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ELECTROMYOGRAPHIC ACTIVITY OF MASTICATORY MUSCLES IN GIRLS AT PUBERTAL AGE (WITH AND WITHOUT DISORDERS OF REPRODUCTIVE SYSTEM)

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BACKGROUND: Processes of active and rapid growth, including growth of dento-facial region, formation of reproductive system and constitutional type occur at pubertal age under control of sex hormones. Disorders in functioning of hypothalamic-pituitary system can cause violations in reproductive system formation, decreasing of mineral bone mass, somatic diseases, including malocclusions [1]. Discrepancy of age and skeletal maturity can negatively impact to functional status of muscles and temporomandibular joint (TMJ). Mandibular functions and jaw movements are associated with electromyographic activity of the masticatory muscles [2, 3]. The analysis of the masticatory muscle activity in subjects with altered occlusal relationships could provide useful data of the functional impact of morphological discrepancies [4]. Previous studies indicated that the prevalence of TMD-symptoms in children and adolescents in the general population ranged from 1 to 50 % [5, 6]. In majority of clinical trials EMG-activity of masticatory muscles was evaluated and compared with EMG-activity in adolescents with and without symptoms of TMD [7, 8]. One reported no differences in sEMG activity between teenagers with and without TMD. In contrast, another study reported statistically significant differences changes in mean frequencies between teenagers with and without TMD [8]. There was revealed a lower sEMG ratio between the masseter and anterior temporalis muscles during clenching with increased activity of anterior temporalis and reduced activity of masseter muscles in children with TMD compared to asymptomatic children [4]. But, there are no studies, devoted to evolution of masticatory muscle activity in girls with disorders of reproductive system at pubertal age.

In this context, the aim of our study was to investigate the differences in EMG-activity of the masseter and anterior temporalis muscles in girls with disorders of reproductive system and without.

METHOD. The study group included 32 girls of puberty age with reproductive health disorders, 17 (53,1%) of them with abnormal uterine bleeding, 7 (21,9%) – with hypomenstrual syndrome, 5 (15,6%) – with dysmenorrhea, 3 (9,4%) – with delayed sexual development. Diagnosis was put by gynecologists. The average age of girls in the study group was 14,66±0,3 years. Body composition parameters were determined by anthropometric parameters using Pinier index [9]. Girls by body composition were divided on asthenic (tall stature), hypersthenic (short stature) and normosthenic (normal stature, matching growth and weight) [9]. Occlusion features, including incisal overjet; canine and molar relationship and malocclusion features were recorded [10]. All subjects were evaluated by the same examiner, according to the Research Diagnostic Criteria for TMD RDC/TMD [11]. The following were the exclusion criteria: tooth loss, without crossbite, no dental pain or periodontal problems, previous or current traumas in the head, neck and TMJ region, current orthodontic treatment.

Recording of sEMG of masticatory muscles was performed according to the recommendations Sforza et al. and Tartaglia et al [12, 13]. The masseter and anterior temporal muscles of both sides (left and right) were examined. Disposable silver chloride bipolar surface electrodes (diameter 10 mm, Neirosoft, Russia) were positioned on the muscular bellies parallel to muscular fibers [14]. The skin was cleaned with 70% alcohol prior to the placement of the electrodes. In particular, on the anterior temporalis muscles, the electrodes were positioned vertically, 3 cm of the zygomatic arch, just lateral

to the eyebrow (lateral to the orbit of the eye); on the masseter muscles, the electrodes were parallel to muscular fibers, between the cheek bone and the corner of the jaw, with the upper pole of the electrode at the intersection between the tragus-labial commissure and the exocanthion–gonion lines. A disposable reference electrode was applied to the forehead. sEMG activity was recorded using a computerized instrument Synapsis and software by Neirotech (Russia). The analog EMG signal was amplified and digitized. Patients were sitting in a natural position without muscular tension, arms, legs were not crossed, head was held equally without support. Lips were kept closed slightly, tooth – in physiological rest. To avoid the effect of fatigue, there was three minutes-rest between each test.

EMG-activity was recorded in 3 tests, lasted 10s for each one. The first test or the maximum voluntary clenching (MVC) was performed in intercuspal position (without any material placed on the molar teeth) for evaluation of symmetry of the masseter and anterior temporalis muscles of the left and right sides. The second and third tests were one-side clenching, using cotton rolls on right and left sides respectively for evaluation of EMG-activity of masticatory muscles on working and balancing sides.

To compare the masticatory muscles activity was examined 25 girls without disorders of reproductive system and clinical signs of TMD, matched by age. They were included in the control group.The average age of girls in control group – 14,48±0,33 years.

The procedures received approval from the Bioethics Committee of the Ukrainian Medical Stomatological Academy (Poltava, Ukraine). All girls and their parients signed astatement of informed consent.

The obtained data was statistically analyzed using the Student's t-test and the Fisher's criterion X2. The hypotheses were verified at the level of significance $p<0,05$.

RESULTS. Table 1 displays distribution by type of body composition in girls of both groups.

Table 1. Comparison between groups of body composition

Body composition	Study group	Index Pinier	Control group	Index Pinier	p value
asthenic	20 (62,5%)	38,15±0,72	3 (12,0%)	34,1±0,22	p<0,05
normosthenic	11 (34,4%)	20,73±0,34	18 (72,0%)	23,64±0,43	p>0,05
hyperstenic	1 (3,1%)	8,0	4 (16,0%)	8,61±0,18	p>0,05

Girls with asthenic body stature were predominated in the study group in 5.2 times compared with the control group. Normosthenic body composition was diagnosed in 2.2 times more often in the control group, then in the study group. It means, that majority of girls of the study group were taller and had deficit of body weight.

All girls of the study group had the I Class relationship. Painful palpation and tension of masseter muscles was found in 30 (93.8%) patients of the study group, temporal and masseter muscles – in 25 (78.1%) adolescents during clinical examination. Reciprocal TMJ clicking on the left side was examined in 5 (15.6%) girls, on the right – in 2 (6.2%) adolescents in carrying of 3-4 consistent vertical movements - open and close the mouth. Click disappeared during movements of the lower jaw forward or to the side. Deviation of the mandible on average 6,1 ± 1,34mm to the side with painful palpation of masticatory muscles was observed in 22 (68.8%) girls of the study group. 23 (71.%) girls of the study group diagnosed with myofascial pain (Ia), 7 (21.9%) – with myofascial pain and disc displacement with reduction (IIa). 2 (6,2%) girls of the study group did not have clinical symptoms and signs of TMD.

Tables 2, 3 displays average amplitude EMG data for the two groups.

Table 2. Comparison between groups of the muscles electromyographic activities (average amplitude, in μV) at maximum voluntary clenching

Muscle	study group	control group	p value
masseter right	318,09±16,52	212,76±7,92	p<0,001
masseter left	358,47±17,15	223,60±9,12	p<0,05
temporalis right	331,81±19,10	188,04±9,23	p<0,01
temporalis left	398,16±87,81	189,80±8,93	p<0,01

There was not balanced activity between right and left masseter and anterior temporalis muscles in girls with disorders of reproductive system and TMD. It proves by significant difference of average amplitude on the left and right sides both masseter and anterior temporalis muscles during maximum voluntary clenching in adolescents of the study group.

We observed symmetrical EMG-activity of masseter and anterior temporalis muscles on the left and right sides in girls of the control group.

Table 3. Comparison between groups of the muscles electromyographic activities (average amplitude, in μV) at one-side clenching

Muscle	Right-side clenching			Left-side clenching		
	study	control	p value	study	control	p value
masseter right	238,94±13,82	203,00±8,45	p<0,01	293,22±4,51	183,56±1,98	p<0,01
masseter left	281,03±12,88	172,92±8,23	p<0,01	336,84±8,94	202,28±11,15	p<0,01
temporalis right	244,13±14,45	189,56±7,55	p<0,05	268,38±21,61	147,64±9,15	p<0,01
temporalis left	250,31±9,48	152,4±7,2	p<0,001	287,56±21,37	188,76±10,01	p<0,01

Increased EMG-activity of anterior temporalis and masseter muscles on balancing side compared with working side during one-side clenching was observed in all girls of the study group.

Increased EMG-activity of masticatory muscles on the working side and decreased EMG-activity on balancing side were found in adolescents of the control group. Prevalence of EMG-activity of masseter and anterior temporalis muscles on the right side was observed at right-side clenching. These statistical significant differences between average amplitude on working and balancing sides confirms normal and balanced activity of muscles in girls of the control group.

So, prevalence of asthenic body composition was observed among girls with disorders of reproductive system. Such body stature characterizes by insufficient body weight. Deficit of fat mass can cause disorders of reproductive system at female adolescents [15]. The vast majority of girls with asthenic stature had vertical growth pattern. In clinical trials activity of the anterior temporalis, masseter and buccinator was observed significantly lower in the vertical facial pattern subjects compared with horizontal and normal pattern [16]. In our study increased and asymmetrical activity of masseter and anterior temporalis muscles was observed in girls with disorders of reproductive system. This fact can explain clinical signs and symptoms of myogenious TMD in 93,8% cases in the study group.

CONCLUSION. Significant difference is investigated in EMG-activity of the masseter and anterior temporalis muscles between girls with disorders reproductive system and without. 93,8% adolescents of the study group had TMD group Ia and Ia plus IIa. In all girls of the study group increased and unbalanced activity of masseter and anterior temporalis muscles on right and left sides was diagnosed.

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KIDNEY LESION IN MICROSCOPIC POLYANGIITIS

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Abstract. *Morphological signs of renal pathology in microscopic polyangiitis, their connection with extrarenal manifestations of the disease as well as the pathogenesis of such nephropathy remain insufficiently studied, what became the aim of our study. Material and methods. Kidney biopsy was made 12 patients. Results and discussion. Damage of glomeruli, stroma, tubulus and vessels were detected without exception in all patients with Ig A, G, M, C3- and C1q- components deposition in the kidney structures that depend on the presence of cardiac, pulmonary, hepatic, articular and neurological pathologies, and morphological indicators of renal lesion affect the parameters of proteinuria, hematuria, uricosuria, and surface properties of urine, associated with blood levels of different antibodies, rheumatoid factor and circulating immune complexes. Conclusions. Renal involvement in microscopic polyangiitis affects all morphological structures and indicates on the immune complex damage of glomeruli, stroma, tubulus and vessels.*

Keywords: *systemic vasculitis, nephropathy, clinic, morphology.*

Introduction. Renal lesion in systemic vasculitis which associated with Anti-neutrophil cytoplasmic antibodies (ANCA-SV) is one of the most common forms of visceritis that determines patient life prognosis [3, 5]. According to K.Sugiyama et al. [15], nephropathy occurs in 87% of the patients with microscopic polianhiyit (MPA), and is believed to S.M.Seck et al. [13] and R.A.Sinico et al. [14] - in all cases of the disease. Kidney damage dominates in the clinical course of MPA [6], and there are even monovisceritis isolated form of the disease with the development of necrotizing glomerulonephritis [7]. More than half number of the patients with MPA die from progressive renal failure [16].