Benefits of Using Dual Allcem in the Cementation of Fiberglass Posts

Dra. Granda Macías Luz Amelia, Mg[1], Macas Cuenca Jiphson Javier[2], Paredes Balseca Jenny Carolina[3], Morales Cobos Jorge David[4]
[1]Universidad Regional Autónoma de los Andes UNIANDES, Ambato, Ecuador.
https://orcid.org/0000-0001-5611-2819
Email: ua.luzgranda@uniandes.edu.ec
[2]Universidad Regional Autónoma de los Andes UNIANDES, Ambato, Ecuador.
https://orcid.org/0000-0002-8796-6419
Email: oa.jiphsonjmc85@uniandes.edu.ec
[3]Universidad Regional Autónoma de los Andes UNIANDES, Ambato, Ecuador.
https://orcid.org/0000-0002- 7448-5931
Email: ua.jennyparedes@uniandes.edu.ec
[4]Universidad Regional Autónoma de los Andes UNIANDES, Ambato, Ecuador
https://orcid.org/0000-0002-2530-839x
Email: ua.jorgemc52@uniandes.edu.ec

Abstract
Cementation is a means by which the post is joined to the dentin, for this purpose there are different types of materials, among which we focus on Dual Allcem resinous cement with a fiberglass post. The objective of determining the main uses of Dual Allcem in the cementation of fiberglass posts to demonstrate its effectiveness in the restoration of teeth with a small amount of coronary remnant. The research modality used was qualitative and quantitative with a cross-sectional design and a descriptive scope. For the bibliographic review of this article, the document analysis technique was used, including studies from indexed scientific journals and research on different digital platforms. Among the main results, it was evidenced that Dual Allcem is widely used in the realization of stumps but more frequent in the adhesive cementation of posts, posts and crown fixation, being a product with low cost and easy application. Among the main benefits it was evidenced that due to its elastic modulus it has a greater resistance to fractures supporting the forces of the masticatory system. Moreover, it also has a great adhesion and traction force. Therefore, it is concluded that the use of Dual Allcem cement due to its properties similar to dentin allows adequate adhesion with the post and dentin, perceiving almost no microfiltration in the restoration process, favoring the duration of the restoration.
Keywords: Cementation, Resinous cement, Fiberglass posts, Dual Allcem

1. Introduction

The use of intraradicular posts are frequently used in the restoration processes of a dental organ with little amount of coronary remnant, which has been used for more than 100 years, where they are complemented with other materials to achieve greater resistance and retention to the residual limb and then fix the crown for the final restoration. (1,2)
The intraradicular posts, as the name implies, is a material that will be introduced into the root canals of the tooth being considered as an intraradicular retainer, helping to maintain the dental tissue, that is, without losing a large amount of tissue, benefiting the dental organ to stay longer in the mouth. (3)
There are many post materials, for the effect of this research will concentrate on fiberglass poles whose characteristics have been evidenced over the years, being one of the preferred by dentists in restorations, since it has a high level of effectiveness because it reduces the risk of a root fracture, because it has an elasticity of 29 to 50 Gpa which resembles dentin, allowing it to be flexible when receiving occlusal loads, which will avoid the concentration of internal tensions in the root canal. (4,5)
Within the process of reconstruction of the dental organ with little amount of coronary remnant, it is relevant to consider the materials and techniques to be used, so cementing is also crucial during restoration; since a suitable cement must be chosen to avoid interference between the junction of the post with the root surface. Cementation is understood as a medium that joins two solid surfaces to fix them through their liquid composition, this allows the wetting of the surfaces, filling spaces and irregularities between them, guaranteeing contact between the surfaces. (6, 7)
For the realization of segmentation can be given in two ways or types known as conventional or adhesive. For conventional cementation it is kept in contact by means of a macro-mechanical friction between the cement and the dental surface or restoration, so it remains retained and anchored,

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thus being locked, making it impossible to move or separate. With regard to adhesive cementation, it is also known as micromechanical retention which consists of the union of two phases that are locked depending on the microscopic morphology. Adhesion to dental substrates is based on a procedure where the mineral is removed and replaced by polymerized resin monomers. (8)

It has been shown that cementitious media to achieve better results should have a thickness of 10 to 20 µm, which studies indicate that resin cements are the most suitable for better adhesion, even more without being dual self-adhesive; since they have a low inorganic filling that allows it to be more fluid. (3,9)

The resin cement that will be collected information for this article will be Dual Allcem which has some uses such as the realization of residual limbs and adhesive cementation of root bolts or posts and fixing of crowns. Among its main characteristics it has an adequate viscosity, dual polymerization, a high resistance to bending with 62% inorganic load by weight, allowing great safety and reliability when working with said material. (10)

The chemical composition of Dual Allcem is comprised of an organic part such as bisphenol-A-diglicidileter dimethacrylate (Bis-GMA), bisphenol-A-diglicidileter ethoxylated dimethacrylate (Bis-EMA) and triethylene glycol dimethacrylate (TEGDMA), co-initiators, initiators (canforquinone and dibenzoyl peroxide) and stabilizers, which are resinous monomers. And in the inorganic part barium-aluminum silicate glass microparticles and silicon dioxide nanoparticles that are used as a charge, giving a total of approximately 68% charge by weight, all these particles are silanized that contribute to the strong adhesion of the cementing agent. As for the chemical composition of dentin, it has been shown that it is made up of 70% inorganic material composed of hydroxyapatite crystals and amorphous calcium phosphate, 20% of organic matrix especially by collagen fibers and 10% of water.

Proving that having an organic and inorganic part the product has a high adhesion resistance. (11-13)

Other studies indicate that fiberglass posts are complemented by resin cementing agents, since with this type of posts the thickness of the cement will not have to be so thick, thus helping the resistance between the post and the dentin of the root. However, the prepared channel must be completely arrived with the cementing agent, since bubbles can be detected in the resinous cements. (14,15)

2. Materials and Methods

Types of research according to the approach

For this review article aims to determine the main benefits of Dual Allcem in the cementation of fiberglass posts to demonstrate its effectiveness in restoring teeth with little amount of coronary remainder.

This scientific article will be qualitative

Qualitative: Because information was collected that helped to understand the issue raised as are its applications and benefits when using Dual Allcem in the cementing of fiberglass poles.

Type of research by scope

Descriptive: The scope will be descriptive, which will allow analyzing the use of Dual Allcem, advantages, disadvantages of the application of this cementing agent, among others, in order to support this research.

Methods to be used

Analytical-synthetic: By means of this method it will be possible to analyze the use of the cementing agent Dual Allcem where the subject will be decomposed into parts to obtain the characteristics of the material and describe the benefit in the cementation of glass posts.

Inductive-deductive: Through this method it will be possible to reach the conclusions of this article, determining if the use of Dual Allcem in the cementation of fiberglass poles is recommended.

Documentary analysis: This technique will allow the collection of information through digital platforms that contain published journals of scientific research on the subject to be studied that will help to obtain the expected results of the research.

Selection criteria

For the present bibliographic review, the following inclusion and exclusion criteria will be taken into account, which will allow the results of the research to be obtained.

Inclusion criteria

It will include scientific articles published on digital platforms such as Google Scholar, Dialnet, Redalyc, among others. Articles from 2016 onwards that must include keywords such as: Dual Allcem, cementing agent, cementing of posts, intraradicular poles, fiberglass poles.

Among the articles it must be stated that the cementation of fiberglass poles using Dual Allcem has been carried out on adult patients of 18 years.

Exclusion criteria

The articles that will be excluded will be those that are not related to the keywords described above and research equal to or less than the year 2015.

Articles that are not related to Dual Allcem or the cementing of fiberglass poles.

3. Results

Through the bibliographic review, 29 articles were evidenced, of which the cementation of fiberglass posts was conceptualized, evidencing the use of Dual Allcem as a cementing agent, including its applications, advantages, disadvantages in the

restorations of the dental organ.

Variable	Articles
Fiberglass poles	
Definition	16 of 29 items (1,2,3,6,14,15,16,17,18,19,20,21,22,27,28,29)
Characteristics	12 of 29 items (2,3,5,9,15,16,17,18,19,27,28,29)
Use	11 of 29 items (1,2,6,14,15,17,18,19,27,28,29)
Form of application	9 of 29 items (9,2,15,17,18,19,22,27,29)
Advantages	8 of 29 items (1,2,15,16,17,18,19,29)
Disadvantages	8 of 29 items (1,12,15,16,17,18,19,29)
Cementation	
Definition	13 of 29 items (6,8,14,15,16,17,18,19,20,21,23,27,28)
Characteristics	13 of 29 items (6,7,8,9,15,16,17,18,19,20,21,23,28)
Materials	11 of 29 items (3,6,8,15,16,17,18,19,23,28,29)
Disadvantages	7 of 29 items (6,15,16,17,18,19,23)
Types of cements used for fiberglass poles	8 of 29 items (15,16,17,19,23,27,28,29)
Allcem Dual Cement	
Composition	9 of 29 items (6,10,11,13,14,18,19,23,24)
Proceeds	9 of 29 items (6,10,11,13,14,18,19,23,24)
Application	15 of 29 items (6,10,11,13,14,18,19,21,23,24,25,26,27,28,29)

Fiberglass poles

The posts are rigid elements of intraradicular retention that allows the rehabilitation of a crown, including the protection of the tooth by fading the force that runs through the root to prevent subsequent fractures. Fiberglass poles are considered as non-metallic prefabricated poles, being easy to use in the treatment of teeth with little amount of coronary remnant. (16,17)

The characteristics of fiberglass poles are often silica, wrapped in a matrix of epoxy resin in 29% and with 29% inorganic components such as calcium, boron, sodium, aluminum, iron. According to their mechanical properties they are very similar to dentin due to their modulus of elasticity between 18 and 22 GPa, since dentin has 18 GPa. (17,18)

Regarding the uses of fiberglass poles, Erazo in his study established that fiberglass poles are an important part of restoration processes, since their use is mainly to provide support, resistance to masticatory processes and even stability to the forces exerted laterally on the affected tooth, allowing a longer useful life, without the need for immediate removal due to infections or fractures. (6)

Within the forms of application, Rojas in his research clarified that the forms for the application of fiberglass poles include the anatomical pole technique; the technique of reconstruction of the conductor with glass ionomer and finally that which includes accessory fiber poles; emphasizing that the technique depends on the characteristics of the affected tooth, as well as the needs of the patient.(19)

So it is evident that Cedillo et al in their study mentions that an adequate application of the anatomical post technique allows that there is no alteration in its positioning throughout the cementation process, which in turn benefits in the correct distribution of occlusal loads, limiting the contractions caused by the polymerization of resins and therefore the stress caused by them; clarifying that this technique is the most used. (9)

On the other hand, another of the techniques considered is focused on the reconstruction of the duct with glass ionomer, so Monar in his inquiry states that this technique is not used for the cementation of the posts but rather to minimize the width of the ducts of the treated tooth; However, its application is given by its characteristics that include ion exchange, microbial limitation, biocompatibility and even the generation of correct gingival hystic results. (20)

Finally, Gallo in his research section mentions that the technique of fiber posts of accessories is considered as a new dental trend, since its objective is to reduce the width between the post with the ducts in order to avoid excessive cementation; In addition, it establishes that this technique is

assimilated to that of anatomical post and allows a decrease in cemental contraction and even limits dentin wear for the adaptation of the post in the dental canal. (21)

Among the advantages that can be evidenced of fiberglass poles have a modulus of elasticity similar to dentin, helps in the reduction of procedures, a low rate of root fracture, that is, it is resistant to fractures, favors the use of dual resin due to the transfer of light to the apex, It facilitates manipulation in its use for cutting and removing, being flexible and resistant to stress, including its biocompatibility with other components. (20)

Among the disadvantages of fiberglass posts is that they do not fit curved or irregular ducts, which means that other types of components such as accessory or resin bolts must be used at the time of cementation, if a suitable technique is not used it can lose its fracture strength properties. (22)

Cementation

Cementation is considered the most important process in the application of a post, as it allows the fixation and durability of the restoration; since it facilitates the union between the post, the dentin by means of a hermetic seal to reduce the risk of leaks, isolating the periapex of bacterial contamination. (18,22)

To carry out a restoration there are different types of cementing agents each with its characteristics, currently the most used are zinc phosphate, glass ionomer, glass ionomer modified with resin and resin-based cement. Resin-based cements need an adhesive and self-adhesive system. (22)

For the cementation of fiberglass posts it is evident that dual resinous cements are better since they have greater benefits due to their combination of acid and hydrophilic monomers allows to reduce the steps in the procedure making the protocol simpler and provide greater adhesion and mechanical retention. (16,17) By means of resinous cement with its adhesive properties, the so-called "hybrid layer" is obtained, which allows the infiltration of the adhesive into the collagen fibers, recommending the use of this type of cement for fiberglass posts. (4)

Among the disadvantages of resin cements it is evident that to be used they have a great technical sensitivity so it is necessary to proceed meticulously in their handling following the steps in order and correct time at the time of removing the excesses when the material is cured It has also been observed a low adhesion in conjunction with zinc oxide and eugenol. (8,17)

Allcem Dual Cement

Dual Allcem is a resinous type cement whose cost is low compared to other brands of the same type, its dual property refers to a base and catalyst paste that such a combination allows the beginning of chemical polymerization. Its presentation is given in colors A1, A2, A3 and translucent. This product has properties such as generating a high adhesive capacity, bending consistency and a high level of conversion, being easy to apply. (23)

Among the benefits offered by Dual Allcem cement is the high level of resistance it contains against bending or compression actions; It contemplates a high mechanical resistance, to the tensile force and allows its adhesion to all types of surfaces; It provides chemical curing or photocuring, does not produce bubbles during mixing and even has properties that make it easily manageable for handling. (11)

Finally, the application of Dual Allcem cement is done only to make residual limbs, cement posts or bolts and even to help in the fixation of the crowns, so this cement must be introduced uniformly in the inner part of the dental canal, using a homogeneous mixture and trying not to leave spaces or openings, although these are minimal, as a way to guarantee their effectiveness and avoid landslides. (24,25)

4. Discussion

For the restoration of a tooth that requires an intraradicular post, Párraga mentions that it must contemplate the amount of dental structure, the amount of the product to be used, the wear of the dentin that weakens the product, the occlusal forces where it is evident that glass fibers due to their composition similar to dentin and modulus of elasticity are more resistant to fractures, While the cast posts despite having their advantages such as their long durability time, aesthetically they are not pleasing in the previous sector, compared to fiberglass poles. (24)

Thus, Ruiz et al in their literature review points out that the best alternative for restoring a tooth is the use of fiberglass posts since they show favorable tensional forces for the anterior sector favoring the masticatory system compared to metal posts or castings. (1)

A study conducted by Requena shows that Allcem Dual Cement was used for the cementation of a fiberglass post in a restoration of an endodontic tooth with fixed prosthesis; Where it was evidenced that photoactivation was 40 minutes, this study indicates that fiberglass poles are the most recommended due to their structure similar to dentin; where it should be taken into consideration that the post should occupy two thirds of the root leaving a filling with gutta-percha cones of 3 to 5 mm to achieve a good seal. Another study carried out by Erazo indicates that the use of fiberglass poles allows the transmission of halogen light in photoactivation, which increases the uniformity and hardening of cement, in cases of using dual-type cements.(16) (6)

A study conducted by Cruzado on the tensile strength strength of composite resin scale using dual cement, the comparison of two brands of dual cements was made where it was evidenced that Allcem Dual Cement has an average strength of 22.75 ± 6.78 Mpa, which allows to obtain a good adhesion between the tooth and the incrustation, in lower and upper molars. However, a study conducted by Condori on the tensile strength with fiberglass posts on 10 teeth, showed that Dual Allcem offers lower strength in the lower

premolars.(13)(25)
Another comparative study by Orellana et al where dual Allcem was used in resin incrustations was observed that being an adhesive cement has better properties for sealing, where tests were carried out on 80 samples, which 51.25% (42 samples) verified that there were no microfiltrations compared to a self-adhesive cement. Likewise, Cueva et al conducted an in vitro study to evaluate the microfiltration in composite resin incrustations where 20 premolars cemented with Dual Allcem were used, which showed that it had a high level of absence of microfiltrations.(26)(27)
As for the adhesive techniques Ferrín made a bibliographic compilation where it is demonstrated that there are three techniques for the cementation of fiberglass posts, etching system, self-etching system and universal systems each has its characteristics that allow a good adhesion, however, the conventional etching system is the most used with Dual Allcem cement because it favors the collapse of the network of exposed collagens and A low diffusion of the resin, which allows to have an adequate adhesive interface.(28)
In a literature review carried out by Chávez regarding the use of disinfectant serves to improve the strength of adhesion when cementing fiberglass poles with Dual Allcem it is evident that there are no significant results, what is demonstrated in this study is that if it helps to prevent the degeneration of adhesion; since some authors state that it does help to have a better adhesion while others do not. Thus, Pinos conducted a comparative study between sodium hypochlorite 5.25% and chlorhexidine 2% where it was shown that hypochlorite has a greater effect on the strength of adhesion than chlorhexidine in the cementation of fiberglass posts with resinous cement.(29)(22)
Another research carried out with sodium hypochlorite and EDTA applying fiberglass poles cemented with Dual Allcem, Morales points out that there was no significant difference between these two components, the tests carried out had a sample of 30 samples, 15 unirradicular premolars for each chemical substance, where the hypochlorite gave a 6.31 Mpa charge with which the bolt of the tooth root was detached and the EDTA 5.97 Mpa, These results can also indicate that hypochlorite has greater adhesion resistance with respect to EDTA. (15)
In a recent study by José Israel Castillo González, Andrea Katherine Miranda Anchundia, and Liset Camaño Carballo, a neutrosophic method was used to recommend the best approach to restoring lost biological space in restorative dentistry with fixed prostheses(30). The study highlighted the importance of using adhesive systems with resin cements, as they provide better retention and resistance to fracture than traditional cements. Dual allcem combines these two elements, making it an ideal choice for cementing fiberglass posts.
A study by Ricardo et al. (31) explored the relationship between artificial intelligence and intellectual property in the field of dentistry. The authors found that AI technology has the potential to revolutionize restorative dentistry by improving treatment outcomes and reducing the time and cost of treatment. Dual allcem is an example of such technology, as it incorporates self-adhesive technology and resin cement to improve the bond strength of the cement to the tooth structure and post.
In another study by Ricardo et al. (32), project-based learning was assessed as a teaching method in dentistry. The study found that project-based learning improves critical thinking and problem-solving skills, both of which are important in restorative dentistry. Using dual allcem in the cementation of fiberglass posts requires attention to detail and problem-solving skills to ensure proper bonding and retention.
Ariel Romero Fernández, Elsy Labrada González, and Diego Loyola Carrasco investigated the level of knowledge of dentistry students in dental emergencies. The authors used neutrosophic values and sets to evaluate the students' knowledge. The study highlighted the importance of proper treatment planning and execution in dental emergencies, which involves the use of appropriate materials, including dental cements such as dual allcem (33).
In a review by Granda Macías (34), the use of feldspathic ceramic veneers in dental restoration was explored. The author found that feldspathic ceramic veneers are an effective solution for restoring teeth with cosmetic and functional issues. The use of dual allcem in the cementation of these veneers can improve retention and bond strength, resulting in better treatment outcomes.

5. Conclusions

In conclusion, through the bibliographic review of other studies and research, concepts of what is understood as intraradicular posts, their materials, their form of application, including the materials used for the cementation of these posts, focused specifically on Dual Allcem resinous cement, its form of application and benefits were collected.
The intraradicular post that favors the restoration of a tooth are fiberglass posts with a resinous cement as is the case of Dual Allcem because it has properties that favor photoactivation allowing almost no microfiltration in the root canal, giving greater durability and adhesion resistance to dental rehabilitation.
It was also evidenced that using disinfectant chemicals such as sodium hypochlorite allows to give a greater adhesion strength to the fiberglass post in conjunction with Dual Allcem cement, this resinous cement also shows benefits such as an easy and fast application due to the fewer steps to follow in the procedure.

Bibliography

Ruiz-Matorel M, Pardo-Betancourt F, Jaimes-Monroy

G, Muñoz-Martínez E, Palma-Medina JE. Fracture resistance of fiberglass posts vs cast posts on anterior teeth. Systematic review. CES Dentistry Magazine. [Online].; 2016 [accessed 10 Aug 2021]; 29(1): 45-56.. Available in: https://revistas.ces.edu.co/index.php/odontologia/article/view/3925/2622.

Moradas-Estrada M. Reconstruction of the endodontic deinte with cast posts or fiber spikes. Literature review. Advances in Odontostomatology. [Online].; 2016 [accessed 10 Aug 2021]; 32(6): 317-321.. Available in: https://scielo.isciii.es/pdf/odonto/v32n6/original4.pdf.

Lamas-Lara C, Alvarado-Menacho S, Terán-Casafranca L, Angulo de la Vega G, Jiménez-Castro J, Cisneros-Cotrina A, et al. Current status of fiberglass poles. Sanmarquina Dentistry Magazine. [Online].; 2015 [accessed 11 Aug 2021]; 18(2):111-116.. Available in: https://revistasinvestigacion.unmsm.edu.pe/index.php/odont/article/view/11532/10368.

Delgado-Morón M. Monoblock functional aspect? Glass fribra poles. ADM Magazine. [Online].; 2014 [accessed 11 Aug 2021]; 72(5): 272-274.. Available in: https://www.medigraphic.com/pdfs/adm/od-2015/od155j.pdf.

Delgado-Morón M. Splint effect: Important aspect in rehabilitation with fiberglass poles. ADM Magazine. [Online].; 2014 [accessed 12 Aug 2021]; 71(3): 120-123.. Available in: https://www.medigraphic.com/pdfs/adm/od-2014/od143e.pdf.

Erazo-Count AD. Cementing of fiber posts. Repository National University of Chimborazo. [Online].; 2020 [accessed 12 Aug 2021].. Available in: http://dspace.unach.edu.ec/bitstream/51000/7167/1/TESIS%20Adriana%20Denisse%20Erazo%20Conde-ODO.pdf.

Miguelena-Muro KE, Guerrero-Ibarra J, Garcilazo-Gómez A, Rios-Szalay E. Analysis of resistance to displacement of two resin cements, in intraradicular dentin. Mexican Dental Journal. [Online].; 2016 [accessed 12 Aug 2021]; 20(4): 238-242.. Available in: http://revistas.unam.mx/index.php/rom/article/view/57742/51179.

Moraga-Tapia M, Pinilla-Herrera D. Techniques of cementation of indirect resins with adhesive materials, the last 10 years. Scoping review. [Online]. Santiago de Chile: Universidad Andrés Bello.; 2020 [accessed 13 Aug 2021]: 1-26.. Available in: http://repositorio.unab.cl/xmlui/handle/ria/17850.

Cedillo-Valencia JdJ, Cedillo-Felix VM. Post-endodontic restoration, technique with fiberglass accessory posts. ADM Magazine. [Online].; 2017 [accessed 11 Aug 2021]; 74(2): 79-89.. Available in: https://www.medigraphic.com/pdfs/adm/od-2017/od172f.pdf.

FGM. Technical profile. Allcem Core. [Online].; 2015 [accessed 12 Aug 2021].. Available in: https://issuu.com/fgmprodutosodontologicos/docs/perfil_allcem_core_es.

Allcem. Technical Profile of Allcem Dual. Resinous cement adhesive. [Online]; 2017 [accessed 20 Aug 2021]. Available in: https://docplayer.es/33348459-Perfil-tecnico-rev-01-dic-07-cemento-resinoso-adhesivo-allcem.html.

Alano-Díaz S, Villegas-Padilla K, Mandalunis P. Dentin alterations with aging. Journal Faculty of Dentistry UBA. [Online]; 2018 [accessed 23 Aug 2021]; 33(75): 29-35. Available in: http://odontologia.uba.ar/?page_id=807.

Crossover F. Tensile strength of composite resin scale cemented with dual cement, in vitro. [Online]. Peru: National University of Trujillo; 2017 [accessed November 18, 2021]. Available in: https://dspace.unitru.edu.pe/bitstream/handle/UNITRU/12597/Cruzado%20Oliva%20Fredy%20Hugo.pdf?sequence=1&isAllowed=y.

Vilcapoma H, Ganoza R, Bolaños A, Tapia A, Balarezo A. Use of a composite fiberglass pole and core made of CAD/CAM to restore an endodontically treated tooth: case report. Journal of Stomatology Herediana. [Online].; 2019 [accessed 13 Aug 2021]; 29 (3): 231-240.. Available in: https://revistas.upch.edu.pe/index.php/REH/article/view/3607/4001.

Morales Chancusi EC. Effect of sodium hypochlorite vs EDTA as irrigating conditioners on the adhesion strength of fiberglass posts with dual resinous cement. [Online]. Quito: Universidad Centrak del Ecuador; 2017 [accessed 21 November 2021]. Available in: http://www.dspace.uce.edu.ec/handle/25000/12789.

Requena A. Restoration of endodontic tooth with unitary fixed prosthesis. [Online]. Guayaquil: University of Guayaquil; 2019 [accessed November 18, 2021]. Available in: http://repositorio.ug.edu.ec/bitstream/redug/44330/1/REQUENAAngelica.pdf.

Alvarado M. Tensile strength of two techniques for cementing fiberglass posts in primary anterior teeth: in vitro study. [Online]. Quito: Universidad Central del Ecuador; 2018 [accessed November 18, 2021]. Available in: http://www.dspace.uce.edu.ec/bitstream/25000/16387/1/T-UCE-0015-ODO-011-P.pdf.

Pazmiño Regalado E. Distribution of stresses in lower unirradicular premolars treated endodontically and restored with fiberglass and quartz poles, using the finite element technique. [Online]. Guayaquil: Central University of Ecuador; 2016 [accessed 18 November 2021]. Available in: http://www.dspace.uce.edu.ec:8080/handle/25000/7801.

Rojas K. Adaptation of fiberglass poles White Post (FGM) and FRC Postec Plus (Ivoclar Vivadent) in uniradicular teeth. [Online]. Guayaquil: University of Guayaquil; 2019 [accessed November 18, 2021]. Available in: http://repositorio.ug.edu.ec/bitstream/redug/44207/1/RojasKarla.pdf.

Monar N. Assessment of fracture resistance to comprehensive loads in mandibular premolars treated with endodontics and restored with fiberglass and quartz posts with smooth surface. [Online]. Quito: Universidad Central del Ecuador; 2017 [accessed November 18, 2021]. Available in: http://www.dspace.uce.edu.ec/bitstream/25000/9834/1/T-UCE-0015-616.pdf.

Rooster E. Selection and cementation criteria for fiberglass poles. [Online]. Guayaquil: University of Guayaquil; 2020 [accessed November 18, 2021]. Available in: http://repositorio.ug.edu.ec/bitstream/redug/49708/1/3444GALLOevelyn.pdf.

Pinos D. Analysis of the adhesion strength of intraradicular fiberglass bolts after irrigation with % chlorhexidine and 5.25% sodium hypochlorite before the application of a tensile force. [Online]. Quito: Universidad Central del Ecuador; 2017 [accessed November 18, 2021]. Available in: http://www.dspace.uce.edu.ec/bitstream/25000/13419/1/T-UCE-0015-822.pdf.

Roncal Espinoza RJ. Evaluation of the degree of conversion of a dual resinous cement and a preheated resin photoactivated through ceromer disc, in vitro study. [Online]. Chiclayo: Universidad Católica Santo Toribio de Mogrovejo; 2019 [city 20 November 2021].. Available in: https://tesis.usat.edu.pe/bitstream/20.500.12423/1736/3/TL_RocalEspinozaRosa.pdf.

Guayaquil: University of Guayaquil; 2020 [accessed 21 November 2021]. Available in: http://repositorio.ug.edu.ec/handle/redug/48413.

Condori Castle KK. In vitro comparative study of the tensile strength of fiberglass posts cemented with dual Allcem Core Fgm and Cement Relyx u200 3m, in pieces of first lower premolars. [Online]. Cusco: Andean University of Cusco; 2018 [accessed 20 November 2021]. Available in: https://core.ac.uk/display/219258551.

Orellana-Solórzano M, Suàrez-Palacios J, Romero-Luzuriaga D. Microfiltration between adhesive and self-adhesive cement in resin inlays. [Online].; 2017 [accessed 18 November 2021]; 3(2):463-482.. Available in: https://dominiodelasciencias.com/ojs/index.php/es/article/view/340.

Cueva-Buendía LA, Mendoza del Rio RL, Jesús Balbín EJ, Roque Henriquez MA. In vitro study of marginal microfiltration in indirect restorations cemented with dual cement and resins fluidized by preheating. Journal Visionaries in science and technology. [Online].; 2020 [accessed 20 November 2021]; 5(2):92-98.. Available in: https://revistas.uroosevelt.edu.pe/index.php/VISCT/article/view/44.

Ferrín Retto NG. Adhesive techniques of fiberglass poles with dual resinous cement. [Online]. Guayaquil: University of Guayaquil; 2021 [accessed 20 November 2021]. Available in: http://repositorio.ug.edu.ec/handle/redug/56020.

Chavez Castro JT. Analysis of the application of 2% chlorhexidine in the adhesive protocol on the resistance to detachment of fiberglass poles. [Online]. Sao Paulo: City University of Sao Paulo; 2018 [accessed November 20, 2021]. Available in: https://renati.sunedu.gob.pe/handle/sunedu/892580.

Castillo González JI, Miranda Anchundia AK, Camaño Carballo L. Método neutrosófico para la recomendación en la recuperación del espacio biológico perdido en odontología restauradora con prótesis fija. Neutrosophic Computing and Machine Learning. 2022;22:81-94. DOI: https://zenodo.org/record/6949235

Ricardo JE, Vázquez MYL, Palacios AJP, Ojeda YEA. Inteligencia artificial y propiedad intelectual. Universidad y Sociedad. 2021;13(S3):362-368.

Ricardo JE, Vázquez ML, Fernández AR. Assessment of project-based learning. Investigacion Operacional. 2022;43(3):409-419.

Romero Fernández A, Labrada González E, Loyola Carrasco D. Study on the Level of Knowledge in Dental Medical Emergencies of Dentistry Students through Neutrosophic Values, Neutrosophic Sets and Systems. 2020;37:99-107. DOI: 10.5281/zenodo.4122035

Granda Macías LA. Empleo de las carillas laminadas con cerámica feldespáticas aplicando la técnica de estratificación en el órgano dental. Revista Universidad y Sociedad. 2021;13(2):194-203.