

# Posterior X-Bite: Frequency and Distribution by Gender in a Sample of Pakistani Population

Muhammad Azeem, Arfan Ul Haq, Syed Muhammad Ali Tirmizey

## ABSTRACT

**Introduction:** The mass spread of orthodontic setups in Pakistan highlights the need of having data for planning orthodontic therapy need. The worldwide prevalence of posterior cross bite ranges from 8% - 28% and varies between ethnic groups and by age and gender. This study was design to find out the frequency of posterior X-bite (PXC) and its gender distribution in our population. **Objective:** The purpose of present study was to estimate the frequency of PXC among patients visiting Faisalabad medical university. **Study design:** A cross sectional study. **Setting:** Department of Orthodontics and ENT, Faisalabad medical university. **Duration of study:** 6 months from 15.3.2017 to 15.09.2017. **Sample size:** The calculated sample size was 300 patients. **Sampling technique:** Purposive sampling technique. **Data collection procedure:** Clinical intraoral examination was used to confirm the presence of PXC. Using established recording criteria, a single operator assessed the posterior crossbites in a sample of 300 patients. The data was analyzed in Statistical Package for the Social Sciences software package (SPSS) 20. **Results:** The mean age of the patients was 13.46±4.34 years. The frequency of PXC was found to be 20%. Male to female ratio was 1:1. Bilateral PXC was more prevalent. **Conclusion:** Frequency of posterior X-bite was found to be 20% and both genders were equally affected, with bilateral type more prevalent as compared to unilateral type. Further studies are suggested in order to further clarify and provide more accurate calculations of the PXC frequency in Pakistani subjects.

**Keywords:** X-bite; Posterior crossbite; Transverse.

### Corresponding Author

**Dr. Muhammad Azeem**

Assistant Professor, Orthodontics  
Faisalabad Medical University, Faisalabad  
Contact: +92 345-8409007  
Email: dental.concepts@hotmail.com

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## INTRODUCTION

Posterior X-bite (PXC) can be defined as lack of normal transverse relation between the maxillary and mandibular premolars and molars in centric occlusion.<sup>1</sup> This malocclusion is multifactorial in nature, usually caused by interplay of genetic and environmental factors.<sup>2</sup> Several aetiologies have been presented with involvement of skeletal, dental, neuromuscular, and functional components. Other proposed aetiologies are: over retained or premature loss of primary dentition, space issues, orofacial clefts, genetics, arch length issues, abnormality in teeth emergence sequence, oral thumb sucking habits, oral respiration, ear nose throat (ENT) and temporomandibular joint issues.<sup>3-7</sup>

Various successful management methods have been reported including cross elastics, occlusal equilibrium, rapid and slow maxillary expanders, fixed and removable expander appliances, orthognathic surgery and at present the use of temporary anchorage devices.<sup>8-12</sup> Harrison and Ashby found that "The grinding of premature interferences in deciduous teeth is effective in managing PXC from being progressing to permanent dentition." They also concluded that, when removal of interferences alone is not curative, simple expansion appliance is a good alternative. Treatment is usually indicated in early mix dentition in order to avoid growth related adverse effects.<sup>13</sup> Systematic reviews concluded that there is lack of evidence in

favour of any PXC correction appliance, thus requiring further clinical trials.

Crossbite is classified as dental or skeletal, anterior or posterior, unilateral or bilateral and with or without displacement. It may present as simple or complex.<sup>14</sup> PXC can have long lasting orofacial implications while growth such as, mandibular shift, midline shifts, masticatory issues and adverse effects on temporomandibular joints.<sup>15</sup>

The prevalence of PXC ranges from 8% to 28% in different populations.<sup>16-20</sup> In view of the fact that the prevalence in different populations is different, this study was design to find out frequency of PXC and its gender distribution among the patients visiting department of Orthodontics and ENT, Faisalabad medical university, Pakistan.

**Objective:** The purpose of this study was to find out the frequency of posterior X-bite among the patients visiting department of Orthodontics and ENT, Faisalabad medical university, Pakistan.

## METHODOLOGY

**Study design:** A cross sectional study

**Setting:** Department of Orthodontics and ENT, Faisalabad medical university, Lahore

**Duration of study:** 6 months from 15-3-2017 to 15-9-2017

**Sample size:** The calculated sample size was 300 patients

**Sampling technique:** Purposive sampling technique

### Inclusion Criteria

All teeth present except wisdoms  
Patients of posterior X-bite  
Patients willing to participate in the research  
No history of orthodontic treatment

### Exclusion Criteria

History of trauma  
Anterior crossbite/Class III malocclusion  
Cleft lip/palate or any craniofacial syndrome  
Any systemic or metabolic disease

### Data Collection Procedure

This study was conducted after institutional approval at the Department of Orthodontics and ENT, Faisalabad medical university, in which untreated patients, between the chronological ages of 8 and 25 years were included to determine the frequency of PXC, whether unilateral or bilateral. Duration of this study was 15.3.2017 to 15.9.2017. Ethical approval was sought before conceiving the current study.

Intraoral examination was done by one expert to confirm the presence of PXC. Posterior crossbite was defined as a minimum of two teeth in unilateral or bilateral posterior lingual crossbite i.e. maxillary posteriors occlude in lingual relationship to the mandibular molars in centric occlusion.

### Data Analysis

The data was analyzed in Statistical Package for the Social Sciences software package (SPSS) 20. The mean age, gender distribution and percentage of unilateral or bilateral type of PXC among the selected sample was calculated.

## RESULTS

The mean age of the patients was  $13.46 \pm 4.34$  years. Out of total sample of 60 (20%) patients had PXC malocclusion (Table No.1). Out of 20, 29 (48.33%) were males while 31 (52.66%) were females (Table No.2), the male to female ratio was found out to be 1:1. 53.13 % had bilateral and 46.87% had unilateral type PXC (Table No.3).

**Table 1: Frequency of PXC among patients visiting Faisalabad medical university (N=300)**

Parameter	Frequency
Total Patients	300
PXC Patients	60 (20 %)

Mean age  $13.46 \pm 4.34$

**Table 2: Gender distribution of PXC (N 60)**

Parameter	Frequency
Males having PXC	29 (48.33 %)
Females having PXC	31(51.66 %)

**Table 3: Type distribution of PXC (N 60)**

Parameter	Frequency
Unilateral type PXC	46.87%
Bilateral type PXC	53.13%

## DISCUSSION

Transverse dimensions of the upper and lower arches play a key role in smile esthetics.<sup>21</sup> In narrow arches, the upper molars usually get compensate naturally in a buccal direction with their palatal cusps hang down below the curve of Wilson, leading to development of PXC and/or occlusal interference from the hanging lingual cusps of maxillary posterior teeth.<sup>22</sup> From a management aspect, PXC does not correct spontaneously and may cause several adverse effects such as occlusal interferences, abnormal growth of the mandible and condylar asymmetries. The functional matrix theory of moss proposed that orofacial growth occurs as a response to functional demands and is mediated by orofacial soft tissues. Thus, as soft tissues grow, both bone and cartilage react. Thus, correct functioning of oral breathing, swallowing, and chewing got major impact on orofacial tissues.

The results of current study revealed that bilateral type was more frequent than unilateral type of PXC. The male to female ratio in our study was 1:1. This is similar to finding of Cuc<sup>23</sup>, but in contrast to the findings of studies where gender differences were found in occurrence of PXC.<sup>16-18</sup>

Frequency of PXC in the present study was found out to be 20%, which are similar to prevalence of PXC calculated in other studies.<sup>16-20</sup> In a study by Jalber Almeida et al of Brazil it was found that 28% of kids has PXC, out of which 45.9% had unilateral PXC.<sup>24</sup> In another study by Cuc Albinita and Cuc O it was found that the frequency of PXC was 4-5%.<sup>23</sup> The high percentage of PXC in current study might be because it was conducted among patients seeking orthodontic / ENT treatment and not the normal population. The differences in frequency of occurrence of PXC likely occur due to different cultural and economic standards, which in turn may influence oral habits and behaviour of the subjects.<sup>25</sup>

Exclusive breastfeeding until 6 months of age is recommended by the World Health Organization to minimize the occurrence of gastric infection and underweight deficit,<sup>26</sup> and may be a protective factor against development of PXC malocclusion.

The development of dentition and occlusion is a result of combined interaction between genetic factors and environmental factors, such as oral functions of breathing, swallowing, and chewing. There have been few reports on interdisciplinary clinical examinations of oral functions by an orthodontist and otolaryngologist. No significant research has been done on the calculation of frequency of posterior cross bite in Pakistani subjects. This study is an attempt to find out the frequency of posterior cross bite Pakistani subjects and its variation in gender. This study would be helpful in the diagnosis and correction of PXC in our local population. Large scale

studies are recommended to establish the prevalence of PXC in our population; this would help in more appropriate management of the PXC malocclusion.

**Limitation of Study:** Limitation of this study is small sample size; further large-scale studies are suggested. However, its findings may act as a reference for future planning of posterior crossbite cases in our local population.



## CONCLUSION

It was concluded that frequency of posterior X-bite was 20% and both genders were equally affected, with bilateral type more prevalent as compared to unilateral.

## REFERENCES

1. Germa A, Clément C, Weissenbach M, Heude B, Forhan A, Martin-Marchand L, Bonet M, Vital S, Kaminski M, Nabet C. Early risk factors for posterior crossbite and anterior open bite in the primary dentition. *Angle Orthod.* 2016;86(5):832-8
2. Thilagarani PR, Kumar DA, Mahobia Y, Tiwari A, Nadkerny VD, Jha MS. Prevalence of Cross Bite Occlusion in Bilaspur, Chhattisgarh. *Indian Journal of Dental Education.* 2015;8(4):191-4.
3. Zegan G, Dascalu CG, Mavru RB, Golovcencu L. Risk factors and predictors of crossbite at children. *Rev Med Chir Soc Med Nat Iasi.* 2015;119(2):564-71.
4. Kwak YY, Jang I, Choi DS, Cha BK. Functional evaluation of orthopedic and orthodontic treatment in a patient with unilateral posterior crossbite and facial asymmetry. *Korean J Orthod.* 2014;44(3):143-53
5. Nuvvula S, Tharay N, Nirmala SV, Mallineni SK. Management of traumatic dental injury, midline diastema, and single tooth crossbite in a 9-year-old child: A pediatric dentistry approach. *Int J Pedod Rehabil* 2016; 1:22-5.
6. Santos RR, Garbin AJ, Saliba O, Garbin CA. Analysis of association between posterior crossbite, median line deviation and facial asymmetry. *Int. J. Odontostomat* 2014;8(1):93-7.
7. Sarig R, Slon V, Abbas J, May H, Shpack N, Vardimon AD, Hershkovitz I. Malocclusion in early anatomically modern human: a reflection on the etiology of modern dental misalignment. *PLoS One.* 2013;20;8(11): e80771.
8. Mittal R, Patel S, Sharma K. Scissor bite correction for the second molars using simplified RM appliance. *APOS Trends in Orthodontics.* 2016;1;6(1):45-6.
9. Masucci C, Cipriani L, Defraia E, Franchi L. Transverse relationship of permanent molars after crossbite correction in deciduous dentition. *Eur J Orthod.* 2017;1;39(5):560-6.
10. Ileri Z, Basciftci FA. Asymmetric rapid maxillary expansion in true unilateral crossbite malocclusion: a prospective controlled clinical study. *The Angle Orthodontist.* 2014;25;85(2):245-52.
11. Ugolini A, Doldo T, Ghislanzoni LT, Mapelli A, Giorgetti R, Sforza C. Rapid palatal expansion effects on mandibular transverse dimensions in unilateral posterior crossbite patients: a three-dimensional digital imaging study. *Prog Orthod.* 2016;17:1-21.
12. Lee H, Nguyen A, Hong C, Hoang P, Pham J, Ting K. Biomechanical effects of maxillary expansion on a patient with cleft palate: A finite element analysis. *Am J Orthod Dentofacial Orthop.* 2016;150(2):313-23.
13. Rosa M, Lucchi P, Manti G, Caprioglio A. Rapid Palatal Expansion in the absence of posterior cross-bite to intercept maxillary incisor crowding in the mixed dentition: a CBCT evaluation of spontaneous changes of untouched permanent molars *Eur J Paediatr Dent.* 2016;17(4):286-94.
14. Tsanidis N, Antonarakis GS, Kiliaridis S. Functional changes after early treatment of unilateral posterior cross-bite associated with mandibular shift: a systematic review. *J Oral Rehabil.* 2016;43(1):59-68.
15. Psarras V, Kontos I, Tsolakis A, Droukas B, Tzakis M. Signs and symptoms of craniomandibular disorders in children and adolescents with unilateral posterior crossbite. *Journal of Oral Rehabilitation.* 2015;1;42(9):1-2.
16. Kutin G, Hawes RR. Posterior cross-bites in the deciduous and mixed dentitions. *Am J Orthod.* 1969;56(5):491-504.
17. Egermark-Eriksson I, Carlsson GE, Magnusson T, Thilander B. A longitudinal study on malocclusion in relation to signs and symptoms of cranio-mandibular disorders in children and adolescents. *Eur J Orthod.* 1990;12(4):399-407.
18. Sultana N, Hassan GS, Jha D, Nashrin T, Nahar L, Naim MA. Prevalence of Cross Bite Among the Orthodontic Patients in Bangabandhu Sheikh Mujib Medical University. *Bangladesh Journal of Medicine.* 2015;10;26(1):9-12.
19. Andrade AS, Gameiro GH, DeRossi M, Gavião MB. Posterior crossbite and functional changes: a systematic review. *Angle Orthod.* 2009;79(2):380-6.
20. Allen D, Rebellato J, Sheats R, Ceron AM. Skeletal and dental contributions to posterior crossbites. *Angle Orthod.* 2003;73(5):515-24.
21. Proffit WR, Field HW, Ackerman JL, Bailey LTJ, Tulloch JEC. *Contemporary Orthodontics.* 5th ed. St Louis (Missouri): Mosby Inc. 2013:243.
22. McNamara JA. Maxillary deficiency syndrome in: Current therapy in orthodontics. 1st ed. *American Journal of Orthodontics and Dentofacial Orthopedics.* 2010;117(5):567-70.
23. Cuc A, Cuc O. Reverse crossbite-statistical study in the period of mixed dentition. *Analele Universității din Oradea, Fascicula: Ecotoxicologie, Zootehnie și Tehnologii de Industrie Alimentară.* 2011;10(B):69-74.
24. Dos Santos JA, Cavalcanti AL, Aguiar YP. Prevalence of anterior and posterior crossbite in 13-17-year-old schoolchildren attending municipal public schools in the city of Campina Grande (PB). *South Brazilian Dentistry Journal.* 2010;7(3):261-7.
25. Macena MC, Katz CR, Rosenblatt A. Prevalence of a posterior crossbite and sucking habits in Brazilian children aged 18–59 months. *Eur J Orthod.* 2009;31(4):357-61.
26. Narbutyte I, Narbutyte A, Linkeviciene L. Relationship between breastfeeding, bottle-feeding and development of malocclusion. *Stomatologija.* 2013;15(3):67-72..

## AUTHORSHIP AND CONTRIBUTION DECLARATION

<b>AUTHORS</b>	<b>Contribution to The Paper</b>	<b>Signatures</b>
<b>Dr. Muhammad Azeem</b> Assistant Professor, Orthodontics Faisalabad Medical University, Faisalabad	Corresponding author, conceiving and designing the study, data recording, analysis and interpretation of data	
<b>Dr. Arfan Ul Haq</b> Dean of dentistry, Professor & Head of Orthodontics, Faisalabad Medical University, Faisalabad	Main supervisor, wrote and critically reviewed the manuscript	
<b>Prof. Dr. Syed Muhammad Ali Tirmizey</b> Professor of ENT, Vice Chancellor, Faisalabad Medical University, Faisalabad	Analysis and interpretation of data, critically reviewed the manuscript & final editing	