The Impact of Pharmacologic and Prosthetic-aesthetic Treatment in Elderly with Temporomandibular Joint Disorders and Neuropsychiatric Affectation

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Abstract

The temporomandibular joint (TMJ) imbalances and dysfunctions can lead to a group of different affections named temporomandibular disorders (TMDs). Elderly with TMDs are experiencing severe phenomena due to instability centric relationship, craniomandibular malrelations, hypotonia, edentation and general chronic diseases. The aim of our study is to investigate the efficiency of the pharmacologic treatment followed by prosthetic-aesthetic and gnathological treatment in elderly patients. This prospective study is based on data obtained from 96 patients, aged 65-74, 67 female and 29 male. The data was analyzed by correlating the independent variables with the dependent ones and the prevalence of TMDs. Study results revealed a high prevalence of TMDs (27.35%). The prevalence of TMJ pain (81.25%) and depressive manifestations were high (47.92%). After the pharmacologic medication, in association with

prosthetic-aesthetic and gnathological treatment, the prevalence of depressive manifestations decreased (at 32.29%).

In conclusion, the pharmacologic medication followed by prosthetic-aesthetic and gnathological treatment determine improved outcomes in elderly patients with TMDs not only in terms of pain and neuropsychiatric manifestations, but also clinically, i.e., at TMJ function level and in all the facial and oral aspects.

Keywords: Dental Public Health; Temporomandibular Joint (TMJ), Temporomandibular Disorders (TMDs); Algodysfunctional Syndrome (ADS); Prosthetic-aesthetic and Gnathologic Treatment; Neuropsychiatric Affectation.

1. Introduction

Population ageing is an undeniable fact; by the year 2025, the world will host 1.2 billion people aged 60 and over and rising to 1.9 billion in 2050. In 2017, people aged over 65 was 19.4% of the European population. The increase of geriatric population and their specific pathology, most of the health problems of older age being the result of chronic diseases, explain the high consumption of health services and medicines registered worldwide in the last 10 years (World report on ageing and health, 2015).

For our country, the demographic data on 2017 showed that the share of persons aged 65 years and over was 17.8% of the Romanian total population ("Population statistics at regional level - Statistics Explained", 2019; Chisnoiu et. al., 2015).

The ageing of populations worldwide demands comprehensive public-health responses. So, by now, two international policy instruments have guided action on ageing: *"Political declaration and Madrid international plan of action on ageing"* (2002) and the "*World Health Organization's Active ageing: a policy framework*" (Geneva: World Health Organization, 2002).

Temporomandibular disorders (TMDs) has been described as a cluster of different diseases (such as arthritis of the TMJ, ankylosis of the TMJ, internal derangement of TMJ etc.), characterized by pain in the preauricular area, in the TMJ and face, masticatory muscles and other muscles of the head and neck, limitation or deviations in mandibular range of motion, and clicking of the TMJ during mandibular function. Elderly patients are experiencing more severe phenomena due to instability centric relationship, edentation, hypotonia and altered craniomandibular relationships, chronic diseases, neurologic and psychiatric affectations (Petersen & Yamamoto, 2005). Also, all the imbalances of TMJ can lead to algodysfunctional syndrome (ADS) (Plesh et. al., 2011). A person is considered to have a TMD only if pain or limitation of motion is enough severe to make them seek professional care ("Overview of Temporomandibular Disorders - Dental Disorders - MSD Manual Professional Edition", 2019; Petersen et. al., 2013).

2. Aim and Objective

Nowadays, the scientific interest for TMDs in the elderly is high and this pathology is considered a priority public health issue that requires special attention from dental medicine professionals.

The purpose of our study is to investigate the impact of the TMDs pharmacologic treatment, prosthetic-aesthetical, gnathological treatment and the neuropsychiatric affectations in elderly patients, outlining as first objective the evaluation of treatment effectiveness. One of the TMDs that we will take into consideration in the study is the TMJ arthrosis, which is, in fact, one of the frequent pathologies at this level in elderly patients.

3. Material and Method

This is a prospective study based on data obtained between January 4, 2016 and October 30, 2018 from 358 elderly persons, aged 65-74, from Iasi County and Galati County. Because we lost 7 patients from the study, for domicile changing reasons (4 persons) or death (3 persons), the

response rate was 96.93%. The study involved 351 elderly persons, 114 men and 237 women; 103 of them were aged 65-74. In our final study group 96 elderly patients remained (mean age: 69.27 ± 5.73 years), diagnosed with TMDs: 67 female and 29 male gender.

Data concerning general, oral and mental health were retrieved from elderly patients with painful TMDs according to the research diagnostic criteria ("Overview of Temporomandibular Disorders - Dental Disorders - MSD Manual Professional Edition", 2019; Schiffman et. al., 2014).

The inclusion criteria in our study were: agreement to participate in the study; age 65-74; definite diagnosis of TMDs. Also, in the last 90 days, all patients had to have experienced: pain in the temporomandibular region (or chronic pain at the level of stomatognatic system and cephalic extremity); presence of muscular tonus and muscular contraction alterations or muscular dysfunction (such, limitation of mouth opening, and deviation of mandible from the medial line during the opening, fatigue of cephalic extremity muscles and functional alteration of stomatognatic system).

From the study the following categories *were excluded*: uncooperative elderly persons or those who did not respect the prescribed treatment; patients who refused to participate; mental diseases with MMS less than 19; alcohol addicts (Fillingim et. al., 2013). Also excluded were the elderly with TMJ affliction, trauma, rheumatoid arthritis or neoplasm and with all the other conditions that mimic the TMDs ("Overview of Temporomandibular Disorders - Dental Disorders - MSD Manual Professional Edition", 2019).

Study protocol

We started the study (step 1) with the questionnaires (Gonzalez et. al., 2011): a) “TMJ pain screener” for TMJ pain in the mandible or in the muscles, in the previous 90 days; b) “Symptoms of TMDs questionnaire” for subjective symptoms; c) “Geriatric Depression Scale” (GDS) and distress inventory for mental health and neuropsychiatric affectation (Kroenke, Spitzer, Williams & Löwe, 2009).

We mention that the diagnosis of mental health affections in the elderly remains a problem because the symptoms are often masked or negated by the patient or their family, are frequent somatization of the diseases or cognitive disorder as its main manifestation (Diagnostic and statistical manual of mental disorders, 2013).

The pain is the most common TMDs symptom ("The National Institutes of Health (NIH) Consensus Development Program: Management of Temporomandibular Disorders", 2019). In elderly patients, the pain is disabling and can impair cognitive functions, disrupt the sleep cycle, lead to a decrease in activities of daily living and stop elderly people to participate in social activities. Nowadays, it is recognized that chronic pain is influenced by a dynamic interaction between physical, psychological and social factors.

Step 2 of our study was the TMJ objective examination for clinical signs and a muscular examination; TMDs diagnosis was based on a standard clinical examination and paraclinical exams, such as TMJ tomography.

The objective examination of the TMJ has been realized by inspection, palpation and auscultation. Pretragienical areas are statically and dynamically examined, both of the TMJs, firstly separate and then simultaneously for comparison. Any static or dynamic deformation of the unilateral or bilateral pretragienical area has been registered both in mandibular rest or in occlusion and movement. During the TMJ examination, the patient was ordered to execute closing/opening movements, aperture movements, laterality, protrusion, with a frequency that shall not be tiring and which permits careful observation. The presence of clicks in the TMJ during opening/closing of the mouth has been monitored. The examination of the muscles in dynamic aims to detect the pain provoked by contraction and symmetric, equal participation in the realization of the mandibular dynamic movement. The examination of the muscles in order to determine the painful points and the irradiation areas is made by inspection and palpation; any painful areas, trigger areas with determinations at distance, as they are noted in the observation paper, circumscribing the painful area at direct palpation, trigger area, irradiation area.

Step 3 of our study included: a) administering anti-inflammatory medication to control the TMDs symptoms; b) prosthetic-aesthetic and gnatological treatment.

Prior to prescribing the medication, we considered the following: the existence in patients' history of any allergic reactions or adverse drug reactions; indications, contraindications, interactions and dosage of prescribed drugs; medication tolerance and evolution of the symptoms under treatment were monitored.

Nonsteroidal anti-inflammatory drugs (NSAIDs) have been most commonly prescribed for pain in the orofacial region; NSAIDs were indicated for mild to moderate acute inflammatory conditions in the TMJ and are generally beneficial for patients with inflammatory TMDs resulting from disc displacement without reduction (Ouanounou et. al., 2017). In our study, we administered anti-inflammatory medicine frequently used in TMJ medication (as ibuprofen 800-1200 mg/day), for a period of 10- to maximum 14 days. For all elderly patients the lowest effective dose was used to control TMDs symptoms for the shortest treatment duration.

Variables

As *independent variables*, demographic factors such as age, gender (male/female) and social environment (rural area/urban area) were taken into account. As *dependent variables*, we considered: general health indicators (pain), mental health indicators (depression, distress), symptoms of TMDs, results of objective TMJ examination for clinical signs or muscular examination and the use of dental prosthesis.

The *statistical analysis* was performed with the SPSS 20.0 software package for Windows (SPSS software, 2012). The obtained data allowed for the classification of patients with respect to gender distribution, age group distribution, clinical aspects, type of TMDs treatment instituted, appreciation of chronic pain and mental health indicators.

To assess the significance of the identified differences we performed the Chi-squared test (Pearson χ^2); p values ≤ 0.05 were considered to be statistically significant. Especially, the Chi-square test was used to evaluate the prevalence of TMDs with gender and its association with mental health indicators (prevalence of distress and depression). The patients were informed about the study and the content of the questionnaire and appropriate consent was taken from all subjects.

4. Results and Discussions

General characteristics of the studied group

96 elderly patients were included in the study: 67 (69.79%) female and 29 (30.21%) male gender (Figure 1), the gender ratio being F/M=67/29= 2.31/1.

Elderly patients are divided depending on the social environment: 55 (57.29%) patients from rural and 41 (42.71%) patients from urban areas (Figure 2).

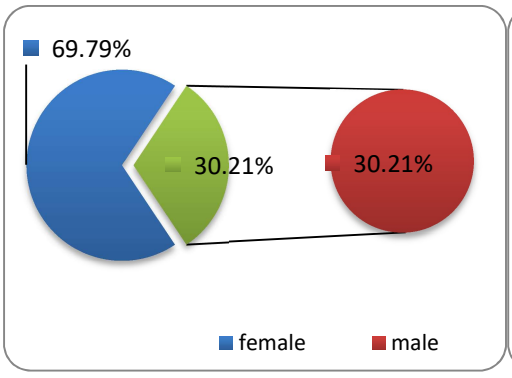

Figure 1. Gender distribution

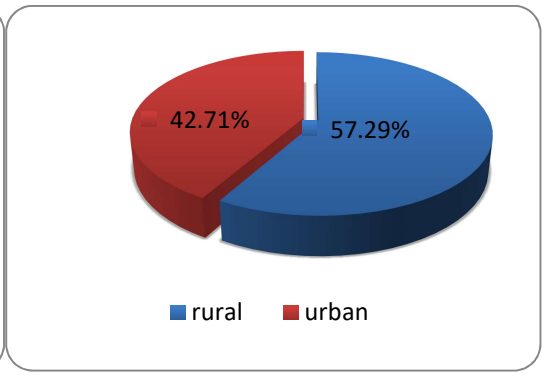

Figure 2. Social environment distribution

Also, the elderly patients were classified on age groups: 43 (44.79%) were aged 65-69 and 56 (58.33%) were aged 70-74 (table 1).

Table 1. General characteristics of the studied group

Age:	**65-74 years**						Pearson's χ^2			
Gender:	**Male**		**Female**		**Total**					
	n_1	(%)	n_2	(%)	N	(%)	χ^2_c	Degrees of freedom (DF)	*p* value	Statistical Significance
Variables:	29	30.21	67	69.79	96	100.00				
Social environment:	11	26.83	30	73.17	41	42.71	0.388	1	0.533355256	NS
-urban;	18	32.73	37	67.27	55	57.27				
-rural.										
Age groups:										
-65-69 years;	12	27.91	31	72.09	43	44.79	0.07	1	0.79133678	NS
-70-74 years.	17	30.36	39	69.64	56	58.33				

The prevalence of TMDs symptoms before treatment is presented in table 2.

At the beginning of our study, the calculated prevalence of TMDs in elderly patients was 27.35%: 25.44% in men and 28.27% in women.

The unitary holistic vision supports the dishomeostatic theory in the generation of TMDs and the idea of the conjugate action of trigger factors (Dascalu, Antohe, Golovcencu & Zegan, 2017; Trandafir et. al., 2018).

TMDs severity

After treatment, the severity of TMDs decreased (with 8.33%) both in male (with 13.79%) and female (with 5.97%) patients.

The self-reported pain disclosed TMJ chronic problems. After treatment, The following could be noted: a decrease of moderate pain prevalence (with 6.21%) and a growth of pain free prevalence (with 3.13%). Nevertheless, these changes are statistically insignificant (χ^2_c=1.281, DF=3, p=0.73364968).

Table 2. Reported TMDs symptoms before treatment

Age:	65-74 years						Pearson's χ^2_c			
Gender:	Male		Female		Total					
Variables:	n_1	(%)	n_2	(%)	N	(%)	χ^2_c	Degrees of freedom (DF)	*p* value	Statistical Significance
TMDs prevalence	29	25.44	67	28.27	96	27.35	0.311	1	0.57706719	NS
TMDs severity:	11	37.93	24	35.82	35	36.46				
-mild;	15	51.72	37	55.22	52	54.17	0.112	2	0.9455391	NS
-moderate;	3	10.35	6	8.96	9	9.37				
-severe.										
Pain in the last 90 days:	2	6.90	5	7.46	7	7.29	0.075	4	0.99931421	NS
-pain free;	9	31.03	20	29.85	29	30.21				
-mild;	15	51.72	36	53.73	51	53.13				
-moderate;	2	6.90	4	5.97	6	6.25				

-severe; -non-response.	1	3.45	2	2.99	3	3.13				
Pain detected at palpation by examiner: -no; -yes.	7 22	24.14 75.86	11 56	16.42 83.58	18 78	18.75 81.25	0.792	1	0.37349605	NS
Headache attributed to TMDs	14	48.28	35	52.24	49	51.04	0.127	1	0.72156305	NS
Depression: -mild depressive mood; -medium -depressive mood.	17 8 9	58.62 27.59 31.03	29 26 7	43.28 38.81 10.45	46 34 16	47.92 35.42 16.67	1.908	1	0.16718559	NS
Distress prevalence	6	20.69	17	25.37	23	23.96	0.244	1	0.62133191	NS
Dental prosthesis use	14	48.28	41	61.19	55	57.29	1.38	1	0.24010115	NS

The prevalence of TMDs symptoms after treatment is presented in table 3.

Table 3. Reported symptoms of TMDs after treatment

Age:	65-74 years						Pearson's χ^2_c			
Gender:	Male		Female		Total					
Variables:	n_1	(%)	n_2	(%)	N	(%)	χ^2_c	Degrees of freedom (DF)	*p* value	Statistical Significance
TMDs severity: -mild; -moderate; -severe.	15 12 2	51.72 41.38 6.90	28 35 4	41.79 52.24 5.97	43 47 6	44.79 48.96 6.25	0.991	2	0.6092662	NS
Self reported chronic pain: -pain free; -mild; -moderate; -severe.	3 12 12 2	10.34 41.38 41.38 6.90	7 24 34 2	10.45 35.82 50.75 2.99	10 36 46 4	10.42 37.50 47.92 4.17	1.281	3	0.73364968	NS
Pain detected at palpation by examiner: -pain free; -yes.	9 20	31.03 68.97	16 51	23.88 76.12	25 71	26.04 73.96	0.538	1	0.43626278	NS
Headache attributed to TMDs	11	37.93	23	34.33	34	35.42	0.115	1	0.73452197	NS
Depression:	10	34.48	21	31.34	31	32.29	0.091	1	0.76290969	NS

-mild depressive mood; -medium depressive mood.	7 3	24.14 10.34	14 7	20.90 10.45	21 10	21.88 10.42				
Distress prevalence	3	10.34	11	16.42	14	14.58	0.599	1	0.43895983	NS
Dental aesthetic-prosthetic treatment	28	96.55	63	94.03	91	94.79	**14.972**	1	**0.00010912**	**SS**

After treatment, the prevalence of *pain detected at palpation by examiner* decreased (by 7.29%) in elderly patients, both in males (by 6.89%) and females (by 7.46%), but these changes are also statistically insignificant (χ^2_c=0.538, DF=1, p=0.43626278).

The prevalence of *headache attributed to TMJ disorders* decreased (by 15.62%) in elderly patients. After treatment, in male gender subjects, a decrease of headache prevalence attributed to TMDs (with 10.35%) can be noted; similarly to female gender subjects, a decrease (by 17.91%) of the TMDs headache prevalence attributable to the treatment, statistically significant (χ^2_c=4.377, DF=1, p=0.3642706) was observed.

Neuropsychiatric affectation

Elderly patients with persistent TMDs problems may suffer psychologically and socially. Failed treatments and recurrent pain contribute to distress (23.96%) and depression (Figure 3).

At the beginning of our study, the prevalence of depressive manifestations was high (47.92%); after pharmacological followed by prosthetic-aesthetical treatment, prevalence decreased (at 32.29%), which is statistically significant (χ^2_c=4.879, DF=1, p=0.02718536).

Therapeutic effectiveness

The effects of the NSAIDs were preserved throughout the time of administration; it can also be mentioned that improved outcomes were not observed only in terms of pain but also in terms of the clinical function of the TMJ.

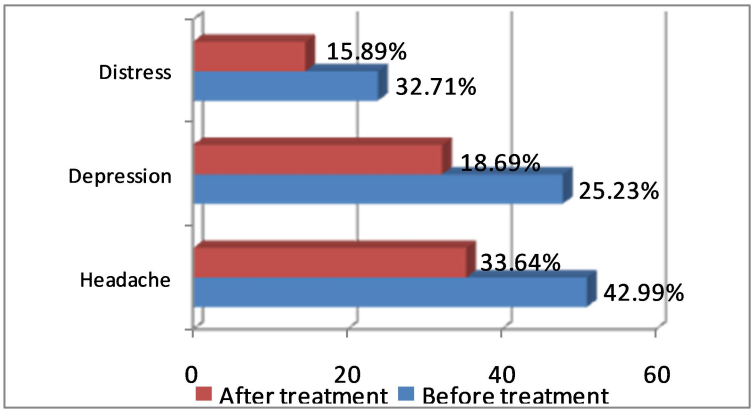

Figure 3. Prevalence of neuropsychiatric affectation in elderly patients with TMDs before and after treatment

Another important parameter that we took into consideration was *the side effects of the* NSAIDs treatment. In our study there were no usual side effects during the administration of any of the used drugs, if the basic rules are observed.

Elderly patients have been applied, simultaneously, different fix prosthetic treatments (Condratovici et. al., 2018; Oancea et. al., 2018), as follows: in 67 cases (69.79%) acrylic prostheses were applied and in the rest, both fixed and mobile, in 2 cases (2.08%) the method of relaxation mouth guards being used; only 5 elderly patients (5.21%) rejected the prosthetic treatment (Figure 4).

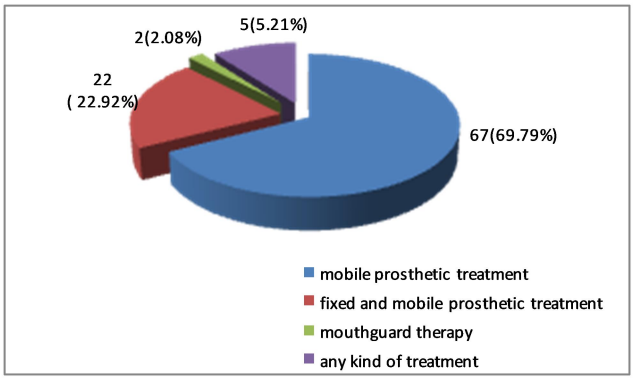

Figure 4. Prosthetic-aesthetic and gnathological treatment in elderly patients

At the facial level, the appearance of the teeth and oral cavity as a whole is of particular importance, and by its morphology and complexity of functions, its physical and psychological significance is the dominant facial element. Psychiatric disorders are secondary to body shape changes (facial features, facet level, golden proportions and intraoral signs) due to the projection of one's own body morphology, which determines the degree of comfort of the individual in the report with the normal body composition. Intraoral signs of edentation no longer correspond to the normal facial image created; inducing confusion can cause psychological imbalance or depression.

In conclusion, pharmacologic medication followed by prosthetic-aesthetic and gnathological treatments determine improved health outcomes in elderly patients with TMDs, not only in terms of TMJ pain and neuropsychiatric manifestations (depression and distress), but also clinically, i.e., at TMJ function level and in all the facial and oral aspects.

Contribution of the authors: all authors have equal contribution.
Conflict of interest: nothing to declare.

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