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Ceramic Materials in dentistry using the SPSS Method

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Abstract: *Dental ceramics can be used in a variety of root canal therapy, such as inlays, bone grafting, crowns, and bridges, to replace earthenware (PFM) systems with everything systems. Dental crowns, dental composite components, and dentures are all made of porcelain and glass-ceramic materials, which are together referred to as dental ceramics. Conventional dental porcelain is feldspar-based and contain sizable amounts of kaolin ($Al_2O_32SiO_22H_2O$), quartz, and feldspar ($KAlSi_3O_8$). Rocks containing mica and iron are known to contain feldspar, a grey crystalline mineral. Ceramics are any of the countless hard, brittle, heat, corrosion-resistant substances produced by molding and thereafter scorching an inorganic, non-metallic substance like clay to high temperatures. Common examples include earthenware, pottery, and brick. Dental ceramics that are made of Lucite feldspathic material are very attractive and frequently utilized. Inlays, on lays, partial crowns, crowns, and veneers for metals and ceramics are among their clinical indications. Ceramics are resistant to high temperatures, effective thermal insulators, and have minimal thermal expansion. For uses like as lining industrial furnaces and sealing space shuttles, it makes really good thermal barriers. Dental ceramics are explained within a framework that makes it simple to comprehend how they developed. symptoms and composition. Engineering assessments of efficacy of treatment are discussed, and research is done. Behavior of all earthenware systems clinically. The usage of dental ceramics is discussed from a practical standpoint. Emphasizing what they know but also how we know it while maximizing beauty and endurance. Reviewing the history of ceramics' use in dentistry is helpful. This account has three purposes: (1) to warn professionals Pottery and improved ceramics were created to remedy the issue; (2) to increase actual issues or restoration diversity; and (3) give a soft backdrop in nature and ceramic science. The use of ceramics has always represented the adoption of "high technology" and "Craftsmanship". Ratio studies are statistical analyses of data from appraisals and property valuations. Nearly all states utilize them to produce quantitative measure of the proportion of current market price about which individually estimated taxable property is appraised as well as to offer assessment performance indicators. Evaluation parameters: Ceramic materials in dentistry, Glass-ceramics, predominantly glassy ceramics, Substructure ceramics, Particle-filled glasses and Polycrystalline ceramics. Result: The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis. Characteristics of sisal fiber the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.*

Keywords: *Ceramic materials in dentistry, Glass-ceramics, predominantly glassy ceramics, Substructure ceramics, Particle-filled glasses and Polycrystalline ceramics.*

1. INTRODUCTION

Dental ceramics are explained within a framework that makes it simple to comprehend how they were developed, what makes up their composition, and how they are classified. The information on the clinical behavior of all ceramic systems is reviewed, and engineering assessments of clinical performance are discussed. Emphasizing everything we know and how we know it, practical aspects of the choice and utilization of dental ceramics to maximize aesthetics and durability are discussed. This account aims three times: (1) to remind practitioners that the use of ceramics has always been associated with the adoption of "high technology" and "craftsmanship," (2) to support the notion that cents and improved ceramics were developed to address particular issues or to broaden the scope of restoration, and (3) to give a softer background on the biological and scientific properties of ceramics. Also, hints are provided to readers on where to search for the emergence of new ceramic technologies [1]. In the past ten years, advances Lithium disilicate, titanium dioxide, and zirconium oxide are examples of ceramic core materials that made it possible for all-ceramic restorations to become widely used. Together with the many ceramic products and systems already in use, a review of the scientific journals on the therapy treatment's effectiveness is suggested. Different from other FPDPs, metal-ceramic FPDPs fail mostly as a result of tooth decay and breakage. In addition to offering therapeutic advice for their usage, it analyses the most recent research on the durability, material properties, peripheral and inner fit, organization as well as connecting, color, and beauty of all-ceramic surfaces and textures, and so forth [2]. The best materials to fill them are ceramic ones. They offer good physical, chemical, tribological, mechanical, tribological, and microhardness, creep, and resilience to thermal shock (corrosion and wear resistance) qualities (density, thermal conductivity, coefficient of thermal expansion). extended period at service temperature. In the energy and transportation sectors, high temperature applications including composites Passivation coatings (TBCs), biological border coated (EBCs), and earthenware matrix (CMCs) are becoming more common [3]. It has long been known that ceramic matrix materials are susceptible to heat stresses. Duhamel gathered data from thermal conduction in a cylinder using multiple methods (1838). ' Since then, over thirty studies have been published, most of which center on the prediction of stress concentration during an infinite circle subject to temperature gradients. Thermal stresses are obviously not a brand-new or unstudied phenomenon [4]. goods made of ceramic. Moreover, the isoprenoids of yttrium, dysprosium, and ytterbium were converted into oxides and deposition took place under nitrogen at 200-300 "C. 26 A1203 can be deposited on InP. et. al. 1.0% deposited TiOz and TaO5 from metal ethoxides, according to a more recent work [5]. Ceramic materials that feature flaws, which influence strength and durability, have long led the way in technological advancements. If the grain size is connected to the critical flaw size that causes failure, strength gains in the sense of the Griffith instability criterion can be made by shrinking the microstructure. A strength of around 1 GPa is anticipated for crucial flaws that are approximately micrometer in size. The findings of investigations on crack extension behavior will help to further clarify the key elements of this hardening technique for ceramic materials after this study of stiffening mechanisms resulting from crack screening [6]. Although amorphous glasses, polycrystalline ceramics, and decorative (crystals in an organic state) solutions are all conceivable, silicate predecessors to glasses have been the focus of sol-gel research. Today, aerogels and optical coatings are the main uses for these materials. Nuclear reactors employ aerogels (1), diaphanous permeable solids made by using Cherenkov monitoring equipment to dry gels or solvents above their critical point. As insulating glazing materials, aerogels are also about to enter the market [7]. Ceramics are insulators; however, metal and semiconductor ceramics are more prevalent. Several researchers from all around the world have been drawn to this field since the discovery of greater conductivity in ceramic oxides2.3. The crystal structures of ceramic materials are typically more intricate than those of electronics, metals, or intermetallic [8]. Ceramic materials have good thermal, optical, and chemical stability together with low density, making them ideal for applications requiring outstanding performance. Si3N4-based electronic surfaces or high temperature components like turbochargers, valve tabs, and other ceramic materials are a few examples of practical applications. Furthermore, doping silicon nitride ceramics with rare earth metals can enhance their mechanical qualities [9]. Dental ceramics are made of silica. Feldspar-based ceramics are prone to failure because of their intrinsic brittleness. This is why tectosilicate stones like feldspar (KAlSi3O8), quartz (SiO2), and kaolin (Al2O3) that are made of feldspar and burned at temperatures above 870 degrees Celsius 2SiO22 H2O) are recommended. To enhance mechanical qualities, high crystalline content ceramics like alumina (aluminum zirconia (niobium dioxide), ZrO2, and aluminums trioxide, Al2O3. In prosthetic dentistry, ceramics with a cubic crystal content are frequently utilized as the core (substructure), while veneers made of ceramics based on feldspar are used to cover the core [10]. To get over technological constraints, ceramics have developed into a significant industrial product and are frequently utilized in many different industries. Glass is an exception, but ceramics are typically inorganic crystalline materials made up of metals and nonmetals joined together by ionic or covalent bonding. Industrial ceramics are divided into six groups based on their chemical composition: oxides, carbides, nitrides, borides, silicates, and glass ceramics (Figure 1). Ceramics are a top engineering material because they can sustain higher working temperatures than metals and plastics can. They are typically chemically inert and have strength and rigidity that are comparable to those of metals. The majority of ceramics are resistant to harsh conditions, good at insulating heat and electrical [11]. In the field of nanoparticles science, where it has long been understood that the stability and chemistry of a particle depend on the forces that act between dispersed phase in a medium, often a liquid, the significance of surface forces is better described. Nonetheless, despite the fact that it is not always clear how surface forces operate, they have an impact on numerous fields of science and technology [12]. Due to different levels of metallic bonding, these compounds have stronger electrical and thermal high thermal conductivity than oxide ceramics. UHTCs are able to tolerate severe heats, heat fluxes, intensity, dynamic loads, surface chemistry, and other circumstances beyond the capability of current structural materials thanks to this interesting mix of metal-like or ceramic-like features [13]. In many structurally significant ceramic systems, slow crack propagation occurs before rapid fracture, which results in a time - independent of strength. Making precise failure predictions demands a thorough understanding of the night before going to bed behavior of these materials, which is necessary for successful structural exploitation. By including a component proof test before use, failure prediction accuracy is greatly increased. As a result, everyone agrees that effective proof testing is essential for the effective implementation of ceramic materials in structural applications [14]. An oscilloscope trace is used to determine the cycle's precise properties, and the proper values of g are then determined. These g values enable the estimation of fracture velocities per cycle from statically velocity data and comparison with measured break velocities. The measured break velocities and the velocities indicated by constant slow crack growth did not differ significantly in any of the examples. As a result, we draw the conclusion that for these ceramic materials [15]. In a similar vein, only their surface actually makes contact with the bone when live

A live body has ceramic materials injected. To promote the production of new marrow in within transplant, it is advisable to select materials with the proper permeability structure. Designing thick bioactive ceramic materials that can create in situ porous structures once they're implanted is a novel way to solve this issue [16]. The urgent issue of increasing the service qualities of ceramic materials in various engineering and industrial areas still exists. This issue can be resolved without the use of pricey doping components by drastically decreasing or greatly increasing the number of atomic flaws (such as single crystals, hairs, nanotubes, etc.) in the lattices. For instance, a material's hardness qualities can be increased by a factor of 5–6 with a grain size reduction from tens of micrometers to tens of nanometers. Among the most promising techniques for producing nanostructures, surface nano structure, can be applied to the close layers of products created from various materials if the problem of temperature of the fault structure in just this material is resolved [17]. Work on the prospective use of very porous ceramic coatings on metallic implants is presented in this study. The goal is to encourage spontaneous bone growth to fill in gaps that are of the ideal size. This ideal size must be sufficient to support the development of capillaries, blood vessels, and the closely related osteocytes, which will then lead to the production of new trabecular bone in within ceramic coating. This specific strain of artificial bone is thought to be able to retain a significant portion of the qualities of natural bone, including self-repair and resorption, because there is a relatively big volume reduce stress and its causes [18]. Dental glass-ceramic molar crown failure rates (Decor-Caulk Dentsply, Milford, DE) have been reported to be 5% annually. polishing and grinding. Acute fractures of all-ceramic orthodontic restorations frequently begin at the internal surfaces, progress through the material, and eventually result in total fracture, according to some research [19]. Ceramic materials can only achieve the desired insulating resistance, longevity, and clearing with careful management these materials' exceptional performance is mostly due to innovative methods of chemical preparation such drying and sol-gel processing. In general, ceramics exhibit a heavy reliance on microstructure. Changing the particle size and grain size distribution is the easiest approach to alter a microstructure. Broadening of the peak and a sharp drop in maximum permittivity at the Curie point in composite (Ba, Ca) (Ti, Zr) O3 crystalline ceramics [20].

2. MATERIAL AND METHOD

Ceramic materials in dentistry: Dental crowns, tooth - colored components, and dentures are all made of porcelain and glass-ceramic materials, which are together referred to as dental ceramics. Conventional dental stoneware is feldspar-based and contain sizable amounts of kaolin ($Al_2O_32SiO_22H_2O$), quartz, and feldspar ($KAlSi_3O_8$). Rocks containing mica and iron are known to contain feldspar, a grey crystalline mineral. There are five main categories of ceramics: abrasive, electrical, magnetic, temperamental, and structure ceramic materials. Clay is frequently used to make structural ceramics, which can withstand pressure, heat, and oxidation. Some instances of architectural ceramics include bricks and tiles.

Glass-ceramics: Glass-ceramics are classified as composite materials made of crystals embedded in glass. By combining the amorphous and crystalline states, a novel material type with tunable special features is produced. Glass-ceramics are solid objects made of glass and ceramic that have undergone controlled crystallization. The chemical makeup of vitreous ceramics is identical to that of glasses, however they are typically 95–98% crystalline and include only a trace amount of glass. The crystals are frequently quite homogeneous in size and are typically very small less than 1 m.

Predominantly glassy ceramics: Chandeliers in a glass matrix are used to create composite materials known as glass-ceramics. A new kind of material with tunable special features is produced by combining the amorphous and crystalline phases. A glass-ceramic is a solid substance that contains both glass and crystals. It is created when a glass is carefully crystallized. Although vitreous ceramics share the same chemical make-up as glasses, they are typically 95–98% crystalline and contain just a trace amount of glass. The crystals are often very tiny—less than 1 m—and frequently have highly consistent sizes.

Substructure ceramics: a technique for building a dental restoration's structure that involves firing a dental metal foundation and a dental ceramic covering. For ceramics bonding with metal, point over 50 °C, low-melting ceramic is utilized. This bonding takes place due to oxide on the metal surface. Ceramic-bonded-metal (PFM) or ceramic-bonded-metal (PBM) replacements are the terms used to describe these treatments.

Particle-filled glasses: Glasses are amorphous, while ceramics are crystalline. As a result, glasses never melt when heated; instead, they progressively soften. Ceramics have high melting points and/or heat stability by nature. A Greater flexural strength (104 MPa) and energy absorption (compared to conventional interbedded porcelain for metal dental crowns) are produced by higher leucite concentrations. Lucite serves as a reinforcing phase. The material has a high coefficient of thermal contraction because it contains a lot of leucite. Feldspathic porcelain offers dentists and their ceramists to provide significantly less intrusive aesthetic treatments, which is exactly what patients anticipate because to its great aesthetic value and little preparatory requirements.

Polycrystalline ceramics: A composite material called polycrystalline ceramic exhibits characteristics similar to those of the grains as well as grain boundaries that make up the material. The smallest component in series controls the overall capacitance of a circuit comprised of capacitive connected in series. Solids with several tiny crystals are referred to as polycrystalline materials ("grains"). Grain boundaries divide grains, which typically have variable crystal orientations. The range of grain size is nanometers to millimeters.

Method: SPSS Statistics is a statistical control Advanced Analytics, Multivariate Analytics, Business enterprise Intelligence and IBM a statistic created by a software program is package crook research. A set of generated statistics is Crook Research is for a long time SPSS Inc. Produced by, it was acquired by IBM in 2009. Current versions (after 2015) icon Named: IBM SPSS Statistics. The name of the software program is to start with social Became the Statistical Package for Science (SPSS) [3] Reflects the real marketplace, then information SPSS is converted into product and service solutions Widely used for statistical evaluation within the social sciences is an application used. pasted into a syntax statement. Programs are interactive Directed or unsupervised production Through the workflow facility. SPSS Statistics is an internal log Organization, types of information, information processing and on applicable documents imposes regulations, these jointly programming make it easier. SPSS datasets are two-dimensional Have a tabular structure, in which Queues usually form Events (with individuals or families) and Columns (age, gender or family income with) to form measurements. of records Only categories are described: Miscellaneous and Text content (or "string"). All statistics Processing is also sequential through the statement (dataset) going on Files are one-to-one and one-to-one Many can be matched, although many are not in addition to those case-variables form and by processing, there may be a separate matrix session, there you have matrix and linear algebra on matrices using functions Information may be processed.

3. RESULT AND DISCUSSION

TABLE 1. Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Ceramic materials in dentistry	25	4	1	5	2.88	1.236
Glass-ceramics	25	4	1	5	3.08	1.525
Predominantly glassy ceramics	25	4	1	5	2.72	1.458
Substructure ceramics	25	4	1	5	3.00	1.528
Particle-filled glasses	25	4	1	5	3.04	1.428
Polycrystalline ceramics	25	4	1	5	2.84	1.491
Valid N (listwise)	25					

Table 1 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation Ceramic materials in dentistry, Glass-ceramics, predominantly glassy ceramics, Substructure ceramics, Particle-filled glasses and Polycrystalline ceramics this also using.

TABLE 2. Frequencies Statistics

		Ceramic materials in dentistry	Glass-ceramics	Predominantly glassy ceramics	Substructure ceramics	Particle-filled glasses	Polycrystalline ceramics
N	Valid	25	25	25	25	25	25
	Missing	0	0	0	0	0	0
Mean		2.88	3.08	2.72	3.00	3.04	2.84
Median		3.00	3.00	3.00	3.00	3.00	3.00
Mode		3	5	1	5	3	1[a]
Std. Deviation		1.236	1.525	1.458	1.528	1.428	1.491
Sum		72	77	68	75	76	71
Percentiles	25	2.00	2.00	1.00	2.00	2.00	1.00
	50	3.00	3.00	3.00	3.00	3.00	3.00
	75	3.50	5.00	4.00	5.00	5.00	4.00
a. Multiple modes exist. The smallest value is shown							

Table 2 Show the Frequency Statistics in Ceramic Materials in dentistry is Statistics is a powerful statistical software platform Ceramic material in dentistry, Glass-ceramics, predominantly glassy ceramics, Substructure ceramics, Particle-filled glasses and Polycrystalline ceramics curve values are given.

TABLE 3. Reliability Statistics

Cronbach's Alpha Based on Standardized Items	N of Items
.861	6

Table 3 shows the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is . 865 which indicates 86% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

TABLE 4. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted
Ceramic materials in dentistry	.881
Glass-ceramics	.840
Predominantly glassy ceramics	.817
Substructure ceramics	.822
Particle-filled glasses	.831
Polycrystalline ceramics	.851

Table 4 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results. The Cronbach's Alpha value for Ceramic materials in dentistry - .881, Glass-ceramics - .840, Predominantly glassy ceramics -.817, Substructure ceramics - .822, Particle-filled glasses - .831, Polycrystalline ceramics -.851 This indicates all the parameter can be considered for analysis.

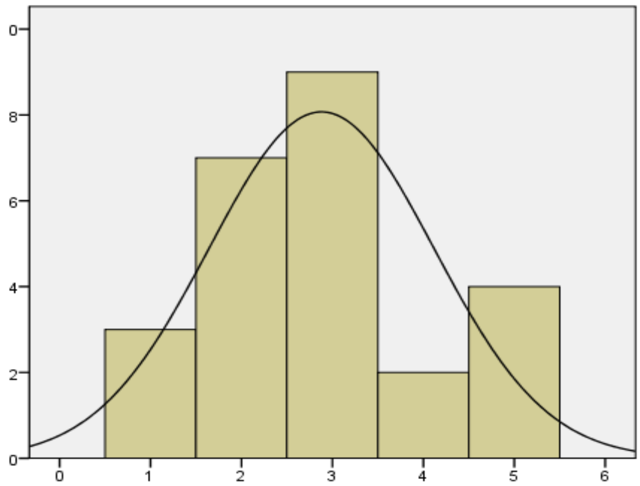

FIGURE 1. Ceramic material in dentistry

Figure 1 shows the histogram plot for Ceramic material in dentistry from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 3 for Ceramic material in dentistry except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

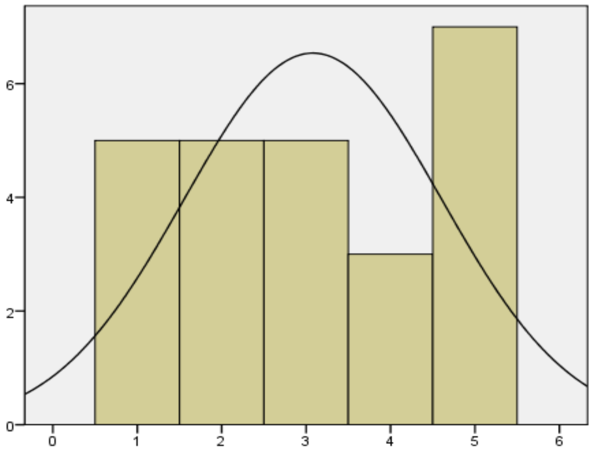

FIGURE 2. Glass-ceramics

Figure 2 shows the histogram plot for Glass-ceramics from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Glass-ceramics except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

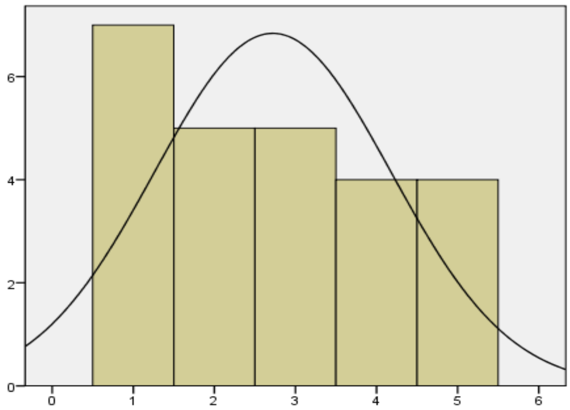

FIGURE 3. predominantly glassy ceramics

Figure 3 shows the histogram plot for predominantly glassy ceramics from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 1 for predominantly glassy ceramics except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

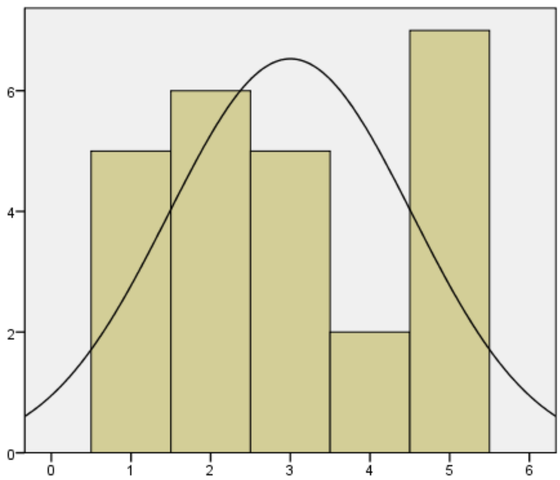

FIGURE 4. Substructure ceramics

Figure 4 shows the histogram plot for Substructure ceramics from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Substructure ceramics except the 4 value all other values are under the normal curve shows model is significantly following normal distribution.

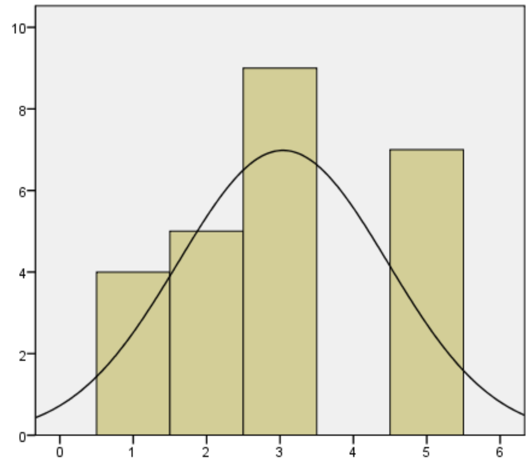

FIGURE 5. Particle-filled glasses

Figure 5 shows the histogram plot for Particle-filled glasses from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 3 for Particle-filled glasses except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

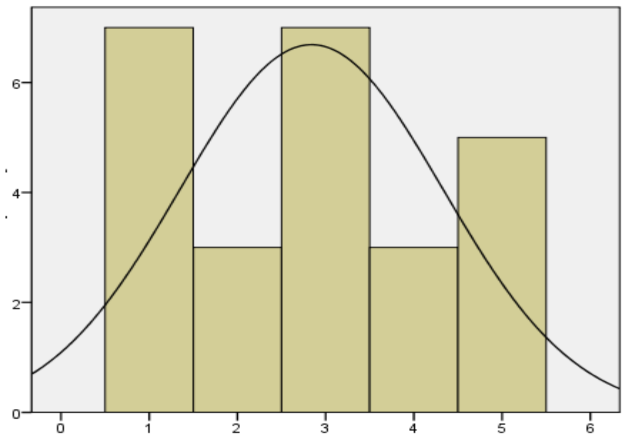

FIGURE 6. Polycrystalline ceramics

Figure 6 shows the histogram plot for Polycrystalline ceramics from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 1,3 for Polycrystalline ceramics except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

TABLE 5. Correlations

	Ceramic materials in dentistry	**Glass-ceramics**	**Predominantly glassy ceramics**	**Substructure ceramics**	**Particle-filled glasses**	**Polycrystalline ceramics**
Ceramic materials in dentistry	1	.271	.351	.353	.263	.419*
Glass-ceramics	.271	1	.629**	.662**	.553**	.464*
Predominantly glassy ceramics	.351	.629**	1	.729**	.726**	.553**
Substructure ceramics	.353	.662**	.729**	1	.688**	.457*
Particle-filled glasses	.263	.553**	.726**	.688**	1	.512**
Polycrystalline ceramics	.419*	.464*	.553**	.457*	.512**	1

Table 5 shows the correlation between motivation parameters for Ceramic material in dentistry for Polycrystalline ceramics is having highest correlation with Glass-ceramics and having lowest correlation. Next correlation between motivation parameters for Glass-ceramics for Substructure ceramics is having highest correlation with Ceramic materials in dentistry and having lowest correlation. Next correlation between motivation parameters for predominantly glassy ceramics for Substructure ceramics is having highest correlation with Ceramic materials in dentistry and having lowest correlation. Next correlation between motivation parameters for Substructure ceramics for Predominantly glassy ceramics is having highest correlation with Ceramic materials in dentistry and having lowest correlation. Next correlation between motivation parameters for Particle-filled glasses for Predominantly glassy ceramics is having highest correlation with Ceramic materials in dentistry and having lowest correlation. Next correlation between motivation parameters for Polycrystalline ceramics for Predominantly glassy ceramics is having highest correlation with Ceramic materials in dentistry and having lowest correlation.

4. CONCLUSION

Dental ceramics can be used in a variety of root canal therapy, such as inlays, bone grafting, crowns, and bridges, to replace earthenware (PFM) systems with everything systems. Dental crowns, dental composite components, and dentures are all made of porcelain and glass-ceramic materials, which are together referred to as dental ceramics. Conventional dental porcelain is feldspar-based and contain sizable amounts of kaolin (Al2O32SiO22H2O), quartz, and feldspar (KAlSi3O8). Rocks containing mica and iron are known to contain feldspar, a grey crystalline mineral. Dental ceramics are explained within a framework that makes it simple to comprehend how they developed. symptoms and composition. Engineering assessments of efficacy of treatment are discussed, and research is done. Behaviour of all earthenware systems clinically. The usage of dental ceramics is discussed from a practical standpoint. Emphasizing what they know but also how we know it while maximising beauty and endurance Dental ceramics are explained within a framework that makes it simple to comprehend how they were developed, what makes up their composition, and how they are classified. The information on the clinical behaviour of all ceramic systems is reviewed, and engineering assessments of clinical performance are discussed. Emphasizing everything we know and how we know it, practical aspects of the choice and utilization of dental ceramics to maximise aesthetics and durability are discussed. Dental crowns, tooth - colored components, and dentures are all made of porcelain and glass-ceramic materials, which are together referred to as dental ceramics. Conventional dental stoneware is feldspar-based and contain sizable amounts of kaolin (Al2O32SiO22H2O), quartz, and feldspar (KAlSi3O8). Rocks containing mica and iron are known to contain feldspar, a grey crystalline mineral. Glass-ceramics are classified as composite materials made of crystals embedded in glass. By combining the amorphous and crystalline states, a novel material type with tunable special features is produced. Chandeliers in a glass matrix are used to create composite materials known as glass-ceramics. A new kind of material with tunable special features is produced by combining the amorphous and crystalline phases. A glass-ceramic is a solid substance that contains both glass and crystals. a technique for building a dental restoration's structure that involves firing a dental metal foundation and a dental ceramic covering. For ceramics bonding with metal, point over 50 °C, low-melting ceramic is utilised. Ratio studies are statistical analyses of data from appraisals and property valuations. Nearly all states utilise them to produce quantitative measure of the proportion of current market price about which individually estimated taxable property is appraised as well as to offer assessment performance indicators. Ceramic materials in dentistry, Glass-ceramics, predominantly glassy ceramics, Substructure ceramics, Particle-filled glasses and Polycrystalline ceramics. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

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