# Preference And Attitude Of Dental Students And Dental Practitioners Regarding Different Types Of Matrix Bands At Qassim University

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## ABSTRACT

**Background:** Matrix bands are essential tools in restorative dentistry, aiding in the achievement of proper contour, contact, and marginal adaptation during Class II restorations. Preferences in matrix systems may vary based on the practitioner's clinical experience, educational level, and gender, influencing restoration outcomes.

**Methods:** A cross-sectional study was conducted using an electronically distributed questionnaire targeting Saudi dental students and practitioners in Qassim who had begun clinical practice. The survey collected data on demographics, frequency of use, perceived advantages and disadvantages, and clinical indications of matrix band systems. Statistical analysis was performed to identify significant differences in preferences across gender and academic levels.

**Results:** A total of 112 participants responded, including 68 males (60.7%) and 44 females (39.3%). Fourth-year students constituted the largest subgroup (30.4%). Sectional matrix bands were most preferred for simple Class II restorations (51.8%) due to better contact and patient comfort. Auto matrix bands were favored in complex cases (50%), with a statistically significant preference among males ($p = 0.012$). Tofflemire bands, although commonly used in early training, were considered less suitable for complex restorations. Gender- and level-based differences in matrix band preference were statistically significant, particularly in simple and complex cases (p-values = 0.003 and 0.001, respectively).

**Conclusion:** Matrix band preferences among dental students and practitioners in Qassim vary notably based on gender and level of training. The significant inclination of male practitioners toward the Auto matrix band, and the reliance of early-year students on Tofflemire bands, suggests evolving preferences with experience. These insights can guide curriculum development and continuing education to ensure well-rounded proficiency in restorative techniques.

**Keywords:** *Matrix band systems, Auto matrix, Tofflemire, sectional matrix, restorative dentistry*

## 1. INTRODUCTION

A matrix is characterised as a precisely shaped piece of metal or other material utilised to support and shape the repair during its placement and hardening (1, 2). The attributes of an effective matrix include rigidity, proper anatomical contour establishment, restoration of accurate proximal contact relation, ease of adaptation to the tooth, contouring capability, prevention of gingival excess, strength to withstand condensation pressure, and ease of removal from the tooth (3, 4).

Proximal contact sites between teeth preserve the integrity of the stomatognathic system by counterbalancing the anterior component of the force generated by the mesial drifting tendency of teeth (5). The inability to restore contact points will disrupt homeostasis and harmony, prompting the remaining elements of the stomatognathic system to instinctively seek a new balance (6). A significant problem for dentists is to replicate optimal contact points while striving for clinically approved restorations, particularly with resin composite materials. Proximal restorations must account for the thickness of the matrix band and the unavoidable polymerisation shrinkage of the resin restorative material. Various approaches have been employed to attain optimal contact sites with proximal resin composite restorations (7, 8, 9).

Due to its ease and rapid application, Tofflemire and other circumferential matrices have always been regarded as the optimal selection for amalgam restorations. These matrices constrict along gingival borders upon application, reducing the probability of overhanging restorations (10, 11). It has been recognised for some time that unless these circumferential matrices are curved prior to installation, they tend to yield proximal surfaces that are comparatively flat (12-14).

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The increasing prevalence of resin composites in Class II restorations has introduced additional issues in establishing adequate proximal connections (15). In contrast to amalgam, the consistency of resin composites is less effective at displacing a matrix band. Spring-loaded rings with tines have been implemented to enhance proximal separation by interacting with the line angles of the teeth. The attitudes and preferences of dental practitioners and students about usability and efficiency warrant thorough investigation. The objective of this study is to examine the preferences and attitudes of dental students and practitioners concerning various types of matrix bands at Qassim University.

## 2. METHODOLOGY

This cross-sectional study utilised an internet questionnaire to evaluate the attitudes and views of Saudi undergraduate dentistry students and dental practitioners concerning several matrix band systems. The poll was disseminated via platforms like Google Forms, facilitating effective outreach to a varied demographic in the Qassim region. Participants comprised individuals at different stages of dental education and professional practice, ensuring a thorough representation of perspectives. The survey included 100 respondents, consisting of dentistry students and early-career practitioners. The questionnaire had multiple-choice and short-answer questions aimed at obtaining comprehensive feedback on the benefits, drawbacks, indications, and clinical uses of various matrix band systems. It also examined factors affecting the choice of particular systems and collected recommendations for enhancing restorative outcomes.

Participation was optional, and ethical principles, including anonymity and confidentiality, were rigorously maintained during the data collection procedure. The survey was executed over an 18-month duration, from September 2022 to February 2024, yielding a comprehensive dataset that captures diverse experiences and viewpoints within the target demographic.

The inclusion criteria were restricted to Saudi dental students and practitioners currently living in the Qassim region who had initiated clinical practice. The exclusion criteria were non-Saudi persons, those from outside the Qassim region, and those who had not commenced clinical training. This targeted sampling method guaranteed that the results were particularly pertinent to dental practice in the Qassim context.

The data was entered into Microsoft Excel and analysed using SPSS (Statistical Package for Social Sciences) package 26.0 for relevant statistical comparisons. Results presented in the form of tables and graphs. Categorical variables were summarized as frequencies and percentages. Shapiro Wilk test will be used to check whether the continuous variables were following normal distribution or not. Chi-square test was used for the comparison of values between 2 or more variables. Level of statistical significance was set at p-value less than or equal to 0.05.

## 3. RESULTS

A total of 112 participants completed the study questionnaire, including 68 males (60.7%) and 44 females (39.3%). The distribution by educational or professional level revealed that fourth-year dental students constituted the largest subgroup (30.4%, n=34), succeeded by fifth-year students (26.8%, n=30), and third-year students (23.2%, n=26). Interns and practicing dentists constituted 9.8% of the sample (n=11) each. Figure 1 depicts the comprehensive gender distribution, whereas Figure 2 indicates that fourth-year students constituted the predominant level of representation. Figure 3 illustrates the gender distribution throughout academic and professional tiers, with a predominance of males in the third, fourth, and fifth years, but the intern cohort exhibited a female majority (63.6%). Among practicing dentists, males represented a greater percentage (63.6%). Tables 1 and 2 illustrate the demographic distribution of participants categorised by gender and educational attainment or professional experience. In the third year, 57.7% of participants were male, while 42.3% were female. The discrepancy increased in the fourth year (70.6% male, 29.4% female) and diminished significantly in the fifth year (60% male, 40% female). Conversely, among interns, the tendency shifted, with 63.6% being female. Practicing dentists exhibited a comparable male-dominant trend, with 63.6% being male. Table 3 delineates participants' perspectives and usage habits regarding different matrix band systems. Sectional bands were favoured in uncomplicated Class II restorations by 51.8% of participants, who also saw them as providing optimal contact and contour (42%) and patient comfort (52.7%). Auto matrix bands were preferred in complex cavity scenarios by 50% of participants, however 20.5% saw them as susceptible to distortion. Tofflemire bands, while utilised most frequently overall (41.1%), were also the most frequently identified as least favoured (42.9%) and regarded as challenging to employ in intricate circumstances (71.4%). Nonetheless, 45.5% of people considered them the simplest to apply and remove. Table 4 delineates gender-specific variations in matrix band preferences. Male participants exhibited a much greater utilisation of the Auto matrix band (67.7%) in contrast to females (32.3%), a discrepancy deemed statistically significant (p = 0.012). Males had a greater preference for Tofflemire bands in uncomplicated Class II cases (75%), whereas females favoured Sectional bands (44.8%). In complex restorations, both sexes preferred the Auto matrix band, with a more pronounced inclination among males (57.1%) compared to females (42.9%). Regarding usability, Sectional bands were predominantly assessed as the most manageable by both sexes. The perceived danger of distortion was predominantly linked to sectional bands, especially among males (63%). These data reveal significant gender-based differences in the selection and perception of matrix band systems, perhaps impacted by clinical training, familiarity, or handling preferences.

**Table 1: Sociodemographic characteristics of study participants**

| Variable | | n | % |
|---|---|---|---|
| Gender | Female | 44 | 39.3 |
| | Male | 68 | 60.7 |
| Level | Third year | 26 | 23.2 |
| | Forth year | 34 | 30.4 |
| | Fifth year | 30 | 26.8 |
| | Intern | 11 | 9.8 |
| | Dentist | 11 | 9.8 |
| Total | | 112 | 100 |

**Table 2: Level of study participants by gender**

| Variable | | Gender | | | | Total |
|---|---|---|---|---|---|---|
| | | Female | | Male | | |
| | | n | % | n | % | |
| Level | Third year | 11 | 42.3 | 15 | 57.7 | 26 |
| | Forth year | 10 | 29.4 | 24 | 70.6 | 34 |
| | Fifth year | 12 | 40 | 18 | 60 | 30 |
| | Intern | 7 | 63.6 | 4 | 36.4 | 11 |
| | Dentist | 4 | 36.4 | 7 | 63.6 | 11 |

**Table 3: Frequency distribution of level of participants by gender**

| Question | Attitude | | | | | |
|---|---|---|---|---|---|---|
| | Auto matrix band | | Sectional band | | Tofflemire | |
| | n | % | n | % | n | % |
| Which is the most use matrix band in your restorative cases ? | 31 | 27.7 | 35 | 31.3 | 46 | 41.1 |
| Which is the least use matrix band in your restorative cases ? | 33 | 29.5 | 31 | 27.7 | 48 | 42.9 |
| What is your preference matrix band in simple Class II ? | 30 | 26.8 | 58 | 51.8 | 24 | 21.4 |
| What is your preference matrix band in compound and complex cavities ? | 56 | 50 | 15 | 13.4 | 41 | 36.6 |
| Which matrix band provide you optimum contact and contour? | 28 | 25 | 47 | 42 | 37 | 33 |
| Which matrix band provide you less contact and | 21 | 18.8 | 40 | 35.7 | 62 | 55.4 |

| contour? | | | | | | |
|---|---|---|---|---|---|---|
| Which matrix band is the easiest application and removal? | 39 | 34.8 | 51 | 45.5 | 11 | 9.8 |
| Which matrix band is the complex in application and removal ? | 21 | 18.8 | 11 | 9.8 | 80 | 71.4 |
| What is the most convent matrix band to the patient ? | 38 | 33.9 | 59 | 52.7 | 15 | 13.4 |
| Which is the appropriate matrix band in missing adjacent teeth ? | 56 | 50 | 12 | 10.7 | 44 | 39.3 |
| ……………is high risk to distort? | 23 | 20.5 | 46 | 41.1 | 43 | 38.4 |
| The best matrix band in the existing of rubber dam is ? | 43 | 38.4 | 58 | 51.8 | 11 | 9.8 |
| Which are matrix band have poor made and invention and need to enhance ? | 41 | 36.6 | 33 | 29.5 | 38 | 33.9 |

**Table 4: Frequency distribution of attitude responses by gender**

| Question | Attitude | Gender | | | | P value |
|---|---|---|---|---|---|---|
| | | Female | | Male | | |
| | | n | % | n | % | |
| Which is the most use matrix band in your restorative cases ? | Automatrix band | 10 | 32.3 | 21 | 67.7 | 0.012* |
| | Sectional band | 21 | 60 | 14 | 40 | |
| | Tofflemire | 13 | 28.3 | 33 | 71.7 | |
| Which is the least use matrix band in your restorative cases ? | Automatrix band | 16 | 48.5 | 17 | 51.5 | 0.461 |
| | Sectional band | 11 | 35.5 | 20 | 64.5 | |
| | Tofflemire | 17 | 35.4 | 31 | 64.6 | |
| What is your preference matrix band in simple Class II ? | Automatrix band | 12 | 40 | 18 | 60 | 0.298 |
| | Sectional band | 26 | 44.8 | 32 | 55.2 | |
| | Tofflemire | 6 | 25 | 18 | 75 | |
| What is your preference matrix band in compound and complex cavities ? | Automatrix band | 24 | 42.9 | 32 | 57.1 | 0.845 |
| | Sectional band | 5 | 33.3 | 10 | 66.7 | |
| | Tofflemire | 15 | 36.6 | 26 | 63.4 | |
| Which matrix band provide you optimum contact and contour? | Automatrix band | 10 | 35.7 | 18 | 64.3 | 0.726 |
| | Sectional band | 21 | 44.7 | 26 | 55.3 | |
| | Tofflemire | 13 | 35.1 | 24 | 64.9 | |
| Which matrix band provide you less contact and contour? | Automatrix band | 8 | 38.1 | 13 | 61.9 | 0.290 |
| | Sectional band | 12 | 30 | 28 | 70 | |
| | Tofflemire | 24 | 47.1 | 27 | 52.9 | |
| Which matrix band is the easiest | Automatrix band | 10 | 25.6 | 29 | 74.4 | 0.059 |

| | | | | | | |
|---|---|---|---|---|---|---|
| application and removal? | Sectional band | 30 | 48.4 | 32 | 51.6 | |
| | Tofflemire | 4 | 36.4 | 7 | 63.6 | |
| Which matrix band is the complex in application and removal ? | Automatrix band | 8 | 38.1 | 13 | 61.9 | 0.845 |
| | Sectional band | 3 | 27.3 | 8 | 72.7 | |
| | Tofflemire | 33 | 41.3 | 47 | 58.8 | |
| What is the most convent matrix band to the patient ? | Automatrix band | 13 | 34.2 | 25 | 65.8 | 0.581 |
| | Sectional band | 23 | 39 | 36 | 61 | |
| | Tofflemire | 8 | 53.3 | 7 | 46.7 | |
| Which is the appropriate matrix band in missing adjacent teeth ? | Automatrix band | 22 | 39.3 | 34 | 60.7 | 0.988 |
| | Sectional band | 4 | 33.3 | 8 | 66.7 | |
| | Tofflemire | 18 | 40.9 | 26 | 59.1 | |
| ……………is high risk to distort? | Automatrix band | 9 | 39.1 | 14 | 60.9 | 0.922 |
| | Sectional band | 17 | 37 | 29 | 63 | |
| | Tofflemire | 18 | 41.9 | 25 | 58.1 | |
| The best matrix band in the existing of rubber dam is ? | Automatrix band | 18 | 41.9 | 25 | 58.1 | 0.970 |
| | Sectional band | 23 | 39.7 | 35 | 60.3 | |
| | Tofflemire | 3 | 27.3 | 8 | 72.7 | |
| Which are matrix band have poor made and invention and need to enhance ? | Automatrix band | 15 | 36.6 | 26 | 63.4 | 0.139 |
| | Sectional band | 10 | 30.3 | 23 | 69.7 | |
| | Tofflemire | 19 | 50 | 19 | 50 | |

## 4. DISCUSSION

The primary objective of operative dentistry is to protect the tissue and preserve the health of the teeth. The objective of a restoration is to reconstruct absent tooth structure while ensuring enough strength and safeguarding the pulp from external impacts (16). Dentists and dental students encounter a considerable barrier in achieving optimal shapes and contact points while striving for clinically acceptable restorations, particularly when utilising resin composite materials. Proximal restorations on posterior and anterior teeth must account for the thickness of the matrix band and the unavoidable polymerisation shrinkage of the resin restorative material. A range of methods has been employed to determine appropriate contact sites with adjacent resin composite restorations (8).

This cross-sectional study utilised an internet questionnaire to evaluate the attitudes and views of Saudi undergraduate dentistry students and practitioners concerning several matrix band systems. This study reveals notable disparities in matrix band preferences across dental students and practitioners, affected by their educational background and practical experience.

Of the 112 participants, 68 are male, representing 60.7% of the sample, while 44 are female, constituting 39.3%. The primary group comprises of fourth-year dentistry students, accounting for 30.4% of the sample with 34 participants. The third-year students represent 23.2% of the total, with 26 individuals. Fifth-year students constitute 26.8% of the sample, with 30 participants. The study included 11 interns and 11 practicing dentists, each representing 9.8% of the total sample.

The current study reveals a marked preference for the Automatrix band among Fourth Year students, evidenced by a significant p-value of 0.001, highlighting its utility in more intricate restorative instances generally addressed at this academic level. This tendency diminishes as practitioners acquire experience, potentially signifying the integration of more sophisticated or alternative technologies in their professional activity. Kovacs-Ivacson et al. (17) discovered that 97.78% of participants regard matrix systems as essential for restorations, with sectional matrices favoured for class II cavities and circular matrices for MOD cavities. Merely 5.45% utilise a matrix for Class V repairs. The study by Douglas et al. (18) revealed that 96% of dental practitioners favoured the Siqveland matrix band, with the majority refraining from switching

bands between patients due to concerns over cost and time. There was a widespread belief that replacing matrix bands between patients was superfluous.

The current study indicates that the pronounced preference for Tofflemire bands among Third Year students, recognised as a fundamental instrument in initial dental education, progressively diminishes with further academic advancement. This trend is evidenced by a p-value of 0.003 for preferences in uncomplicated Class II instances, indicating that students increasingly favour newer and potentially more effective matrix bands as their skills develop and they face a broader array of clinical scenarios. Shalaan et al. (5) observed that among dentists utilising circumferential matrix systems, 333 dentists (80.2%) employed the Tofflemire holder, while 19 dentists (4.6%) utilised the Ivory no. 2 holder, 8 dentists (2%) opted for the Ivory no. 8 holder, and 3 dentists (0.7%) used the Automatrix holder (Dentsply Sirona, Konstanz, Germany). In a separate survey conducted by Lowe et al., (19) 2% of respondents identified the Tofflemire matrix as their primary option, while an additional 8% utilised it on occasion. While no research were identified about dental students' preferences for matrix band systems, Tofflemire bands are generally favoured due to the students' educational level.

The current study observed significant differences in matrix band preferences between male and female practitioners, particularly regarding the Automatrix band (p-value of 0.012), suggesting divergent approaches to clinical practice that warrant further exploration in professional development and training programs. The Automatrix band was utilised by female dentists in 10 instances, accounting for 32.3% of the overall female comments about this matrix band type. Conversely, male dentists indicated utilising the Automatrix band 21 times, representing 67.7% of the male responses to the identical inquiry. Although research specifically investigating gender differences in matrix band preferences, especially for the Automatrix band, is scarce, studies have indicated wider gender-based disparities in dental practice patterns. These disparities may indirectly affect preferences for specific dental instruments and methodologies. A study by Rouisse et al. (20) indicated that female dentists had a greater propensity for preventative treatment and employed more conservative strategies in caries control than their male counterparts. Female dentists typically restored interproximal lesions at a more advanced stage of development, prioritising preventive therapy during the initial phases of dental caries. This study did not directly examine matrix band preferences; nonetheless, the identified differences in therapeutic philosophies may influence the selection of restorative instruments, including matrix bands, in clinical practice.

This study's findings reveal notable disparities in matrix band choices between dental students and practitioners, shaped by their educational background and practical experience. The statistically significant preferences for the Automatrix and Tofflemire bands among particular groups indicate that distinct characteristics of these bands may better accommodate the skills and requirements at various phases of dental education and practice. This study provides useful insights about the matrix band preferences of dental students and practitioners in the Qassim region, although it has several drawbacks. The sample size, while sufficient for a cross-sectional survey, may not comprehensively represent the range of perspectives across all areas or institutions in Saudi Arabia, hence constraining the generalisability of the findings. Furthermore, self-reported responses may be affected by recall bias or subjective interpretation, especially for the perceived usability or efficacy of particular matrix systems.

## 5. CONCLUSION

This study underscores significant variations in matrix band choices between dental students and practitioners, shaped by characteristics including academic level, clinical experience, and gender. Automatrix bands were predominantly favoured by male practitioners and those managing intricate restorations, but Tofflemire bands continued to prevail in initial clinical training. Sectional bands became favoured because to their user-friendliness and clinical results in uncomplicated Class II restorations. The notable gender-based disparity in preferences, especially regarding the Automatrix system, indicates possible variations in clinical procedure and methodology that require additional examination. These findings highlight the necessity of customising educational and professional training programs to accommodate varied clinical perspectives and to guarantee that all practitioners are adept in a range of restorative instruments and procedures.

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