

# Effects of Xylitol in Orthodontic Patients - A Review

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**Abstract:** *There has been a trend of improving smile as well as facial esthetics among the adolescents as well as the adults. Fixed orthodontic appliances act as a retentive area for plaque deposition. The plaque is a reservoir of various bacteria such as Streptococcus mutans, Lactobacillus sp. They increase the acidogenicity of the oral environment and lead to dental caries, white spot lesions along with various periodontal diseases. Tooth brushing is the mechanical way of removal of dental plaque. Various chemical agents such as xylitol can be used as a supplement for maintenance of oral hygiene. The following review article discusses about the effects of using xylitol in patients undergoing orthodontic treatment.*

**Keywords:** Oral hygiene, Xylitol, Chewing gum, Dental plaque, Caries

## 1. Introduction

The aim of orthodontic treatment is to improve smile esthetics with healthy surrounding tissues along with ideal tooth alignment.<sup>1</sup>As the appliances used during treatment create retentive areas for plaque formation, they negatively impact oral hygiene.<sup>2</sup>The appliances hinder with the mechanical removal of the plaque.<sup>3</sup> It leads to increase in the count of *Lactobacillus* and *Streptococcus mutans* during treatment.<sup>4</sup> Dental plaque is considered the foremost agent for the initiation and progression of many periodontal diseases.<sup>5</sup> Apart from the mechanical cleaning procedure such as tooth brushing, use of xylitol containing substances can be used for the prevention of plaque deposition.<sup>6</sup>

### Xylitol

Xylitol is a natural five carbon sugar alcohol. It is found in low concentrations in various fruits and vegetables.<sup>1</sup>It is used as a cariostatic agent for the past two decades.<sup>7</sup> This anti- caries agent is also widely found in many sugar free products such as chewing gums, tablets and lozenges.<sup>1</sup>It helps in increase salivary flow which further stimulates mineralization.<sup>8</sup>The most striking feature of xylitol is that it cannot be fermented by the oral bacteria.<sup>9</sup> It further reduces the amount of dental plaque by inhibiting the growth, metabolism and polysaccharide production of *Streptococcus mutans*.<sup>10</sup>

The mechanism of action of xylitol is an intra-cellular accumulation of xylitol 5- phosphate with inhibition of glycolytic enzymes. It leads to impaired growth and acid production.<sup>11</sup> It has also been established that the xylitol resistant *Streptococcus mutans* have an impaired ability to colonize and even adhere to the tooth surfaces.<sup>12</sup>Though the caries preventive potential of xylitol containing gum has been established in various controlled clinical trials<sup>13</sup>, the level of evidence might be disputed.<sup>14</sup>

There is a debate among clinicians about the dosage of the xylitol. It has been suggested that a daily intake of 5- 10 g in fractionated doses is required to obtain a clinical anti- caries effect.<sup>11</sup> On the other hand a lower dose of xylitol exhibits a less favourable outcome.<sup>15</sup> Another study has suggested that 10.5 g of xylitol per day leads to reduced level of plaque

accumulation and *Streptococcus mutans* in young patients wearing fixed orthodontic appliances.<sup>16</sup>

## 2. Discussion

Although xylitol stimulates mineralization by increasing the salivary flow, there has been a debate among many researchers. According to them, chewing rather than the sugar alcohol itself should be credited for the enhanced salivary stimulation.<sup>17</sup>

There has been a limited number of studies investigating the effects of xylitol in patients undergoing orthodontic treatment.<sup>16</sup> Few Studies have been done on the effects of xylitol impregnated toothbrushes on plaque accumulations.<sup>18</sup> Recently a study<sup>1</sup> has also concluded that there had been no difference in the periodontal status and microflora while using xylitol impregnated and xylitol free toothbrushes.

Increased intake of xylitol containing tablets or chewing gums leads to decreased adherence of plaque on the tooth surfaces.<sup>8</sup> A study<sup>8</sup> has concluded that xylitol in convenient doses neither reduce acidogenicity nor reduce plaque adherence to tooth surfaces as well as orthodontic brackets. They further concluded that a change in the salivary bacterial composition could be seen following intake of xylitol containing tablets but in the long term the bacterial count remained unchanged.<sup>8</sup>

In another study, Mohamed I. Masoud et. al<sup>19</sup> concluded that Xylitol did not have a clinical or bacterial benefit in patients with fixed orthodontic appliances. Oral hygiene instructions and 6-month topical fluoride application were effective at reducing plaque scores and bacterial counts in patients with full fixed appliances regardless of whether or not xylitol was used.<sup>19</sup>

## 3. Conclusion

Mechanical removal of plaque by tooth brushing is the primary mode of removal of plaque from tooth surfaces and orthodontic appliances placed in the oral cavity. Xylitol containing tablets, chewing gums can be used as a supplement for reducing the bacterial count and the

adherence of the dental plaque. Various studies have suggested the efficacy of xylitol but mostly in the short term. Further studies will be required to know the efficiency of xylitol for long term purposes.

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