



RESEARCH LETTER

Bite forces in young dental outpatients in a tertiary hospital in Bangladesh

Gazi Shamim Hassan¹ | Tanzila Rafique¹ | Ranjit Ghosh¹ | Mohammed Sharif Hossain Rasel²

¹Department of Orthodontics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

²Department of Conservative Dentistry and Endodontics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

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The maximum voluntary bite force serves as an important measure of the functional status of the masticatory system. The reliability and precision of bite force measurements are influenced not only by participant-specific factors but also by the mechanical properties of the recording device used.^{1,2} Bite force, produced by the action of jaw elevator muscles and influenced by cranio-mandibular biomechanics and reflexes, is an indicator of masticatory function. Because bite force levels vary according to technique, sex, and age, they often need to be compared to standard reference values.³

Measuring bite force can be diagnostically valuable for conditions impacting the musculoskeletal system of the facial bones.⁴ Various devices like strain gauge transducers, piezo resistive and piezoelectric transducers, optical fiber transducers, and pressure-sensitive films are used to measure bite forces. However, the thickness of these devices may interfere with normal occlusion.⁵

This cross-sectional study was done in the Department of Orthodontics at Bangabandhu Sheikh Mujib Medical University in Dhaka, Bangladesh, to assess maximum bite forces among young adults. The T-Scanner 10 device (Tekscan Inc., South Boston, MA, USA), was used for this purpose. This device not only measures bite force but also evaluates treatment efficacy by comparing values before and after intervention.⁶

Given that maximum bite force is typically found in young adults, this study recruited men and women aged 24 to 30 years. The samples were taken from patients

HIGHLIGHTS

1. Assessing the maximum bite force is crucial for therapeutic purposes, as tooth position affects muscular and occlusal forces in all planes.
2. The maximum bite forces were measured among 100 Bangladeshi young adults (aged 24 to 30 years) using the T scanner 10 device, which is a computerized occlusal analysis system for objectively analyzing a person's occlusion.
3. The maximum bite force in this sample was 52 Newton, which can be used as reference for future studies. However, this is lower than findings in other populations.

visiting the outpatient department of dental faculty. Participants with congenital or maxillofacial anomalies were excluded. A sampling frame was created from 300 consecutive patients who met the inclusion and exclusion criteria, from which 100 participants were randomly selected. Maximum bite force was recorded on right and left sides of the jaw during centric occlusion, with three successive bites recorded for each participant.

The participants had an average age of 27.3 years with a standard deviation of 2.1 years, ranging from 24 to 30 years, and an equal sex distribution. Prostheses were present in 5% of the participants, over a third (37%) had missing teeth, and among those, nearly one-third (31%) had space due to missing teeth. The overall mean (standard deviation) maximum bite force was 51.6 (2.8) Newtons, with nearly identical forces recorded on the right and left sides. No significant differences were

TABLE 1 Comparison of maximum bite force (Newton) during multi-bite among different involved region of the jaw (n=100)

Closure	Both side	Right side	Left side	P
	Mean (SD)	Mean (SD)	Mean (SD)	
First	50.9 (4.9)	49.6 (18.7)	52.1 (18.3)	0.48
Second	50.8 (5.6)	52.5 (17.1)	49.1 (18.2)	0.30
Third	50.0 (0.02)	51.0 (17.9)	49.0 (18.0)	0.58
Overall	51.6 (2.8)	51.0 (16.3)	50.1 (16.7)	0.76

found in the bite force between the right and left sides across the first, second, and third closures (**TABLE 1**).

So far, research on bite forces in this Bangladeshi people is limited. A study done on a Brazilian population reported average maximum bite forces (subgroup analysis) of 262.28 Newtons for males and 345.26 Newtons for females in the 18 to 25-year age group, which are significantly higher than the values observed in our study.² The lower bite forces in our study may be attributed to the fact that participants were recruited from the dental outpatient department, where underlying dental issues could have affected their bite force. Factors such as malocclusion, missing teeth, dietary habits, and fear of biting due to pain or untreated dental conditions may have contributed to the lower bite forces observed.⁸ Although we did not identify significant factors associated with maximum bite force, other studies have reported bone type, facial shape, and mandibular plane angle across different age groups are associated with maximum bite force.^{8,9} In general, the findings of our study are limited in their generalizability, and further research with an adequate sample size, rigorous methodology, and appropriate measurements in healthy people is recommended.

Finally, the maximum bite force (52 Newtons) in our findings is low compared to other populations. Because our findings might have been influenced by underlying dental conditions, further research in healthy Bangladeshi people is warranted.

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Author contributions

Conception and design: TR, GSH. *Acquisition, analysis, and interpretation of data:* TR, HAR. *Manuscript drafting and revising it critically:* GSH, HAR, TR, GR. *Approval of the final version of the manuscript:* GSH, TR, SS, GR. *Guarantor of accuracy and integrity of the work:* GSH, TR.

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Conflict of interest

We do not have any conflict of interest.

Ethical approval

Ethical approval was taken from the Review Board of the Bangladesh Medical Research Council, memo: BMRC/Grants/2018-2019/99(1-100).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

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