for acne.[3, 9] Furthermore, decreased iron absorption due to calcium and casein is another disadvantage of cow milk for infants in the first year of their lives.[9]

Despite efforts and innovations in milk production and the availability of varieties of milk products, milk consumption has been reduced since 1970.[8, 10] In the USA, programs like National School Lunch Program (NSLP) and School Breakfast Program (SBP) have encouraged the intake of milk in schools by recommending at least one cup per day as part of their breakfast and lunch.[11] These programs have directed schools to provide fortified and pasteurized milk in flavored and non-flavored options and nondairy milk for children with special dietary requirements.[12]

Milk allergy and lactose intolerance are both major concerns. However, the prevalence of cow milk allergy ranges from 0.6 to 3.0%, whereas lactose intolerance has an incidence of 0–17.9% reported in the literature. Most people with suspected lactose intolerance or malabsorption can tolerate 12g to 15g of lactose.[3,10]

The survey aims to assess the perception and practice of parents regarding milk consumption and its benefits, as well as its association with oral health among school-going children in Lahore.

METHODS

This questionnaire-based descriptive cross-sectional survey was conducted from 1st January 2022 to 10th May 2022 with the approval of the Institutional Review Board (IRB) of de' Montmorency College of Dentistry (No:3654/DCD) and the participating schools. Three private and three public primary schools were selected using convenience sampling. The sample size was determined to be 211 participants, calculated using 95% confidence interval, a 5% significance level and an anticipated prevalence rate of 0.836.[13]

The data was collected using in-hand questionnaires administered during scheduled parent-teacher meetings after consent. The questionnaire was given to the parents/guardians at the parent-teacher meeting. The inclusion criteria were parents and guardians who attended parent-teacher meetings with students from preschool to class 10. Two hundred and eleven participants took part in the survey.

The questionnaire was designed by the authors and validated by two research experts using face validity. The questionnaire consists of two parts and 20 items. The first part targets demographics, whereas the second deals with questions regarding milk nutrition and consumption and its association with oral hygiene. The forms were immediately collected and checked for completion, and ambiguities were discussed.

The IBM Statistical Package for Social Sciences was used to perform statistical analysis on the data (SPSS version 20, IBM Corporation, USA, New York, 2011). The results were summarized using descriptive statistics. The Chi-Square test compared milk consumption and parental awareness among private and public-school-going children and other categorical variables. A p- value of ≤0.05 was considered significant.

RESULTS

There were 211 respondents, 110 (52.1%) from government schools and 101 (47.9%) from private schools. Female students were 54.5%, whereas male students comprised 45.5% of the participants. The response rate was 100%. Parents of students from kindergarten to primary were included in the study. The milk consumption and practices are expressed in Table 1.

In the present study, 89.1% children had regular milk-drinking habit, and more than sixty percent consumed 1-2 cups of milk daily. The majority of the respondents were giving milk to their children in the morning only (28.5%). The most preferred source of milk was buffalo (45.4%). Moreover, the most preferred type of milk was 'whole milk' (70.6%). 58.6% were adding sweetening agents in milk. The most common sweetening agent was white sugar (36.9%). The most common agent for cleaning was tooth brush (54.1%), whereas flossing was the least preferred method (3.2%) (Table 1).

The perception of parents regarding milk nutrition and its effects on oral health are tabulated Table 2. Around two third of the participants (71.6%) were aware of the term 'lactose intolerance'; the parents of private school children were more aware. The prevalence of lactose intolerance and milk allergy is expressed in Figure 1.

There was no statistically significant difference between private and public-school students regarding habit and amount of milk consumption and maintaining oral

hygiene after consuming milk. Parents of government school-going children were keener regarding oral cavity cleaning after milk consumption (Table 3).

There was a statistically significant difference among the views of parents of private and public-school-going children regarding the association of milk consumption with dental caries. Significant proportion of parents of government school children (38.9%) believed milk could make their teeth whiter. 78.8 % believed milk strengthens teeth. More than half of the respondents (57.2%) think that milk is essential for healthy gums (Table 3).

Table 1: Milk Consumption Practices and Preferences

Statements	N (%)
Does your child drink milk regularly	
Yes	188(89.1)
No	23(10.9)
Milk serving per day	
½ Cup	34(16.3)
1 cup	82(38.5)
2 Cups	70(33.2)
3 or more cups	25(12)
At what time do you provide milk to your child	
Morning	60(28.5)
Evening	29(13.4)
Night	37(17.6)
Morning & Evening	55(26.2)
Morning & Night	30(14.3)
Do you add sweetening agent in milk	
Yes	123(58.3)
No	88(41.7)
Which sweetening agent do you use	
White sugar	78(36.9)
Brown sugar	19(9.1)
Honey	40(18.9)
Jaggery	9(4.3)
Others	65(30.8)
What type of milk do you prefer for your child	
Whole milk	144(70.6)
Packed milk	37(19.8)
Powdered milk	16(9.6)
Source of milk you prefer for your child	
Buffalo	96(45.4)
Cow	89(42.3)
Goat	17(7.9)
Camel	9(4.4)
Do you clean the oral cavity of your child after milk consumption	
Yes	77(36.5)
No	74(35.1)
Sometimes	60(28.4)
Which oral hygiene agent do you use	
Brushing	114(54.1)
Oral rinse with water	70(33.2)
Oral Rinse with the mouth was	20(9.5)
Flossing	7(3.2)

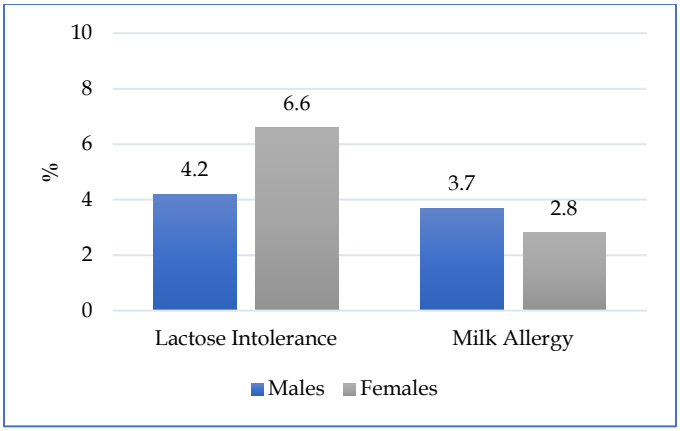
Table 2: Perception of Parents Regarding Milk Nutrition and Oral Hygiene

Statements	N (%)
Awareness of lactose intolerance	
Aware	151(71.6)
Unaware	60(28.4)
Milk can make your child's teeth whiter	
Yes	82(38.9)
No	78(37)
May be	51(24)
Milk can make your child's teeth stronger	
Yes	166(78.8)
No	2(1.0)
May be	43(20.2)
Milk is good for gums	
Yes	121(57.3)
No	18(8.6)
May be	72(34.1)
Milk can cause caries in teeth	
Yes	31(14.7)
No	111(52.6)
May be	69(32.7)

Table 3: Comparison of perception and practices of parents of private and public-school children regarding milk nutrition

Statements	Public N (%)	Private N (%)	X^2	p-value
Milk drinking habit				
Yes	92(43.6)	96(45.4)	7.06	0.06
No	18(8.5)	5(2.3)		
Use of sweetening agent				
Yes	71(33.6)	52(24.6)	19.53	0.00
No	39(18.4)	49(23.2)		
Awareness of lactose intolerance				
Yes	68(32.2)	81(38.3)	8.02	0.01
No	42(19.9)	20(9.4)		
Milk whitens the teeth				
Yes	63(29.8)	24(11.3)		
No	14(6.6)	47(22.2)	35.74	0.00
Unaware	33(15.6)	30(14.2)		
Milk strengthens the teeth				
Yes	84(39.8)	80(37.9)		
No	6(2.8)	7(3.3)	0.82	0.84
Unaware	20(9.4)	14(6.6)		
Milk is good for gums				
Yes	56(26.5)	63(29.8)		
No	15(7.1)	12(5.6)	3.32	0.34
Unaware	39(18.4)	26(12.3)		
Milk causes cavities				
Yes	12(5.6)	29(13.7)		
No	59(27.9)	61(28.9)	20.89	0.00
Unaware	35(16.5)	15(7.1)		
Regular brushing after milk				
Yes	51(24.1)	25(11.8)	14.25	0.003
No	59(27.9)	76(36)		

Figure 1: Prevalence of lactose intolerance and milk allergy among male and female students



DISCUSSION

Ingestion of milk has been demonstrated to be quite beneficial in numerous scientific investigations. As stated in the American Journal of Clinical Nutrition, milk is a rich source of numerous vitamins, minerals, and nutrients.[14] In recent years, milk has emerged as a contentious issue in the United States due to the increasing number of vegans and the proliferation of research examining the nutritional benefits and drawbacks of milk. In the present study, 89.1% of the participants admitted their child is consuming milk regularly, a finding that is consistent with prior studies and existing literature.[15] In younger generation, milk consumption has decreased substantially over the past few decades, notwithstanding the global increase in milk production.[16] In contrast, milk production and consumption have increased substantially in Pakistan and throughout Asia as a whole.[17,18] The current study findings align with studies conducted in India and China, where increasing urbanization and dietary changes have led to a higher demand for milk and dairy products.[19,20]

More than 60% of participants in our study consumed 1-2 cups per day, closer to the suggested guidelines. The American Academy of Pediatrics recommends 2–3 cups (16–24 ounces) of whole milk for toddlers aged 12–24 months and 2–2.5 cups (16–20 ounces) of low-fat dairy for children aged 2–5 years.[21,22] However, US national dietary standards recommend three cups (732 mL) of milk daily for young adults to meet key nutrient needs.[23] A study conducted by Bacchetta et al., also emphasizes the importance of meeting daily dairy intake to ensure adequate calcium and vitamin D levels in children.[24]

The majority of the participant in the present study gave milk to their children either in the morning or both morning and evening. Milk in the morning supplies you with the proteins you need for the day, and milk at night helps you sleep better. There is no consensus regarding which time is suitable for milk consumption. However, most of the literature recommends that milk be consumed before bedtime.[25] A comparative study with Western dietary habits shows that evening milk consumption is more prevalent in Asian countries due to cultural beliefs and digestive benefits.[26]

The most preferred milk source in our study was buffalo milk, followed by cow, goat, and camel. This is explained by the fact that buffalo milk accounts for 68% of the total milk output in Pakistan. Cowmilk is the most preferred milk worldwide, followed by goat, sheep, and camel milk. Cow milk has lower fat and is easily digestible, whereas buffalo milk is creamier and thicker. Regarding nutritional value, buffalo milk has more protein than cow milk, whereas goat milk has more minerals, vitamins, and alkalinity and is more easily digestible.[27] Camel milk is abundant in antioxidants, minerals, and vitamins, which protect you from major illnesses.[28] The findings of this study findings align with recent reports highlighting the growing demand for camel milk due to its hypoallergenic properties and nutritional benefits.[28]

In the present study, participants preferred whole milk to powdered or raw milk. Whole milk has a higher fat content and is also known as fresh, unadulterated milk. However, because raw milk contains certain hazardous microorganisms despite better nutritional content, it is suggested to be pasteurized before usage.[6] Powdered milk is dehydrated and modified; thus, it loses some of its nutritional content and has oxidized cholesterol as a health drawback.[29] Studies from developed countries support the preference for pasteurized milk due to safety concerns and government regulations.[14,30]

More than half of the participants in this study were adding sweetening agents to milk to make it more acceptable for their children. At the same time, white sugar was the most frequent sweetening agent reported. Many factors influence children's perceptions of milk, yet the fundamental drivers of milk consumption remain flavor and habit. Flavored milk consumption has doubled in the last decade. Beverages containing sugar or other sweeteners, such as chocolate or other flavored milk, should not be offered to children under five since they have added sugar and may cause dental caries if not cleaned regularly.[31,32] The findings of this study are consistent with studies showing a correlation between flavored milk consumption and increased sugar intake among children.[33]

In the present study 27% of the participants were not cleaning the oral cavity of their children after giving them milk, which is a significantly higher proportion. Most participants in this study believe that milk strengthens teeth which may have led to the conclusion that cleaning is unnecessary. The sweetening agent in milk can start a

carious process and may lead to rampant caries. Parents must be educated about using flavored milk and the need for oral hygiene after consuming sweetened milk.[31] These findings align with similar studies that emphasize the role of parental education in preventing dental caries linked to milk consumption.[34,35]

Around two-thirds of the participants in our study were aware of lactose intolerance, whereas 10% of the children reported intolerance to lactose, and 6.6% reported milk allergy. The results were in coherence with the previous literature.[36] Lactose intolerance is one of the main reasons why people don't drink milk. Around 2/3 population of humans has reportedly reduced their ability to effectively digest lactose in the past few decades. Lactose intolerance is common in adulthood, with around 30 million Americans suffering from it. Most lactose-intolerant people can handle 12–15 g of lactose.[36] Cow's milk allergy is estimated to affect 0.25% to 4.9% of the population, with children being more affected than adults. Cows' milk allergy affects 7% of babies under one, though most children outgrow it by the age of five.[37] Our findings are consistent with previous studies indicating regional variations in lactose intolerance prevalence.[9,36,38]

Most participants in the present agreed that milk is good for oral health, especially in strengthening teeth. In contrast, most parents from private schools believed milk could prevent caries. Parents should be aware that despite milk being good for health, regular oral cavity cleaning is still needed after milk consumption.[32] Similar studies suggest that public health campaigns should focus on promoting oral hygiene alongside milk consumption.[10,17,19,32]

CONCLUSION

The majority of children consumed milk regularly. The awareness of parents about milk nutrition and lactose intolerance, as well as its effect on the oral cavity, was adequate; however, parents should be educated about the different sources of milk and their benefits, the amount of milk to give to their children at different ages, alternate non-dairy based milk for lactose intolerant children, avoiding the use of regular sweetening agents in milk, and the role of milk in oral health, particularly tooth strengthening. Furthermore, regular oral cavity cleansing should be recommended after drinking sweetened or unsweetened dairy.

LIMITATIONS

One of the few shortcomings of this study is the use of convenience sampling, which may not accurately represent the broader population. Moreover, the lack of questions regarding non-animal-based milk, e.g., soy milk, almond milk, etc., and the lack of questions regarding raw milk. The knowledge about pasteurization, duration of boiling, and other milk-based products and their effect on the oral cavity remained unexplored and will be considered in future studies.

SUGGESTIONS / RECOMMENDATIONS

Longitudinal studies: Conduct longitudinal studies to examine the long-term effects of milk consumption on oral health in school-going children.

Intervention studies: Design intervention studies to evaluate the effectiveness of targeted programs promoting milk consumption and oral health education.

Exploring socioeconomic factors: Investigate how socioeconomic factors influence milk consumption and oral health outcomes in school-going children.

Developing culturally tailored interventions: Create culturally tailored interventions to promote milk consumption and oral health education among diverse populations.

CONFLICT OF INTEREST / DISCLOSURE

The authors declare no conflict of interest.

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