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Schizophrenia and oral health: a literature review

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Medical disorders can affect dental health directly or indirectly. As psychiatric disorders are one of the most frequent diseases in dental patients, such patients form a special needs group, which require modifications and adjustments to the standard treatment protocols. Schizophrenia is a complex, chronic mental disorder, which involves behavioural and cognitive changes, disturbances in perceptions, and impairment of certain conscious functions. In its active phase, the symptoms include delusions, hallucinations, disorganized speech, and abnormal motor function. If a schizophrenic patient presents to a dental office, psychiatric consultation may be necessary. Usually, it is suggested that any elective dental treatment should be deferred until the patient's symptoms are under control or in a state of inactivity. Side effects of the medications may affect the patient in an adverse way; thus, a careful monitoring by a psychiatrist is essential and forms a part of the recommended treatment approach. This paper will address a literature review of various concepts and recommendations for defining a suitable dental treatment plan for the patients with schizophrenia.

Keywords: schizophrenia, oral hygiene, periodontal status, smoking, dental treatment, psychiatric disorders

Introduction

Contemporary dentistry has developed far beyond classical dentistry and is a separate field of medical science briefly synonymized as dental medicine and deals with prevention, diagnosis, and treatment of oral, dental, and maxillofacial disorders, which may be affected by various medical ailments, either directly or indirectly. It is reported that psychiatric disorders are one of the most frequently present disorders of dental patients [13].

Having a healthy oral cavity is one of the most significant aspects of the life quality that can affect mastication, speech, aesthetics, and well-being of the person. In the western world, psychiatric disorders and dental diseases are amongst the most prevalent health disorders and are commonly comorbid. There are sufficient evidences that patients suffering from psychiatric diseases are more susceptible to grave dental decay and poor oral hygiene [38]. While the medical community is aware of the health issues associated with psychiatric disorders; oral disorders in psychiatric patients are inadequately recognized by the psychiatrists and must be addressed on a more regular basis [22].

Throughout the epidemiology of oral diseases, oral health was always considered fundamental to the general health and well-being of the population. Dental caries and periodontal problems are two major diseases, which affect the oral cavity and the dental hard and soft tissues [36]. A substantial part of the society suffers from either dental caries, or periodontal problems, or a combination of both. At the same time, mental health is considered another significant influencer of well-being and the quality of life. In 2013, it was estimated that, globally, over 450 million people (22.7% of the whole population) were suffering from psychiatric disorders that manifested as either a chronic mental illness or an aggressive disease. [4]. Mood disorders (approximately 48.4%) and schizophrenia (approximately 14.3%) were the most prevalent mental disorders, while bipolar disorders and apprehensiveness were exhibited at a lower rate (approximately 12.2%) *(Figure 1)* [19].

Schizophrenia

Schizophrenia is a complex chronic mental disorder, that affects thoughts, perceptions, emotions, and behaviours. While the symptoms could manifest differently, the psychological and the physical consequences of untreated schizophrenia may have devastating effects on the patients and their friends and family members.

With oral and dental health being noteworthy areas of the health care system and recognized by the other

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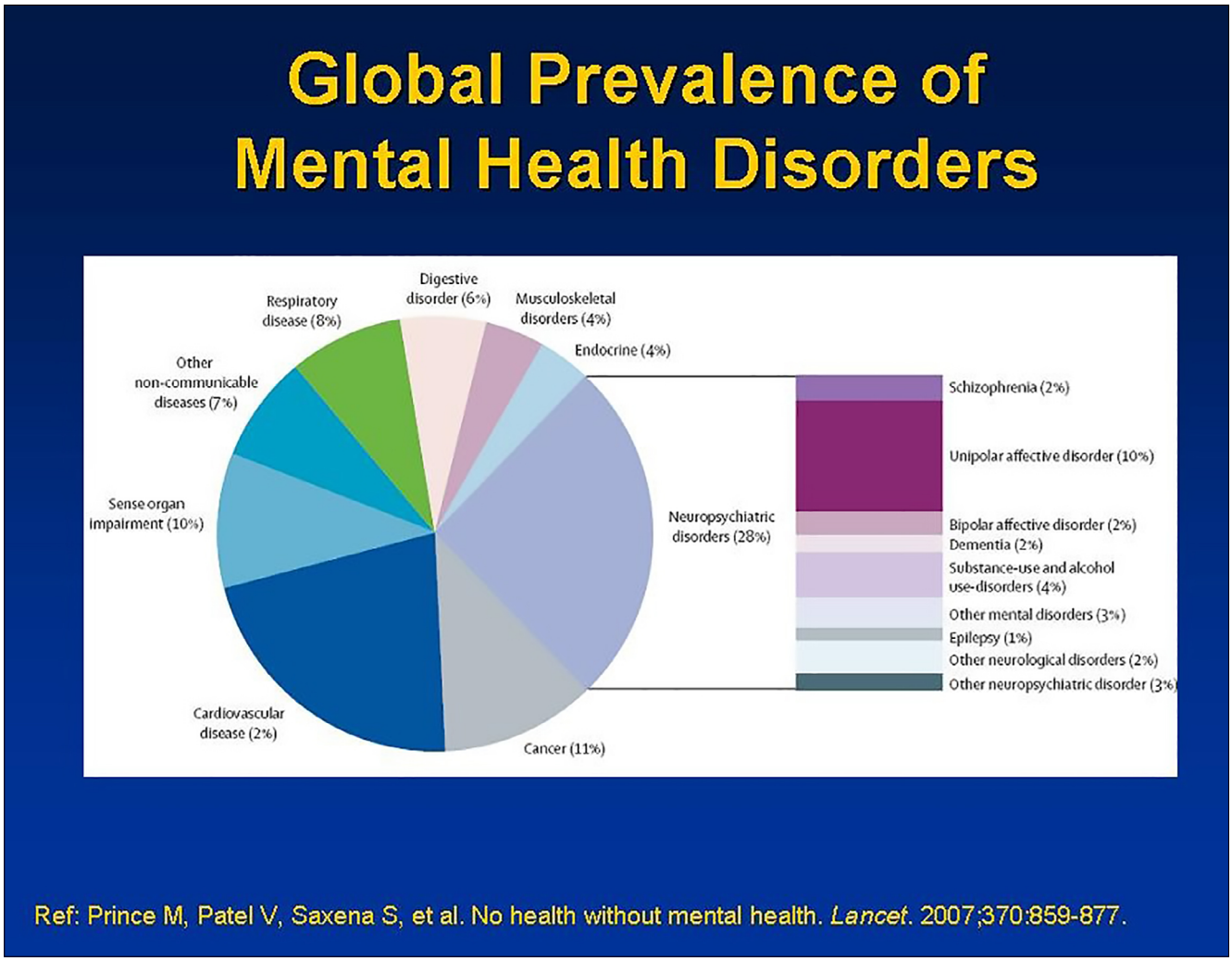


Figure 1: Global prevalence of mental health disorders [34]

specialists, dentists should be aware of the patient's mental disorders and their potential effect on the dental treatment planning and prognosis. Furthermore, drug interactions, the stability of the regular medication, and the possible side effects must be considered. Dental and oral medicine consist of various fields, which can be affected by other disorders.

The two major diseases affecting the oral cavity are tooth decay (caries) and gum diseases (periodontal problems) [31]. Dental decay is a process during which the hard tissues of the tooth are destroyed and a cavity is created by oral bacteria's acid, which demineralizes the enamel and the dentin. Gum problems caused by the dental plaque, which, if not removed, may result in gingivitis that may progress to periodontitis, and finally, to tooth loss.

In the following paragraph, the interrelationship between schizophrenia and oral health is examined and the recommended adjustments to the treatment and the care protocols are outlined.

Effect on oral hygiene (periodontitis and dental caries)

Oral hygiene measures are set in order to keep the oral cavity, the hard tissues, and the gums clean and healthy and to prevent further dental or dental-related diseases, such as gingivitis, periodontitis, dental decay, and halitosis. In schizophrenia patients, oral findings include high rate of caries and periodontal disease, xerostomia, painful oral ulcers, dysphagia, and candidiasis [32]. In schizophrenic patients, commonly prescribed first- and second-generation antipsychotics are causing hyposalivation and xerostomia. As a result of a dry environment, the mitigating cleansing effect of the saliva is missing, thus leading to a higher incidence of root caries, and in addition, painful mucosal ulcers. Other outcomes of xerostomia could be dysphagia, difficulties with speech, and the proliferation of *Candida albicans*, resulting in candidiasis [32]. Compounded by a possible lack of family support, communication is-

sues, and inferior organisation skills, the combination leads to the poor oral health maintenance, which is of a paramount importance, especially when compounded by the schizophrenia.

Unfortunately, such patients either do not take adequate care of their oral and body hygiene or altogether neglect them; yet, notwithstanding the above, these patients never complain about their bad breath or body odour [6, 11].

Periodontal problems in schizophrenic patients

Almost in all psychiatric patients, even at a relatively young age, periodontal problems are so severe that either tooth loss is imminent or a partial edentulism is already present to a certain degree. To measure the periodontal state of a patient, we assess the progression of the disorder based on four clinical periodontal parameters (indices): plaque index (PI), bleeding on probing (BoP), probing pocket depth (PPD), and clinical attachment loss (CAL). An increase in any of the above indices might indicate the neglected oral hygiene and/or the presence of a periodontal disease. An increase of the PI and BoP may result in an increased PPD and CAL scores [33] *(Figure 2)*.

Probing pocket depth (PPD) and clinical attachment levels (CAL) are quantified in millimetres (mm). In periodontal status, increased PPD and CAL are indicative of the exacerbation of periodontal inflammation [33].

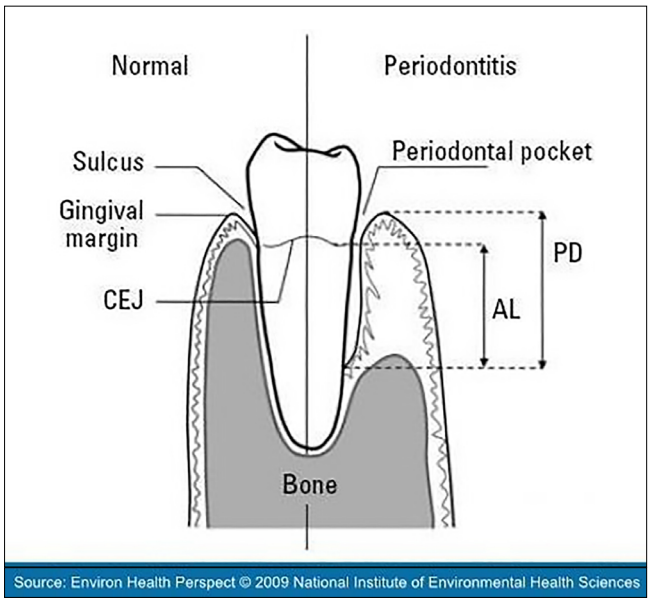


Figure 2: Clinical methods for assessing periodontal problems [3]

In psychiatric patients, approximately 50% have severe clinical attachment loss (more than 6 mm) and a probing pocket depth of up to 5 mm, whilst the remainder have less severe periodontal problems [33] *(Table 1)*.

Table 1

Percentage of psychiatric patients with clinical attachment loss and probing depth [33]

mm	Clinical Attachment Loss %	Probing Depth %
1	94.9	100.0
2	100.0	100.0
3	100.0	96.6
4	96.6	83.1
5	84.7	47.5
6	62.7	23.7
≥7	49.2	15.3

Patients with schizophrenia and mental retardation exhibit clinical attachment levels from 2 to 7 mm [33]. Some patients over the age of 65, who are on anti-psychotics or anti-Parkinson medication, were reported to have clinical attachment levels of up to 17 mm [33]. Since schizophrenic patients suffer from severe CAL, to prevent further periodontal deterioration, an adequate periodontal care is required twice as frequently as in the healthy population [2].

Additional periodontal complications could be related to the side effects of the medication, poor tooth brushing, and tobacco use. There is evidence that some antipsychotic drugs (for example, clozapine) can cause either sialorrhea (excessive amount of saliva) or xerostomia (hyposalivation) [12]. Therefore, in patients with excessive salivary flow rate (SFR), there is a higher risk for basic periodontal problems, such as higher plaque index and bleeding on probing score, leading to the higher risk for increased periodontal pocket depth and periodontal clinical attachment levels [12].

Statistically, approximately 40 percent of patients with schizophrenia are suffering from severe periodontal problems. These patients have at least 6 mm or more clinical attachment loss. Approximately 30% of these patients have up to 5 mm PPD. Due to a relapse in psychiatric state during hospitalisation, the latter indicators worsen; furthermore, the periodontal health of psychiatric patients can be affected by the administered medication [33] *(Table 2)*.

Dental caries in schizophrenic patients

Periodontal care directly affects dental health. The risk for early tooth loss is significantly reduced in people with healthy periodontium. Schizophrenic patients are more prone to plaque accumulation; therefore, they have higher susceptibility to dental caries that is due to additional biofilm retention, which further compromises periodontal health.

Table 2

Percentage of psychiatric patients with clinical attachment loss and probing depth by psychiatric disease [33]

mm	Mental disease: Schizophrenia		Bipolar affective disorder		Squizoaffective disorder		Mental retardation		Schizophrenia & mental retardation		Total
Clinical Attachment Loss											
	F	%	F	%	F	%	F	%	F	%	%
1	17	100.0	4	100.0	7	100.0	27	93.1	1	50.0	94.9
2	17	100.0	4	100.0	7	100.0	29	100.0	2	100.0	100.0
3	17	100.0	4	100.0	7	100.0	29	100.0	2	100.0	100.0
4	17	100.0	4	100.0	6	85.7	28	96.6	2	100.0	96.6
5	15	88.2	4	100.0	5	71.4	24	82.8	2	100.0	84.7
6	9	52.9	3	75.0	4	57.1	19	65.5	2	100.0	62.7
≥7	7	41.2	3	75.0	2	28.6	15	51.7	2	100.0	49.2
Probing Depth											
1	17	100.0	4	100.0	7	100.0	29	93.1	2	50.0	100.0
2	17	100.0	4	100.0	7	100.0	29	100.0	2	100.0	100.0
3	15	88.2	4	100.0	7	100.0	29	100.0	2	100.0	96.6
4	11	64.7	1	25.0	7	100.0	28	96.6	2	100.0	83.1
5	5	29.4	1	25.0	3	42.9	17	58.6	2	100.0	47.5
6	2	11.8	1	25.0	1	14.3	9	31.0	1	50.0	23.7
≥7	0	0.0	0	0.0	1	14.3	8	27.6	0	0.0	15.3

In patients with chronic schizophrenia, the decayed, missing, and filled teeth, as well as the duration of hospitalization in mental institutions, play an important role in the quality of oral hygiene and periodontal health. The inpatients have more severe periodontal problems and dental caries compared to those treated as outpatients (ambulatory psychiatric care) [40]. On average, schizophrenic patients have approximately 6 times more decayed teeth than the non-schizophrenic population, while mentally sound people in the society have about 1.5 times more filled teeth than schizophrenic patients, thus indicating a significantly better dental maintenance care [2]. It could be the consequence of older age, bad smoking habits, development of severe tremor that, together or separately, may further compromise the daily frequency of tooth brushing and have an overall negative effect on the schizophrenic patients' oral health [41].

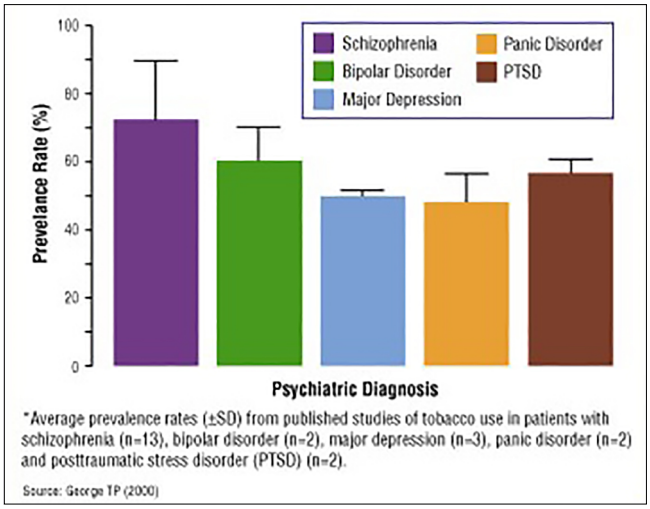
Smoking and schizophrenia

Smoking has a detrimental effect on the oral hygiene of the individual. Whilst smokers have a high risk of tooth staining, bad breath, tooth decay, periodontal problems, and tooth loss [39], approximately 90 percent of the oral cancer patients are smokers [23], thus linking smoking with an increased risk of oral cancer.

Similar to other mentally ill patients, schizophrenic patients are heavy smokers. According to a 2006 survey, in the United States, approximately 80 percent of the schizophrenic patients smoked as opposed to the 20 percent of smokers present in the mentally healthy

Table 2

Prevalence Rates of Tobacco Use in Psychiatric Disorders [14]*



population [24] *(Figure 3)*. From a financial point of view, schizophrenic patients spend approximately 7 percent of their income just on tobacco products alone [15]. In schizophrenic patients, smoking is one of the most important causes of bad oral hygiene. Notwithstanding cancers and other health problems linked to tobacco; smoking is one of the leading causes of premature death in schizophrenic patients [28].

Patients' management in dental and oral surgery

Communication with the patient

The communication skills of a dentist are very important for any patient; however, in schizophrenic patients such skills have extended significance. As schizophrenic patients can develop psycho-motor agitation, which manifests as akathisia, a movement disorder, which is usually characterized by restlessness of the upper or lower extremities and the inability to stay calm and relaxed in the dental chair during treatment, therefore preoperative sedative medication should be prescribed. To strengthen patient's belief and understanding, the dentist has to explain every single step of the procedure to the patient. During the treatment, the patient must be questioned about any feelings, thoughts, or unfamiliar sounds, which they deem negative. For such patients, it is recommended to attend the treatment accompanied by someone they trust or are familiar with, such as a relative or a family member, who could remain in the operatory throughout the treatment [8, 16, 23].

Anaesthesia for schizophrenic patients

Usually, the use of general or local anaesthetic agents is suggested for all dental patients. In schizophrenic patients, more often than not, dental treatment must be carried out under general anaesthesia. In those cases, to reduce or eliminate cardiac arrhythmia side effects, lithium containing medications should be suspended 2 to 3 days prior to the intervention [37]. Due to unwanted side effects of hypotension, the use of barbiturates is not recommended. Furthermore, the use of adrenalin to control the haemorrhage is also contraindicated [35, 37].

Another significant problem in dental surgery is the interaction between anti-psychotic drugs taken by the schizophrenic patients and the local anaesthetics, which are injected submucosally during dental or oral surgery. Approximately 21 percent of the schizophrenic patients, who are taking anti-psychotic drugs, have a series of side effects, such as extra-pyramidal symptoms, sedation, hypotension, and disturbances of the cardiovascular (e.g. tachycardia) and the autonomic nervous systems [27]. Due to anti-psychotic drugs, the heart rate of the schizophrenic patients will increase during the anaesthesia [26]. Schizophrenic patients who are on chlorpromazine therapy may develop hypotension immediately after the administration of the anaesthesia [25]. Instead, in schizophrenic patients, to negate the hypotensive side effect of anti-psychotic drugs, the use of vasopressors is recommended for the local anaesthesia [43]. It is also advisable to avoid the use of drugs with anti-cholinergic or anti-dopaminergic effects, as those might potentiate the hypotensive side effects of the anti-psychotic drugs. Consequently, anti-histamines and anti-emetics are frequently used in sedation and anaesthesia regimens. These two types of drugs can have both anti-cholinergic and/or anti-dopaminergic effect during local anaesthesia [5, 30].

Antipsychotic drugs may interact with epinephrine causing severe hypertension, while the use of atropine may result in an increased anticholinergic effect. Due to such interaction, during surgery on schizophrenic patients, the use of epinephrine and atropine must be limited [37]. Furthermore, some antibiotics may also interact with anti-psychotic drugs. For example, erythromycin, when interacting with clozapine, may increase the risk of convulsions [7].

In schizophrenic patients treated with antidepressant drugs, such as amitriptyline, clomipramine, imipramine, trimipramine, and lofepramine, the drug interaction with local and general anaesthesia and antidepressants can be seen in *Table 3* [7]:

Table 3

Drugs having anti-cholinergic and anti-dopaminergic actions [5]

	Relative Antagonist Activity		
Drug	*Cholinergic*	*Histaminic*	*Dopamine*
Scopolamine	+++	0	0
Diphenhydramine	++	++	0
Hydroxyzine	++	++	0
Promethazine	++	++	+
Prochlorperazine	+	+	++
Droperidol	0,+	0,+	+++

Other side effects of the anti-psychotic drugs in the oral cavity are summarised in the following table *(Table 4 and Table 5)* [35, 37]

Other effects of schizophrenia in dentistry

Orthodontics and schizophrenia

The incidence of schizophrenia increases during adolescence. Anti-psychotic drugs used to manage the symptoms may cause xerostomia, dystonia, and tardive dyskinesia. In orthodontics, these result in serious complications for the use of intraoral appliances [29]. Because of the soft tissue laceration, long term usage of these appliances is not recommended [29]. Schizophrenic patients tend to neglect their oral hygiene and the oral hygiene instructions, thus adversely affecting the fragility of the elastic orthodontic appliances they may wear [17, 18].

Table 4

Interaction between local and general anaesthesia and antidepressants [7]

Local anesthetic: sympathomimetics (eg adrenaline) → hypertension and arrhythmias. – not a contra-indication to adrenaline but dose reduction is advised.
General anesthetic → increased risk of cardiac arrhythmias and hypotension.

Table 5

Other side effects of the anti-psychotic drugs in the oral cavity [10]

Side effect:		Note:
Xerostomia	→	Increas susceptibility to candidiasis and dental caries
Oral pigmentation		–
Neck muscles rigidity or tonic spasm frequently	→	Dysphagia, difficulties in speech and swallowing
Tardive dyskinesia	→	Uncontrollable face, jaw and tongue movements

In addition, schizophrenic patients are not good candidates for the orthodontic treatment. In case of such treatment being unavoidable, patients taking anti-psychotic medication should also be surveilled by a psychiatrist [29].

Prosthodontics and schizophrenia

Dental prosthesis improves mastication ability, digestion, aesthetics, and overall quality of life of partially or completely edentulous patients. Poor oral hygiene in schizophrenic patients provides an additional risk factor for tooth loss, with susceptibility being 3.5 times greater than that of people without mental illnesses [41]. Subsequently, this means that such patients' requirements for prosthodontic treatments are 3.5 times higher than that of other people in the society.

Side effects of the anti-psychotic drugs, such as xerostomia and tardive dyskinesia of the jaw, lips, or tongue, may make the use of removable dentures (whether partial or total) impractical or impossible. For instance, due to unintended soft tissue lacerations and ulcers associated with orthodontic appliances, long term usage of these is also not recommended for schizophrenic patients [44].

Temporomandibular joint disorders (TMD) in schizophrenic patients

Other significant dental issues in schizophrenic patients are temporomandibular joint disorders and bruxism [21]. The symptoms of temporomandibular joint disorders include pain during palpation, limitation of maximum mouth opening, alteration of mouth opening pathway (deviation/deflection), and temporomandibular joint (TMJ) noises. Bruxism is presented with the non-physiological tooth-wear pattern [21]. The prevalence of the temporomandibular joint disorders in the society is between 5 to 15 percent, and for bruxism is about 20 percent [42]. About 40 percent of the schizophrenic patients are suffering from temporomandibular joint disorders, and upon mouth opening, have symptoms such as pain on palpation, deflection, and clicking TMJ sounds [21]. The reason for temporomandibular joint disorders in schizophrenic patients is mostly due to tardive dyskinesia [21]. Additionally, these patients may have masticatory muscle pain. In total, approximately 40 percent of schizophrenic patients have severe tooth wear and bruxism, which are due to stress [21].

In case of severe temporomandibular joints disorders, schizophrenic patients are required to wear an occlusal splint as a night guard; although, due to xerostomia, wearing such splints may be very uncomfortable. Further therapies may include physiotherapy, behavioural therapy, pain control medication for inflammation or muscle rigidity, and finally, surgery, as the last choice [1, 20].

Conclusion

Offer of the available dental treatment should be made to the schizophrenic patients based on the current state of the disease. As the disorder is chronic, an elective dental treatment has to be postponed until the patient's symptoms are under control or in a state of inactivity. Side effects of medications can be astringent, and a careful monitoring by a physician/psychiatrist is essential with any schizophrenic patient.

Appointment management and important recommendations for the dentists will be as follows:

1. Review full medical history (especially psychiatric history) and prescribed medications and consult with the psychiatrist if necessary.
2. For multiple appointments, it is recommended to use a familiar, organized routine.
3. Engender restful atmosphere and reduce possible stimulants (e.g. keep background music low).
4. Avoid unnecessary contact and refrain from arguing with or contradicting the patient.
5. Use simple and easy ways to propose oral hygiene instructions to the patient.
6. Listen carefully to the methods of oral hygiene described by the patient and modify them as necessary.
7. In case the patient cooperation is not satisfactory, consult with the psychiatrist.
8. Remaining signs of bad oral hygiene, could mean that the patient's oral hygiene needs to be adjusted.
9. Any dentist treating a schizophrenic patient should be familiar with the possible oral findings: xerostomia, dysphagia, masticatory spasm, recurrent oral candidiasis, and oral ulcers.
10. To avoid postural hypotension, advise the patient to

raise up slowly. In severe cases, monitor vital signs to check for possible tachycardia and palpitations.
11. For patients using medication which may cause tardive dyskinesia or those with TD symptoms, use the bite block.
12. Limit the use of local anaesthetics containing epinephrine.
13. Due to the anticholinergic effects of atropine, its use should be limited.

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Review

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Skizofrénia és szájhigiénia: irodalmi áttekintés

Az általános betegségek közvetlenül vagy közvetve befolyásolhatják a fogak egészségét és a páciens szájhigiénéjét. A fogorvosi rendelőben megjelenő betegek körében a pszichiátriai kórképek a leggyakoribb rendellenességek közé tartoznak. A fogászati kezelések során az érintetteknek speciális igényeik vannak. A skizofrénia egy olyan krónikus mentális betegség, amely a személyes érzelmek és érzések zavaraival jár, illetve mentális és bizonyos tudati funkciók romlásához vezet. A tünetek közé tartoznak a téveszmék, a hallucinációk, a rendezetlen gondolkodás és a következetlenség. Amennyiben hasadásos elmezavarban szenvedő páciens jelentkezik kezelésre a fogorvosi rendelőben, pszichiátriai konzultációt kell biztosítani. Az elektív fogászati beavatkozásokat el kell halasztani mindaddig, amíg a páciens tünetei kontroll alá kerülnek. A gyógyszerek mellékhatásai súlyosak lehetnek, ezért elengedhetetlen a beteg gondos és folyamatos ellenőrzése.

Kulcsszavak: skizofrénia, szájhigiénia, fogágybetegség, dohányzás, fogászati kezelés, pszichiátriai rendellenességek