

Issues of Fake Braces: A Review of Literature

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Abstract

The rising trend of fake braces, particularly in Southeast Asia, has raised significant health concerns. Regarded as a fashion statement, fake braces are unregulated orthodontic appliances sold through social media and online marketplaces. Unlike conventional braces, fake braces are often self-applied or installed by unqualified individuals, lacking the oversight of licensed professionals. Adolescents and young adults are drawn to fake braces because of their perception as a status symbol, affordability and potential to be aesthetically customised. However, serious concerns exist around oral health, including periodontal damage, infection, allergic reactions and unintentional ingestion due to the low-quality materials. These risks are further highlighted by reports of mortality and morbidity. According to studies, fake braces exhibit irregular surface textures, encouraging the growth of germs and the creation of biofilms, which exacerbates oral problems such as caries. Despite these risks, research on the toxicity and clinical impacts of fake braces remains sparse. Laboratory analyses indicate the presence of standard alloy components, but the long-term safety of these materials in unregulated devices is unverified. Efforts to regulate the sale and installation of fake braces are undermined by their easy accessibility online. This review examines the sociocultural drivers, material composition, associated risks and regulatory challenges surrounding the use of fake braces. It also emphasises the need for public education, stricter enforcement of medical device regulations, and further research on the detrimental effects of fake braces on oral and systemic health. Robust evidence is crucial for policy interventions to curb this alarming trend.

Keywords: Cytotoxicity, Fake braces, Fashion braces, Material composition

Received: 15-Dec-2024 **Revised:** 16-Apr-2025 **Accepted:** 22-May-2025

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Introduction

A growing demand exists among communities around the world for orthodontic treatment. The desire for a better dental appearance (65 %) and to obtain straight teeth (48 %) are the most significant factors affecting patients in Malaysia when pursuing orthodontic treatment.¹ Orthodontic treatment is seen by the public as a method to enhance personal appearance, oral health and self-confidence. Several studies have linked malocclusion to quality of life.^{2,3} However, long waiting lists for government clinics make these issues difficult to address. The downside of orthodontic treatment by specialists from the public perspective is that it is costly, patients must attend clinical appointments regularly every 6–8 weeks and treatment may last up to 3 years.⁴ Fake braces, artificial removable and fixed orthodontic appliances, have recently become popular among adolescents and young adults.⁵ Tooth surfaces decorated with various designs and colourful orthodontic rubber bands (also known as O-rings) are considered accessories just like earrings or necklaces. Fake braces are mostly advertised on online shopping platforms. Some can also be found on social media such as Instagram, Facebook and Twitter. They can be self-fixed, or the fixation can be performed by illegal practitioners at beauty salons, hotels or even homes. Fake braces can be purchased much cheaper than genuine ones, and the duration of wear is only 3–5 months, with no follow-up review to monitor the teeth.^{5–7} For adolescents and young adults, fake braces are an easier option. This article examines issues pertaining to fake braces, along with a few factors that contribute to their detrimental effect on oral tissues, whether they have been studied or not.

Issues regarding fake braces

No scientific evidence documents the origin of fake braces. However, the issue has been receiving attention in Thailand since 2004, when the deaths of two adolescents were linked to the use of fake braces. A non-professional practitioner in the northeast city of Khon Kaen left a 17-year-old girl with an infected

thyroid that led to heart failure, causing death. In Chonburi, the death of a girl aged 14 years was linked to fake braces bought at an illegal stall.⁸ In Malaysia, an Annual Report by the Ministry of Health Malaysia published in December 2019 noted that between 2015 and 2018, a total of 42 complaints included 27 about the installation of fake braces. All offences were prosecuted, with fines ranging from RM30,000–RM100,000 or imprisonment ranging from 2 to 12 months.⁹ Fake braces are currently very popular in Southeast Asian countries such as Thailand, Malaysia, Indonesia and China as a fashion statement. Cases of fake braces have also been reported in the Middle East¹⁰ and seemed to gain popularity in Brazil since 2016.¹¹ Wearing an orthodontic fixed appliance is considered a sign of status, style and wealth due to the high treatment cost. This is partially due to its popularity among young celebrities and social media influencers. Hollywood actors and singers such as Britney Spears, Emma Watson, Gwen Stefani and Miley Cyrus have played a role in making these adornments popular among young generations.¹² In contrast, young people in Western countries consider wearing orthodontic appliances and other facial accessories stigmatised and the epitome of an awkward adolescent period.⁴ Due to the increasing trend of braces, various terms have been used to describe these fake adornments. The terms fake, fashion and faux braces have been used interchangeably. Nasir et al. attempted to classify these accessories into two categories. ‘Fake’ braces are fashion appliances that are not bonded to the teeth; orthodontic brackets and elastics are attached to the wire, and the wire is bent at the end and inserted between the molars. Thus, no direct tooth movement is caused. ‘Real’ braces are fixed to the teeth and can induce tooth movement.¹³ However, these definitions could be confusing to lay consumers because the term ‘real’ might suggest that these fake accessories are legitimate. Another term widely used to refer to these artificial braces, mainly in literature from Middle Eastern countries, is fashion braces. This

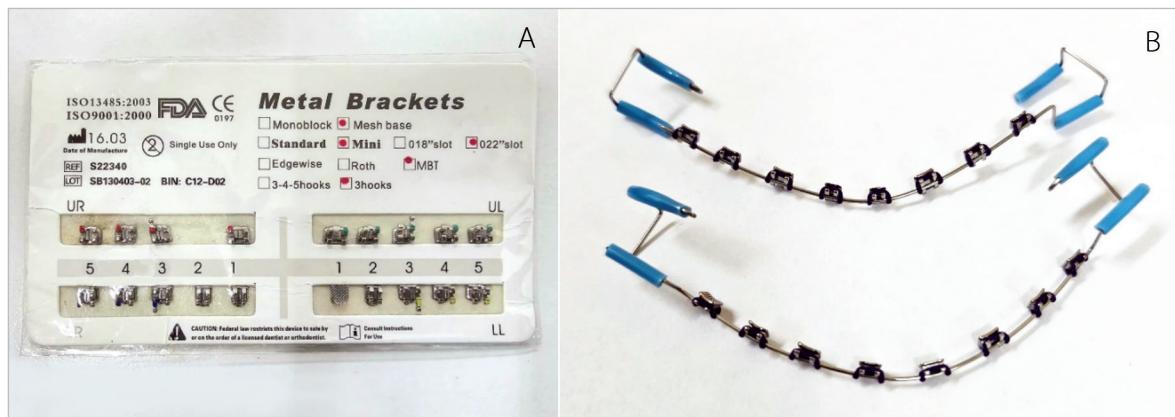


Figure 1 Two types of fake braces sold in online marketplaces. (A) Bonded-type fake braces; (B) removable-type fake braces or 'click braces'.

refers to both the bonded and non-bonded types of artificial braces.^{7,14,15} The non-bonded type is also known as click braces in some online marketplaces in Malaysia¹⁶ or simply removable braces. Figure 1 shows the two most common types of fake braces that are readily available in online marketplaces.

Fake braces can be easily purchased via social media platforms such as Instagram, Facebook and Twitter, as well as various online marketplaces such as Shopee and Lazada in Malaysia¹⁷ and other global shopping platforms such as Alibaba, AliExpress, eBay and Amazon.¹⁸ Bonded-type fake braces are usually provided by non-professional practitioners or self-proclaimed dentists in unlicensed premises such as hotel rooms, customers' homes and beauty spas. These unqualified practitioners have never received any formal dental education and have often learned about braces and how to fix them through YouTube and other online video platforms.¹⁹ The status of these illegal materials is also unknown. The risks associated with wearing these kinds of braces include pain, damage to the surrounding tooth-supporting structures (such as the periodontal ligaments), accidental swallowing or aspiration of the appliance, infection from unsterilised equipment, lead poisoning,^{13,20} worsening of crowding, discolouration of the teeth due to prolonged leaching of composite at the bracket base, and poor maintenance of oral hygiene leading to the development of white spot

lesions, caries and poor gingival health.¹⁰ Conversely, conventional or medical-grade braces are produced by medical device manufacturers and widely used by licensed orthodontic specialists at dental clinics or hospitals. These conventional brackets are thoroughly tested for safety and efficacy in producing the desired tooth movement.^{13,21}

Elemental composition of fake braces

To date, very little scientific research has been published regarding fake braces. The topic has been discussed in several^{15-17,20,22} articles raising concerns with "YouTube-based orthodontics", but not in terms of material composition, cytotoxicity or bacterial contamination. A recent study by Nasir^{13,23} discussed the chemical and microstructural analysis of fake braces. Each bracket ('fake', 'real' and conventional braces) was manufactured from different alloys, predominantly iron, chromium, nickel, copper and carbon. No significant difference existed between the three types of braces in terms of material composition, and no toxic metals such as lead, mercury or arsenic were detected. However, only three samples were tested from each group, and these results should be interpreted cautiously. Haleem further tested the chemical and microstructural changes in fake braces immersed in simulated body fluids (SBF) at various intervals (days 0, 7, 14 and 28). The changes in the surface microstructure of the fake braces and changes

in the pH of the SBF were recorded. The fake braces had increased irregularity and rough surfaces, with obvious large alloy particles in the surface texture. In comparison with the control stainless steel standard orthodontic archwire, the fake braces had identical ion components, surface irregularities and pH changes. However, this study did not represent the real oral environment because SBF was used as the medium and the pH was not manipulated to simulate the oral environment. Furthermore, the fake braces used in the study were of the click braces type and not the type that is bonded to the teeth. Both studies by Nasir and Haleem also did not investigate the toxicity effects of fake braces against human cells or tissues.

Cytotoxicity of fake braces

Cytotoxicity is an in vitro test to determine whether any cell death may be caused by the medical device due to the leaching of toxic substances or direct contact. Detailed procedures on how to perform cytotoxicity tests are found in ISO 10993-5.²⁴ Even conventional orthodontic appliances may corrode over time due to exposure to chemical, thermal and physical agents such as food, liquid and toothbrushes in the mouth²⁵ if left longer than the intended treatment duration, which is usually approximately 2 years. This effect may be worse with an inferior stainless steel grade, which may be the case with fake braces, probably worn longer due to social pressure. The major corrosion products are nickel, chromium and iron. These products can be absorbed into the body.²⁶ Nickel allergy is the most common contact allergy in developed countries; patch test evidence from general populations in many studies has shown that this allergy affects 10 % – 30 % of women and 1 % – 3 % of men.²⁷ Of the general population, 10 % are allergic to nickel.²⁸ Allergic reactions to chromium released from orthodontic components have also been reported.²⁹ Ahrari³⁰ categorised cytotoxicity as 1) more than 90 % cell viability (no cytotoxicity), 2) 60 % – 90 % cell viability (slight toxicity), 3) 30 % – 59 % cell viability (moderate cytotoxicity), and 4) less than 30 %

cell viability (severe cytotoxicity). Metal orthodontic materials used in the clinic (such as orthodontic bands, brackets and archwires) can be considered non-cytotoxic to slightly cytotoxic.^{31,32} Investigation into the cytotoxicity of a material used in the body is important because it can guide clinicians in choosing materials to avoid irritation or reactions towards soft tissue and danger to the body systemically.^{33,34} Although some sellers state on their fake braces packaging that the consumer should only wear it as an accessory and oral hygiene is important, proper follow-up by an authorised dentist is crucial to monitor their dental health. Users may wear the device for a long duration, which may cause unwanted tooth movement and soft tissue irritation.

Plaque retention

Another parameter that has not been investigated by any researchers to date is the dental plaque retention on these materials, either in vitro or in vivo. Metal brackets used in orthodontic practice have been found to inflict ecological changes in the oral environment, such as decreased pH of the saliva and increased plaque accumulation.³⁵ Generally, the formation of dental plaque on teeth is composed of numerous bacterial species. One of the bacterial strains that is prominently involved in dental plaque and caries formation is *Streptococcus mutans*.³⁶ This bacterium is the primary cariogen that produces several virulence factors.³⁷ *Streptococcus* species have long filamentous structures similar to the pili observed on bacteria surfaces. These structures exhibit adhesive properties and may play a key role in adhering to host cells and tissues, as well as in biofilm formation.³⁸ Studies have also found that isolates of *Streptococcus mutans* have a higher ability to produce biofilm or plaque-like substances in the oral cavity, compared to isolates of other *Streptococcus* species.^{39,40} In the context of caries aetiology, the ability of *Streptococcus mutans* to form biofilm on tooth surfaces or dental materials is significant from a clinical viewpoint. Studies have reported that the surface roughness of dental materials

has a crucial impact on bacterial adhesion and the subsequent biofilm formation, and microorganisms adhere best to a bracket surface that is more porous and less smooth.^{41,42} Fake braces have unpolished and irregular surface textures, with most showing large alloy particles.¹³ This can ultimately cause a higher affinity of bacterial plaque film formation on fake braces surfaces, compared to conventional ones.^{13,23,43}

Discussion

According to the Medical Device Act 2012, any medical devices, or in this case any orthodontic products, to be sold in Malaysia must be registered with an authorised local representative, who must also be registered with the Malaysian Dental Association.¹⁷ This is important because the representative is responsible for any harm caused by the appliance sold, not the dental practitioner.²⁰ This also gives a sense of security to the patient and practitioner because the origin and quality of the products acquired are known. Orthodontic materials and products sold via online platforms are poorly regulated and at a very high risk of contamination due to poor handling and packaging. They suffer from improper labelling, and most even come without an expiry date disclosure.¹⁷ The fact that these products can be easily obtained via online shopping platforms adds to these risks. Despite restrictions imposed by some online shopping platforms on selling medical devices,⁴⁴ irresponsible sellers will always find a loophole to sell their products. A review of some of these platforms showed that the number of fake braces sold reaches thousands, and the numbers keep increasing. This shows that the trend of wearing fake braces and the illegal practice of providing such treatments are increasing at an alarming rate. The leading reason that this trend is gaining traction is a lack of awareness and education on the dangers of these products. To date, only a few laboratory studies have attempted to expose the dangers of fake braces. All studies found that fake braces were of lower quality, with poor surface finishing, higher surface roughness

and higher toxic metal leaching.^{4,13,23,45} However, among these studies, none attempted to look into the destructive effect of fake braces directly towards the oral tissues. Further studies focusing on the level of cytotoxicity towards human oral tissues, plaque retentiveness and bacterial adhesion of fake braces would be clinically relevant.

Conclusion

The increasing availability and use of fake braces through online platforms pose a serious threat to patient safety and professional integrity. While existing regulations under the Medical Device Act 2012 aim to ensure product safety and accountability, enforcement and public awareness remain insufficient. Strengthening regulatory oversight, enhancing public education, and conducting more comprehensive clinical studies on the biological risks of fake braces are essential steps toward mitigating this growing concern.

Author contributions

MZ: Conceptualization, Methodology, Software, Formal analysis, Investigation, Data Curation, Writing - Original Draft, Visualization; AA: Validation, Writing - Review & Editing, Supervision; NN: Resources, Writing - Review & Editing, Supervision; NA: Writing - Review & Editing, Supervision.

Disclosure statement

The authors have no conflicts of interest.

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