What's new for the clinician – summaries of recently published papers (February 2025)

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Edited and compiled by Prof V Yengopal, Faculty of Dentistry, University of the Western Cape

1. ORAL HEALTH OF PEOPLE WITH EMOTIONAL DISORDERS: A SYSTEMATIC REVIEW AND META-ANALYSIS

While it may not be widely understood, there is a clear connection between a person's dental health and their mental health. Numerous studies have identified associations between mental health and oral health; however, the interaction often does not get much attention, even among health care professionals. Shappell and Cartier (2023)[1] point out the various ways in which oral health and mental health are interconnected, each having an impact on the other. Dental health problems can impact a person's quality of life and exacerbate mental health problems. For example:

- When a person has poor oral health, it can impact their eating, speech and self-esteem and lead to reduced social interactions, further harming mental wellbeing.
- Many people, including people with mental health conditions, have anxiety associated with dental care and procedures and avoid needed care, but chronic oral pain can contribute to poor mental health and make treating mental health conditions more difficult.
- Symptoms of mental illnesses can contribute to poor nutrition which, in turn, contributes to poor dental health.
- People with mental illness, particularly those experiencing symptoms of serious mental illness, may have difficulty maintaining an effective daily dental care routine and accessing needed dental treatment.

Shappell and Cartier (2023)[1] highlighted four key dental conditions seen in patients with psychiatric disorders: tooth decay, gum diseases, dry mouth (xerostomia) and teeth grinding (bruxism). Dry mouth can be a complication of anxiety and is a side effect of many psychotropic medications. They suggest that over-the-counter products (such as oral moisturisers, mouth rinses, toothpaste or xylitol gum) can be helpful for dry mouth. Teeth grinding, which can damage teeth and contribute to teeth and jaw pain, is treated by wearing a night guard and working with a psychiatrist to address medication side effects and psychological factors. Therapy can be helpful if a person is extremely anxious about going to the dentist. Rangel and colleagues (2024)[2] reported on a systematic review to answer the following focused question: "Is there an association between severe mental illnesses and oral health conditions?"

Methodology

This systematic review was carried out in accordance with the guidelines of PRISMA (Preferred Reporting Items for Systematic Review and Meta- Analysis). The PECOS strategy was used in this analysis to specify the following inclusion criteria for study selection:

- Population (P): Adults aged 18 and older;
- Exposure (E): The exposure group included individuals with severe mental illnesses such as schizoaffective disorder, bipolar disorder, severe/major depression and obsessive-compulsive disorder;
- Comparison (C): The control group consisted of individuals without severe mental disorders;
- Outcome (O): Patients with dental caries, periodontitis, tooth loss (including edentulism) and temporomandibular joint abnormalities are also individuals with severe mental illnesses;
- Study design (S): Observational studies.

Studies that included samples of patients diagnosed with severe mental disorders were included. Studies that assessed oral health – specifically dental caries, periodontal disease, temporomandibular joint disorders and tooth loss, including edentulism – were included. A mandatory comparison was made with a control group, which included individuals without any severe mental disorders. Observational, case control, cohort and cross-sectional studies were included. There was no discrimination based on ethnicity, gender, age, language or year of publication. Studies with no healthy control group were excluded.

All searches were conducted before August 2021 and updated in March 2023 on EMBASE, Latin American and Caribbean Literature on Health Sciences (LILACS), PubMed/Medline, Psycinfo, Scopus and Web of Science. In addition, gray literature was also a source of information: Brazilian Digital Library of Theses and Dissertations (BDTD), Google Scholar, Open Gray and ProQuest Dissertation and Thesis. In addition, a manual search was performed in the references of studies included, and an expert was consulted to verify any possible articles not included in the selection. The Endnote® software was used to remove duplicate references. Two researchers independently screened each item for relevance by title and abstract. In cases where a decision could not be reached on whether the eligibility criteria were met by the title and abstract alone, the full text of the article was read. When disagreements arose and were not resolved through discussion between the first and second reviewers, a third researcher was consulted to reach consensus. To ensure alignment between both reviewers, the kappa coefficient of agreement was calculated, and the selection of studies began only when the agreement value exceeded 0.8, indicating a good agreement.

When data were missing or incomplete, efforts were made to contact the authors for important unpublished information. Authors were contacted via email for three consecutive weeks whenever additional information was required. For data extraction, the following information was collected: the last name of the first author, publication year, country of publication, study design, oral health and mental health conditions analysed, sample characteristics, mean age of samples, measurements of oral health and mental health, type of statistical analysis used, adjustment variables and study results. The frequencies, means and standard deviations were extracted from studies for all oral health-related outcomes, comparing the groups with severe mental health conditions and the control group.

The case control, cross-sectional and cohort studies included were assessed as for methodological quality using the Joanna Briggs Institute assessment. The GRADE tool was used to generate Risk of Bias Graphs using the RevMan Software. The Odds Ratio was calculated based on binary variables, comparing individuals with severe mental disorders to healthy individuals. For continuous variables, such as the CPO-D index, the difference in means between the two groups of interest was used. Where pooling of studies or data was possible, a random-effects meta-analysis was conducted.

Results

A total of 7,668 studies were retrieved using the search strategy from the six electronic databases and grey literature. A total of 5,734 studies remained after removing duplicate references. After reading the titles and abstracts (phase 1), 63 articles were selected for full reading (phase 2), of which 43 were excluded. This process resulted in 20 studies included for qualitative and quantitative syntheses.

Among the selected studies, 19 were in English and one was in Brazilian Portuguese. Among the case control studies (9 studies), sample sizes ranged from 40 to 390 participants, aged 18 to 67 years. In cross-sectional studies (8 studies), the sample size varied between 60 and 1,643 participants, aged 18 to 71 years. In cohort studies (2 studies), the sample size was 61,685 and 184,824 participants, with a mean age of 44 years. All of the above evaluated the relationship between periodontitis and bipolar disorder. Two studies did not match age and gender between groups, one study analysed only females in the samples and another evaluated only males. The remaining studies matched as for age and gender.

The psychological conditions assessed in the studies included were schizophrenia, bipolar disorder, severe depression and obsessive-compulsive disorder. The most used index to establish the diagnosis was the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM IV); for oral health conditions, the index was the Decayed, Missing or Filled Teeth (DMFT), the Community Periodontal Index (CPI) and the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).

Regarding the bias of individual studies, two case control studies and two cross-sectional studies were classified as having a moderate risk of bias. All others were classified as having a low risk of bias.

A meta-analysis was possible only for the DMFT index by comparing the mean values of decayed, missing and filled teeth between the group with a mental disorder and the control group. The DMFT index values were higher among individuals with schizophrenia [MD=5.27; 95% CI=4.13 – 6.42; I2=35%; Tau2=0.789] and bipolar disorder [MD=1.90; 95% CI=0.87-2.93]. The values were lower among individuals with obsessive-compulsive disorder [MD=-0.85; 95% CI=-1.46-0.24]

Considering studies not included in the meta-analysis, most studies showed a worsening of the evaluated outcome. Only two studies observed improvement, and one study showed no difference

The certainty of evidence was very low for DMFT in patients with schizophrenia. Also, the certainty of evidence was low due to the observational design of the studies included, which are prone to the influence of confounding factors; in addition, the eligibility criteria were not clear. There was no publication bias, as there was an effort to search all the available literature on the subject, including gray literature.

Conclusions

There was evidence of an association between the DMFT index and schizophrenia. The DMFT index was higher, indicating a greater number of decayed, missing or filled teeth in people with schizophrenia and bipolar disorder, while it is lower in people with obsessive-compulsive disorder. Based on the limited evidence available, there is still no confirmation of the association between the DMFT index and obsessive-compulsive disorder. Studies addressing periodontal probing depth, plaque index and TMD did not allow for pooled data calculation.

Implications for practice

Although the level of certainty was low for the association between DMFT and some mental disorders, the findings nevertheless underscore the importance of a comprehensive health approach for patients with mental disorder.

REFERENCE

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2. Rangel JP, Borges AF, Leão LO, de Mattos de Araujo BM, Stechman Neto J, Guariza-Filho O, de Oliveira Rosario M, de Araujo CM, Taveira KV. Oral health of people with emotional disorders: A systematic review and meta-analysis. Clinical Oral Investigations. 2024 May;28(5):1-29

2. THE EFFECT OF VARIOUS DENTURE CLEANSERS ON THE PHYSICAL AND MECHANICAL PROPERTIES OF CAD/CAM AND HEAT-POLYMERISED DENTURE BASE MATERIALS: AN IN VITRO STUDY

Most dentures are produced using the conventional heat polymerisation method and it is still widely used because it does not require expensive equipment. However, the durability of these acrylic resin-based prosthetic bases is affected by many factors such as the powder-to-liquid ratio, polymerisation method (fast boiling or slow boiling), the knowledge and skills of the technician, and storage conditions of the material. Recent studies have shown that computer-aided design and manufacturing technology (CAD/CAM), which has a wide range of applications in dentistry, has started to be used in the production of complete dentures. No polymerisation shrinkage is observed because the prepolymerised blocks used with this technique are injection polymerised under high temperature and pressure. Prostheses produced using prepolymerised blocks have many advantages for both the patient and the physician, such as better fit, reduction in microorganism counts, number of appointments and cost, the ability to store data in a digital environment and quickly reproduce prostheses in case of any complications, and standardisation and quality control.

Dentures provide a surface for microbial adhesion and lead to the formation of multispecies microbial biofilms which also serve as a reservoir for various pathogenic microbes including *Candida* spp, *Streptococcus mutans*, *Staphylococcus aureus* and *Escherichia coli*. The presence of pathogens in denture plaque is associated with local infection (denture stomatitis and dental caries) and systemic infections such as aspirate pneumonia and gastrointestinal infection. Therefore, denture hygiene is an important element of maintaining good mouth hygiene among patients who wear dentures.

There are two main denture cleaning methods, mechanical and chemical. Mechanical cleaning includes the use of toothbrushes and ultrasonic devices. The commercially available denture cleaning chemicals can be categorised according to their chemical composition: bleach-based (sodium hypochlorite), peroxide-effervescent type and enzyme-based denture cleansers. In recent years, nanoparticles, antimicrobial peptides and plant extracts have received significant attention as antimicrobial agents for dental applications. The use of water and a toothbrush is the most common method for denture cleaning due to the low cost, simplicity and effectiveness. However, this method is abrasive to dentures and produces scratches when brushing with a hard-bristled brush. This leads to high risks of microbial colonisation and plaque formation on dentures. Therefore, the general chemical, physical and mechanical structural properties of the material and the effects of the cleaning method to be used on the material should be well known. Selin and Ipek (2024)[1] reported on an invitro study that sought to comparatively investigate the effect of different denture cleansers on surface roughness, surface hardness and flexural strength of CAD/CAM and heat polymerised denture base materials.

The null hypothesis of the study was that denture cleansers applied to polymethyl methacrylate (PMMA) base materials obtained using different production methods would not affect surface roughness, surface hardness and flexural strength.

Materials and methods

The compositions and details of the materials used in the study are shown below.

Material	Composition
Ivoclar Ivobase (P1)	Polymethylmethacrylate
BILKIM PMMABlank (P2)	Polymethylmethacrylate
IQ-15 (H1)	Powder: Polymethylmethacrylate, Liquid: Methyl methacrylate
Meliodent Heat Cure (H2)	Powder: Polymethylmethacrylate, Liquid: Methyl methacrylate
Corega tabs (D2)	Bicarbonate; sodium lauryl sulfoacetate; sodium perborate monohydrate; sodium polyphosphate
Protefix tabs (D3)	Sodium bicarbonate, potassium caroate, sodium perborate, citric acid, sodium lauryl sulfate, aroma
Neutral electrolysed acid water (D4)	Chlorine
Acidic electrolysed acid water (D5)	Chlorine

Custom wax specimens of uniform dimensions of 64×10×3.3mm was employed for the fabrication of conventional heat-polymerised acrylic resin specimens using the traditional flask-press-pack technique according to the manufacturer's instructions. A Universal lightweight turning device was used to obtain standard specimens of 64×10×3.3mm from prepolymerised PMMA. Fifty specimens of milled PMMA from two manufacturers and 50 specimens of heat-polymerised PMMA from two other manufacturers were obtained, in total 200 specimens.

A single clinician performed finishing, polishing and cleaning procedure of acrylic resin specimens. The definitive dimensions of all specimens were checked using a digital caliper and kept in 37±2°C distilled water for 24h for residual monomer elimination.

Each group was randomly divided into five different subgroups (n:10) according to the cleaning agent to be applied. The specimens in the control group were kept in 37±2°C distilled water without any cleaning agent (D1). The specimens in the effervescent tablet-treated groups (D2: Corega tabs and water; D3: Protefix active cleansing tablets and water) were kept in solutions obtained by adding one cleansing tablet into 200ml of approximately 35°C water for 15min per the user instructions. At the end of each 15min, the specimens were washed under running water and dried using paper towels.
The specimens in the groups that were cleaned with neutral (D4) and acidic (D5) forms of electrolysed acidic water (EAW). The specimens in D4 groups were cleaned with neutral EAW. The neutral form EAW was added until it covered entire of the specimens. After 1min waiting time, specimens were washed under running water and dried using paper towels. The same procedures were applied for D5 groups with acidic EAW. In each group, the immersion procedure was repeated 90 times to mimic a three-month patient use period.

Surface roughness measurements were made using a mechanical profilometer. Roughness measurements were made at three different points from the centre of the specimen surfaces, and the arithmetic averages of the obtained values (Ra) were taken. An additional specimen from each group was prepared to be examined under a scanning electron microscope. Images were evaluated at ×1000 at 15kV.

A Vickers hardness tester was used to determine the surface hardness. The force to be applied by the measuring tip to the specimen surface was set to 25 gf (0.245N) for 30sec. Surface hardness values were found by taking the arithmetic mean of the measurements from three points of each test specimen.

For testing flexural strength, specimens were subjected to the three-point bending test with an Instron Universal Testing Machine. A uniformly increasing force was applied until the specimens were fractured, and the highest fracture load of each specimen was recorded. Peak load was noted at which the specimens fractured. The obtained force (N) values were converted to MPa.

Results

The denture cleansers had no significant effect on the surface roughness values of the specimen in the milled P1 (Ivoclar Ivobase) group ($p > 0.05$). However, specimens treated with electrolysed acidic water (EAW)D5 in P2, H1 (IQ-15) and H2 (Meliodent Heat Cure) groups showed significantly higher surface roughness values than the control group ($p<0.05$). Among the control groups, the smoothest and most homogeneous surface images were obtained in the P1 (Ivoclar Ivobase) group. The images of the control group of all denture bases material showed a more homogeneous structure than the images of the denture cleanser treated groups. The increased irregularity was clearly observed on the image of the P2 (BILKIM PMMABlank), H1 (IQ-15) and H2 (Meliodent Heat Cure) group specimens after treated with D5 (acidic electrolysed acid water). On the specimen surface of the H1 (IQ-15) group, the image of the control and the treated with D4 (neutral electrolysed acid water) showed similar homogeneity. However, increased irregularities were observed in the specimens treated with D5 (acidic electrolysed acid water) and small pores were observed in the specimens treated with D2 (Corega tabs) and D3 (Protefix tabs).

Among the control groups, the P1 (Ivoclar Ivobase) group showed significantly higher surface hardness values than the other groups except H1 (IQ-15) ($p<0.05$). The specimens treated with D2 (Corega tabs), D3 (Protefix tabs) and D5 (acidic electrolysed acid water) showed significantly lower surface hardness than the control group ($p<0.05$). However, denture cleansers had no significant effect on the surface hardness values of the specimens in the P2 (BILKIM PMMABlank), H1 (IQ-15) and H2 (Meliodent Heat Cure) groups ($p>0.05$). Among the control groups, P1 (Ivoclar Ivobase) showed significantly higher flexural strength values than the other groups except H2 ($p<0.05$). However, no significant differences were found between H1 (IQ-15) and H2 (Meliodent Heat Cure). The P1 (Ivoclar Ivobase) group specimens treated with D5 (acidic electrolysed acid water) showed significantly lower flexural strength values than the control group ($p<0.05$). However, denture cleansers had no significant effect on the flexural strength values of the specimens in the P2 (BILKIM PMMABlank), H1 (IQ-15) and H2 (Meliodent Heat Cure) groups ($p>0.05$).

Conclusions

The milled P1 (Ivoclar Ivobase) group showed lower surface roughness, higher surface hardness and flexural strength values than the other groups. While the surface roughness of P1 group was not affected by cleaning agents, surface roughness values of the other groups increased significantly after acidic EAW (D5). Additionally, denture cleansers had no significant effect on surface hardness and flexural strength values of milled P2 and heat polymerised H1 and H2 groups. However, the surface hardness and flexural strength of milled P1 group were affected by the denture cleansers. Also, after exposure to denture cleansers, surface roughness, surface hardness and flexural strength of milled and heat polymerised PMMA were within the acceptable clinical values.

Implications for practice

Although the use denture cleansers affected the surface roughness, surface hardness and flexural strength of milled and heat polymerised PMMA, these effects were within the acceptable clinical values.

REFERENCE

1. Selin OT, Ipek C. The effect of various denture cleansers on the physical and mechanical properties of CAD/CAM and heat-polymerized denture base materials: an in vitro study. Clinical Oral Investigations. 2024 Nov 6;28(11):629

Online CPD in 6 Easy Steps

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.