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Phoniatic evaluation of prospective speech therapy students – results, observations, comments

SUMMARY

This paper presents the results of the authors' research concerning the suitability of candidates for speech therapy university studies and their prospective work as speech and language therapists (SLTs). This profession poses special requirements for candidates for speech therapists who work with children with various speech impediments and, therefore, must offer them a model of articulation to follow. Therefore, it is necessary to perform an evaluation of the physical capacity of the candidates for the profession of SLT before they start university studies in speech development. Such initial evaluation of the candidates is indispensable because it demonstrates their physical ability to acquire relevant skills and practice mandatory to possess by future SLTs. The material studied consisted of 60 subjects, mostly women between the ages of 18 and 24 from north-eastern Poland. The paper discusses anatomical defects frequently observed in the investigated subjects within the vocal tract and in the craniofacial region, as well as speech defects and their connection with articulation disorders and occlusion. It was found that only 26% of the candidates did not present any clinical and/or articulation deviations, while 74% of applicants for logopedics university training were found to have anatomical or articulatory defects. One person had phoniatic problems in the form of discrete hoarseness of the voice, but they do not constitute a contraindication for admission to study speech therapy and prospective practice of the SLT profession. Therefore, the authors emphasize that restricting the examination only to the phoniatic evaluation (obligatory for applicants for speech therapy university studies in Poland) is insufficient, because it does not include the correctness or accuracy of the bite or articulation. As has been demonstrated in our study, such problems subsequently lead to disqualifying the candidates from the SLT profession. Only

a comprehensive phoniatric-orthodontic-speech therapy assessment that takes into account both the visual and auditory perceptive aspects of voice as well as individual speech sounds and their clusters can allow a meaningful assessment of the presence or absence of contraindications to practice as a speech and language therapist.

Key words: articulation, occlusal conditions, phoniatric assessment of prospective speech therapy students, contraindications to speech therapy studies

INTRODUCTION

Profession of Speech and Language Therapist (SLT) is very demanding. Apart from the broad interdisciplinary theoretical knowledge and practical skills, it requires high qualifications to operate the voice in relation to phonation, diction and articulation, as well as impeccable anatomical conditions in the craniofacial area. Pronunciation of the speech therapist is in fact a role model for patients, and his or her anatomical structures constitute an essential tool for their work and proper demonstration of articulatory movements of speech organ. Thus of paramount importance is that only these candidates who promise to practice the profession properly also with regard to the correct anatomy of their speech organs and good articulation are qualified for speech therapy studies. For this purpose preliminary interviews and/or medical examination of the candidates are carried out. It may look a bit different as for the details in the various centers. However, the candidates are mostly referred to phoniatric examinations and such a referral includes a possible study of the candidate's articulation quality that confirms the absence of any speech defects. In this article we present the data from one of such phoniatric examinations carried out by our team, as well as the resulting conclusions.

MATERIAL AND METHODS

Research material consisted of 60 candidates for speech therapy studies aged between 18 and 24 years old (the majority aged 18 and 19, see Fig. 1). Sex ratio was F to M – 96:4. The investigated subjects came mostly from north-eastern Poland.

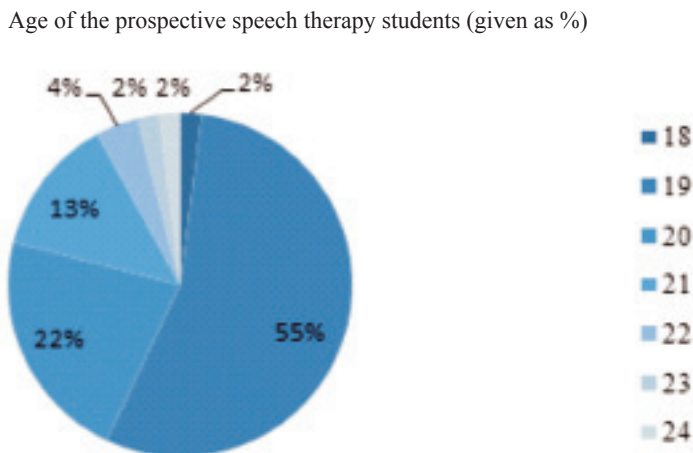


Fig. 1. Age distribution in an evaluated sample (given as percentage)

The examination of the suitability of candidates for a SLT profession was carried out by a phoniatician (based on the referral) and two other professionals co-opted to examination – a phonetician and a speech and language therapist. The research was based on the standard clinical phoniatic evaluation of ears, nose, throat, larynx and palate, on the assessment of the dental system and occlusal conditions as well as on the direct observation of the tongue movements during pronunciation of the set of words specially selected by the phoniatician (counting to ten, repeating the words such as *sasanka* [pasqueflower], *szosa* [road], *szczaw* [sorrel], *tata* [dad], *torba* [bag], *to tutaj* [it is here], *dach* [roof], *duch* [ghost], *pogoda* [weather], *siano* [hay], *ciocia* [aunt], etc.). Then the quality of the candidate’s pronunciation was evaluated by the speech therapist and phonetician during a short spontaneous speech session, reading out the text and repetition of sounds, groups of sounds and words (evaluation of diction and articulation). The results are summarized in 5 Figures (from 2 to 6).

RESULTS

1. Of all the respondents, only 26% were without any clinical changes and articulation disorders. Seventy four % of prospective speech therapy students were diagnosed with anatomical and/or speech defects. Percentage distribution of subjects without anatomical and articulation disorders in relation to the whole study group is shown in Fig. 2.

Standard and articulation and/or anatomic disorders

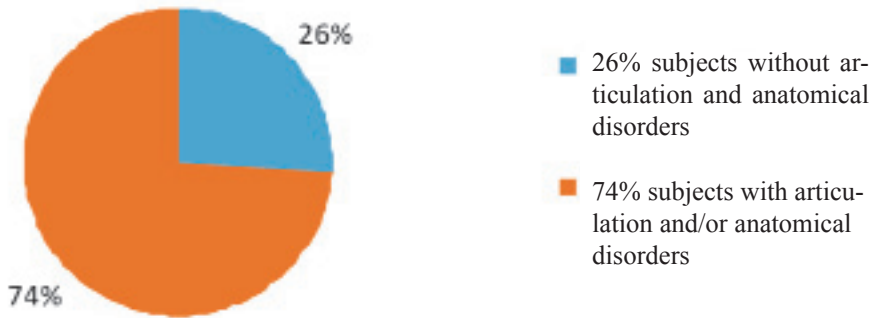


Fig. 2. Percentage distribution of subjects without anatomical and articulation disorders in relation to subjects with such disorders (given as percentage)

Anatomical anomalies occurred in 49% subjects from the study group and in 66.7% of investigated subjects with some occlusal and/or articulation anomalies. The majority of anatomical disorders identified in the craniofacial area were malocclusions. Figure 3 illustrates the distribution of anomalies and their percentage participation in the group of subjects with the anatomical and/or speech defects.

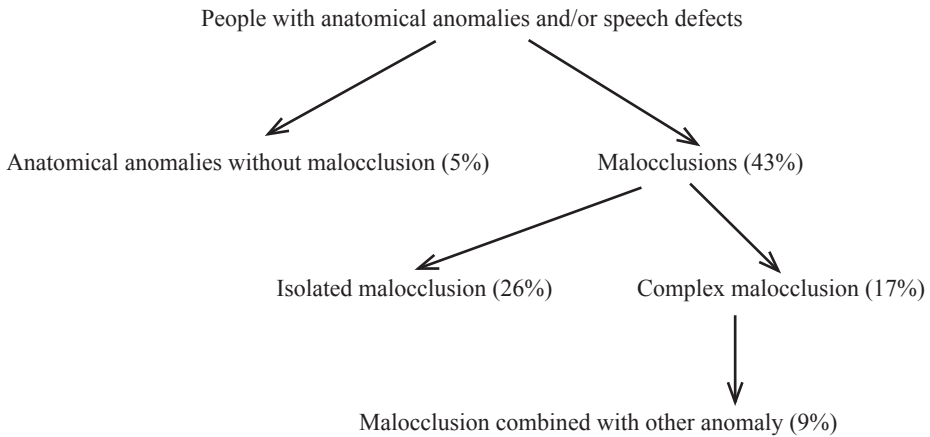


Fig. 3. Distribution of anomalies and their percentage participation in the subjects with anatomical and/or speech defects

In our material the most frequent malocclusions were the following:

1) median plane shifts in the form of lateral displacement of the mandible and crossbite, and 2) horizontal plane shifts in the form of deep bite (overbite) and open bite. Types and percentage distribution of the malocclusions are illustrated in Figure 4.

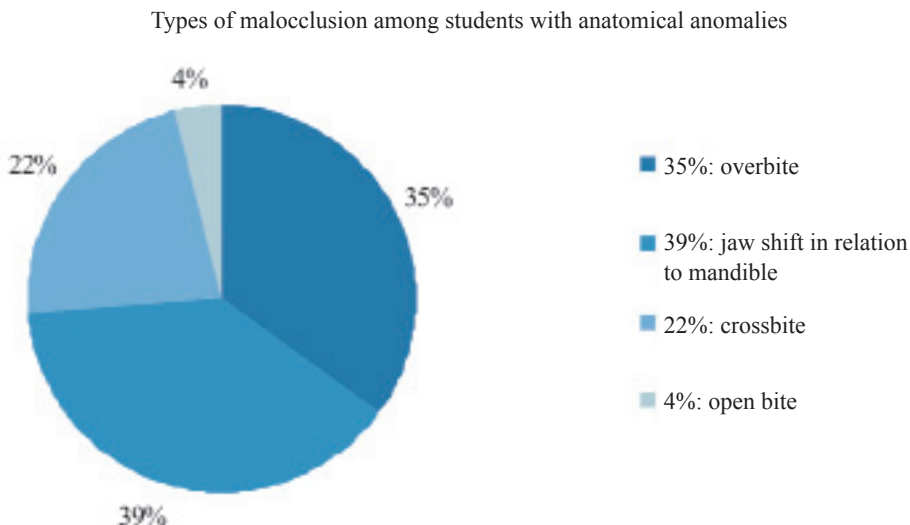


Fig. 4. Types and percentage distribution of the malocclusion among prospective speech therapy students (given as percentage)

Among other occlusal irregularities among the researched material were the following: abnormal teeth size (lateral incisor microdontia), excessive teeth number (hyperdontia), abnormal tooth position (tilting, rotation, diastema), which usually accompanied the malocclusions.

Anatomical anomalies other than malocclusion observed in this study group were: the high-arched palate (9% of the examined group and 19% of all subjects with any craniofacial anomaly which is always an anomaly accompanying other anatomical disorders) and tonsillar hypertrophy (4% of the examined group and 7% of subjects with any craniofacial anomaly which is always an anomaly accompanying other anatomical disorders). There were noted also some individuals with phonation disorders (change of timbre, hoarseness), deviated nasal septum (deviation of nasal septum with anterior nasal spine in contact with inferior turbinate), bifid uvula and even, in one case, a submucous cleft palate accompanied by velopharyngeal insufficiency, tonsillar hypertrophy and periodontitis.

2. Speech defects were found in 57% of prospective speech therapy students. Lipping constituted the majority of the recorded defects. Rhotacism was also stated in several cases, mostly as a disorder accompanying lipping. Percentage distribution of the most common articulation disorders shows Fig. 5.

Rhotacism was related to disorder of implementation of the humming sounds series or humming-hissing sound series and it consisted in the hitting of the tongue

when vibration of tip of the tongue is required (too weak vibration)¹ or lateral arrangement of language combined with a lateral production of a humming sound series.

Lisping was demonstrated in a more or less evident way through the disorder of production of only one, two or all three series of sibilant sounds.

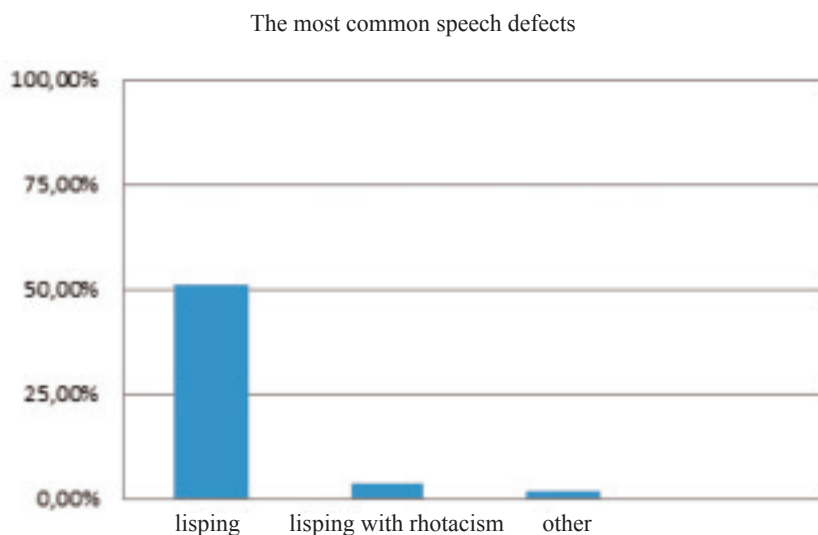


Fig. 5. Types of speech defects among prospective speech therapy students (given as percentage)

In case of a hissing sounds series, the most frequently reported were interdental lisp and/or lateral lisp, whistling lisp, asymmetry when pronouncing of hissing sounds involving movement of mandible to the right which results lateral left interdental lisp. In case of a humming sounds series there were stated following defects: interdental and/or lateral articulation, dorsal stream with apex of tongue being inactive or unmotivated softening of the discussed sound series. When it comes to alveolo-palatal consonants, the disturbance was perceived as a weakening of softness of the discussed sounds to the various degree, or as a lateral articulation.

Besides, the interdental production of consonants [t], [d], [n] in relation to interdental production of hissing sounds series was noted and interdental production of [t], [d], [n], [ɲ] without relation to interdental production of hissing sounds series. In the latter case, despite the clear pushing of the tongue between teeth in the central plane under production of [t], [d], [n], [ɲ], manifested only visually,

¹ For details of allophonic variations on Polish /r/ see: Łobacz, 2000.

production of the hissing consonants remained undisturbed, both in terms of articulation and perception. However, under production of sibilants and consonants [t], [d], [n], the tendency of interdental tongue position was reported, also at rest.

3. Given the phonetic evaluation of the candidate's pronunciation, the attention was drawn to widespread elision of letter 'j' in groups of Cji type (in the read text in the word *rehabilitacji*[*rehabilitation*] and in repetitions although the correct forms are given by the examiner), simplification of final positions of such sequences as -st, -śc (*je*[s r]*ehabilitacja* – *jest rehabilitacja*, *jes*[s u]*pośledzona* – *jest upośledzona*, *zdolno*[ś o]*dczuwania* – *zdolność odczuwania*), diphthong and non nasal pronunciation of the final -q (*osiq* pronounced as *osioł*) and the clear tendency to pronounce a sound which is graphically illustrated as a nasal before fricative consonant in the strongly labialized way without nasality (pronunciation of the words: *węchu*, *wącha* in the following way [ve°xu], [vo°xa]). In the last case it was observed that the degree of labialization is correlated with the loss of nasal resonance – the stronger rounding of the lips, the bigger loss of nasality in the final segment of production of 'ą' and 'ę'. Everything mentioned above is in line with the pronunciation tendencies prevailing in the contemporary general Polish language (see e.g. Osowicka-Kondratowicz, paper in press).

4. Anatomical defects constituted an important factor associated with defective articulation, what is illustrated in Figure 6.

Relation between articulation disorders and occlusion is obvious and it was reflected in the presented paper. According to Konopska's data, 81% of subjects with malocclusion has speech defects (Konopska 2006). In our study group, 70% of investigated subjects with bite disorders presented with articulation disorders, while the remaining 30% of people had only mild occlusal disorders which increases the probability of formation of compensation and adjustment mechanisms.

Overbite, as an isolated defect, was related to the presence of interdental and lateral lispings, wherein the severity of lispings depends on the severity of the mentioned occlusion disorder. In overbite of approx. 5 mm an evident interdental and lateral lispings was observed, whereas in the less pronounced forms of overbite (approx. 2 mm) the articulation defect was manifested more discreetly.

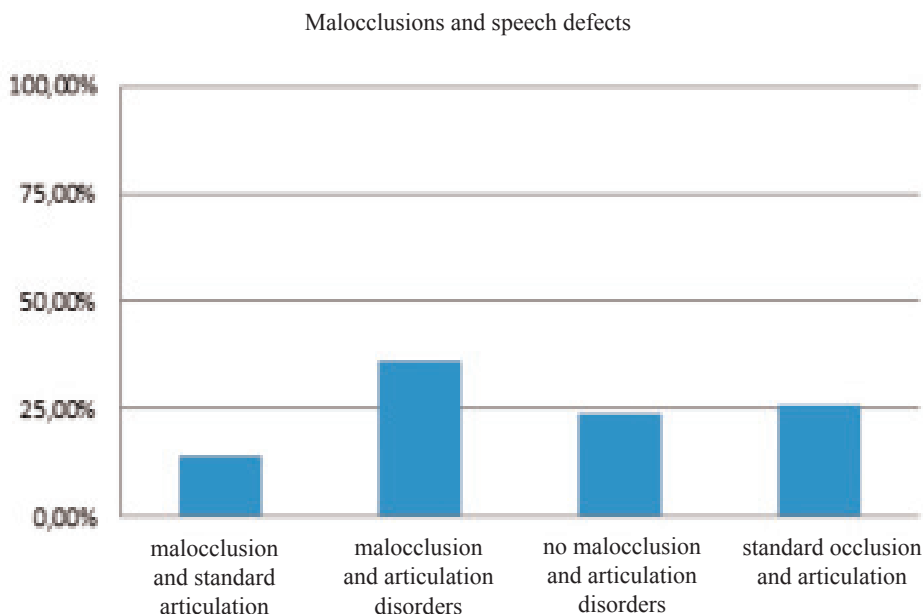


Fig 6. Speech defects and malocclusions (given as percentage)

Overbite, which is a defect accompanying other anatomical disorders (that is overbite with a narrow jaw, open lateral bite and high-arched palate; overbite with a gap between frontal teeth to the right side and slightly shortened teeth on the side arches; overbite with lateral right crossbite and high-arched palate) was always accompanied by speech defect in the form of interdental and lateral lisping, especially with the hissing consonants (on this subject see also further).

Isolated maxillary displacement in relation to mandible was associated with interdental and lateral lisping, while lisping severity depended on the severity of the mentioned malocclusion. With a small asymmetry, articulation may be normative, with a larger displacement (approx. 2 mm) lisping was demonstrated discreetly, with intensification of the defect (approx. 3 mm) the articulation disorder is significant and covers all three series of sibilant consonants.

The maxillary displacement in relation to the mandible as a defect accompanying other disorders (ie. jaw displacement in relation to the mandible in subjects with high-arched palate, with teeth in a slight rotation, lateral crossbite on both sides, in cases with supernumerary lateral incisor outside the arch and the lack of descending of the teeth on the sides of the arches; jaw asymmetry with tilt of dental arch to the left, lower left canine in a slight crossbite) was always accompanied by the speech defect, although the type and severity of this defect was different in the particular subjects. In some cases, despite of complex malocclusions, the articulation disorder was manifested discreetly – either as an interdental produc-

tion of [t], [d], [n], [ń], or in the form of an irregular lisping in a series of hissing and humming sounds with a low grade of intensification. In other subjects, the problem extended beyond sibilant consonants to the defective production of the consonant /r/. With such an occlusion, the relatively good pronunciation, as described in the first case, is probably related to the correctly formed compensation and adjustment mechanisms, as well as with good phonetic hearing.

With lateral crossbite, as an isolated defect, the normative articulation was noted.

In the case of crossbite as a defect accompanying other anatomical disorders (ie. lateral crossbite on both sides with maxillary displacement in relation to mandible in cases with high-arched palate; crossbite with jaw asymmetry with tilt of dental arch to the left; lateral right crossbite with overbite and high-arched palate) the significant lisping was usually stated.

Open bite occurred in the lateral form and only together with other defects, resulting in a strong speech impediment in the form of interdental and lateral lisping.

Fig. 7 illustrates the position of the tongue during pronunciation of the hissing sibilants in a patient with the maxillary displacement of 2 mm to the left in relation to mandible and slight interdental and right lateral lisping. As a result, the tongue is inserted into the interdental lateral openings to the right. The interdental opening is formed due to the left maxillary displacement.

As far as the sibilants are concerned, the tendency to place the tongue in the interdental openings that were formed e.g., due to the maxillary displacement in relation to the mandible, open bite, teeth position disorders or defective teeth structure, was heard particularly when pronouncing the affricate [c]. The relatively strong contact of the tongue with the dental arches during production of the voiceless closure results here in the inserting the tongue into the interdental openings, if any occur in the arches.

The submucosal cleft palate with tonsillar hypertrophy that was stated in individual cases was associated with an exaggerated lisping despite of lack of malocclusion.



Fig. 7. Patient with displacement of jaw in relation to mandible and interdental and lateral right lisping

The high-arched palate occurred only as an anomaly accompanying the other disorders (tonsillar hypertrophy, overbite and/or lateral crossbite, asymmetry) in connection with articulation disorders during the production of sibilants. In some individuals with high-arched palate (3 out of 6) there was an apparent tendency to present with the weakened soft alveolo-palatal consonants (so-called *ś, ź, ć, dź*) in a front position and/or produced as sounds like the palatalized [*sʰ, zʰ, cʰ, dʒʰ*] which can be related to the anatomical structure of the discussed anomaly – behind the high-vaulted hard palate. Under these anatomical conditions, a bulging of anterior-central part of the tongue against the palate may be insufficient in relation to the palatal height, which in turn results in a weakened palatalization of alveolo-palatal consonants and/or incompleteness and inconsistency of the produced closures during articulation of palatal affricates. However, in some individuals with a high-arched palate the alveolo-palatal consonants sounded entirely correct. It shows that the discussed anomaly could be a factor that promotes the wrong production of alveolo-palatal consonants but does not necessarily result in the disturbance. In addition, the weakened softness during the pronunciation of palatal consonants was also reported as the only isolated articulation problem in subjects with the properly vaulted palate, without any anatomical or occlusal defects (Osowicka-Kondratowicz i Serowik 2009; Osowicka-Kondratowicz 2013).

The occurrence of diastemas between the upper incisors, observed in few cases, was found to have no effect on articulation, as long as the distance between the incisors was small. In contrast, a large diastema with the lateral teeth shift,

resulted in the retraction of sibilants due to the low humming intensity during the pronunciation of these consonants.

Proper articulation despite the wrong anatomical conditions was assessed in 23% of investigated subjects with found anatomical defects, which accounted for 11% of the whole study sample and was associated with low severity of the isolated occlusion disorder.

Articulation disorders associated with good anatomical conditions occurred in 36% of the investigated subjects with speech impediments, which constituted 20% of the study sample, and were mostly associated with the tongue dysfunction (the lateral position, dorsal position, flattened articulation resulting in too small arching of the tongue upwards when pronouncing the alveolo-palatal consonants, improper friction sound during production of sibilants connected with the presence of a too deep grooving along midline of the tongue).

In addition, in some cases a certain artificiality of pronunciation due to stress was found as manifested in dry mouth, tightening of jaw, too strong tension or tremors in articulatory apparatus and poorly coordinated articulation.

CONCLUSIONS

According to various authors, the presence of malocclusion in pre-school children ranges from 34.8% to 60%, mostly in the form of maxillary overbite (see Rafałowicz-Wójcik, Matthews-Brzozowska 2005; Siebiert, Kamińska 2014). In this context, the attention is drawn to persistently high prevalence of malocclusion in young adults (43%) that was noted in our study group. Moreover, the focus is directed also to the fact that among our prospective speech therapy students there were no maxillary overbites, the form of malocclusion most frequently found in children, which may be due to the elimination of maxillary overbites in the course of individual development as a result of the completed orthodontic treatment.

A review of Polish research on presence of speech defects in children shows a very large extent of the negative results as to the prevalence of these disorders, persisting in children over the years ranging from 9.6% to 44.1% (see Węsierska 2013: 157–167 and research quoted there). In the reference sources, they indicate a strong correlation between speech defects and age, with a downward tendency of negative results over time. According to the indications of the DSM-IV (*Diagnostic and Statistical Manual and Mental Disorders*),² in children under three years of age the

² DSM IV Disorders Usually First Diagnosed in Infancy, Childhood or Adolescence. 315.31. Expressive Language Disorder, [online] www.psychiatryonline.com, access 26.03.2007 (quoted in Węsierska, 165).

prevalence of speech disorders is in the range of 10–15% vs. 3–7% of the population of school children. Meanwhile, the percentage of speech defects (varying degrees of) in our group of prospective speech therapy students is maintained at a very high level (56.6%). In this situation it is difficult to speak of the declining tendency in the number of negative results with the age, which is also confirmed by some Polish researches (see Węsierska, 2013).³ Interestingly, in many of our cases a complete lack of awareness of the occurrence of defects both in terms of articulation and dental system was observed. This applies also to complex speech disorders and/or malocclusions. All of this is the aftermath of a lack of or improper orthodontic treatment and speech therapy during preschool and school education, which is related to shortcomings in the field of pediatric and neonatal care (lack of “awareness of speech and language problems” in GPs). The results indicate the need for close cooperation between speech therapists and health care, which constitutes an essential element of the full and effective speech therapy care. Meanwhile, some analyzes indicate a certain distance of the doctors towards steps taken by speech therapists to initiate the mutual cooperation (Węsierska 2013: 224–226). The results of our study clearly reflect a high demand for orthodontic and speech therapy care also among young people. At the same time they show how much the profession of speech therapist is needed.

SUMMARY

The professional speech and language therapists working with students in the field of speech therapy indicate that they are visited very frequently by individuals with speech impediments and malocclusion, which does not promise the proper practice of a speech therapist profession. Meanwhile, the prospective speech therapy students are directed to phoniatic examinations in order to determine the presence or absence of contraindications to practice as a speech therapist. However, the phoniatic evaluation itself is absolutely insufficient. In this study only one person (out of 60) had temporary phoniatic problem in the form of a slight hoarseness and lower pitch of voice, which does not constitute contraindications to practice as a speech therapist. Moreover, it should be taken into account that during the routine phoniatic examination, phoniaticians do not examine neither occlusion nor articulation, both of them possibly presenting a real problem for the candidates disqualifying them from practicing the SLT profession. The

³ As a side note, the research show dominance of presence of speech disorders among males (see e.g. Dołęga, 2003; Węsierska, 2013). There were almost exclusively women who took part in our research, and yet the percentage of defective articulation was very large.

phoniatic examinations that take into account these parameters are exceptional. They are only performed as a standard by professor M. Hortis-Dzierzbicka, who in the course of her professional career for many years has been deeply involved in cleft craniofacial care working on a daily routine with the orthodontists and speech therapists as part of the multidisciplinary process of treatment of children with craniofacial anomalies. The vast majority of phoniaticians focus only on the voice disorders which were noted extremely seldom in our study group in a striking contrast to the prevalence of occlusal and articulation disorders. Therefore, only a comprehensive phoniatic-orthodontic-speech therapy evaluation of the candidates for speech therapy studies allows for a reliable assessment of the existence or absence of contraindications to practice as a speech and language therapist.

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