

# A Unique Association of Recurrent Swollen Lymph Nodes and Sweet Products in Pediatrics: A Cross Sectional Analysis in Rural Population of KPK

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## ABSTRACT

**Introduction:** The current study was aimed to investigate the association of dental caries with sweet products (especially sweetened milk at night) with lymphadenopathy in pediatrics. There is a well established mechanism of sweets with dental caries, and such caries can be the cause of recurrent lymphadenopathy.

**Methodology:** A total 201 patients were assessed at pediatric and dental clinic, patients of ages 1 to 5 years having recurrent lymphadenopathy and dental caries were included while the rest were excluded. They were evaluated for a number of parameters including dental caries grading, raised TLC, body temperature, pain, addiction towards sweets, hunger status, difficulty in chewing, sleep habits, social behavior, while their parents were interviewed regarding awareness about dental caries.

**Results:** It was observed that 90% of the patients were addicted to sweets, and 79% were having grade 4 dental caries, 82% were having aggressive behavior, 91% were having pyrexia, 94% were having raised TLC, 75% were in severe pain, 88% were facing difficulty in chewing solid food, 61% were underweight, 58% were anorexic, while 98% of the parent were not having any proper knowledge about caries development.

The practical implication of the study is to develop new strategies to minimize the consumption of sugary products that are the ultimate cause of dental caries. Such caries are then responsible for a number of issues including swollen lymph nodes.

**Conclusion:** All these issues may have a worst impact on the social, physical and mental growth of children. As all the patients were having recurrent lymphadenitis, yet it can be claimed that dental caries are among the primary causes.

**Keywords:** Dental caries; Lymphadenopathy; Pediatrics; Street sweets; Sweetened Milk.

## INTRODUCTION

Lymph nodes being small berries like organs responsible for the filtration of lymph and lymphocytes formation<sup>1</sup>. They are primarily responsible to help the body in various pathological conditions<sup>2</sup>. Lymphadenopathy is a condition when the lymph nodes become swollen while combating with pathogens that causes infections locally or systemic<sup>3</sup>.

Children are at high risk to grab anything and put them in their mouth even if harmful. They are also very fond of sweets and are attracted towards toffees, chocolate, bonbons and candies etc. Meanwhile the toddlers are also in the age of developing new teeth, learning behavior and talking<sup>4</sup>. The American Academy of Pediatrics urges that no sugar or sugary product should be given to children having ages less than 2 years, while those having ages of more than 2 may be given sugar upto 25gm in a day. More sugars intake in diets may lead to a number of health challenges in peds including (but not limited to) hypertension, obesity, cardiac diseases, metabolic disorders and dental caries<sup>5</sup>.

Dental caries also known as tooth decay is caused by a number of factors such as bacteria in oral cavity, snacking, high sugar intake and low dental hygiene<sup>6</sup>. The well established mechanism of dental caries by sweet products is the conversion of sugars to respective acids by oral bacterial flora. The formed acids may affect the equilibrium of mineralization and demineralization and lead to the erosion of enamel and thus enhancing demineralization<sup>7</sup>.

A number of bacteria including, *Streptococcus mutans* and *Streptococcus sobrinus* are among the principal agents of enamel erosion<sup>8</sup>. Species of *Lactobacillus* and *Actinomyces* are also associated with caries. *Actinomyces odontolyticus* colonizes infants before eruption of teeth. Dental caries always leads to abscess, which is among the leading causes of swollen lymph nodes in parotid, tonsillar, and submandibular region<sup>8</sup>.

Due to lack of awareness in urban population of Pakistan, there is mismanagement of feeding the toddlers. As soon as the mother milk production is decreased or the demand for intake is increases, the toddlers are switched to any diet including cattle milk. Kids already have issue with taste of cattle milk and fond of sweet substances are given sweetened milk. The sweetened milk is perceived to help the toddlers sleep well, as they are able to maintain a high blood sugar level and not induces as hunger reflex that cause a disturb sleep.

In the current study we have evaluated the unique association of feeding the toddlers with sweetened milk especially at night causing dental caries that in turn causes the recurrent swollen lymph nodes.

## METHODOLOGY

A Prospective, cross sectional survey was conducted in a period of 6 months i.e. January 2022 to June 2022 as a joint venture of Pediatric and dental clinic at Charsadda, KPK. The entire patients diagnosed with recurrent swollen lymph nodes in pediatric medical clinic were referred to dental clinic for the assessment of dental caries. Written Informed consent have been taken from parents of participants. Ethical principles under the ICH-GCP guidelines were followed. Protected Health Information (PHI) of patients were coded and stored in a secured place.

All the patients diagnosed with recurrent swollen lymph nodes and having dental caries were examined for the association. Out of total, 201 patients (ages 1 to 5 years) were found to meet the inclusion criteria. Non probability, convenient sampling technique was used to collect sampling units. Predesigned proforma was used to collect patient information having two different parts. First part consisting of socio-demographic variables, while second part includes a number of parameters including body weight, food habit, hunger status, sleep habit, attraction towards street shops sweets/candies, addiction of night sweetened milk,

social behavior, caries grading, intervention (including extraction or excavation and composite filling) needed, pain, sensitivity to hot/cold, swollen lymph nodes, body temperature, parents awareness level, difficulty in chewing and WBC level were observed for complete assessment. The inclusion criteria were patients with recurrent swollen lymph nodes, dental carries, and age ranges between 1 to 5 years. Patients other than the mentioned criteria were excluded.

The data was analyzed using graphPad Prism V5 and descriptive statistics was used to present the data. Association between recurrent swollen lymph nodes and sweetened milk was determine by using chi-square. P value less than 0.05 was considered statistically significant.

**Ethical Approval:** The studies were approved from the Institutional Research and Ethics Committee of the University of Lahore, Lahore, Pakistan (reg. no: IREC-2022-1H).

## RESULTS

Among the a maximum proportion (38.308%) patients were from age range of 4 to 5 years followed by patients of ages 3-4 years (26.368%). Similarly, least number of patients (4.975%) under age 1 year was observed. The major number of patients having body weight of 10-15 kg were found to be most affected with a significant percentage of 61.144% followed by 15-20 kg with 17.413%, no patient was observed in weight limits of 1-5 kg weight range. A maximum proportion (51%) of patient was having poor food habit, similarly the hunger status (58%), and sleep habit (59%) were also found to be poor. Among the patients 98% patient were found to be attracted towards street shops sweets and candies. In the observed patients 90% were addicted to drink sweetened milk at night. 82% patients were observed to have aggressive behavior. In the context of dental carries grading, the maximum number of patient (79%) were found in grade 4 followed by grade 3 and 2 with percentages of 16 and 5% respectively. 92% patients were observed with no intervention needed, excavation was found to be the suitable intervention in contrast to composite filling. A maximum of 75% patients were claiming of persistent pain associated with dental caries/ swollen limp nodes, 53% patients were found sensitive to hot/cold. In the observed patients majority (91%) were presented with pyrexia condition while 88% were having problems with chewing of solid food. 94% patients were having a raised WBC profile, while all the patients were having swollen lymph nodes.

Table 1: Patient's data distribution (percentage wise) collected at peads/dental clinic with caries and recurrent lymphadenopathy.

Age wise distribution of patients	
Ages	Percentage
Upto 1 year	4.975
1-2 years	14.428
2-3 years	15.920
3-4 years	26.368
4-5 years	38.308
Weight wise distribution of patients	
Weight (Kg)	Percentage
1-5	0
5-10	8.955
10-15	61.144
Sensitivity to hot and cold	
Sensitivity to hot/cold	Percentage
Yes	53
No	47
Lymphadenopathy in patients	
Swollen lymph nodes	Percentage
Yes	100
No	00
Raised body temperature in patients	
Body temperature	Percentage
Normal	9
Pyrexia	91
Awareness level of parents of patients	
Parents awareness level	Percentage

Educated about caries	2
Non- educated	98
Chewing status of patients	
Difficulty in Chewing solid food	Percentage
Yes	88
No	12
Raised TLC test in patients	
WBC level	Percentage
Raised	94
Normal (in range)	6

## DISCUSSION

There is a well established mechanism of the formation of dental caries associated with sweets<sup>9</sup>. The dental enamel which is the basic protective layer of the tooth is eroded by the acid formed due to bacterial metabolism of the sugary substances<sup>10</sup>. Intake of sugars in peads is totally contraindicated as mentioned in a number of guidelines including NIH, CDC, FDA etc<sup>11</sup>. The sugar (mixed in milk) intake by peads especially at night while sleeping provides sufficient time to bacteria to convert that sugar into associated acids, leading to the erosion of enamel and certainly the carries<sup>8</sup>. The dental carries serves to be a home for the pathogenic bacteria<sup>12</sup>. The bacteria on and off get escaped to systemic circulation, whereby it is captured by lymph nodes. The closely available lymph nodes to the oral cavity are parotid, tonciller and submandibular<sup>13</sup>. Almost all the patients were having any of the above lymph nodes swollen as well as dental carries. Upon the investigation it was found that a major portion of the patients were addicted to street sweets or sweetened milk (especially at night). A number of previously conducted studies confirm the above statement; in a review by Bleich and Vercammen it is reported that among the detrimental impacts of consumption of sugary substances includes obesity/ extra weight gain and dental caries in children<sup>14</sup>. Similarly a huge number of studies suggest that sugar-sweetened beverage consumption must be reduced to promote the dental health of children<sup>15</sup>. In other study it is also indicated that consumption of sweet drinks (non-milk extrinsic sugars) cause's dental caries in earlier ages<sup>16</sup>. They found a positive association between dental caries and free sugars consumption at bedtime in children<sup>17</sup>. The impact of sugary substances on dental caries has been highlighted in a recent review study<sup>18</sup> The stated results were in procession with those stated in a descriptive review conducted by Hujuel and Lingström in 2017; they mentioned that the fermentable carbohydrates were responsible for caries development<sup>3</sup>.

Lymphadenopahty is a term characterized by swollen lymph nodes and is one of the most common findings in patients with dental caries<sup>19</sup>. Majority of such patients have enlarged lymph nodes in the head and neck region, however the causes of such enlargement of lymph nodes is different so the strategies to manage them may also be not the same. Cervical lymphadenopathy is generally associated with a number of infection including dental issues<sup>20</sup>.

Dental caries being the home for a number of pathogenic bacteria including species of Lactoabacillus, Stryptococcus and Staphylococcus<sup>21</sup>. Bacterial cervical lymphadenitis is usually caused by Streptococcus pyogenes ( $\beta$ -hemolytic streptococci) or Staphylococcus aureus<sup>22</sup>. Anaerobic bacteria can cause cervical lymphadenitis, usually in association with dental caries and periodontal disease<sup>23</sup>. It is evident from the results of our study that all the patients presented to the dental clinic were having complains of recurrent lymphadenitis as well as dental carries. These results are in line with previously conducted studies by Jaitendar et al in 2014 in mentally challenged institutionalized patients, where patients with caries (79.2%) were having lymphadenitis in 76.3%<sup>24</sup>. Similarly, in another case report by Renie Kumala Dewi, it is also clear that the patient suffering from lymphadenitis was having a number of oral issues including dental caries due to low oral hygiene practices<sup>25</sup>. A study suggests that the majority of caries causes lymadenopathy in submandibular

region in children<sup>26</sup>. Similarly, it is reported in another study that managing caries in children subsided the recurrent lymphadenopathies<sup>27</sup>. The lymphadenopathy was among the primary symptoms of children having dental caries<sup>28</sup>. Along with lymphadenopathy a number of worth mentioning issues were observed in our study. The TLC of majority of patients was raised yet can be claimed bacterial lymph adenitis. A major population of the parents was not aware about the caries development. The leading among them was underweight due to poor hunger status (58%), over aggression (82%), poor sleep habit (59%), pain (75%), pyrexia (91%) and difficulty in chewing was observed in 88%.

## CONCLUSION

From the study it can be concluded that recurrent lymphadenopathy in pediatrics is closely associated with dental caries. These issues are certainly having the negative impact on the normal physical as well as mental growth of the children, hence sweets intake should be decreased among pediatrics to avoid dental caries, parents should be educated about the diet of peads.

Furthermore experimental studies are warranted to co-relate these studies scientifically.

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