BMC Oral Health

RESEARCH

Open Access

Public perception of the advertised claims of Damon® appliance system in Saudi Arabia: a cross-sectional survey-based study

Nabeel Almotairy[1*]

Abstract

Introduction The clinical validity of self-ligating brackets' advertised claims, such as those for the Damon® appliance system, has been explored, but public awareness remains underexamined. This study assessed Saudi public perceptions of these claims.

Materials and methods A web-based survey distributed via social media evaluated perceptions of Damon system claims, including treatment efficiency, patient discomfort, oral hygiene maintenance, and treatment esthetic results. Participants were also asked to outline their perception of Damon's appliance cost. Responses were ranked on a Likert scale and analyzed using the Chi-square test with Bonferroni corrections.

Results Of 918 adults, 11% were familiar with the Damon system. Among Damon appliance-aware respondents, 64.4% believed it was superior to traditional braces. Around 56.4% thought it required fewer visits, and 49.5% believed treatment time was shorter, though many were neutral or uncertain. Regarding tooth extraction needs, 43.6% agreed it required lower needs, while 48.5% believed it causes less discomfort. About 46.5% agreed it was easier to maintain oral hygiene, and 54.5% thought it provided better esthetic results. Notably, 52.5% mistakenly believed it was cheaper than traditional braces. However, no major association was found between socio-demographics and Damon appliance knowledge, but females were more likely to perceive it as superior ($P = .012$).

Conclusions This study highlighted the dissimilarities between public perception and scientific evidence regarding the Damon system. These mixed findings suggest a need for guidelines in orthodontic advertising to prevent potential misinformation. Providing the public with reliable, evidence-based information is crucial for supporting informed decision-making in orthodontic care.

Keywords Damon system, Self-ligating, Treatment efficiency, Patient knowledge, Advertisement

Introduction

Over the last century, the field of orthodontics has undergone many significant developments and technological advancements. This technological progress has focused on enhancing the efficiency of orthodontic treatment and treatment satisfaction among orthodontic patients. Self-ligating brackets (SLBs) are key examples of such advancements. However, SLBs have been around long, although they are usually presented to patients as a modern treatment modality [1].

Stolzenberg initially described SLBs in 1935 in his 'Russell Lock' edgewise attachment [1, 2]. Subsequently, many major orthodontic manufacturers have introduced different SLBs [1]. SLBs eliminate the need for metallic or elastic ligatures. Additionally, they have an inbuilt lid

*Correspondence:
Nabeel Almotairy
N.S.Almotairy@qu.edu.sa
[1] Department of Orthodontics and Pediatric Dentistry, College of Dentistry, Qassim University, P.O. Box 4732, Buraidah 51452, Saudi Arabia

mechanism that can be opened or closed to secure the archwire [1]. Based on the lid closure mechanism, SLBs can be categorized as active or passive. In active SLBs, the lid exerts a force on the archwire, whilst passive SLBs do not exert such force [1]. Some passive SLBs exist on the premise that eliminating elastic or metallic archwire ligatures reduces friction, thus enhancing the sliding mechanics and reducing treatment time [3]. SLBs gained popularity in the orthodontic marketplace, with many manufacturers promoting them with various claims, where the Damon appliance system is a major example. Such claims include quicker bracket ligation, reduced archwire friction, quicker treatment duration, fewer appointments, minimal tooth discomfort, enhanced esthetic outcomes, and better oral hygiene [2, 4, 5]. However, previous studies found that the Damon system does not offer significant advantages over traditional brackets regarding treatment efficiency, tooth discomfort, or occlusal outcomes [6–11].

Orthodontic manufacturers' claims should be subjected to rigorous scientific research to assess their clinical validity. However, many such claims are widely advertised in orthodontic journals, conferences, and among key opinion leaders [12–14]. Furthermore, products often make their way into clinical practice without sufficient scientific evidence to back them up [15]. In the United States, the American Dental Association (ADA) provides guidelines on marketing and advertising for dental products and services. While there is no specific regulation for the SLBs advertising code, the ADA emphasizes that all dental advertising must be truthful and not misleading [16]. Additionally, a study assessing the compliance of orthodontic practice websites in Australia found that adherence to ethical, legal, and regulatory advertising requirements was lacking [17]. This suggests a need for greater diligence among orthodontists to ensure that their advertising practices do not jeopardize patient safety. Recently, the UK Advertising Standards Authority has implemented legislation to prevent the spread of claims by a major SLBs manufacturer because insufficient scientific evidence supports them [18]. Few other countries have implemented such measures to protect the public from being misled by manufacturers' false advertisements.

Patients can encounter misinformation online, where spreading false information through social networks increases the likelihood of making incorrect treatment decisions [19–21]. This misinformation often provides a compelling narrative that can overshadow factual information, influencing patients' treatment choices and overall health outcomes [22]. While the clinical validity of the advertised claims of SLBs and the Damon appliance system in particular has been adequately explored [6–11], the knowledge of the advertised claims of Damon system within the public, as far as the author is aware, has never been investigated. This is significant because if a particular SLB manufacturer advertises claims about their system that it reduces treatment time or causes little tooth discomfort without high-quality scientific evidence, patients may choose this treatment option under false pretenses. This compromises their autonomy, as their choices are not based on truthful information. Moreover, without proper informed consent, patients cannot fully comprehend a particular treatment option's potential risks and benefits, further infringing on their autonomy. Thus, the present study aims to examine the public's knowledge regarding the advertised claims of the Damon appliance system and compares this to traditional braces.

Materials and methods

This study was approved by the ethics committee at Qassim University, Saudi Arabia (#ST/6092/2021). An initial search was conducted to determine the most common claims of Damon appliance treatment compared to traditional braces [6–11, 15]. These claims were categorized into four general domains:

1) Treatment efficiency
2) Patient discomfort
3) Oral hygiene maintenance
4) Treatment esthetic results

Using the collected advertisement claims, a web-based close-ended survey in the Arabic language was structured using the SurveyMonkey website (Momentive Inc., California, United States) following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [23]. Two experienced orthodontists tested the validity of the survey. Then, the survey was piloted with five patients visiting the orthodontic clinic to test the clarity of the survey questions for non-specialists.

On the first page of the survey, the research purpose, and the expected time to finish the survey were outlined, as well as the data management practices and the researcher's contact details. The participants were asked to sign that they agreed to participate in the study before they could move on to the next section. Moreover, socio-demographic information (nationality, age, gender, educational level, job title, and monthly income in Saudi Riyal [SAR]) was collected in this section. Additionally, information about the participants' orthodontic treatment history was collected, such as the orthodontic appliance type (traditional braces, Damon brace system, lingual braces, removable functional appliances, or clear aligners) and treatment duration. The survey also collected information regarding the participants' sources

of orthodontic information (i.e., books and magazines, orthodontists, word-of-mouth, or social media platforms). Additionally, the participants had to answer a yes/no question to indicate whether they knew the Damon appliance system. If a participant responds with 'no,' then there will be no further questions, and they will be asked to press the 'submit' button to end the survey. However, if they answer 'yes,' further questions will be presented to grasp their understanding of the Damon appliance system and whether they think they are generally better than traditional braces (answered with 'Yes,' 'No,' or 'Do not know'). Subsequently, six questions regarding the common Damon system claims were asked, and a final question was designed to gauge the participants' perception of Damon appliance treatment cost. All items in the survey were measured using a 6-point Likert-type scale (0 – Do not know, 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, or 5 – Strongly disagree).

Convenience sampling was employed to recruit adult participants by distributing the survey link to major groups of Saudi nationals on different social media platforms such as Facebook, Twitter, Telegram, Instagram, and WhatsApp. The survey link was available from 16 September to 21 October 2024 and reposted at one-week and three-week intervals. An IP-blocking feature was enabled to allow the participants to complete the survey only once.

The sample size for this study was estimated for X^2 tests using G*Power software (version 3.1.9.6; Heinrich Heine University Düsseldorf, Düsseldorf, Germany). For a 95% confidence level ($\alpha = 0.05$; 1 - $\beta = 0.80$) and an effect size (d) of 0.3, a sample of 88 participants was needed.

Statistics

The collected responses were exported to Microsoft Excel and translated into English. Any participants who were not Saudi nationals, working in dentistry-related fields, or had previously undergone Damon appliance treatment were excluded from the study. The participants' education levels and monthly income were categorized as low, average, or high based on the data published by the General Authority of Statistics in Saudi Arabia. Statistical analysis was conducted using the SPSS program (version 23; SPSS Inc, Chicago, IL). The absolute values and response percentages were calculated for every question with their corresponding 95% confidence interval (CI). A *p*-value less than 0.05 was considered statistically significant. Moreover, a Chi-Square test with Bonferroni corrections was used to investigate the correlation between participants' responses to Damon appliance claims and their socio-demographics. Cramér's V effect size (95% CI) was also calculated to assess the strength of association for multinomial categorical variables. The value of Cramér's V ranges from 0, indicating complete independence between the variables, to 1, signifying a perfect association.

Results

Study sample characteristics

A total of 989 surveys were returned, and 71 were excluded. This was because 55 were completed by non-Saudi nationals, 2 were completed by dentists, and 14 were completed by individuals who had a history of receiving Damon appliance treatment. Of the remaining 918 participants, 101 (11%) knew the Damon system. Table 1 lists the characteristics of the study participants.

The Damon appliance-aware respondents were 52.5% females (95% CI [42.74, 62.22]) and consisted mainly of people 25–34 years old (33.7%; 95% CI [24.44, 42.88]). The respondents' education was average primarily (64.4%; 95% CI [55.11, 73.79]) and showed age but no gender differences ($P < 0.001$; Cramér's V = 0.42; 95% CI [0.25, 0.57]; Supplementary File 1). Respondents in the age range 18–24 years were more likely to have low education ($P < 0.001$; 46.43%; 95% CI [36.7, 56.16]), while it was average for the 35–44-year-old group ($P = 0.018$; 84%; 95% CI [76.85, 91.15]) and high education in the older age group (55–64-year-olds; $P < 0.001$; 66.67%; 95% CI [57.47, 75.86]). Individual's monthly income also showed an age difference ($P < 0.001$; Cramér's V = 0.48; 95% CI [0.31, 0.62]), where respondents in the age range 18–24 years were more likely to have low income ($P < 0.001$; 71.43%; 95% CI [62.62, 80.24]), while other age groups were found to have an equal distribution of low, average, and high-income. Approximately 37.6% (95% CI [28.17, 47.07]) of the respondents had a history of orthodontic treatment which showed gender but no age differences (Fisher's Exact test; $P = 0.01$; Cramér's V = 0.27; 95% CI [0.07, 0.43]; Supplementary File 1). Females were more likely to have a history of orthodontic treatment than males ($P = 0.007$; 62.5%; 95% CI [53.06, 71.94]).

The findings showed that participants primarily obtained their orthodontic information from social media (34.7%, 95% CI [25.37, 43.93]), and no relationship could be identified by participants' ages and history of orthodontic treatment (Table 2). Nonetheless, a significant relationship was identified between gender and orthodontic information sources ($P = 0.018$; Cramér's V = 0.28; 95% CI [0.09, 0.45]), where females were more likely to seek information via social media platforms ($P = 0.02$; 45.28 (14.72, 31.11)) than their male counterparts. On the other hand, word-of-mouth was the most common orthodontic information source for male participants ($P = 0.009$; 27.08%; 95% CI [2.4, 12.7]). The findings also indicated that the orthodontic information source was significantly impacted by

Table 1 Characteristics of the research participants

Variable		*n*	%	95% Confidence Interval
Age (years)				
18–24		28	27.72	(18.99, 36.45)
25–34		34	33.66	(24.44, 42.88)
35–44		25	24.75	(16.33, 33.17)
45–54		8	7.92	(2.65, 13.19)
55–64		6	5.94	(1.33, 10.55)
Gender				
Male		48	47.52	(37.78, 57.26)
Female		53	52.48	(42.74, 62.22)
Education level				
Low	Elementary school	4	3.96	(0.16, 7.76)
	Secondary school	20	19.8	(12.03, 27.57)
Average	Diploma degree	11	10.98	(4.88, 17.08)
	Bachelor's degree	54	53.47	(43.74, 63.2)
High	Master's degree	9	8.91	(3.35, 14.47)
	PhD	3	2.97	(– 0.34, 6.28)
Monthly income (SAR)				
Low	< 3000	27	26.73	(18.1, 35.36)
Average	3000 - 5000	15	14.85	(7.91, 21.79)
	5000–10000	39	38.61	(29.12, 48.1)
High	10000–15000	18	17.82	(10.36, 25.28)
	> 15000	2	1.98	(– 0.74, 4.7)
Previous orthodontic treatment				
No		63	62.38	(52.93, 71.83)
Yes		38	37.62	(28.17, 47.07)
Orthodontic treatment type				
Traditional fixed braces		21	40.38	(30.81, 49.95)
Removable functional appliance		11	21.15	(13.19, 29.11)
Lingual braces		1	1.92	(– 0.76, 4.6)
Clear aligner		5	9.62	(3.87, 15.37)
Orthodontic treatment duration (years)				
≤ 1		8	21.05	(13.1, 29)
≤ 1.5		7	18.42	(10.86, 25.98)
≤ 2		17	44.74	(35.04, 54.44)
≤ 2.5		4	10.53	(4.54, 16.52)
≤ 3		2	5.26	(0.91, 9.61)
Orthodontic information source				
Books and magazines		28	27.72	(18.99, 36.45)
Orthodontist		21	20.79	(12.88, 28.7)
Social media platforms		35	34.65	(25.37, 43.93)
Word of mouth		17	16.83	(9.53, 24.13)

the respondent's educational level (P = 0.004; Cramér's V = 0.31; 95% CI [0.12, 0.47]) and monthly income (P = 0.01; Cramér's V = 0.31; 95% CI [0.12, 0.47]). Meanwhile, it was found that participants with low educational backgrounds were more likely to seek orthodontic information through word of mouth (P = 0.013; 33.33%; 95% CI [24.14, 42.53]), whilst those with average educational backgrounds were more likely to use social media (P = 0.001; 46.15%; 95% CI [36.43, 55.88]) and those with high education used books and

Table 2 Summary of the significant Chi^2 statistics on the relationship between participants' orthodontic information sources and gender, educational level, and monthly income

Variable		Orthodontic information source			
		Books and magazines	Orthodontist	Social media platforms	Word of mouth
Gender (P = 0.018; Cramér's V = 0.28; 95% CI [0.09, 0.45])					
Male	%, 95% CI	29.17 (17.82, 35.01)	20.83 (12.85, 28.66)	22.92 (35.58, 54.99)	27.08 (2.4, 12.7)**
	Adjusted Residual	− 0.31	− 0.01	2.36	− 2.62
Female	%, 95% CI	26.42 (20.3, 38.03)	20.75 (12.91, 28.75)	45.28 (14.72, 31.11)*	7.55 (18.42, 35.75)
	Adjusted Residual	0.31	0.01	− 2.36	2.62
Education level (P = 0.004; Cramér's V = 0.31; 95% CI [0.12, 0.47])					
Low	%, 95% CI	33.33 (24.14, 42.53)	20.83 (12.91, 28.75)	12.5 (6.05, 18.95)	33.33 (24.14, 42.53)*
	Adjusted Residual	0.7	0.01	− 2.61	2.47
Average	%, 95% CI	20 (12.2, 27.8)	20 (12.2, 27.8)	46.15 (36.43, 55.88)**	13.85 (7.11, 20.58)
	Adjusted Residual	− 2.33	− 0.26	3.26	− 1.08
High	%, 95% CI	58.33 (48.72, 67.95)*	25 (16.56, 33.44)	16.67 (9.4, 23.93)	0
	Adjusted Residual	2.52	0.38	− 1.39	− 1.66
Monthly income (P = 0.004; Cramér's V = 0.31; 95% CI [0.12, 0.47])					
Low	%, 95% CI	11.11 (4.98, 17.24)	25.93 (17.38, 34.47)	22.22 (14.11, 30.33)	40.74 (31.16, 50.32)***
	Adjusted Residual	− 2.25	0.77	− 1.59	3.88
Average	%, 95% CI	33.33 (24.14, 42.53)	16.67 (9.4, 23.93)	40.74 (31.16, 50.32)	9.26 (3.61, 14.91)
	Adjusted Residual	1.35	− 1.1	1.38	− 2.18
High	%, 95% CI	35 (25.7, 44.3)	25 (16.56, 33.44)	35 (25.7, 44.3)	5 (0.75, 9.25)
	Adjusted Residual	0.82	0.52	0.04	− 1.58

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

magazines (P = 0.012; 58.33%; 95% CI [48.72, 67.95]). Similarly, the results indicated that word-of-mouth recommendations were primarily sought by participants with low income (P < 0.001; 40.74%; 95% CI [31.16, 50.32]).

Public knowledge of Damon's appliance treatment

Most Damon appliance-aware respondents (64.4%, 95% CI [55.02, 73.7]) believed that it was generally better than traditional braces (Table 3). When it comes to the advertised claims for the Damon system, 56.43% of the participants agreed that it requires fewer clinic visits

Table 3 Participants' knowledge of Damon system's advertised claims

Damon system claims	Response %, 95% CI					
Overall better	Do not know		No		Yes	
	22.77 (14.59, 30.95)		12.87 (6.34, 19.4)		64.36 (55.02, 73.7)	
	Do not know	Disagree	Strongly Disagree	Neutral	Agree	Strongly Agree
Fewer visits	12.87 (6.34, 19.4)	4.95 (0.72, 9.18)	3.96 (0.16, 7.76)	21.78 (13.73, 29.83)	38.61 (29.12, 48.1)	17.82 (10.36, 25.28)
Shorter treatment duration	13.86 (7.12, 20.6)	14.85 (7.91, 21.79)	1.98 (− 0.74, 4.7)	19.8 (12.03, 27.57)	36.63 (27.23, 46.03)	12.87 (6.34, 19.4)
Reduced tooth extraction needs	12.87 (6.34, 19.4)	19.8 (12.03, 27.57)	1.98 (− 0.74, 4.7)	21.78 (13.73, 29.83)	33.66 (24.44, 42.88)	9.9 (4.08, 15.72)
Reduced teeth discomfort	12.87 (6.34, 19.4)	11.88 (5.57, 18.19)	1.98 (− 0.74, 4.7)	24.75 (16.33, 33.17)	33.66 (24.44, 42.88)	14.85 (7.91, 21.79)
Easier to maintain oral hygiene	11.88 (5.57, 18.19)	13.86 (7.12, 20.6)	1.98 (− 0.74, 4.7)	25.74 (17.21, 34.27)	36.63 (27.23, 46.03)	9.9 (4.08, 15.72)
Superior esthetic result	9.9 (4.08, 15.72)	13.86 (7.12, 20.6)	1.98 (− 0.74, 4.7)	19.8 (12.03, 27.57)	40.59 (31.01, 50.17)	13.86 (7.12, 20.6)
Reduced treatment cost	12.87 (6.34, 19.4)	11.88 (5.57, 18.19)	3.96 (0.16, 7.76)	18.81 (11.19, 26.43)	40.59 (31.01, 50.17)	11.88 (5.57, 18.19)

than traditional braces, whilst 21.78% were neutral, and the remaining 21.78% disagreed or were uncertain. While around 49.5% of the participants agreed that Damon appliance treatment requires less treatment time than traditional braces, 19.8% were neutral, and the remaining 30.7% disagreed or were uncertain. Regarding the need for tooth extraction, 43.56% of participants agreed that Damon appliance treatment requires lower tooth extraction than traditional braces, 21.78% were neutral, and the remaining 34.65% disagreed or were uncertain. Similarly, 48.51% of participants also agreed that Damon appliance treatment causes less tooth discomfort, 24.75% were neutral, and the remaining 26.73% disagreed or were uncertain. Regarding whether Damon appliance is easier to maintain oral hygiene than traditional braces, 46.53% agreed, 25.74% were neutral, and the remaining 27.72% disagreed or were uncertain. On the other hand, 54.45% of participants agreed that the esthetic results were better with Damon appliance treatment than traditional braces, whilst 19.8% were neutral, and 25.74% disagreed were uncertain. Regarding treatment costs, most participants (52.47%) agreed that Damon appliance treatment was less expensive than traditional braces; 18.81% were neutral, while the remaining 28.71% disagreed or were uncertain.

Relationship of public socio-demographics to Damon appliance treatment knowledge

No significant relationships between the Damon system advertised claims and participant's age, educational level, orthodontic treatment history, monthly income, and orthodontic information source could be identified. However, a statistically significant difference was identified between participant's gender and the perception that Damon appliance treatment was generally better than traditional braces ($P = 0.033$; Cramér's V = 0.26; 95% CI [0.07, 0.43]; Fig. 1; Supplementary File 1). Specifically, females were more likely to think that Damon appliance was better than traditional braces ($P = 0.012$; 75.47%; 95% CI [67.08, 83.86]), whilst males were more likely to select the 'Do not know' option ($P = 0.016$; 33.33%; 95% CI [24.14, 42.53]). There was also a significant difference in the perception that there is a lower need for tooth extraction with Damon appliance treatment between sexes ($P = 0.021$; Cramér's V = 0.36; 95% CI [0.18, 0.52]), as well as the belief that Damon appliance treatment causes less tooth discomfort ($P = 0.001$; Cramér's V = 0.44; 95% CI [0.27, 0.59]). Moreover, more females expressed neutral opinions about these claims ($P = 0.028$; 30.19%; 95% CI [21.24, 39.14] and $P = 0.021$; 33.96%; 95% CI [21.24, 39.14], respectively) than males, who were more likely to indicate that they do not know ($P = 0.004$; 22.92%; 95% CI [14.72, 31.11] and $P < 0.001$; 25%; 95% CI [14.72, 31.11], respectively). No other significant gender differences could be identified regarding the other claims of Damon's system.

Discussion

Medical producers typically use advertisements to boost new item sales or sustain existing ones [24]. This includes using techniques to make the adverts more appealing and not emphasizing the potential lack of evidence supporting the product. Some SLBs manufacturers make claims about treatment efficiency, outcome, and patient perceptions to sell their products. However, despite the clinical validity of those assertions being thoroughly investigated, knowledge of such claims within the public, as the author is aware, has never been investigated. This study showed that only one-tenth of the participants had heard of the Damon system. However, they still had mixed perceptions of manufacturers' advertisement claims.

The Damon appliance is marketed on the assumption that it is more efficient than traditional braces, with lesser treatment time and fewer visits [3]. In the current study, most respondents believed that Damon appliance treatment generally required fewer visits than traditional braces treatment (around 56%). Additionally, although approximately 50% of participants agreed that the Damon system could result in shorter treatment times than traditional braces, another equal number of participants were neutral, disagreeing, or uncertain. Previous evidence-based literature showed no association of SLBs with shorter treatment duration or fewer clinical visits than traditional braces [7, 25–27]. While one meta-analysis showed that treatment with traditional braces can be, on average, 10 days faster than SLBs, the clinical significance of this difference can be negligible [26]. This discrepancy between participants' perceptions and clinical evidence highlights the need for better patient education regarding treatment expectations.

Since the Damon system uses a robust ligation with super elastic archwires unique to the system, it was further claimed that these factors reduce the need for tooth extraction [3]. In the current study, most participants (more than 50%) were neutral, disagreeing, or uncertain that the Damon appliance requires a lower need for tooth extraction, while around 47% agreed. However, no evidence supports the lower extraction need for the Damon appliance over traditional braces [15]. Thus, it is disingenuous to offer patients Damon appliance treatment based on the claim that it reduces the need for tooth extraction.

Another central claim of the Damon system is that it applies less force to dentition within the physiological boundaries, thus minimizing the patient's discomfort [3]. When asked whether Damon appliance treatment causes

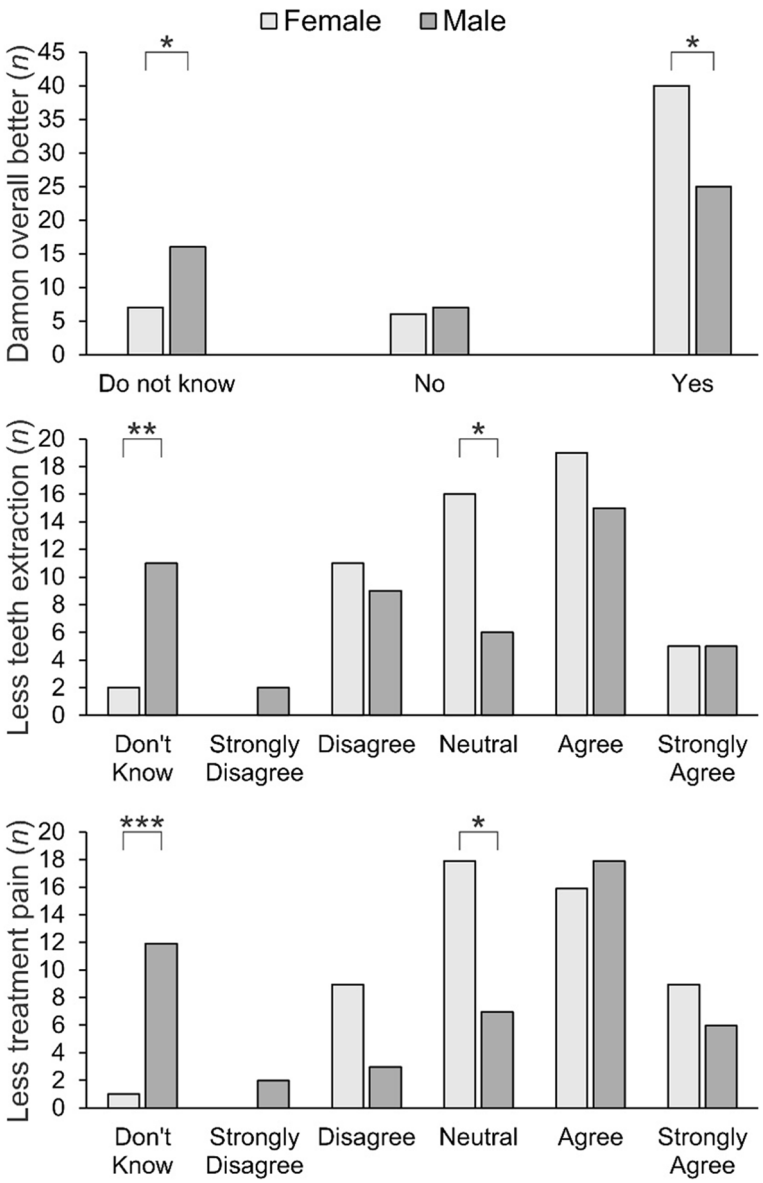

Fig. 1 Gender differences regarding knowledge of advertised claims of the Damon system (* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$)

less tooth discomfort than traditional braces, more than 50% of the participants in the current study were neutral, disagreeing, or uncertain, while only 48.5% agreed. However, three meta-analyses showed that SLBs have no advantage over traditional braces in reducing patients' discomfort after 4 hours, 24 hours, 3 days, and 7 days after appliance placement [7, 10, 26]. These results were corroborated by a multi-centric randomized clinical trial, which showed no significant difference between SLBs and traditional braces on patient discomfort 1, 3, and 5 days after archwire activation [28].

For the oral hygiene maintenance with the Damon appliance compared to traditional braces, most participants (more than 50%) were neutral, disagreeing, or uncertain, while around 47% agreed. A previous study showed Damon appliance to results in more *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, and *Prevotella intermedia* colonization than other types of SLBs, yet no direct comparison was made to traditional braces [29]. However, the current study results partially agree with prior meta-analyses, which showed no significant differences in plaque or gingival indices,

bacterial colonization, or periodontal probing between SLBs and traditional braces [10, 11, 30].

Regarding treatment results, most respondents in this study believed that Damon appliance treatment can result in more esthetic treatment outcomes than traditional braces (around 54%). However, very few studies utilized occlusal indices to measure the treatment quality obtained by Damon appliance compared to traditional braces [15], showing the former to have more positive outcomes than the latter [31, 32]. However, a prior meta-analysis negated this effect due to several factors, including small sample size, retrospective design, and lack of assessor blinding [7]. Additionally, a multi-centric randomized clinical trial showed that Damon appliance treatment did not result in better occlusal outcomes than traditional braces [27]. The disagreement between participants' perceptions and the current body of evidence highlights the need for further high-quality research to evaluate the esthetic outcomes of the Damon appliance compared to traditional braces.

It has been suggested previously that one of the main disadvantages of SLBs is their higher cost [33, 34], where the Damon appliance is, on average, $1100 more expensive than traditional braces [35]. However, most respondents (53%) in the current study falsely believed that Damon appliance treatment was cheaper than traditional braces. However, it should be noted that the precise Damon appliance treatment cost estimation depends on various factors, such as case complexity, treatment length, and variations in individual orthodontic practices and countries.

Social media apps and websites can be used to positively impact patient knowledge and behaviors [36]. The mixed perceptions of the participants in the current study put an ethical obligation on clinicians to present orthodontic appliance information without overstating the advantages or deliberately excluding the disadvantages. Moreover, they should not be based on unsupported claims or poor evidence [37]. This is even more important when considering that social media posts made by orthodontists can impact a patient's perceptions of their professional credibility and that adults are often willing to pay increased monthly fees to receive quick orthodontic treatments [38, 39]. Thus, from a public health and economic perspective, standard regulations are required to control manufacturer adverts, ensure public protection, and provide clear internet access to credible information backed by high-level evidence.

Over the past decade, more and more people have been using social media. It is now an integral part of everyday life and a critical source of information in many fields, including orthodontics [40–43]. Prior investigations have revealed that more than 80% of orthodontic patients employ social media platforms, whilst Facebook and Instagram are the most popular social media sites [38, 44–46]. Moreover, Hanzell et al. [45] also discovered that just 6.7% of participants seek orthodontic information on social media sites, while Siddiqui et al. found it to be 30% [46]. Corroborating the latter study, the findings of the present work reveal that over one-third of participants employ social media to obtain orthodontic information. The differences between the present study's findings and previous investigations could be due to differences in the study timeframe, participants' ages, and ethnicity. As opposed to a previous study, social media use was found to be similar in younger and older people in this study [44]. This may be due to differences in research objectives. For example, in the present work, participants were asked to identify their main source of orthodontic information, whilst previous studies have focused on the general usage of social media.

Recently, there has been a significant increase in companies' use of social media for marketing, meaning that it is now possible to obtain direct access to consumers and patients worldwide [47]. The present study showed that females use social media more frequently than males, which aligns with previous studies' findings [42, 44]. This study also found that females were more likely to believe that Damon appliance treatment is generally superior to traditional bracket treatment than males. A recent study revealed that many orthodontic products are advertised on Instagram, although 60% of such adverts were found to be misleading, and only 1.7% were objectively true [48]. Similar findings were also revealed in another study, in which it was revealed that 82.3% of Facebook pages from orthodontic specialist practices in Australia presented information that could generate unreasonable expectations [49]. The differences in social media usage and inherent dissimilarities between the sexes can explain this gender-related difference in the Damon appliance's overall perception.

In this study, the survey was distributed through various social media platforms. This distribution method allowed for broad participation but did not enable tracking the total number of individuals who received or viewed the survey invitation. Consequently, calculating an accurate response rate was not feasible. We acknowledge that not reporting the response rate put challenges in evaluating the extent to which non-respondents might differ from respondents, potentially introducing bias into the study's results. Additionally, convenience sampling via social media platforms may have resulted in a sample that is younger, more technologically adept than the general population, and likely more familiar with online trends and may have different perceptions or awareness levels regarding orthodontic treatments, such as the

Damon system, compared to older or less internet-active individuals. Overrepresenting certain demographic groups limits how our findings can be generalized to the broader population. Another point to highlight is that this study excluded non-Saudis, patients with prior Damon treatment experience, and dental professionals. Including dental professionals or patients with prior Damon treatment experience could have provided valuable insights into public misconceptions about the Damon system. However, our study aimed to assess the general public's perceptions and awareness of the Damon system, focusing on individuals who are potential patients rather than healthcare providers. Including dental professionals or patients with prior Damon treatment experience might introduce bias, as their knowledge could differ significantly from the general population's. Non-Saudis were excluded to ensure a homogenous sample to minimize confounding variables related to cultural and systemic differences in healthcare experiences. This approach aimed to enhance the internal validity of our findings within the Saudi population. However, excluding non-Saudis and dental professionals limited the study findings to the Saudi Arabian public and cannot be generalizable to other countries. We also acknowledge that quantitative validation measures such as content validity index or test-retest reliability are important in ensuring the robustness of research tools. However, in our study, we opted for a qualitative approach to validate the used survey by consulting two experienced orthodontists to review and refine the survey items. We also piloted the survey with five patients visiting the orthodontic clinic to ensure the clarity of the survey questions for non-specialists. This decision was influenced by resource constraints and the exploratory nature of our research, which aimed to gather raw insights into public perceptions of the Damon system. Future studies are invited to explore the extent to which the public perceives the Damon system's advertised claims in other countries by incorporating more rigorous validation methods.

Conclusions

This study examined public awareness and perceptions of the Damon orthodontic system among 918 participants. While only 11% of respondents were familiar with the Damon system, some participants tended to believe that Damon appliance treatment offered advantages over traditional braces, including perceived improvements in treatment efficacy, comfort, and oral hygiene maintenance. It is important to note that many participants remained uncertain about these perceived benefits. Further, no significant associations were found between participants' socio-demographic characteristics and their knowledge of Damon appliance treatment; however, females believed it was generally better than traditional braces. These mixed findings suggest a need for guidelines in orthodontic advertising to prevent potential misinformation. Providing the public with reliable, evidence-based information is crucial for supporting informed decision-making in orthodontic care.

Abbreviation

SLBs Self-ligating brackets

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12903-025-06021-2.

Supplementary Material 1.

Acknowledgements

The Researchers would like to thank the Deanship of Graduate Studies and Scientific Research at Qassim University for financial support (QU-APC-2025).

Author's contributions

N.A.: Conceptualization, Methodology, Validation, Investigation, Resources, Writing – review & editing, Visualization, Project administration, Supervision.

Funding

This research was self-funded and did not receive any specific grant from funding agencies 8 in the public, commercial, or not-for-profit sectors.

Data availability

The datasets used and/or analysed during the current study available from corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study adhered to the Declaration of Helsinki principles for medical research involving human subjects and was approved by the ethics committee at Qassim University, Saudi Arabia (#ST/6092/2021). The participants were asked to sign that they agreed to participate in the study. Informed consent to participate was obtained from all the participants in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 11 February 2025 Accepted: 16 April 2025
Published online: 24 April 2025

References

1. Harradine N. The history and development of self-ligating brackets. Semin Orthod. 2008;14(1):5–18. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1073874607000679.
2. Stolzenberg J. The Russell attachment and its improved advantages. Int J Orthod Dent Child. 1935;21(9):837–40. Available from:https://linkinghub.elsevier.com/retrieve/pii/S0097052235903689. Cited 2022 Apr 10.
3. Damon D. Damon system: the workbook. 2004.
4. Maijer R, Smith DC. Time savings with self-ligating brackets. J Clin Orthod. 1990;24(1):29–31.Available from: http://www.ncbi.nlm.nih.gov/pubmed/2387895.
5. Turnbull NR, Birnie DJ. Treatment efficiency of conventional vs self-ligating brackets: effects of archwire size and material. Am J Orthod

Dentofacial Orthop. 2007;131(3):395–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17346597. Cited 2022 Apr 10.
6. Miles PG. Self-ligating brackets in orthodontics: do they deliver what they claim? Aust Dent J. 2009;54(1):9–11. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19228126.
7. Chen SSH, Greenlee GM, Kim JE, Smith CL, Huang GJ. Systematic review of self-ligating brackets. Am J Orthod Dentofac Orthop. 2010;137(6):726.e1-726.e18. Available from: http://dx.doi.org/10.1016/j.ajodo.2009.11.009.
8. Marshall SD, Currier GF, Hatch NE, Huang GJ, Nah HD, Owens SE, et al. Ask us. Self-ligating bracket claims. Am J Orthod Dentofacial Orthop. 2010;138(2):128–31. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20715337.
9. Fleming PS, O'Brien K. Self-ligating brackets do not increase treatment efficiency. Am J Orthod Dentofac Orthop. 2013;143(1):11–9. Available from: http://dx.doi.org/10.1016/j.ajodo.2012.10.012.
10. Yang X, Su N, Shi Z, Xiang Z, He Y, Han X, et al. Effects of self-ligating brackets on oral hygiene and discomfort: a systematic review and meta-analysis of randomized controlled clinical trials. Int J Dent Hyg. 2017;15(1):16–22. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27095145.
11. do Nascimento LEAG, de Souza M, Azevedo ARP, Maia LC. Are self-ligating brackets related to less formation of Streptococcus mutans colonies? A systematic review. Dental Press J Orthod. 2014;19(1):60–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24713561.
12. Eliades T. A potentially hazardous shift in the orthodontic continuing education model: a crowd queuing up to educate us. Am J Orthod Dentofac Orthop. 2020;158(1):1–3. https://doi.org/10.1016/j.ajodo.2020.03.017.
13. Livas C, Kouskoura T, Ren Y, Katsaros C, Pandis N. Are claims made in orthodontic journal advertisements evidence-supported? Angle Orthod. 2015;85(2):184–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25490551.
14. Hameed O, Pandis N, Cobourne MT, Seehra J. Product advertisements in orthodontic journals: are they evidence-based? Am J Orthod Dentofac Orthop. 2021;160(1):77–83. https://doi.org/10.1016/j.ajodo.2020.03.032.
15. Wright N, Modarai F, Cobourne MT, Dibiase AT. Do you do Damon®? What is the current evidence base underlying the philosophy of this appliance system? J Orthod. 2011;38(3):222–30. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21875995.
16. American Dental Association. Marketing and advertising: know the legal and ethical issues in dental advertising. Available from: https://www.ada.org/resources/practice/legal-and-regulatory/marketing-and-advertising?utm_source=chatgpt.com. Cited 2025 Mar 6.
17. Meade MJ, Ju X, Hunter D, Jamieson L. Compliance of orthodontic practice websites with ethical, legal and regulatory advertising obligations. Int Orthod. 2023;21(1):100727. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1761722723000062.
18. 15 Dental - ASA | CAP. Available from: https://www.asa.org.uk/rulings/15-dental-a16-365575.html. Cited 2024 Dec 1.
19. Shah S. The influence of internet-derived misinformation on medical treatment decisions: a social learning perspective. Prem J Public Health. 2024;1. Available from: https://premierscience.com/pjph-24-353/
20. World health Organization. Infodemics and misinformation negatively affect people's health behaviours, new WHO review finds. Available from: https://www.who.int/europe/news/item/01-09-2022-infodemics-and-misinformation-negatively-affect-people-s-health-behaviours--new-who-review-finds?utm_source=chatgpt.com. Cited 2025 Mar 6.
21. Almotairy N. Public perception of Invisalign ® clear aligner treatment: a cross-sectional survey-based study. APOS Trends Orthod. 2022;13(1):38. Available from: https://apospublications.com/public-perception-of-invisalign-clear-aligner-treatment-a-cross-sectional-survey-based-study/.
22. Reyna VF. A scientific theory of gist communication and misinformation resistance, with implications for health, education, and policy. Proc Natl Acad Sci. 2021;118(15). Available from: https://pnas.org/doi/full/10.1073/pnas.1912441117
23. Eysenbach G. Improving the quality of web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). J Med Internet Res. 2004;6(3):e34. Available from: http://www.jmir.org/2004/3/e34/.
24. Fugh-Berman A, Alladin K, Chow J. Advertising in medical journals: should current practices change? PLoS Med. 2006;3(6):e130. Available from: https://dx.plos.org/10.1371/journal.pmed.0030130.
25. O'Dywer L, Littlewood SJ, Rahman S, Spencer RJ, Barber SK, Russell JS. A multi-center randomized controlled trial to compare a self-ligating bracket with a conventional bracket in a UK population: Part 1: treatment efficiency. Angle Orthod. 2016;86(1):142–8.
26. Čelar AG, Schedlberger M, Dörfler P, Bertl MH. Systematic review on self-ligating vs. conventional brackets: initial pain, number of visits, treatment time. J Orofac Orthop / Fortschritte der Kieferorthopädie. 2013;74(1):40–51. Available from: http://link.springer.com/10.1007/s00056-012-0116-x.
27. DiBiase AT, Nasr IH, Scott P, Cobourne MT. Duration of treatment and occlusal outcome using Damon3 self-ligated and conventional orthodontic bracket systems in extraction patients: a prospective randomized clinical trial. Am J Orthod Dentofac Orthop. 2011;139(2):e111-6. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-79551716586&doi=10.1016%2Fj.ajodo.2010.07.020&partnerID=40&md5=aac977924b037956c5d4624d06f1f397.
28. Rahman S, Spencer RJ, Littlewood SJ, O'Dywer L, Barber SK, Russell JS. A multicenter randomized controlled trial to compare a self-ligating bracket with a conventional bracket in a UK population: Part 2: pain perception. Angle Orthod. 2016;86(1):149–56.
29. Jung WS, Kim K, Cho S, Ahn SJ. Adhesion of periodontal pathogens to self-ligating orthodontic brackets: an in-vivo prospective study. Am J Orthod Dentofac Orthop. 2016;150(3):467–75. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-84991063254&doi=10.1016%2Fj.ajodo.2016.02.023&partnerID=40&md5=af3f9416a596b704caa3c58930a1d9a4.
30. Fleming PS, Johal A. Self-ligating brackets in orthodontics. Angle Orthod. 2010;80(3):575–84. Available from: http://www.angle.org/doi/10.2319/081009-454.1.
31. Eberting JJ, Straja SR, Tuncay OC. Treatment time, outcome, and patient satisfaction comparisons of Damon and conventional brackets. Clin Orthod Res. 2001;4(4):228–34. Available from: https://onlinelibrary.wiley.com/doi/10.1034/j.1600-0544.2001.40407.x.
32. Harradine NWT. Self-ligating brackets and treatment efficiency. Clin Orthod Res. 2001;4(4):220–7. Available from: https://onlinelibrary.wiley.com/doi/10.1034/j.1600-0544.2001.40406.x.
33. Nabhan AF, Abbas NH, Fleming PS, Johal A, Sadek MM. Self-ligating brackets versus conventional pre-adjusted edgewise brackets for treating malocclusion. Cochrane Database Syst Rev. 2016; Available from: https://doi.wiley.com/10.1002/14651858.CD012407.
34. Prettyman C, Best AM, Lindauer SJ, Tufekci E. Self-ligating vs conventional brackets as perceived by orthodontists. Angle Orthod. 2012;82(6):1060–6. Available from: http://www.angle.org/doi/10.2319/101311-640.1.
35. Damon braces: what you need to know. Available from: https://www.realself.com/nonsurgical/damon-braces? Cited 2025 Mar 10.
36. Sharif MO, Newton T, Cunningham SJ. A systematic review to assess interventions delivered by mobile phones in improving adherence to oral hygiene advice for children and adolescents. Br Dent J. 2019;227(5):375–82. Available from: http://www.nature.com/articles/s41415-019-0660-5.
37. Markowitz K, Roberts E, Strickland M. Dental products and evidence-based dentistry. Quintessence Int. 2019;50(5):402–11. Available from: http://www.ncbi.nlm.nih.gov/pubmed/30957113.
38. Meira TM, Prestes J, Gasparello GG, Antelo OM, Pithon MM, Tanaka OM. The effects of images posted to social media by orthodontists on public perception of professional credibility and willingness to become a client. Prog Orthod. 2021;22(1):7.
39. Uribe F, Padala S, Allareddy V, Nanda R. Patients', parents', and orthodontists' perceptions of the need for and costs of additional procedures to reduce treatment time. Am J Orthod Dentofac Orthop. 2014;145(4):S65-73. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0889540614000002X.
40. Papadimitriou A, Kakali L, Pazera P, Doulis I, Kloukos D. Social media and orthodontic treatment from the patient's perspective: a systematic review. Eur J Orthod. 2020;42(3):231–41. Available from: https://academic.oup.com/ejo/article/42/3/231/5492385.
41. Graf I, Gerwing H, Hoefer K, Ehlebracht D, Christ H, Braumann B. Social media and orthodontics: a mixed-methods analysis of orthodontic-related posts on Twitter and Instagram. Am J Orthod Dentofac Orthop.

2020;158(2):221–8. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0889540620302274.
42. Demographics of Social Media Users and Adoption in the United States | Pew Research Center. Available from: https://www.pewresearch.org/internet/fact-sheet/social-media/?menuItem=45b45364-d5e4-4f53-bf01-b77106560d4c. Cited 2024 Dec 1.
43. Almotairy N. Public perception of Invisalign ® clear aligner treatment: a cross-sectional survey-based study. APOS Trends Orthod. 2022;13:38. Available from: https://apospublications.com/public-perception-of-invisalign-clear-aligner-treatment-a-cross-sectional-survey-based-study/.
44. Nelson KL, Shroff B, Best AM, Lindauer SJ. Orthodontic marketing through social media networks: the patient and practitioner's perspective. Angle Orthod. 2015;85(6):1035–41. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25738740.
45. Henzell M, Knight A, Antoun JS, Farella M. Social media use by orthodontic patients. N Z Dent J. 2013;109(4):130–3. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24396951.
46. Siddiqui N, Chia M, Sharif MO. Social media and orthodontics: are our patients scrolling? J Orthod. 2022;49(2):179–84.
47. Social media - statistics on the use by enterprises. Available from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Social_media_-_statistics_on_the_use_by_enterprises. Cited 2024 Dec 1.
48. Alkadhimi A, Al-Moghrabi D, Fleming PS. The nature and accuracy of Instagram posts concerning marketed orthodontic products. Angle Orthod. 2022;92(2):247–54. Available from: http://www.ncbi.nlm.nih.gov/pubmed/34878515.
49. Meade MJ, Dreyer CW. Facebook legal and regulatory advertising compliance by specialist orthodontic practices: a cross-sectional survey. Aust Orthod J. 2020;36(2):168–74. Available from: https://www.sciendo.com/article/10.21307/aoj-2020-019.

Publisher's Note