

Digital Influencers and the Advertising Of Activated Charcoal-Based Powder as a Dental Whitening Agent: An Alert to Dentists and Their Patients

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• **Conflicts of interest:** none declared.

ABSTRACT

Objective: the aim of this study was to perform a comparative analysis of the content pointed out by digital influencers regarding the activated charcoal products they advertise. In addition, the data found were compared with the available scientific literature in order to adequately guide the population on the safety of activated charcoal products. **Material and Methods:** A research of activated charcoal-based powders was conducted to identify the marketing of digital influencers on Instagram®. Three different products were analyzed: New White, WhiteMax and Carvvo. **Results:** It was found that millions of people receive the contents of the influencers and can be led to the purchase of the so-called whitening products. Furthermore, it was possible to observe the dissemination of information without scientific proof in the advertisements of the brands, with a selective provision of data, in order to create an image of reliable products for the lay public. **Conclusions:** It was concluded that there is a scarcity of scientific data to support the use and mechanism of action of activated charcoal-based whitening powders. In addition, it is important that digital influencers evaluate the safety and efficacy of the products they recommend, in order to make conscious and responsible use of their platform and the voice they have.

Keywords: Charcoal; Tooth Whitening Agents; Advertising; Social Media.

Introduction

While searching for the whitest smile, many individuals choose to purchase products sold freely on the market, whose advertisements promise extraordinary results, without the supervision of the doctor of dental surgery (DDS).^{1,2,3} Some products have gained popularity due to promising fast and low-cost whitening. Toothpastes and powders with whitening appeal may contain hydrogen peroxide, sodium bicarbonate, hydrated silica or aluminum oxide, and activated charcoal, which recently stood out worldwide.^{2,3,4} Its manufacturers promise removal of stains and dental whitening, and increase advertising by stating that it is a natural product.⁴

Powders and toothpastes, including those based on activated charcoal, usually contain abrasive particles that aim to remove extrinsic stains, i.e. superficial pigmentations.⁵ Thus, abrasion, a phenomenon characterized by surface wear through friction, promotes the gradual physical removal of extrinsic pigments.^{5,6} The abrasive potential of charcoal-based toothpastes depends on the nature, particle preparation method and coal size/granulation distribution included in the formulation.⁸ Product information provided by manufacturers of charcoal-based toothpastes suggests that activated charcoal binds to all deposits on the tooth surface, which will be eliminated in brushing, so as to make dental surfaces free of any deposits.^{4,7,8} However, there is a lack of studies that prove the manufacturers' claims about these products marketed as "dental whiteners", based on the appeal

for removal of abrasion stains and elimination of toxins and biofilm by adsorption.^{4,7}

In this regard, it is important to mention that, in social media, there has been a rapid dissemination of information posted by lay digital influencers, advertising activated charcoal-based "whitening" powders without any scientific support.⁹ Certainly social media, as a communication channel, has an important influence on the behavior and habits of the society. Digital influencers use as a marketing strategy the fact that they are natural bleachers, disregarding possible damage caused by abrasion.¹⁰ Even without scientific evidence, lay people choose to use the charcoal-based whitening products attracted by the trust they place in the people they follow.

Thus, the aim of this study is to conduct a comparative survey on the content pointed out by digital influencers regarding the activated charcoal products they promote. In addition, the data found will be compared with the available scientific literature in order to adequately guide the population on the safety of activated-charcoal based products.

Material and Methods

This cross-sectional study investigated the criteria used by digital influencers for the dissemination of activated charcoal-based powders used for tooth brushing, available for sale in Brazil. In order to analyze the marketing of the respective products, a search was carried out on the social network Instagram®. The inclusion criteria of the products were charcoal-based powders marketed in Brazil as dental

whitening products. In addition, they should have their own commercial profiles on Instagram® with more than 100,000 followers. According to these criteria, the products "Whitemax", "New White" and "Carvvo" were selected, whose usernames on Instagram® are "@whitemaxoficial", "@newwhitebr" and "@carvvo" respectively (Figure 1). Aspects related to the specific characteristics of each product were obtained through their official website, and selected available

until August 26, 2020. In view of the purpose of this study to investigate the arguments used by digital influencers in product marketing, we also selected the advertising posts that were present in their Instagram feed® published from January 1, 2019 to August 26, 2020. Digital influencers in such publications with more than 100,000 followers were selected, totaling 30 influencers of WhiteMax, 30 of New White and 17 of Carvvo. (Figure 2).

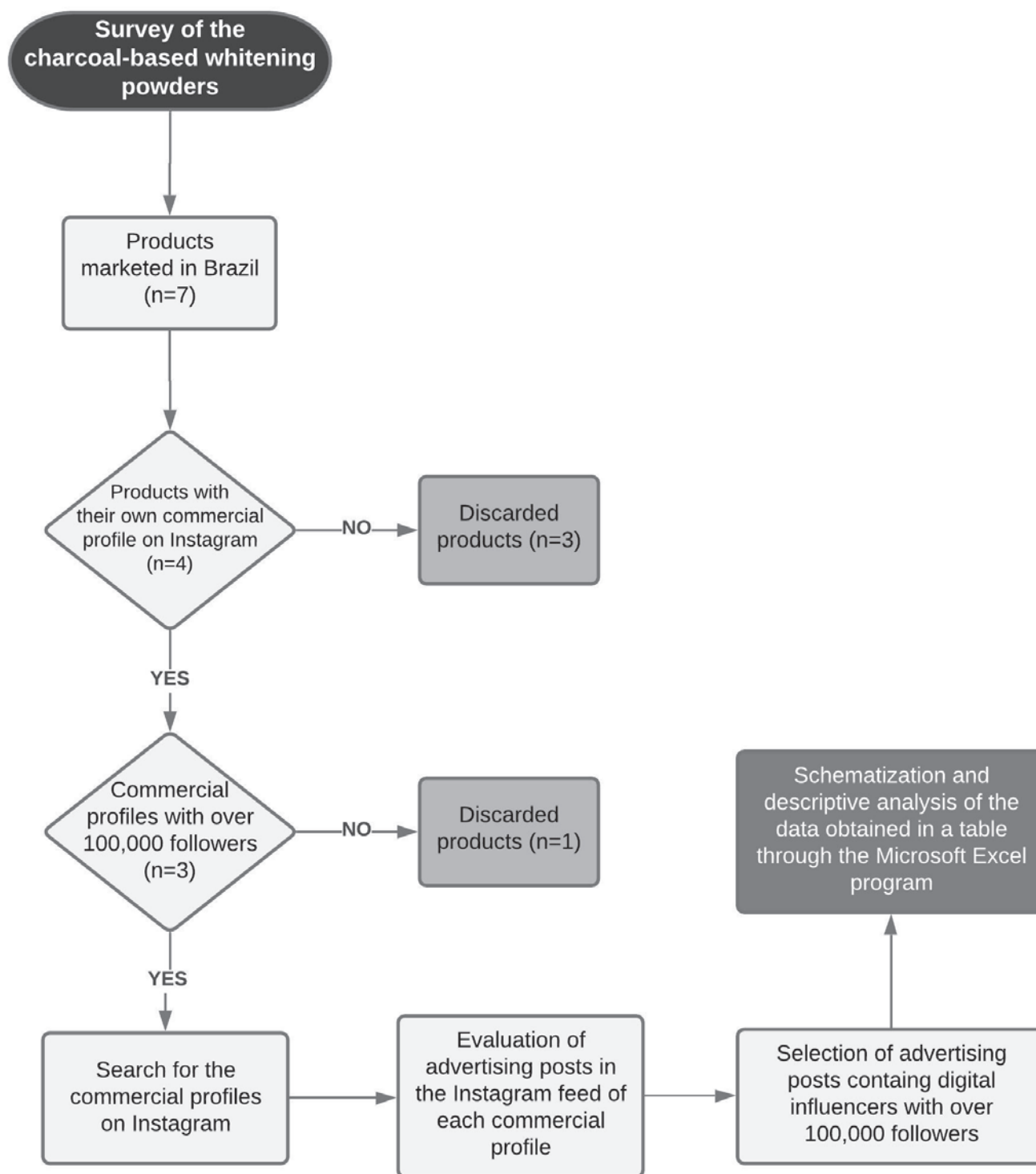


Figure 1. Flowchart of the methodology used to obtain the data.

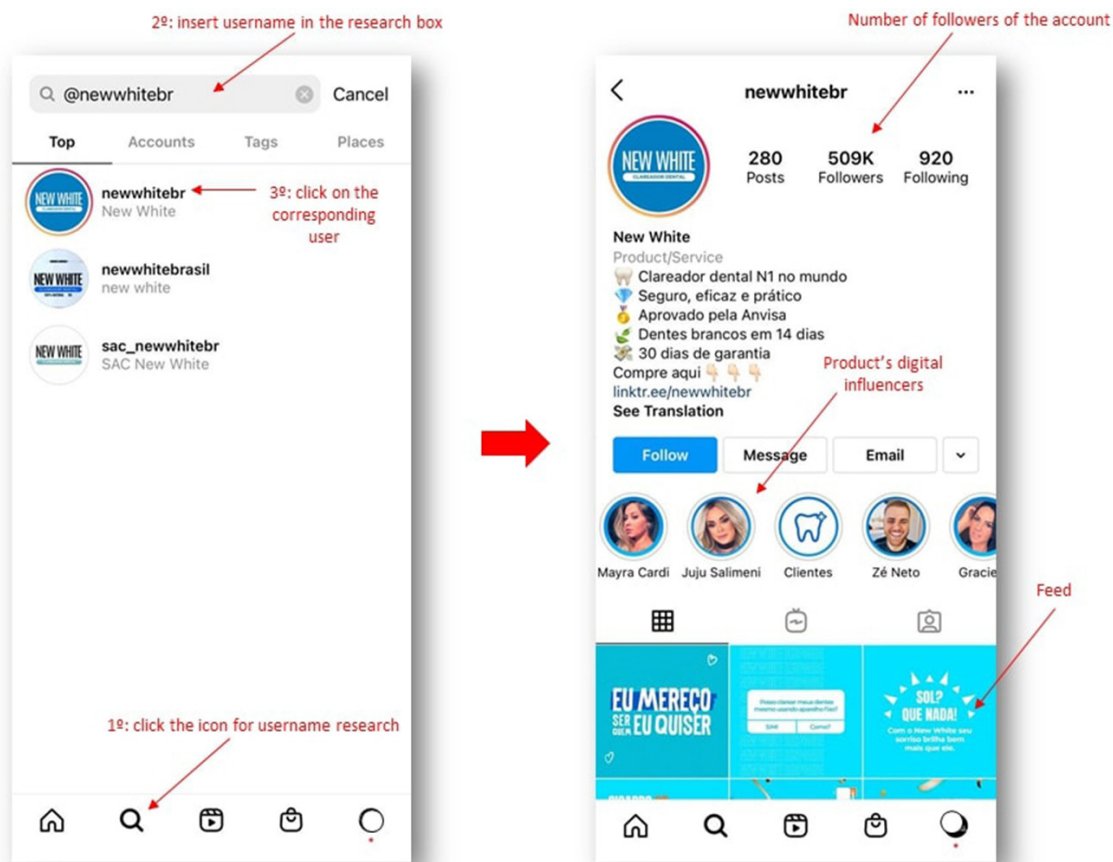


Figure 2. Illustration of the username research on the Instagram platform.

Results

Three activated charcoal-based whitening powders were found by following the inclusion criteria: New White, WhiteMax and Carvvo. They are composed of activated charcoal, white clay (also called "kaolin clay") and orange essential oil. As for the mechanism of action, it is reported on the official website of two products (WhiteMax and Carvvo) that these work by adsorption

and act by mechanical action. The main cosmetic claim found in the respective websites was the promotion of dental whitening, followed by effects such as halitosis treatment, removal of toxins and bacterial plaques, reduction of gingival bleeding and dental remineralization.

WhiteMax ensures whitening in resins and porcelain, but with less effectiveness than in natural teeth. Terms that attract the consumer such as "100% natural" and "approved by ANVISA (Agência Nacional de Vigilância Sanitária)" were used in the advertising of all products. ANVISA is a Brazilian regulatory body that oversees products, medicines, cosmetic foods and services involving health risk, similar to the FDA. In addition, they attribute as an advantage of the treatment the absence of tooth sensitivity, and state that the products are effective even if the user ingests foods containing pigments such as açai and coffee. Recommendations for frequency of use range from 14 to 21 days, with brushing twice a day for

3 minutes, according to Carvvo and New White, and for 5 minutes, according to WhiteMax. It should be done before brushing with toothpaste.

Regarding scientific data, only two products provide supposed values of the degree of abrasiveness in the standardized metric RDA (Relative Dentin Abrasivity). Carvvo has RDA value=92 and WhiteMax RDA=68, and the brands ensure that these values are safe for enamel. On the official website of the New White product, there are 4 documents available. Among them, 3 are related to the properties of the powder components, 2 related to the adsorptive and bactericidal properties of activated charcoal and 1 to the antibactericidal and anti-inflammatory action of mineral clays. The last document refers to the safety of activated charcoal in intra-oral use and efficacy in whitening tooth enamel, according to the website. Carvvo's official website provides 15 documents as a scientific basis. Of these, 8 articles address intrinsic properties of activated charcoal, 3 related to the product itself, 2 to properties of essential oils, 1 related to kaolin clay and 1 to the action of conventional toothpastes. The WhiteMax website does not provide documents used as a scientific basis, it only claims that the product has an RDA value of 68.

In addition, the marketing strategies used by each influencer when promoting the use of the products were

evaluated. For schematization and descriptive analysis of the results, the advertising criteria found in the statements of the influencers were organized in a table in the Microsoft Excel program. The average number of the selected influencers' followers (in millions), regarding each product, is contained in Figure 3. For New White, 30 influencers were selected according to the inclusion criteria, and the arguments used

as a marketing strategy for the product are described in Figure 4. For WhiteMax, 30 influencers were selected according to inclusion criteria, and the arguments used as a marketing strategy for the product are described in Figure 5. For Carvvo, 17 influencers were selected according to the inclusion criteria, and the arguments used as a marketing strategy for the product are described in Figure 6.

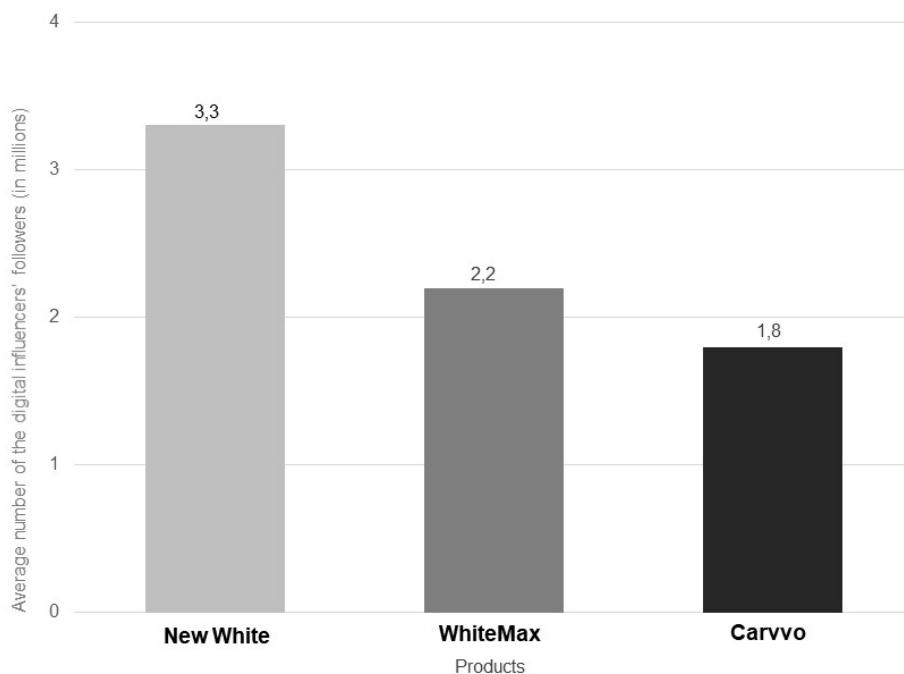


Figure 3. Average number of the selected digital influencers' followers and the respective products.

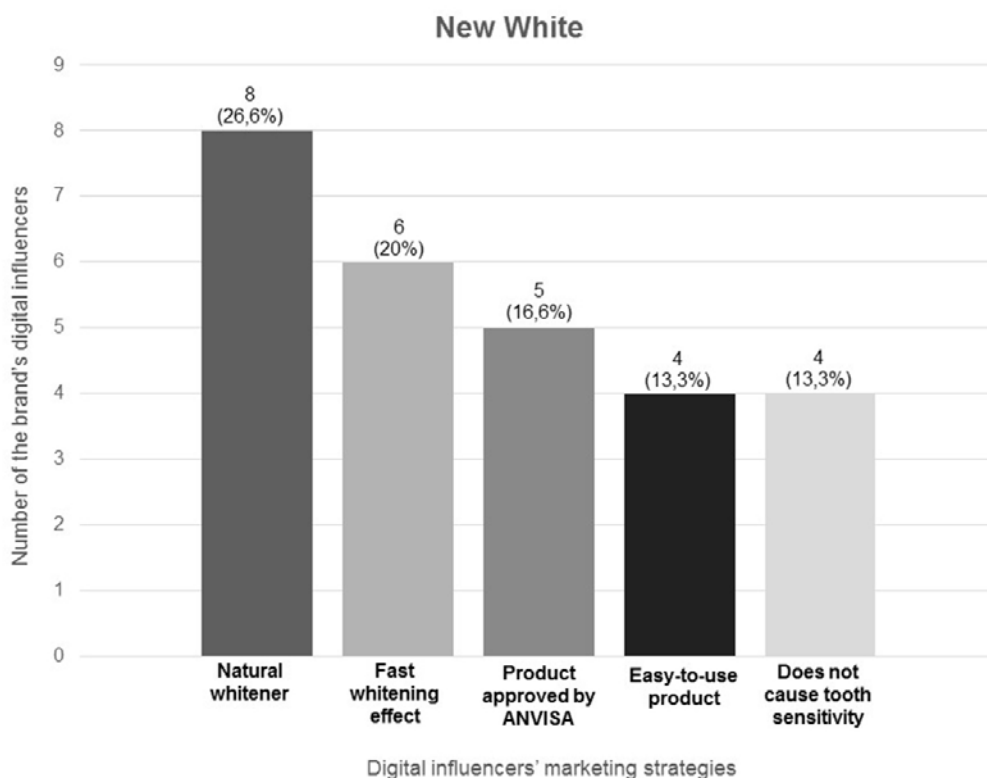


Figure 4. Arguments used as a marketing strategy by digital influencers. Product: New White.



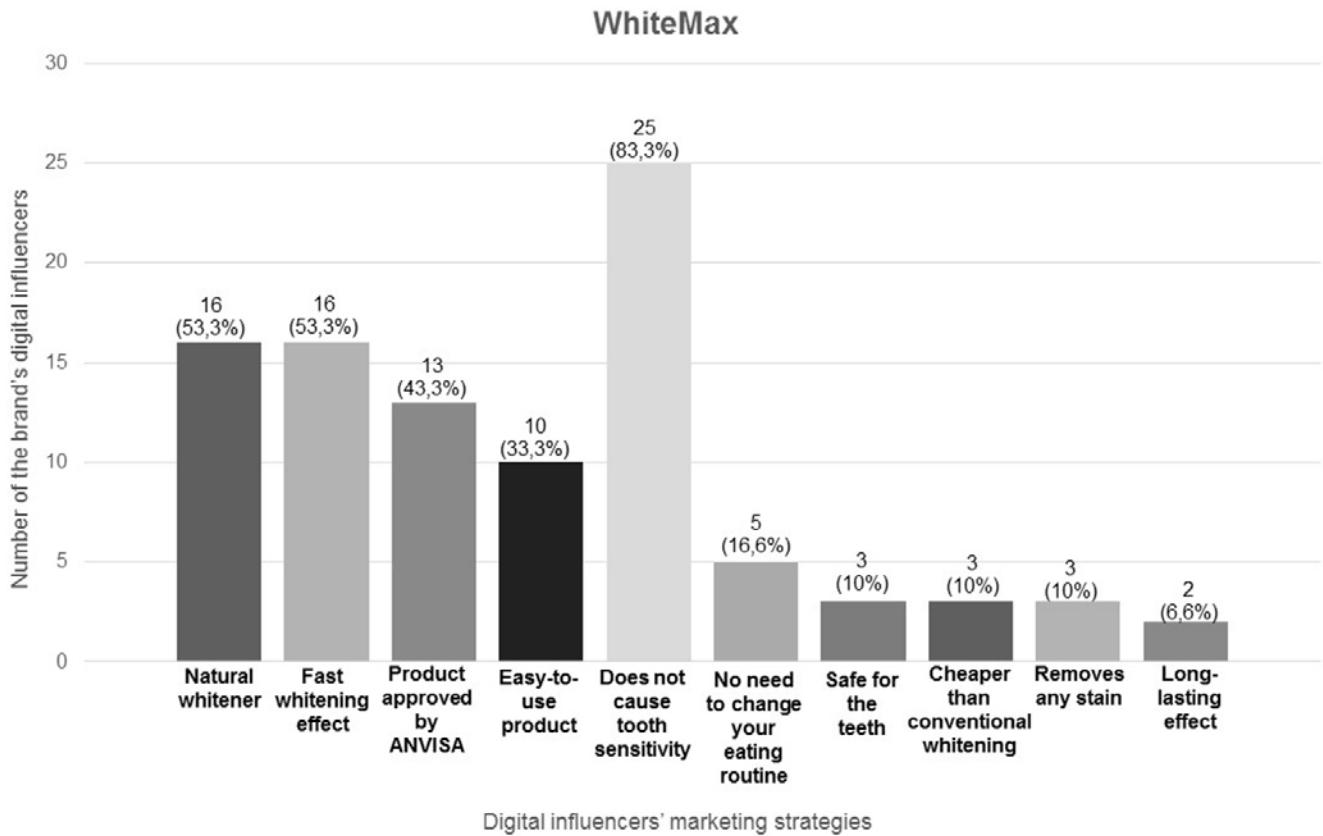


Figure 5. Arguments used as a marketing strategy by digital influencers. Product: WhiteMax.

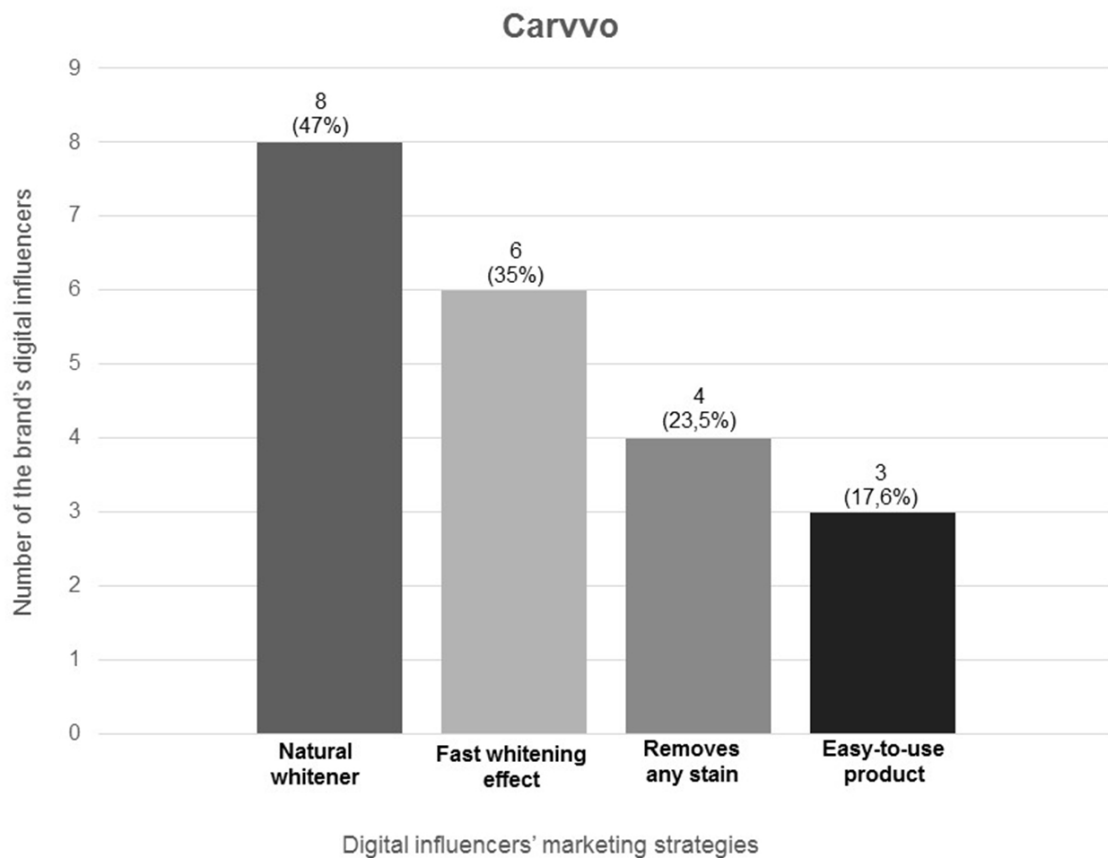


Figure 6. Arguments used as a marketing strategy by digital influencers. Product: Carvvo.

Discussion

Digital influencers are those who have some power in the decision-making of individuals, including in the buying process. Trademarks appropriate this influence through commercial partnerships, since they identify in these actors a strong connection between the product and its consumers and use it as a communication strategy.⁹ Social networks such as Instagram[®] enable such proximity between consumers and influencers, sometimes making the recommendations made by digital influencers more visible and persuasive than the messages produced by the brands of the products themselves.⁹

The choice of Instagram[®] as the social media for the study is justified by the social reach and impact of the network in question. Currently, according to the algorithms released by Google in its 2020 update, Brazil occupies the third position in the ranking of Instagram users[®]. There are about 25 million commercial accounts on the platform, which bring together more than 2 million ads.¹¹

The power of persuasion of an influencer is directly related to their number of followers, along with the frequency and attractiveness of publications on the social platform. In all three (3) products cited in the study (New White, WhiteMax and Carvvo), at least 12 influencers have more than one million followers, which makes evident the amount of people who can be induced and convinced to purchase the so-called whitening powders. The New White product alone is advertised by three influencers with more than 10 (ten) million followers.

Two of the three brands addressed in this study, New White and Carvvo, provide on their respective official websites scientific references that supposedly prove the efficacy and safety of their products.¹²⁻²³ One of the documents provided by New White is a study by Lake Erie College of Osteopathic Medicine²³, which presumably would prove safety of activated charcoal in intra-oral use and efficacy in whitening dental enamel. However, the cited study compares the abrasiveness on surfaces of specimens in acrylic resin when using a whitening paste and activated charcoal powder as toothpaste. This study, therefore, does not present any type of methodology related to intra-oral use of the product and its effects on the dental surface.²⁴ Besides, the work concluded that there was higher abrasiveness of activated charcoal when compared to the abrasiveness of the whitening toothpaste in acrylic resins, contradicting the initial proposal of the New White product.

In the advertising of the products on the Instagram[®] platform, digital influencers use a series of arguments in order to persuade their followers and lead them to the acquisition of so-called whitening powders. Among them, the "natural bleaching" factor was the most recurrent when the three (3) products were analyzed together. This statement aims to categorize the term "natural" as a synonym of "safe" or

"not harmful", which does not always correspond to reality. Followed by this, arguments such as "does not cause tooth sensitivity" and "quick (or immediate) bleaching effect" were intensified in the advertisements.

The fact that the products are supposedly natural does not make them free of potential risk. In fact, there are relevant risks described in the literature such as the production of tooth wear and the increase of areas for biofilm retention.^{25,26,27} Charcoal has been recognized as an abrasive mineral in the teeth and gums and its use raises concern about damage to these structures, as well as increased susceptibility to caries due to the potential loss of enamel.⁴ It is also important to point out that due to the adsorptive property of activated charcoal, fluorides and other active ions present in coal-based products may not be available to act in the proper cleaning and remineralization of the dental substrate as they are in a common toothpaste.⁷

Even with the limitation of scientific research related to the theme, some studies were found that evaluated the enamel surface after the use of activated charcoal-based powders. Rodrigues, *et al.*²⁸ (2019) evaluated through Optical Coherence Tomography the wear of tooth enamel after the use of different toothbrushes and abrasive materials for the purpose of dental whitening. In this study, they found that the groups in which activated charcoal powder was used for brushing showed significant wear of the enamel surface. As for the whitening property, it is described in the literature that brushing with charcoal-based powders did not have a bleaching effect when compared to the use of peroxide-based bleaching gels; and also when compared to the control groups.^{27,28}

Franco, *et al.*²⁴ (2019) evaluated the surface morphology and roughness of bovine tooth enamel between three groups, one treated with toothpaste, the other with activated charcoal powder and the third, with 10% carbamide peroxide. This study showed that the activated charcoal powder was not effective for tooth whitening and did not show significant differences between the groups regarding enamel roughness.

It is also important to highlight that many of the influencers addressed in this study have previous dental treatment performed by dentists, such as ceramic or resin veneers. However, they do not disclose having been submitted to such procedures, despite presenting to their followers their whitening result as a consequence of the use of activated-charcoal based powder. In this context they also state that the products "remove any stain", and have "long-lasting effect", information that lacks scientific validation and that needs to be supported by randomized and independent clinical trials.

The approach used in the marketing of coal-based toothpastes seeks to emphasize the alleged benefits of the products, which attract consumers, but still need to be refuted, to the detriment of possible damaging effects. This

makes the ethics of the product's advertising questionable, since dubious messages, along with the selective provision of information, can be classified as deceptive practices, contrary to consumer protection interests.⁷ Together, these factors induce lay people to misinformation and, above all, to put their dental integrity at risk.

Conclusions

It was possible to conclude there is a scarcity of scientific data that validate the use and mechanism of action of activated charcoal-based whitening powders. For this reason

it is necessary to develop researches that demonstrate the action of these products in the oral cavity and on the dental surface. It is essential that digital influencers evaluate, along with the expert professionals, the safety and effectiveness of the products they advertise and recommend, in order to make conscious and responsible use of their platform and the voice they have. Furthermore, conventional whitening methods performed under the supervision of the DDS are considered safe, effective and minimally invasive, characteristics that are validated by extensive scientific literature.

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Mini Curriculum and Author's Contribution

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