

# fizjoterapia polska

POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 2/2015 (15) KWARTALNIK ISSN 1642-0136

## Zaburzenia narządu ruchu u kobiet w zespole Turnera

## Musculoskeletal disturbances in women with Turner's syndrome

**Analiza  
potencjalnych  
czynn timerów  
ryzyka syndromu  
wypalenia  
zawodowego  
u fizjoterapeutów**

**The analysis of potential  
risks factors for professional burnout syndrome in physiotherapists**



**ZAMÓW PRENUMERATE!**

**SUBSCRIBE!**

[www.redakcja-fp.pl](http://www.redakcja-fp.pl)

[prenumerata@redakcja-fp.pl](mailto:prenumerata@redakcja-fp.pl)



# Zastosowanie terapii manualnej w likwidacji bólu pochodzenia miogennego w zaburzeniach układu stomatognatycznego

*Application of manual therapy in the elimination of myogenic pain in stomatognathic system disorders*

Magdalena Gębska<sup>1(A,B,C,D,E,F)</sup>, Danuta Lietz-Kijak<sup>2(D,E,F)</sup>, Krystyna Opalko<sup>2(A,D,E)</sup>,  
Ewelina Żyżniewska-Banaszak<sup>1(E,F)</sup>, Zbigniew Śliwiński<sup>3(D,E,F,G)</sup>, Marek Kiljański<sup>3,4 (D,E)</sup>

<sup>1</sup>Samodzielna Pracownia Fizjoterapii i Odnowy Biologicznej Pomorskiego Uniwersytetu Medycznego w Szczecinie, Polska/  
Independent Laboratory of Physiotherapy and Biological Renewal at the Pomeranian Medical University in Szczecin, Poland

<sup>2</sup>Katedra i Zakład Propedeutyki i Fizykodiagnostyki Stomatologicznej Pomorskiego Uniwersytetu Medycznego w Szczecinie, Polska/  
Department of Dental Physicodiagnosics and Propedeutics, Pomeranian Medical University, Szczecin, Poland

<sup>3</sup>Instytut Fizjoterapii, Uniwersytet Jana Kochanowskiego w Kielcach, Polska/Institute of Physiotherapy, Jan Kochanowski University, Kielce, Poland

<sup>4</sup>Wyższa Szkoła Informatyki i Umiejętności w Łodzi, Polska / University of Computer Science and Skills, Lodz, Poland

## Streszczenie:

**Wprowadzenie.** W ciągu ostatnich kilku lat nastąpił znaczny rozwój metod fizjoterapii wykorzystywanych w dziedzinie stomatologii. Wśród nich znajduje się terapia manualna, jako forma leczenia zaburzeń czynnościowych układu stomatognatycznego pochodzenia miogennego. Metoda ta jest jeszcze mało popularna wśród lekarzy stomatologów. Wynika to z faktu niewielkiej liczby literatury, a także małej ilości fizjoterapeutów zajmujących się terapią manualną w celu likwidacji objawu bólowego.

**Cel pracy.** określono efekt relaksacyjny oraz analgetyczny mięśni żwaczy pod wpływem zastosowanej terapii manualnej.

**Materiał i metoda.** badania wykonano u 20 osób płci żeńskiej, w wieku od 30 do 38 lat (średnia 34 lata) z rozpoznaniem bólowej postaci zaburzeń układu stomatognatycznego.

U pacjentek przeprowadzono kliniczne badanie podmiotowe oraz przedmiotowe, badanie elektromiograficzne mięśni żwaczy oraz ocenę bólu przy użyciu skali VAS. Następnie badaną grupę poddano zabiegom terapii manualnej.

**Wyniki.** po zakończeniu terapii i analizie wyników zaobserwowano spadek wartości potencjałów elektrycznych badanych mięśni i spadek wartości natężenia bólu w skali VAS.

## Słowa kluczowe:

układ stomatognatyczny, terapia manualna, elektromiografia, ból, skala VAS

## Abstract

**Introduction.** In last years there has been considerable development of physiotherapy methods used in dentistry. Among them is the manual therapy as a form of treatment of functional disorders of the stomatognathic system muscular origin. This method is still very popular among dentists. This is because a small number of literature, and a small amount of physiotherapists involved in manual therapy in order to eliminate the symptom of pain.

**Aim of the study.** determined the effect of relaxing and analgesic masseter muscles under the influence of the use of manual therapy.

**Material and methods.** study was performed in 20 females, aged from 30 to 38 pain diagnosed as a disorder of the stomatognathic system. In patients conducted physical examination and clinical examination, electromyographic study of masseter muscles and pain assessment using the VAS scale. Then, the test group received manual therapy treatments.

**Results.** After completion of therapy and analysis of the results showed a decrease in the electrical potentials studied muscle and decrease of the VAS scale

## Key words:

stomatognathic system, manual therapy, electromyography, pain, VAS scale

## Introduction

Functional disorders of the stomatognathic system constitute one of the most significant health problems in patients. They may relate to all elements of the stomatognathic system: skeletal components (maxilla and mandible), dental arches, temporomandibular joint and surrounding soft tissues [1]. Numerous data indicate that the frequent cause of this phenomenon are parafunctions and stressors that accompany a man every day and contribute to the formation of changes in the functioning of the osteoarticular and muscular system [2,3,4]. This leads to recurring pain not only within the scope of the masticatory apparatus, but also the head and cervical spine. It interferes with activities in many spheres leading to the deterioration of the quality of life [5,6].

Functional disorders of the masticatory system frequently cause diagnostic and therapeutic difficulties for specialists in dentistry and physiotherapy. There is a lack of cooperation and rules of conduct allowing to obtain satisfactory therapy results [7]. According to the literature, there is a need to consider use of manual therapy during the rehabilitation process. It results from the fact that restoring normal functioning of the stomatognathic system requires both improved mobility and normalization of tissue tension [8,9].

All manual treatments used in the diagnosis and treatment of disorders within the joints of the locomotor system and soft tissues may be adapted to the diagnostic-therapeutic process of the SS dysfunctions [10].

In dentistry, the following techniques can be applied:

1. Joint mobilization – moving the articular surfaces by means of a glide (e.g. ventral and dorsal), without exceeding the physiological range of motion.
2. Soft tissue mobilization – when performing differential tests it is stated that mobility is limited due to tight or shortened periarticular soft tissues (and not because of the contracted joint capsule), then depending on the needs, the mobilization is performed, i.e.:
  - a. Functional massage – it is a massage of a muscle and other surrounding soft tissues in combination with the movement in the joint. It is used for both muscle and joint dysfunctions. The muscle along with the surrounding tissues is rubbed and stretched. The massage reduces the tenderness of soft tissues and improves their mobility.
  - b. Transverse friction massage - it is rubbing across the fibers of the sore tendon, muscle belly or muscle attachment to the bone, ligament etc.
  - c. Post-isometric relaxation (PIR) – relates to relaxing (active loosening) sore muscles that were previously kept in isometric tension. For the sake of relaxation, one can use breathing movements as well as head and eye movements. Trigger points appear in muscles exposed to long-term overuse, often due to stress, fatigue, bruxism, injuries and microtraumas (parafunctions).
3. Neuromobilization – mobilizations aimed at restoring the proper neural mobility. The main aim of this procedure is to

normalize the disrupted excitability and intensity of neural processes, and in this way to obtain a more complete information transfer in the body and improvement of the recovery process. Frequently, it enables almost instant improvement of functions and elimination of soreness as well as quicker regeneration of sore tissues in those situations where the pathology originates from dysfunction.

In patients with SS dysfunctions, the therapy within cranial nerves is applied.

Manual therapy performed by a physiotherapist within the stomatognathic system starts with the biomechanical and functional assessment of a patient. Since the dysfunctions of the masticatory system might affect numerous tissues at the same time, it is advised to carry out a detailed analysis of the patient's ailments in order to be able to distinguish between joint-, nerve- and muscle-derived pain. For this purpose, precise manual tests of the stomatognathic system and cervical spine are carried out [11].

Correct execution of manual therapy depends on, among other things, the experience and knowledge of the therapist. Popular methods of manual therapy include Kaltenborn-Evjenth Orthopedic Manual Therapy (OMT), Cyriax method, Ackermann method and Mulligan method.

Effectiveness in the elimination of pain symptoms or increased muscle tone of the stomatognathic system largely depends on the correct diagnostics [12,13].

Global electromyography – sEMG (surface electromyography) is applied to commonly practiced muscle function tests. It is an objective functional examination of the muscle tension which allows to specify numeric values of electric potentials and their graphic representation. Global electromyography is used successfully in numerous fields of medicine. Its main use is to identify muscle disorders and assess both dynamics of the disease process and treatment results [14,15].

#### **Aim of the thesis**

The aims of the thesis are:

1. determining the impact of manual therapy on the change in bioelectric activity of the masseter muscle,
2. the assessment of applied manual therapy for sensing ailments in the stomatognathic system.

#### **Material and method**

The research included a group of 20 female patients aged between 30 and 38 (mean 34) with a diagnosed disorder in the stomatognathic system where the main symptoms were muscle stiffness and pain of varying intensity. Reported muscular pain occurred both at rest and during effort within the facial part of the skull. All patients have been informed about the purpose of the study and gave written consent to participate in the tests. People with neurologic diseases, toothless and treated by means of splint therapy were excluded from the research. All patients underwent pain assessment prior to the start of the treatment and after the 10th

treatment using 'Visual Analog Scale (VAS)' in which a given stimulus is evaluated according to a 0-10 point scale (where '0' corresponds to the lack of stimulus and '10' is the strongest represented stimulus). Surface electromyography was also performed in all patients before the therapy and after the 10th treatment.

Final stage of the diagnostic test was the electromyographic investigation of masseter muscles. Surface electromyography (sEMG) registrations from masseter muscles were performed using Zebris JMA apparatus. SEMG screening of the masseter muscle on its right and left side was done at rest (subject was instructed to loosen the masseter muscles). The tests carried out before and after the treatment were performed by the same person under the same conditions and using the same apparatus.

All patients included in the study were in possession of valid lateral TMJ X-rays with both clenched and open dental arches, documenting the initial condition of the patient reporting to the Department of Dental Propedeutics and Physiodiagnostics. Patients qualified for treatment underwent ten-day manual therapy. Manual therapy treatments were carried out by a physiotherapist holding certificates entitling him to conduct a therapy of temporomandibular disorders. Each patient underwent the following treatments within the facial part of the skull: elimination of active trigger points within soft tissues, mobilization of soft tissues within the masseter muscle in its superficial (extraoral) and dense (intraoral) sections and mobilization of the temporomandibular joint (in the direction contrary to the pain) (Fig. 1). Each time the patient's therapy lasted 30 minutes.

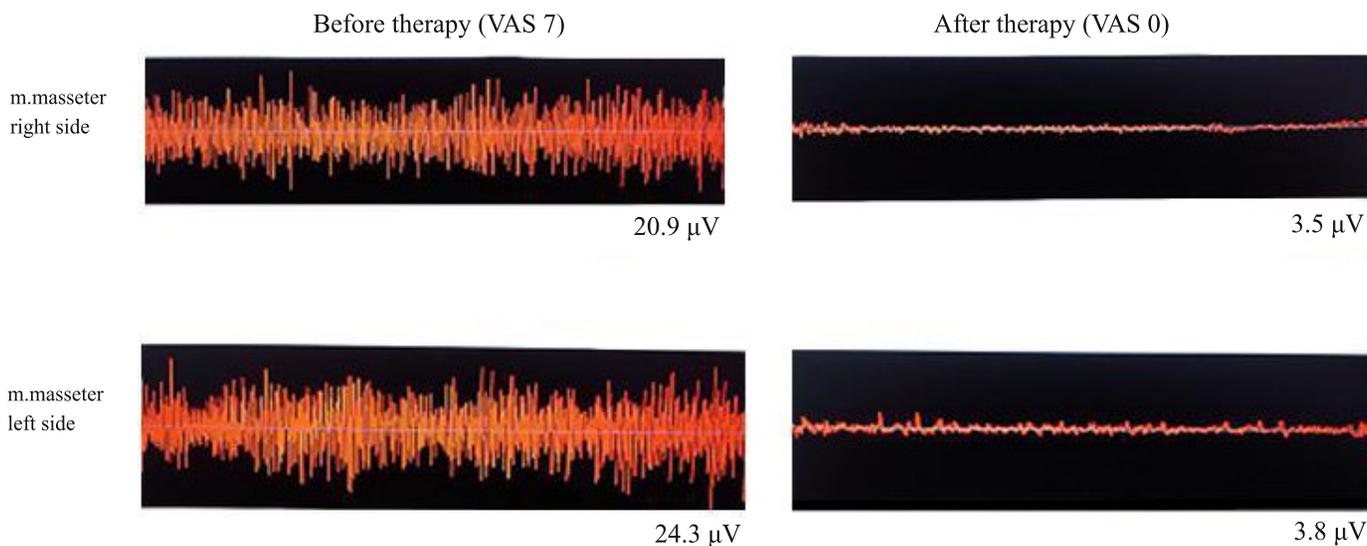


**Fig. 1. Element of the manual therapy (transverse massage of the masseter muscle on the left and right side of the face)**

The sEMG values for masseter muscles were subjected to statistical analysis using a computer application StatSoft Polska – Statistica 2010. The data obtained from all examined muscles showed the distribution to be consistent with the normal distribution. The significance level was assumed to be equal to 0.05.

**Results and their interpretation**

The mean values of electrical potentials before starting the treatment in the form of a manual therapy were as follows: 23,18  $\mu\text{V}$  for the right and 23,00  $\mu\text{V}$  for the left side of the masseter muscle (Fig. 2).



**Fig. 2. Electromyographic record before and after 10-day therapy of one of the patient**

In the final examination performed after a series of 10 treatments, the mean values of potentials for both right and left side of the masseter muscle have decreased significantly. The mean amplitude value for the right side of the masseter muscle was 4,13  $\mu\text{V}$ , and 4,02  $\mu\text{V}$  for the left side (Fig. 2). After 10 manual therapy treatments, 17 patients reported pain relief and another 3 observed a significant reduction in the pain intensity within the stomatognathic system (Fig. 3). The difference between the average value of the masseter muscle amplitude after 10 manual therapy treatments was 19,04  $\mu\text{V}$  on the right and 18,98  $\mu\text{V}$  on the left side. After performed treatments no statistically significant changes in masseter muscle bioelectrical activity have been observed. A significant decrease in perceived pain has been noticed among all patients treated with manual therapy. 17 of them showed complete relief of pain which accounts for 70% of patients (Fig. 4).

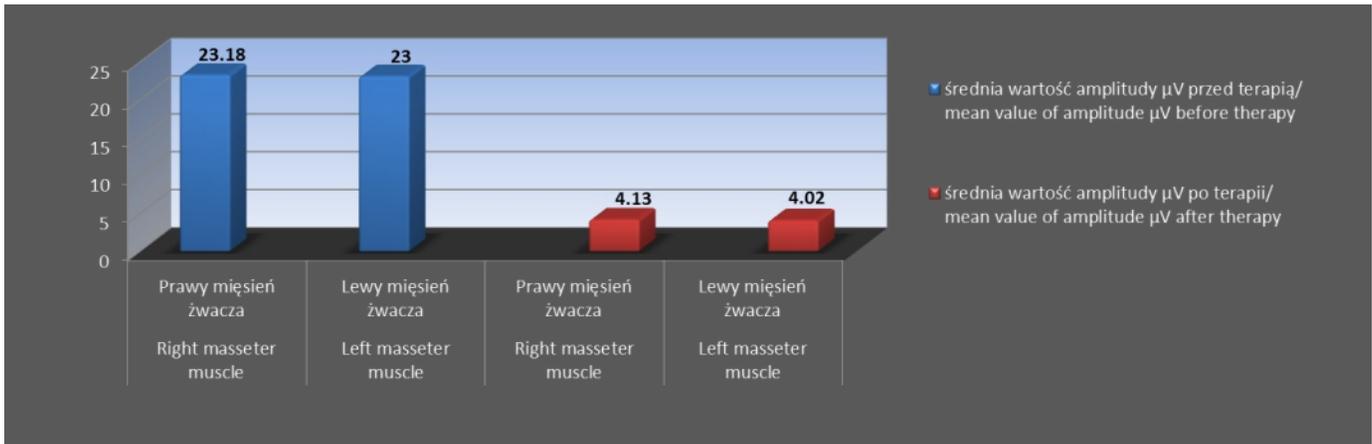


Fig. 3. Mean values of electric potentials ( $\mu V$ ) of the masseter muscle before and after manual therapy

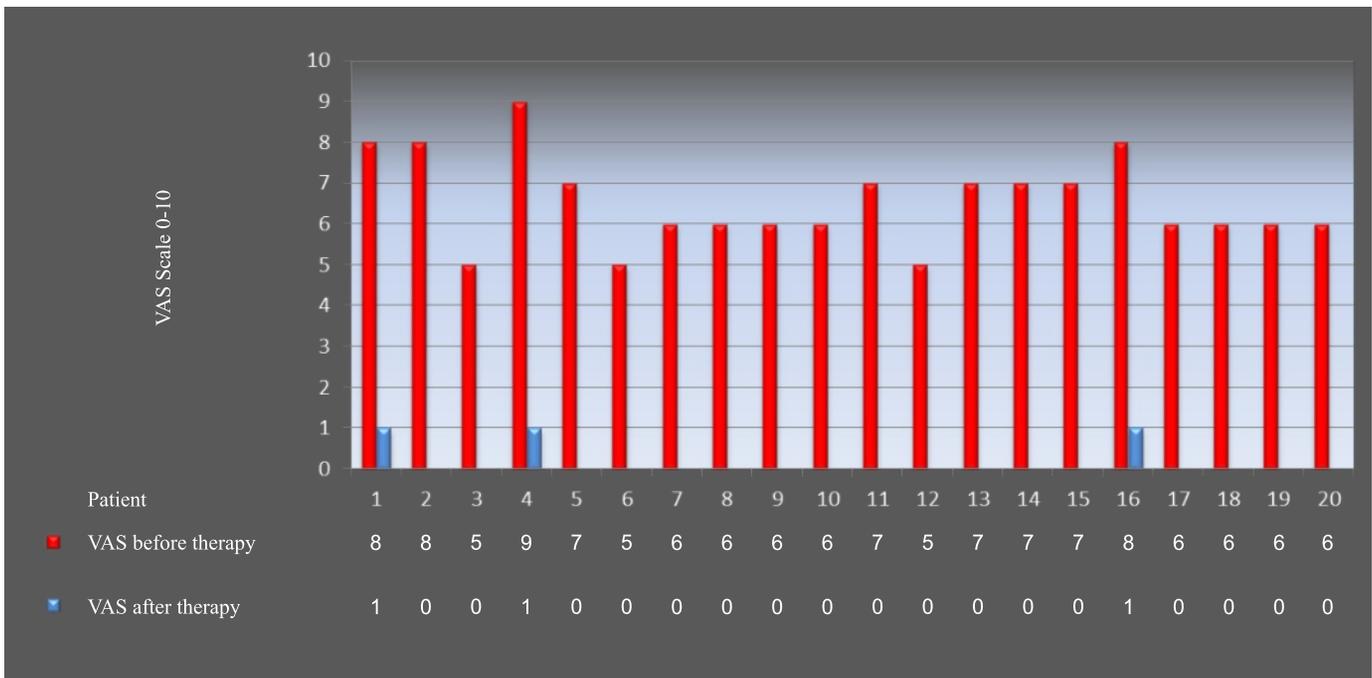


Fig. 4. Evaluation of pain intensity in the VAS scale in a group of 20 patients before and after application of manual therapy

Table 1 presents the statistical results.

There has been observed a significant decrease in the amplitude value of the right and left masseter muscles which demonstrates the effectiveness of the therapy in terms of treating painful forms of the stomatognathic system disorders. The analysis of the obtained statistical results indicates that the applied manual therapy of the stomatognathic system has proven to be an effective way to combat pain and increased muscle tone within the temporomandibular joints. Unfortunately, for the time being, this form of cooperation is not properly used in dentistry. On the one hand, this is due to the lack of qualified physiotherapists, and, on the other hand, due to the lack of information concerning this type of treatment methods among dental surgeons.

**Tab. 1. Analiza statystyczna wartości SEMG mięśni żwaczy przed i po terapii**  
**Table 1. Statistical analysis of masseter muscle SEMG values before and after therapy**

Characteristic of distribution	sEMG of the masseter muscle (n=20)			
	Right part of the face		Left part of the face	
	Before therapy	After therapy	Before therapy	After therapy
min - max	19.60 - 27.70	3.40 - 4.70	19.20 - 27.30	3.00 - 4.60
- m <sub>e</sub>	22.30	22.85	4.30	4.00
x (SD)	23.18 (2.90)	23.00 (2.47)	4.13 (0.44)	4.02 (0.39)

Legend: n – group size, min – minimum value, max – maximum value; x – arithmetic mean, SD – standard deviation

A manual therapy in patients with stomatognathic system disorders has been successfully carried out for 4 years in the Department of Dental Propedeutics and Physiognathics of Pomeranian Medical University in Szczecin. The physiotherapist in collaboration with doctors of dentistry (of various specializations) performs an examination, and then carries out an individually designed therapy addressing particular requirements of the patient. Thanks to the interdisciplinary approach, patients with stomatognathic system disorders receive diagnostics and modern treatment. Indications for treatment using manual therapy at the dentist's surgery include bruxism, micro- and macrotraumas, condition after surgical operations in the head, scars within the head and neck, headaches, muscle hypertrophies, pain within the facial part of the skull, TMJ dysfunctions, partial trismus, cranial nerve palsies, e.g. VII, III.

Before starting manual therapy treatments within the patient's facial part of cranium, it is very important to perform a few examinations. The first of them, the dental examination, aims at excluding odontogenic origin of ailments. The second of them, the special diagnostics of the stomatognathic system, includes pantomographic examinations, tomographic examination, cone-beam computed tomography (CBCT), currently considered as the most valuable imaging examination, as well as diagnostic testing using selected physiotherapy apparatus [15].

Obtained results encourage to continue ongoing research on the effectiveness of applied manual treatments in patients and to promote the idea of cooperation between physiotherapists and dental surgeons in the treatment of stomatognathic system dysfunctions.

### Conclusions

1. A total of 10 manual treatments in patients with stomatognathic system disorders eliminated pain symptoms in 70% of subjects, and significantly reduced the intensity of pain in another 30% of subjects.
2. Manual therapy leads to significant changes in the electrical activity of the masseter muscle in patients with stomatognathic system dysfunctions.

corresponding author



### Magdalena Gębska

Samodzielna Pracownia Fizjoterapii i Odnowy Biologicznej  
PUM, ul. Żołnierska 48, 71-210 Szczecin.  
tel: +48 604-869-571  
e-mail: mgebska@pum.edu.pl

### References

1. Jancelewicz M.: Dysfunkcje układu stomatognatycznego narastającym problemem współczesnej opieki zdrowotnej – przyczyny wzrostu występowania tej dysfunkcji, Hygeia Public Health 2010, 45,1,s. 17-20.
2. McNeely M.L., Armijo Olivo S., Magee D. J.: Therapy interventions for temporomandibular disorders. Phys. Ther. 2006, 86, s.710- 725.
3. LeResche L., Truelove E.L., Dworkin S.F.: Temporomandibular disorders: a survey of dentists' knowledge and beliefs. J Am Dent Assoc 1993; 124: s.90-106.
4. John M.T., Reißmann D. R., Schierz O., Wassell R.W.: Oral Health–Related Quality of Life in Patients with Temporomandibular Disorders, J Orofac Pain; 21, 1, 2007, s.45-54.
5. Panek H., Śpikowska-Szostak J.: Wpływ stresu i cech osobowości na dysfunkcje skroniowo-zuchwowe i bruksizm na podstawie piśmiennictwa i badań własnych, Dent. Med. Probl. 2009, 46, 1, s. 11–16.
6. Cuccia A.M., Caradonna C., Annunziata V., Caradonna D.: Osteopathic manual therapy versus conventional conservative therapy in the treatment of temporomandibular disorders: A randomized controlled trial. Journal of Bodywork & Movement Therapies 2010, 14, s.179- 184.
7. Prośba-Mackiewicz M., Hebel-Różańska J.: Postępowanie wstępne w leczeniu Pacjentów z zaburzeniami czynnościowymi układu stomatognatycznego, Ann. Acad. Med. Gedan., 2007, 37, s. 95–101.
8. Büttner P., Czarna B., Shaw H.: Zastosowanie terapii manualnej w leczeniu dysfunkcji stawu skroniowo żuchwowego. Czas. Stomatol., 2008, 61, 11, s. 807- 814.
9. Wałach A., Pihut M., Loster J.: Charakterystyka zabiegów fizjoterapeutycznych stosowanych w leczeniu pacjentów z zaburzeniami czynnościowymi narządu żucia. Protet. Stomatol., 2006, LVI, 4, s. 274-281.
10. Olson K. A., red. wyd. pol. Gnat R.: Terapia manualna kręgosłupa, wyd. 1, Elsevier Urban & Partner, Wrocław 2011.
11. Phipps Eisensmith L.: Massage therapy decreases frequency and intensity of symptoms related to temporomandibular joint syndrome in one case study. Journal of Bodywork and Movement Therapies 2007,11, s.223–230.
12. Opalko K., Sieroń A.: Zmienne pola magnetyczne w stomatologii i okulistyce, Alfa Medica Press, 2009.
13. Nęcka A.: Zmiana czynności mięśni w układzie stomatognatycznym w różnych sytuacjach klinicznych w świetle badań elektromiograficznych - przegląd piśmiennictwa, Dent.Med.Probl.2006, 43,1, s.115-119.
14. Pallegama R.W., Ranasinghe A.W., Weerasinghe V.S, Sitheequ M.A.: Influence of masticatory muscles pain on electromyographic activities of cervical muscles in patients with myogenous temporomandibular disorders. J Oral.Rehabil, 2004; 31; s.423-429.
15. Sroczyk-Jaszczyńska M., Opalko K., Wilk G., Dojs A.: Zatrzymane zęby trzonowe w obrazie CBCT, TK i pantomograficznym. Opis przypadków. Mag. Stomatol. 2013 :23, 5, s. 94-98.

### PATRONAGE OF POLISH

III INTERDISCYPLINARNY KONGRES NAUKOWY CZASOPISMA **Ortopedia i Rehabilitacja**  
**WSPÓŁCZESNE METODY PROFILAKTYKI I LECZENIA**  
**CHOROBY ZWYRODNIENIOWEJ STAWÓW**

Patronat naukowy:



Warszawa, 11–12 września 2015 r.