

VILNIUS UNIVERSITY

KĘSTUTIS SVEIKATA

MAXILLOFACIAL EVOLUTION OF LITHUANIANS
(Data of Vilnius City Residents at 45 Years of Age and Older)

Summary of doctoral dissertation

Biomedical sciences (B 000), Medicine (06 B)

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The research project was carried out at the Vilnius University during the period of 2008 – 2012.

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The dissertation will be defended at the open meeting of the Doctoral Committee of Medicine of Vilnius University on 24th of September 2013, at 2.00 pm in the Main Lecture of the Medicine Faculty.

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VILNIAUS UNIVERSITETAS

KĘSTUTIS SVEIKATA

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I. INTRODUCTION

Each person may have individual issues about what specific facial features are attractive or unattractive, they may disagree with people in other cultures about certain attributes of beauty, but much of what is considered attractive is shared across cultures. During past few years there was noticeable come back of researches on the human face morphological markers, face aging changes. There are made numerous studies focused on face attractiveness, face recognition, even connection between appearance and intelligence. Many scientists are interested in the factors that contribute to the attractiveness of the face, how someone's attractiveness affects others and their behavior and how it might improve or maintain facial attractiveness. Dentists, genetics, plastic surgeons, anthropologists, forensic experts are trying to understand face changes during humans life and how environmental and genetic factors changes our appearance. Aging is an inevitable process. Changes in the face secondary to aging are the most apparent. Facial aging is a dynamic process involving the aging of soft-tissue and bony structures. The aim of the study is to determinate factors influencing changes in human face. Age related changes in anatomical structures are wide investigated, but still there is a lack of common data. A convenient method for assessing the morphological effects of aging is to divide the face into the upper third (forehead and brows), middle third (midface and nose), and lower third (chin, jaw line, and neck) (Coleman et al., 2006).

The major forces responsible for facial aging include gravity, soft tissue maturation, skeletal remodeling, muscular facial activity, solar changes and changes in stomatognathic system (Zimblet et al., 2001). These factors can be classified into local and systemic.

The aging changes seen in the lower third face affect the lips, chin, lower cheeks and neck. Changes in dentition and absorption of maxillary and mandible bone may result in an overall loss of height and volume. Aging across the mandible border may be described by several mechanisms: fat atrophy, volume loss and loss of elasticity (Pena et al. 2009; Reece et al., 2008). These changes may result in the lower third of the face appearing smaller relative to the upper and middle face thirds, straying from the ideal,

approximately equal proportions. Aging changes in the middle third face may contribute to this appearance, as nasal tip ptosis may create the appearance of a shortened upper lip (Shaw Jr. et al., 2007). The constant effects of gravity combined with loss of elasticity in the tissue may allow for excess skin to drop off the mandible (Coleman et al., 2006). Some authors say that volume loss, including soft and hard tissue is at least equally important as gravity in the pathogenesis of aging (Donath et al., 2007).

There are two ways by which face, and for that matter skin ages: internally and externally. Internal aging is what's commonly referred to as the "natural" aging process.

Some aspects of aging are fairly uncontrollable, and these are largely based on hereditary factors. Other factors are somewhat controllable and are largely the result of exposure to the elements and harmful habits (O'Harre et al., 1990)

A healthy stomatognathic system and healthy oral cavity are attributes of a healthy human being. The complete loss of the teeth (edentulism) is key indicator of the oral health status in population (Albert et al., 2007). Management of individuals presenting with partial or full loss of teeth has been a common task of dentists for decades. The condition can be the result of congenital processes, a partial lack of tooth development (hypodontia), but more commonly is an acquired condition due to microbial-mediated caries, periodontal disease or trauma (Barer, 1994). Epidemiological measures of tooth loss suggest that while complete tooth loss is on the decline, more people will maintain teeth as they age and partial tooth loss will continue to require management by the dental professionals. The two major oral diseases, dental caries and periodontal disease, are both microbial-mediated processes involving bacteria indigenous to the mouth and impact individuals worldwide (Bartlet et al., 1992). Missing teeth have a considerable impact on mastication, digestion, phonation and aesthetics and have been associated with increased predisposition to geriatric diseases (Belfor, 2009).

I.1. Novelty and practical significance of the research

Human facial characteristics are influenced by age-related changes in facial dimensions, changes in tooth emergence, loss and overall oral health. In this respect, Lithuanian population was not examined, there is no studies describing dimensional facial aging changes in the causes of tooth loss.

It is not known how the human face and physical data are affected by social and economic factors, what are the older attitudes towards oral health, hygiene. Teeth prosthetic situation and needs of Lithuanian 45 years of age and older are not investigated.

This study is the first to collect and summarize maxillofacial anthropometric data and dynamics of the overall physical dimensions, to present age-related dynamics, to identify and analyze factors that influence the physical characteristics and facial anthropometric dimensions of ethnic Lithuanian population of Vilnius city over 45 years old.

This maxillofacial study is valuable for anthropologists, dentists, oral and maxillofacial surgeons, plastic surgeons, endocrinologists, geneticists, public health professionals. Data point to the facial features characteristic of Lithuanian ethnic population elderly of Vilnius city; it will serve as a useful data to forensic experts, comprehensively investigating the unknown identity of a person.

I.2. Aim of the study

The aim of the study is to examine face and some common physical characteristics of aging data of the 45 years old and older Lithuanian ethnic population of Vilnius city, to determine their relationship to the overall health, the mouth and dental status, also to the social and economic factors.

I.3. Tasks

1. To investigate the age-related dynamics of the face size and face proportions data as well as sexual dimorphism of 45 years old and older Lithuanian ethnic population of Vilnius residents.
2. To identify and assess the approach to oral health and hygiene of Vilnius city population.
3. To investigate the dental prosthetic situation 45 years old and older inhabitants of Vilnius, to assess needs for prosthodontic treatment.
4. To examine the relationship of the age-related facial characteristics with dental prosthetic situation of 45 years old and older Lithuanian ethnic population.
5. Set the multiplex relationships between the size and proportions of the face, social and economic factors, oral health and dental prosthetic status of Vilnius city population.

I.4. Statements to be defended

1. The general tendency of face aging variation of Vilnius population older than 45 years old does not differ between genders and have a relationship with dental prosthetic situation.
2. The attitude to oral health and hygiene of the older Lithuanian ethnic population people is different depending on age, sex and social status.
3. The number of remaining teeth depends on the economic and social conditions as well as oral hygiene habits.
4. The general dental prosthetic situation of 45 years old and older Lithuanian ethnic population of Vilnius city is unsatisfactory.
5. The facial proportions data and their aging variation are related to the number of remaining teeth and dental prosthetic situation.

II. MATERIAL AND METHODS

This cross-sectional study was approved by Lithuanian Bioethics Committee and carried out by one investigator. Study was performed in period from 2008 to 2012. We have examined 634 patients in the principle of free choice (randomized selection). In order to recruit subjects in relevant age groups, Vilnius city hospitals and retirement homes were chosen. The recruitment was undertaken by the “top-down” principle (Porter, 2004), therefore the endorsement by the healthcare institutions administration was received. Persons, with acute diseases and traumas, not connected to head and neck area, were chosen.

All subjects were divided into eight groups according to their age and gender (Fig.1, Tab.1). The intraoral examinations were performed by single dentist, using dental equipment. During examination these parameters were registered: number of present teeth, existing prosthesis and type of prosthesis if they existed. In addition to examination, subjects were asked how many times prosthetic treatment was preformed. The interviews were made under free agreement and explanation.

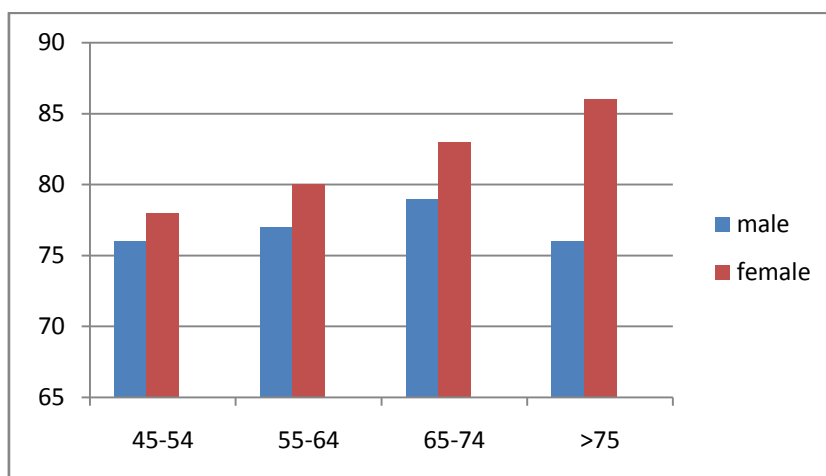


Fig.1. Age groups and number of research participants

Tab. 1. Number of study participants according to gender and age

Gender \ Age	45–54	55–64	65–74	>75
Male	79	78	86	75
Female	80	79	80	84
Total	159	157	166	159

Facial measurements carried out in sitting position by relaxed face. Measurements were carried out on both sides of the face using a small thickened floating caliper and protractor (Fig.2). The following measurements were taken: the head length (g-op), head width (eu-eu), the upper third face width (ft-ft), face width (zy-zy), skull width (t-t), mandibular width (go-go), middle third face depth (obi-sn), middle third face depth (t-sn), upper third face depth (t-n), lower third face depth (t-gn), mandibular depth (go-gn), mandibular ramus height (sdl-go), physiognomic facial height (tr-gn), morphological face height (n-gn), lower third face height (sn-gn), mandibular height (sto-gn) (this dimension in some literature also referred to as the lower face), chin height (sl-gn), lower vermilion height (sto-li), lower lip height (sto-sl), lower lip height (li-sl), upper vermilion height (ls-sto), upper vermilion - cutaneous upper lip height (sn-ls), upper lip height (sn-sto), lateral upper lip height (sbal-chp), middle facial height (n-sto), lip width (che-che), nose sulcus width (chp-cph), nasal width (al-al), intercanthal width (en-en), biocular width (ex-ex), orbital length (en-ex) interpupuliare (pu-pu), nasal bridge length (n-prn), nasal height (n-sn), nasal depth (prn-sn), columella length (sn-c), ear width (pra-pa), ear height (sa-sba). The upper lip - nose and forehead - nose angles were measured.

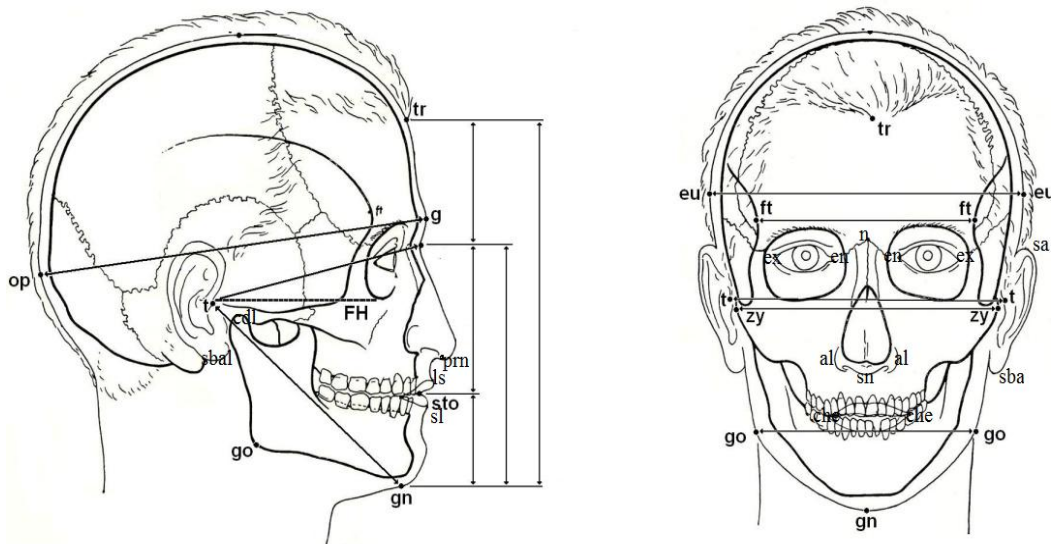


Fig.2. Anthropometric measuring points

In order to accurately assess the proportions of the face, the estimated 41 facial indices were calculated (Tab. 2). Indices show the percentage of the numerator and denominator of the ratio value, without disclosing their absolute values. This means that the paired dimensions, with different absolute values may have the same index value.

Tab.2. Indices of facial proportions

Index	Formula
Intercanthal width – nose width index	$en-en \times 100 / al-al$
Intercanthal width – mouth width index	$en-en \times 100 / che-che$
Intercanthal width – upper third face width index	$en-en \times 100 / ft-ft$
Upper third face – head width index	$ft-ft \times 100 / eu-eu$
Upper third face – skull base width index	$ft-ft \times 100 / t-t$
Biocular width – kaukolès skull base width index	$ex-ex \times 100 / t-t$
Biocular width – face width index	$ex-ex \times 100 / zy-zy$
Biocular width – upper third face width index	$ex-ex \times 100 / ft-ft$
Middle third face – lower third face depth index	$t-sn \times 100 / t-gn$
Nasal tip protrusion – width index	$sn-prn \times 100 / al-al$
Nasal index	$al-al \times 100 / n-sn$
Nose height – lower third face height index	$n-sn \times 100 / sn-gn$
Nose height – face height index	$n-sn \times 100 / n-gn$
Nose – middle third face index	$n-sn \times 100 / n-sto$

Nose – face width index	$al-al \times 100 / zy-zy$
Mouth width – face width index	$che-che \times 100 / zy-zy$
Mandible width – face height index	$go-go \times 100 / n-gn$
Middle third face – face height index	$n-sn \times 100 / n-gn$
Upper third face width – face width index	$ft-ft \times 100 / zy-zy$
Upper third face height – middle third face height index	$tr-n \times 100 / n-sto$
Upper third face height – lower third face height index	$tn-n \times 100 / sn-gn$
Upper vermilion – upper cutaneous lip height index	$ls-sto \times 100 / sn-ls$
Upper vermilion – lower lip vermilion height index	$ls-sto \times 100 / sto-li$
Lower lip height – upper lip height height index	$sto-sl \times 100 / sn-sto$
Cephalic index	$eu-eu \times 100 / g-op$
Facial index	$n-gn \times 100 / zy-zy$
Middle third face – face width index	$n-sto \times 100 / zy-zy$
Mandibular index	$sto-gn \times 100 / go-go$
Intercanthal index	$en-en \times 100 / ex-ex$
Orbital width index	$en-ex \times 100 / en-en$
Upper lip height – mouth width index	$sn-sto \times 100 / che-che$
Lower lip height – mouth width index	$sto-sl \times 100 / che-che$
Ear index	$pra-pa \times 100 / sa-sba$
Ear – face height index	$sa-sba \times 100 / n-gn$
Ear –middle third face index	$sa-sba \times 100 / n-sto$
Lower lip height – mandible height index	$sto-sl \times 100 / sto-gn$
Lower lip height – lower third face height index	$sto-sl \times 100 / sn-gn$
Mouth – mandible width index	$che-che \times 100 / go-go$
Mandible height – mandible ramus height index	$sto-gn \times 100 / cdl-go$
Chin – face height index	$sl-gn \times 100 / n-gn$
Mandible depth – mandible ramus height index	$go-gn \times 100 / sdl-go$

Study presents results the evaluation of oral condition in Vilnius city population, because this population can be considered as mix of Lithuanian people who migrated from different regions of Lithuania to Vilnius.

The statistical analysis was performed using Excel 2003 and SPSS 20 (Statistical Package for Social Sciences) program. Done all the morphological characteristics descriptive statistics: calculating arithmetic averages, their standard errors, 95% confidence interval, 95% confidence mean, median, variance, standard deviations,

coefficients of variation, median, data sets of width (min, max), sampling of indicators of asymmetry and kurtosis coefficients, their standard errors, the most important percentiles (5, 10, 25, 50, 75, 90, 95). The asymmetry of left and right sides were rated by pair's t-test. This method is for comparing twinning variables. In this way each pair of variables were compared.

III. RESULTS

The total number of 634 persons were involved in this study: 308 (48,6%) men and 326 (51,4%) women. 53 anthropometric measurements were taken for each study participant, compared with questionnaire data and statistical analysis was performed.

III.1. Age related dynamics of physical characteristics

Height and weight are the main dimensions characterizing the morphological structure of the human body. Height and weight measurements of all subjects were taken and body mass index (BMI) was calculated. In the study the average height in men in all age groups were significantly higher ($p < 0.05$) than in women (Fig. 3). The downward trend of arithmetic average height of men and women was identified: men average height in 45-54 years age group was 1.8 ± 0.06 m and 1.7 ± 0.07 m in older than the 75 years age group, and women 1.7 ± 0.1 m and 1.6 ± 0.1 m, respectively. Statistically significant difference between age groups was not found.

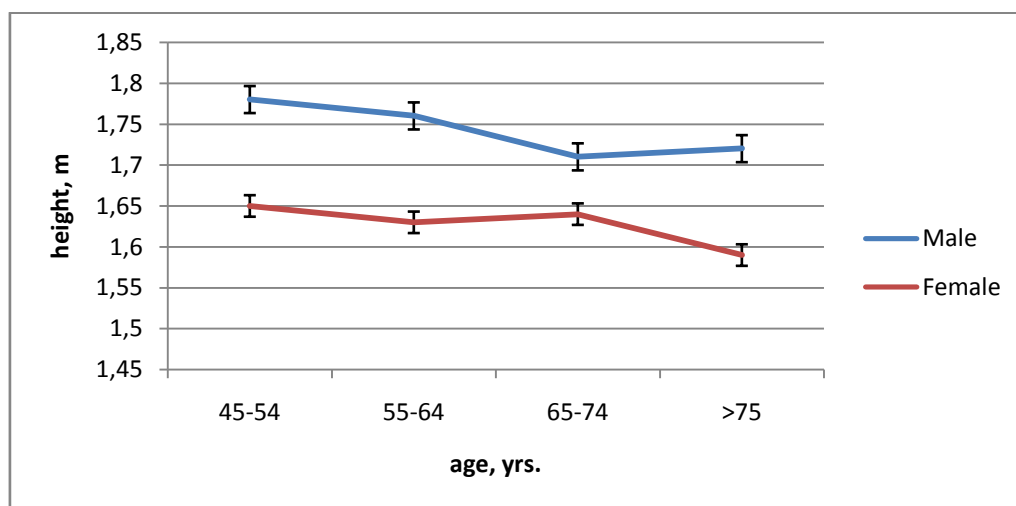


Fig.3. Male's and female's height changes by age

Comparing the changes in body weight dynamics determined that aging is a general downward trend in weight (Fig. 4). Men had a mean weight of 97.3 ± 17.3 kg at the age group 45 – 54 years old; it decreased to 73.1 ± 12.3 kg at the age group over 75 years

old. The average weight of the women decreased from 72.3 ± 13.6 kg to 66.1 ± 14.5 kg. We found a statistically significant inverse relationship between 45-54 years, 55-64 years and 65-74 years age groups for men and between 65-74 years of age and over 75 years age groups, we found no such relationship ($p > 0.05$). Significant weight change rate among women in the age groups did not identify.

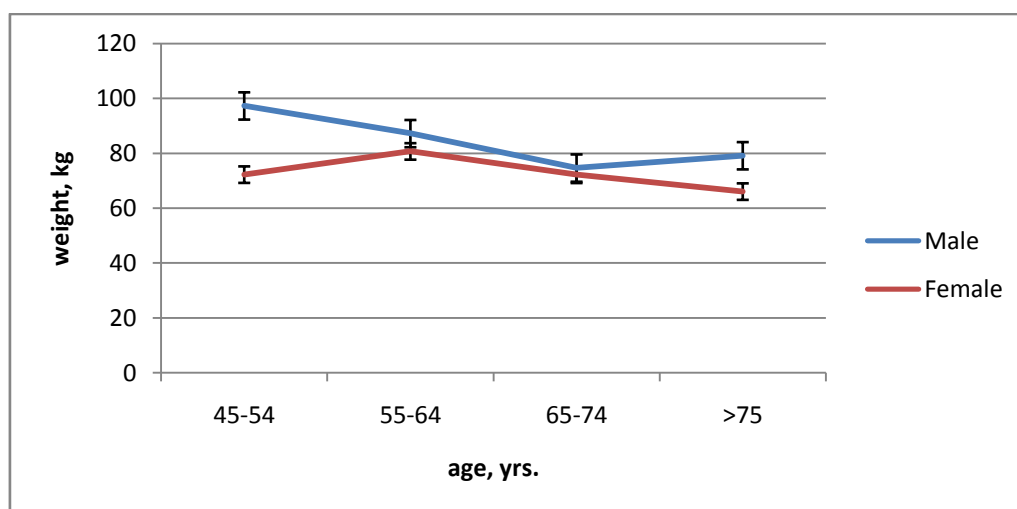


Fig.4. Male's and female's weight changes by age

Younger age groups (45-54 and 55-64) of men were over weighted (21.5% and 33.3%, respectively) and obese (58.2% and 33.3%, respectively) to compare with the older age groups. In 45-54 year age group only 20.3% of men were normal weight. In the group of 45-54 years old men BMI was 30.4 ± 5.02 kg/m², over 75 years of age - 26.7 ± 3.34 kg/m². We found that in the 55-64 and 65-74 age groups were men with a light weight (1.3% and 3.5%), and in the youngest and oldest age groups such cases were not found.

Most normal weighted males were in the group of 65-74 years of age and in the older than 75 years age group (50% and 38.7%, respectively). Unlike in men, most subjects with normal weight in women were in the group of 45-54 years old and over 75 years old age (53.8% and 50%). Most over weighted and obese women were found in the 55-64 years age group (48.1% of obese and 43% over weighted).

34.8% of all the study participants were normal weighted and 63.8% were over weighted or obese.

III.2. Distribution of study subjects according to social and economic factors

Social and economic factors were examined to find out the information about the study participants' education, marital status and living conditions.

There is a statistically significant ($p < 0.05$) differences in both men and women's groups - elderly decline in individuals with high levels of education (college and university) and the increasing number of those with low education (primary and vocational school). By comparing the differences between the sexes it was found that in women were more of having a high level education than in men.

A reliable relationship between height and education (social factor) was found: the average height of primary educated men was 1.7 ± 0.1 m, height of other educational groups of men was at approximately 1.8 m. By studying women was found that minimum average height 1.6 ± 0.04 m was for those with vocational technical education, and women having higher education were highest with the average height of 1.7 ± 0.05 m. It also became clear that education has a relationship to men's and women's weight measurements and body mass index. Although slight, but statistically significant weight loss ($p < 0.001$) and BMI differences ($p < 0.001$) were identified between men with a vocational technical, post-secondary and higher education, the weight ratio decreased from 96.3 ± 19.6 kg to 86.4 ± 17.9 kg, BMI decreased from 30.7 ± 5.1 kg/m² to 27.8 ± 4.8 kg/m². In the group of men with primary education weight and body mass index were the lowest. Statistically significant differences in weight ($p < 0.001$) and body mass index ($p < 0.001$) of educated women were determined. The maximum mean rates of weight and body mass index were among vocational technical and college educated women. Minimum weight and BMI 70.3 ± 11.6 kg and 25.8 ± 4.7 kg/m², respectively had women with the higher education.

By analyzing data was found a statistically significant majority of subjects living in marriage (60.5%) and the lowest (10.8%) were unmarried (Tab. 3).

Tab.3. The distribution of study participants by marital status

Marital status	Number, n	Percentage, %
Married	388	60,5
Not married	69	10,8
Divorced	81	12,6
Other	103	16,1
Total	641	100,0

We found no statistically significant relationship between women height and marital status, but we can statistically significantly conclude that there is a relationship between the weight, BMI and marital status. Married women in weight rates (73.8 ± 13.5 kg) were higher than the unmarried (67.4 ± 7.8 kg). The group of married men were highest (1.8 ± 0.1 m), in groups of divorced or with a different family situation - the lowest (1.7 ± 0.1 m).

III.3. Age related dynamics of facial anthropometric data

By studying the facial anthropometric data was found age-related dynamics change of facial anthropometric data between gender and age groups.

By analyzing changes in facial anthropometric data was found that less data changes were obtained by measuring at the bone level, such points as head width, which did not changed in males, while decreased a little in women (Fig. 5).

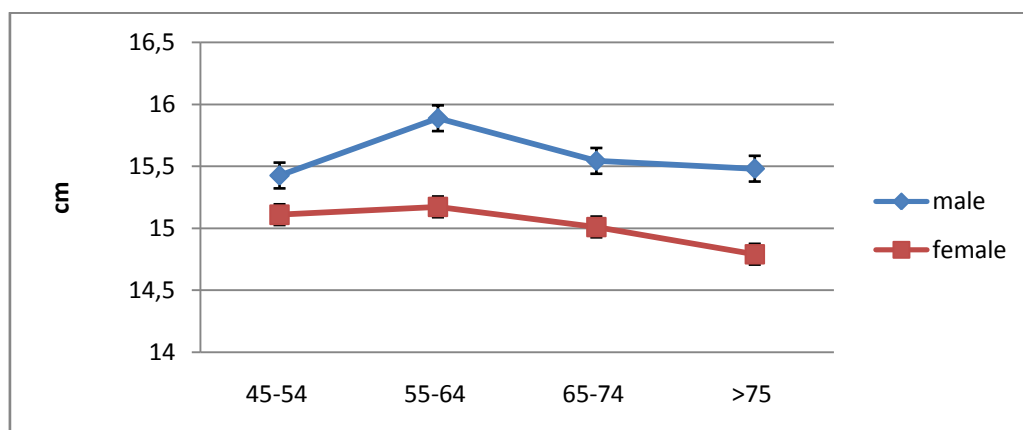


Fig.5. Age related dynamics of head width (euryon – euryon)

Data measured at the soft tissue level, such as the lower vermilion height, decreased mostly. By assessing facial data aging changes vermilion height reduction trend was mostly pronounced: men's lower vermilion height decreased from 0.69 cm to 0.4 cm, women's - from 0.66 cm to 0.55 cm (Fig .6 and 7) and upper vermilion height in men decreased from 0.43 cm to 0.25 cm, in women - from 0,6 cm to 0.35 cm, respectively.

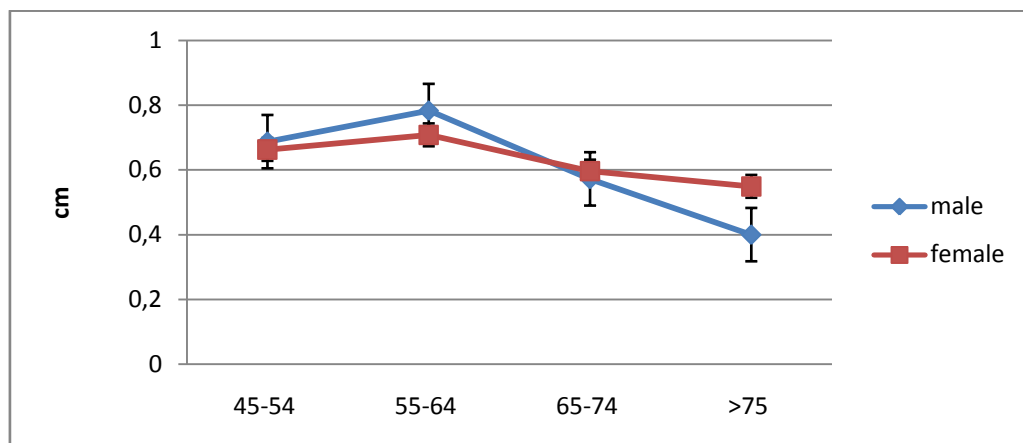


Fig.6. Age related dynamics of lower vermilion height (*sto-li*)

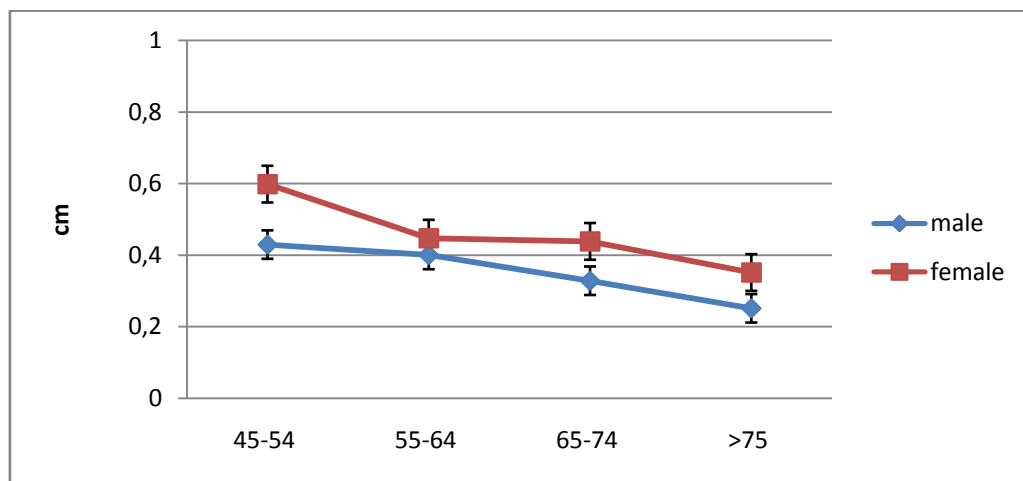


Fig.7. Age related dynamics of upper vermilion height (*ls-sto*)

We note that the men's cutaneous lower lip height increased, while women remained stable (Fig. 8). However, the overall height of the lower lip had a tendency to decrease in subjects of both sexes.

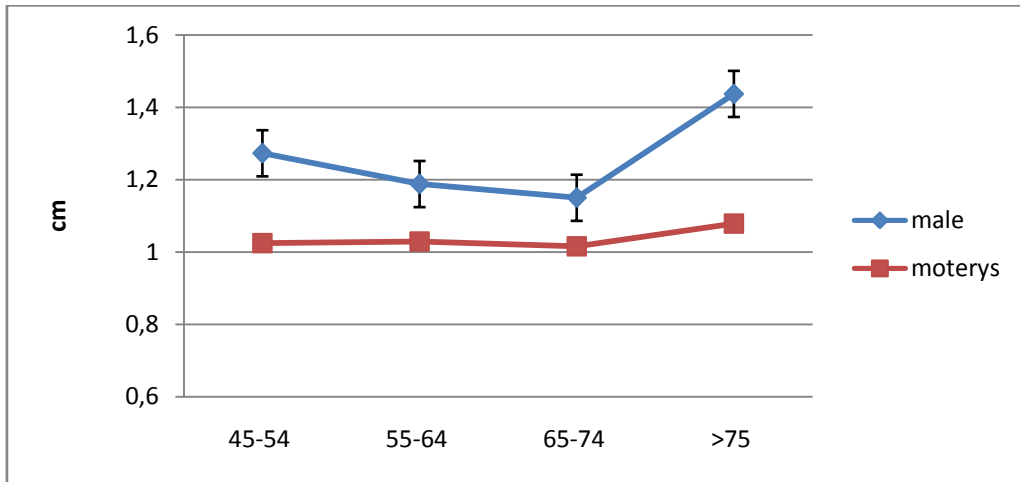


Fig. 8. Age related dynamics of cutaneous lower lip height (*li-sl*)

Measuring the areas of the face which are based on cartilaginous tissue, for example, by measuring the width of the ear (Fig. 9), data values had an increasing trend.

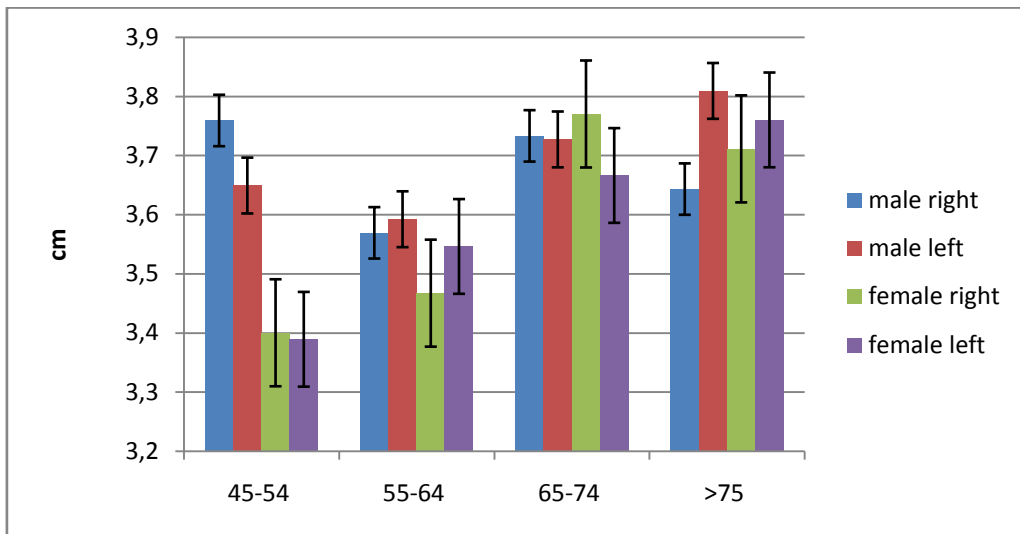


Fig. 9 Age related dynamics of ear width (*pra-pa*)

A slight increase of men's ear height was found, however increases of men's ear width was greater (Fig. 10); women's ear height was significantly increased.

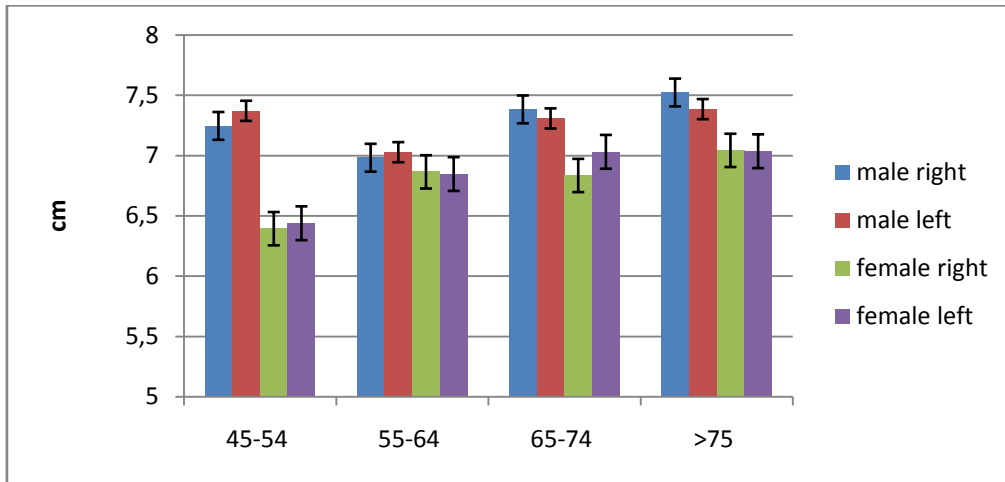


Fig. 10 Age related dynamics of ear height (*sa-sba*)

The dimensions describing changes of face height varied differently. Men's face height (*trixion - gnathion*) increased with the age (Fig. 11) and in women remained stable. Height of the lower third face (*subnasale - gnathion*) decreased in both men and women (Fig. 12).

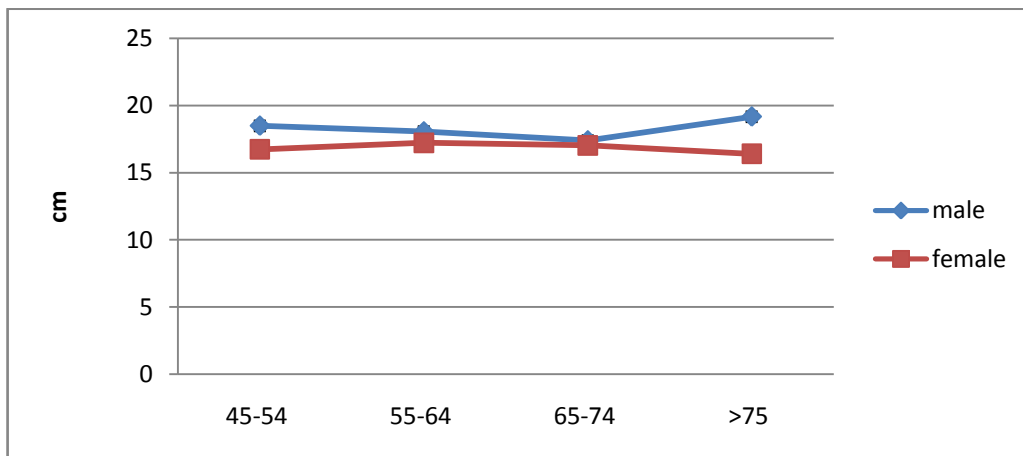


Fig. 11. Age related dynamics of face height (*trixion - gnathion*)

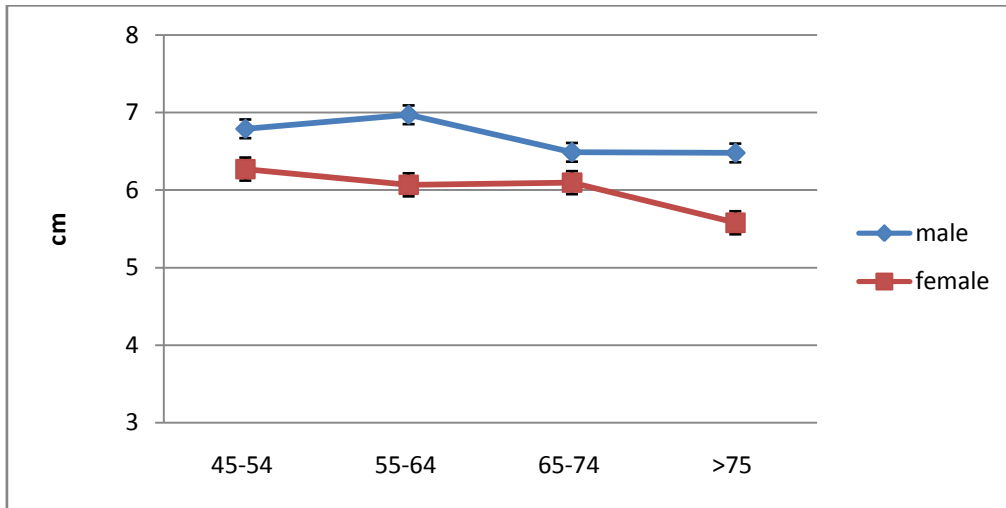


Fig. 12. Age related dynamics of lower third face (*subnasale – gnathion*)

We found a statistically significant dependence between lower third face and number of remaining teeth in both men ($p < 0.02$) and women ($p < 0.001$).

Middle third face (*n-sn*) in women increased ($p < 0.05$), whereas in men was not found any statistically significant change (Fig. 13).

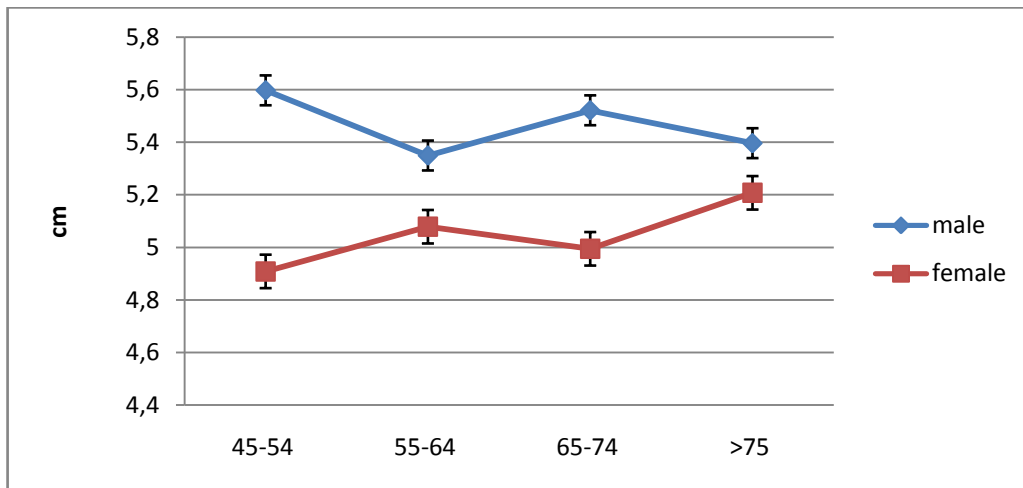


Fig. 13. Age related dynamics of middle third face (*n-sn*)

Morphological face height (*nasion - gnathion*) significantly decreased between men in age groups of 55-64 and 65-74 years old (from 12.27 cm to 11.62 cm, respectively); for

female from 11.81 cm to 10.77 cm in age groups of 65-74 years old and older than 75 years, respectively (Fig.14).

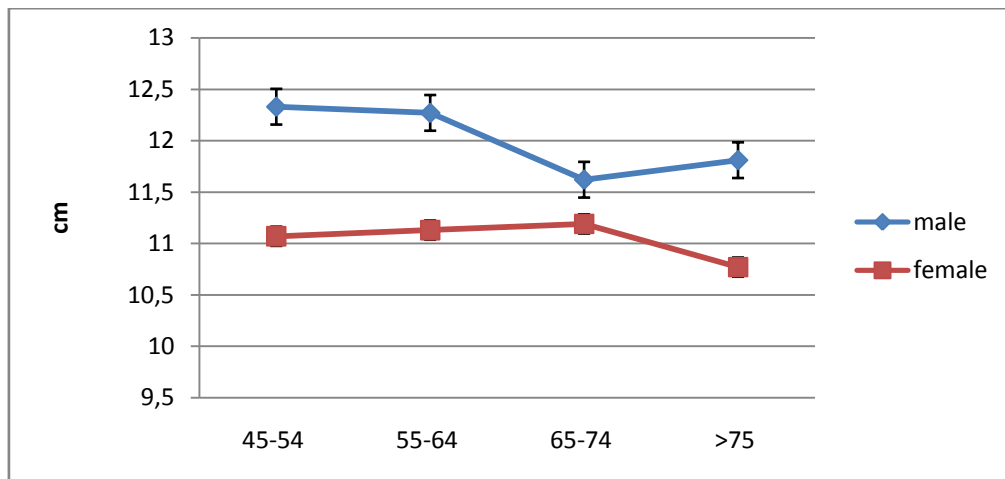


Fig. 14. Age related dynamics of morphological face height (*nasion – gnathion*)

Nose aging changes are characterized by increased width (Fig. 15) and nasal bridge length dimensions (Fig. 16). Since the nasal base reference point (*sn*) remains unchanged, so by the lengthening of nasal bridge the angle of upper lip and nose was tapered (Fig.17).

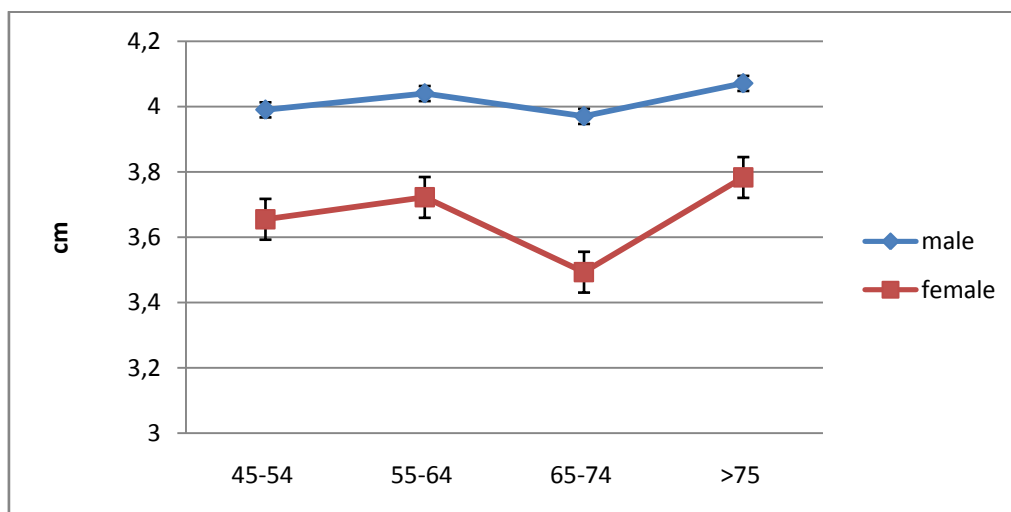


Fig. 15. Age related dynamics of nose width (*al-al*)

Length of men's nasal bridge from 5.4 cm (45-54 years old age group) increased to 5.6 cm (older than 75 years age group), of women's - from 4.8 cm to 5.1 cm, respectively (Fig. 16).

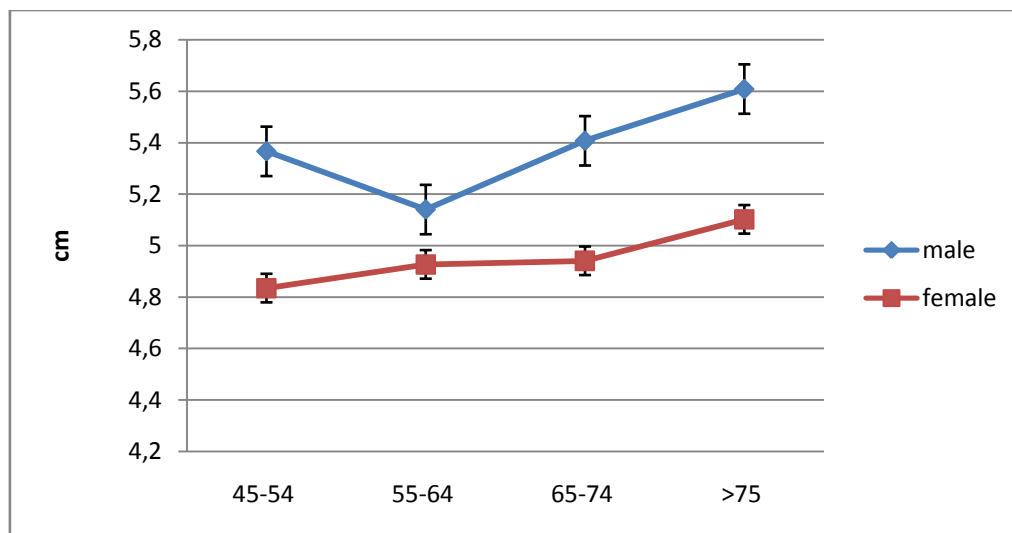


Fig. 16. Age related dynamics of nasal bridge length (*n-prn*)

We found that in men the upper lip and nose angle decreased from 101.7 ° to 87.8 °, in women - from 96.9 ° to 89.6 °, respectively (Fig. 17).

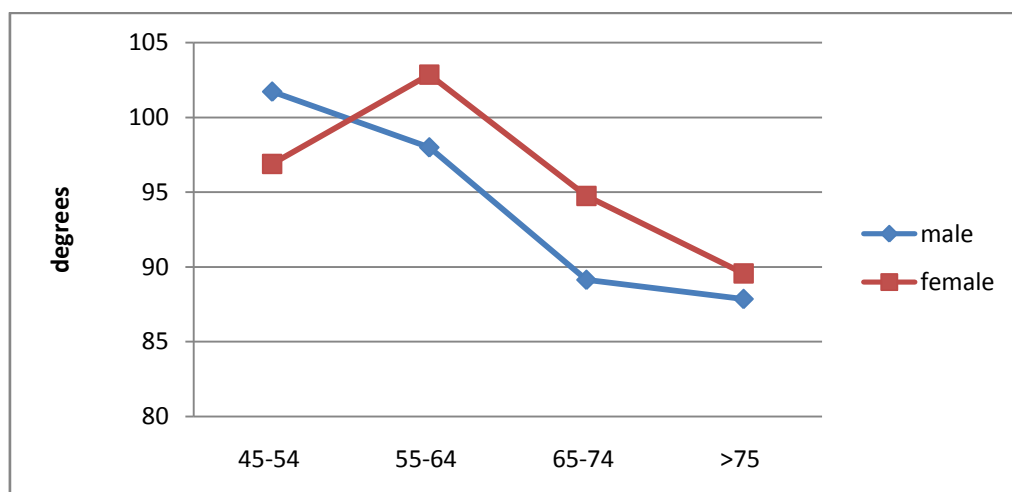


Fig. 17. Age related dynamics of upper lip and nose angle

III.4. Age related dynamics of facial indices

The aging dynamics of women's cephalic index had a decreasing trend. The index value in the age group of youngest subjects was 84.6 ± 3.3 and 83 ± 3.1 in the oldest age group, while in men increased from 80.2 ± 7.8 to 82.4 ± 2.6 , respectively. Statistically significant differences between the age groups of both sexes ($p < 0.001$) was found (Fig. 18).

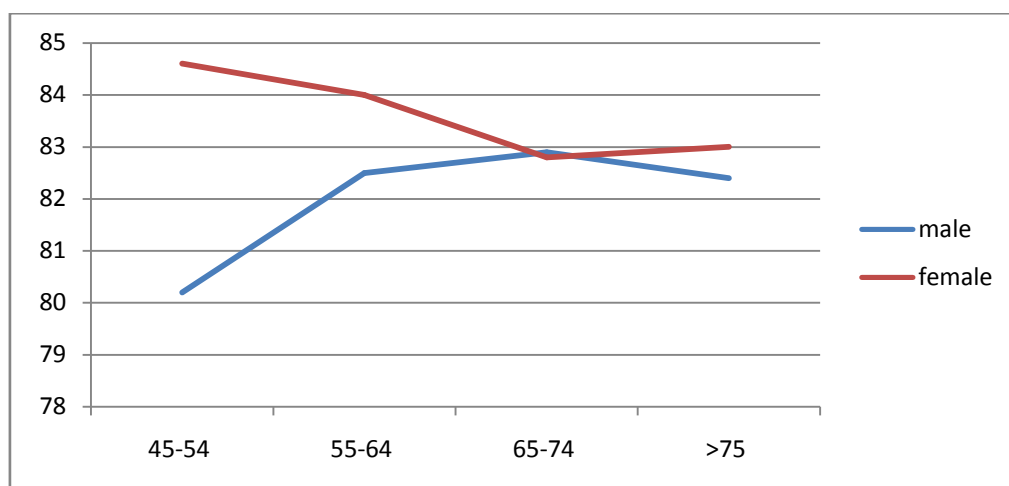


Fig. 18. Aging dynamics of cephalic index

Face index in men had a decreasing trend from 91.6 ± 8.4 to 90 ± 4.5 , in women from 88.1 ± 4.5 to 86.1 ± 9.6 (Fig. 19). Did not found any statistically significant difference between the age groups in women ($p < 0.05$) and men ($p > 0.05$).

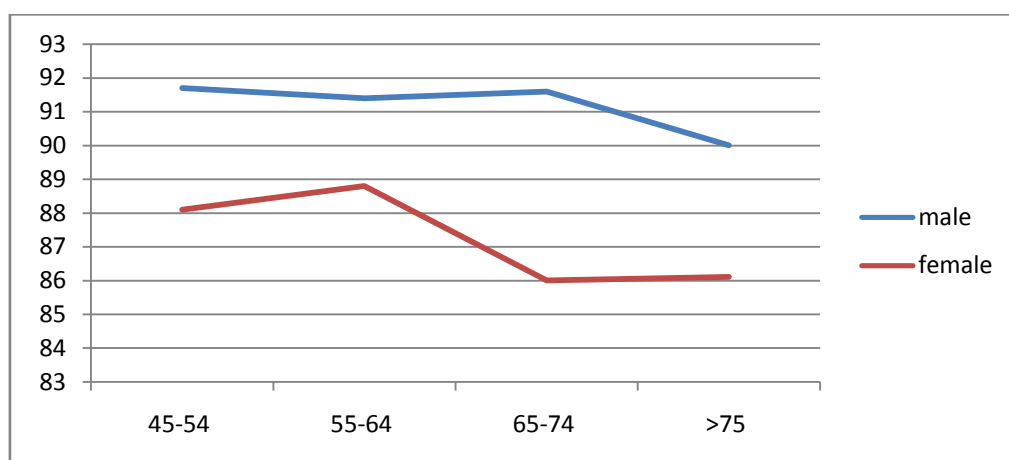


Fig. 19. Aging dynamics of face index

Mandibular index in males decreased from 41.4 ± 4.6 in 45-54 years age group to 40.2 ± 4.42 over 75 years, in females from 42.1 ± 4.2 to 39.1 ± 4.1 , respectively (Fig. 20). Statistically significant differences between the age groups of men were not found ($p > 0.05$); in women was statistically significant difference between age groups of 45-54 years old and older than 75 years ($p < 0.001$).

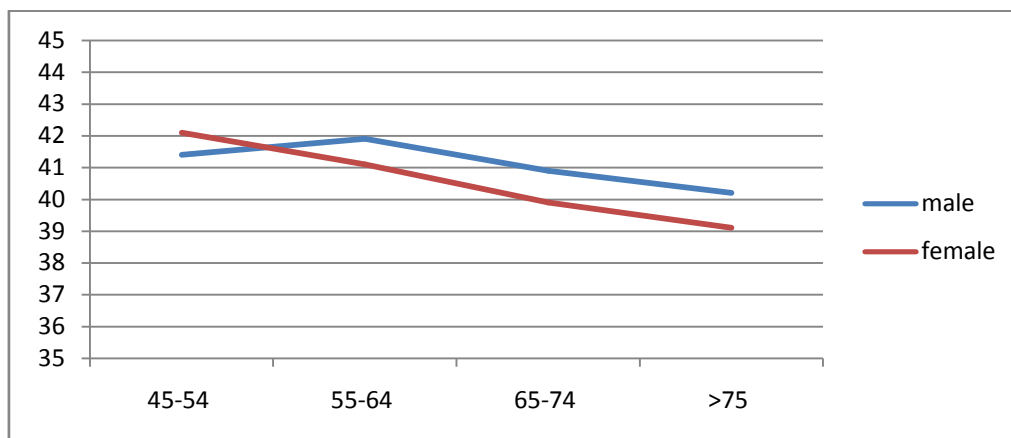


Fig. 20. Aging dynamics of mandibular index

The upper lip height and mouth width index differences between the age groups were statistically significant in subjects of both sexes ($p < 0.001$). In men was found decline of the index from 36.4 ± 8.8 to 29.5 ± 6.6 , in women remained decreasing trend, e.g. the index decreased from 36.2 ± 6.3 to 31.5 ± 8 in the youngest and oldest age groups, respectively (Fig. 21).

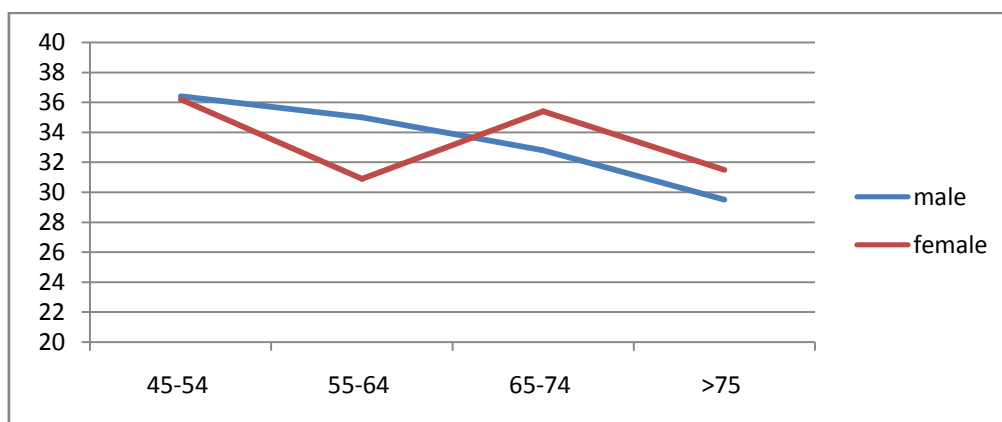


Fig. 21. Aging dynamics of upper lip height and mouth width index

Lower lip height and mouth width index in men was 35 ± 8.5 in the group of 45-54 years old and 29.5 ± 5.4 in the group over 75 years old; in females 31.9 ± 5.8 and 29.7 ± 9.3 , respectively (Fig. 22). Differences between age groups were statistically significant for both men and women ($p < 0.001$).

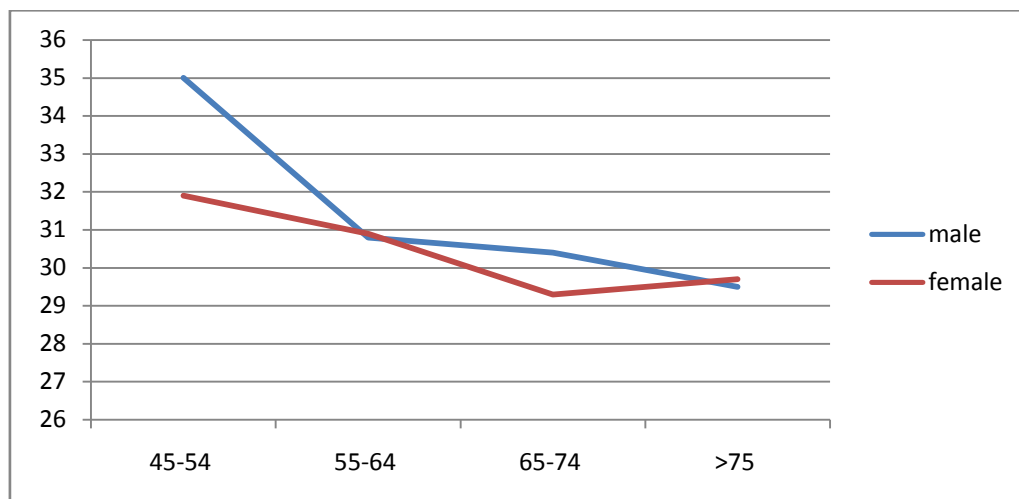


Fig. 22. Aging dynamics of lower lip height and mouth width index

Mouth and mandibular width index value increased for both men and women, from 49.3 ± 4.6 in the youngest age group of men to 52.3 ± 4.3 in the oldest group ($p < 0.05$), and women - from 51.2 ± 3.6 to 52.3 ± 5.9 , respectively ($p < 0.05$) (Fig. 23).

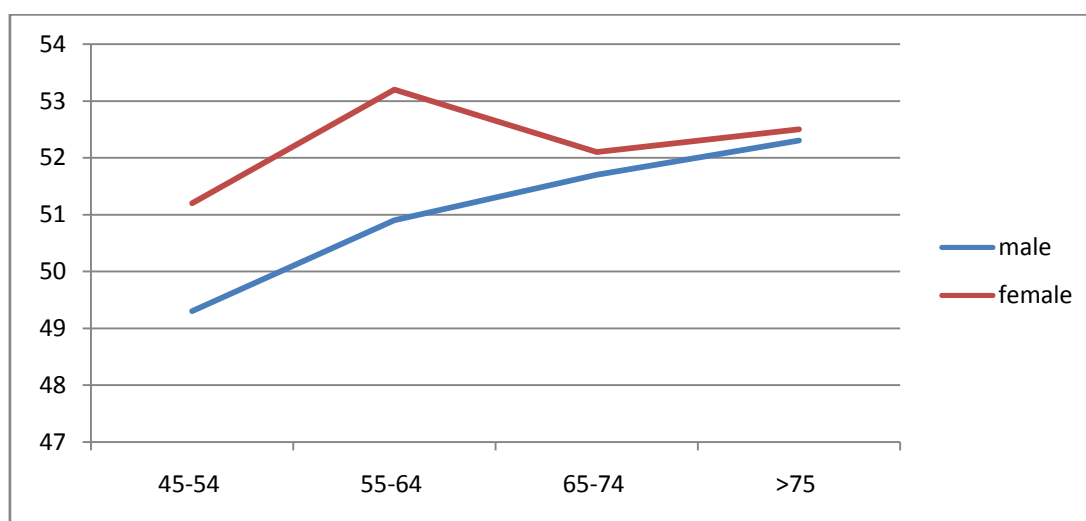


Fig. 23. Aging dynamics of mouth and mandibular width index

In the aging dynamics of lower lip and the upper lip height index statistically significant difference between the groups was not identified (Fig. 24).

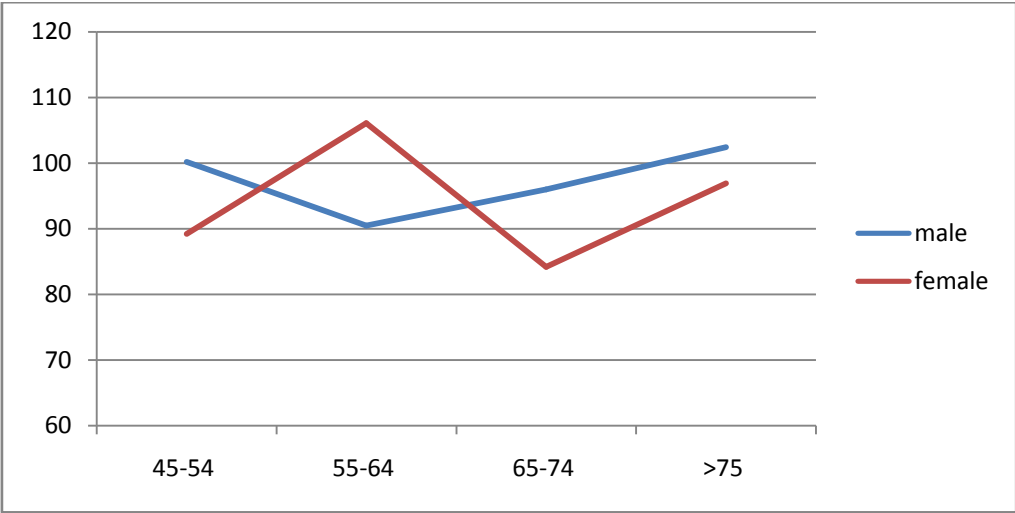


Fig. 24. Aging dynamics of lower lip and upper lip height index

Assessing the mandibular width and facial height index dynamics a statistically significant difference between the age groups of women was not found ($p > 0.05$), but this difference was found in men ($p < 0.001$). Men's index value ranged from 93.3 ± 6.4 in the youngest age group to 96.9 ± 5.8 in the oldest, women's - from the 94.2 ± 6.97 to 95.8 ± 8.6 , respectively (Fig. 25).

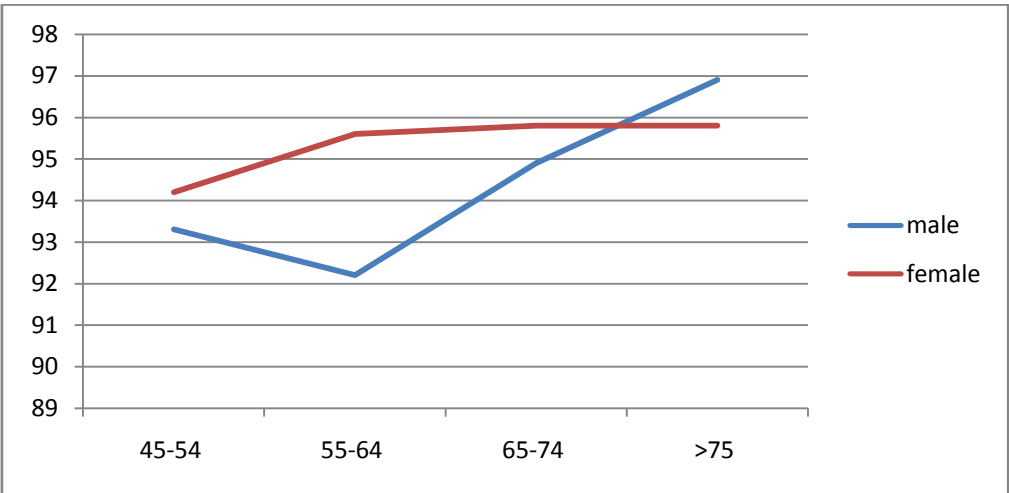


Fig. 25. Aging dynamics of mandibular width and facial height index

The upper and lower lip vermilion index among women differed statistically significant ($p < 0.05$) from 98 ± 41.6 in 45-54 years age group to 83.6 ± 50.3 in age group over 75 years old. In men the difference between the age groups was not significant, e.g. the index value increased from 71.1 ± 34.4 to 72.7 ± 33.4 (Fig. 26).

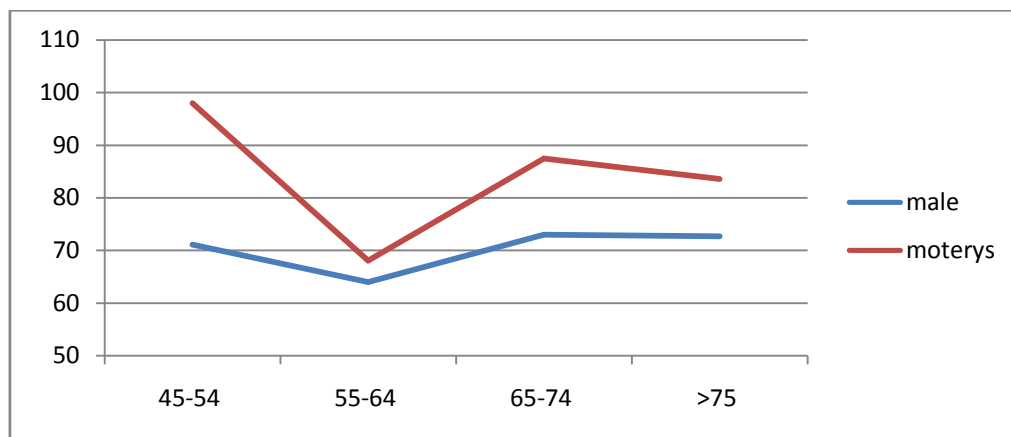


Fig. 26. Aging dynamics of the upper and lower lip vermilion index

The upper vermilion and cutaneous lip height index was 27.1 ± 7.8 in youngest men age group and 17.3 ± 9.3 in the group over 75 years old. In women the index values decreased from 44.9 ± 17.96 in youngest age group to 32.3 ± 14.3 in the oldest (Fig. 27). We found statistically significant differences between the age groups for both men ($p < 0.001$) and women ($p < 0.05$).

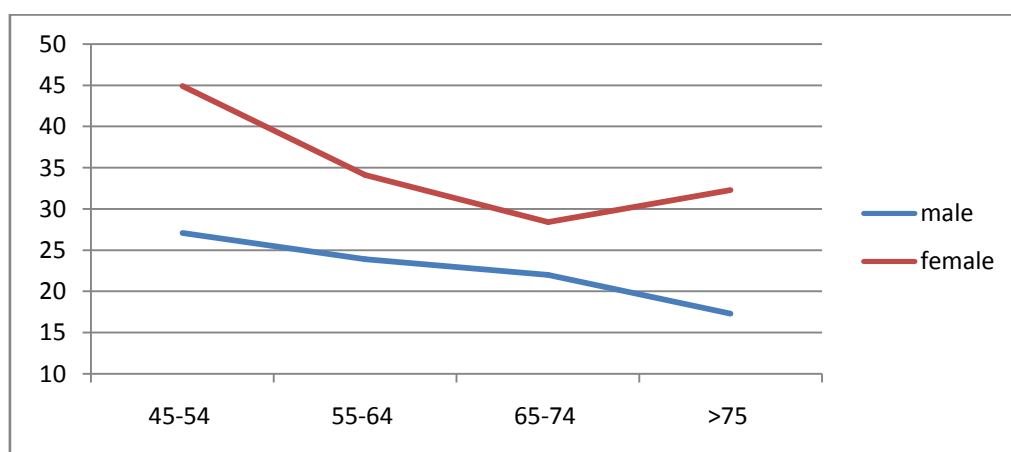


Fig. 27. Aging dynamics of the upper vermilion and cutaneous lip height index

III.5. Dental status of study subjects

III.5.1. Prevalence of edentulism and causes of teeth loss

61% of the study subjects of Lithuanian ethnic population over 45 years old were partially edentulous. Toothless jaws were found in 20% of population. We found 17.5% of participant with one toothless jaw. Only 1.6% of all study participants had all remaining teeth. There is a statistically significant difference in remaining teeth number between all male ($p < 0,001$) and female ($p < 0,001$) age groups. Also it was noticed statistically significant reverse relation between age and number of remaining teeth in men ($p < 0.05$) and women ($p < 0.001$). The main causes for losing teeth indicated by study subjects were dental caries (57.4%), periodontal pathology (34.3%) and financial reasons (1.7%).

III.5.2. Connections between number of remaining teeth and social - economic factors

By analyzing connections between number of remaining teeth and age as well as social – economic factors no statistically significant difference was identified among gender, however there was found statistically significant reverse correlation between aging and number of remaining teeth. Common analysis of number of remaining teeth showed that participants in the age group of 45-54 years old had 21.92 ± 7.58 remaining teeth and in the age group over 75 years old - 4.91 ± 6.32 .

Participant with the higher education level had statistically significant ($p < 0.001$) more remaining teeth than those with the lower education level. Persons with the high education had 17.4 ± 9.3 remaining teeth, those with the primary education - 7.1 ± 7.3 . Statistically significant correlation between number of remaining teeth and marital status was not found.

III.5.3. Connections between number of remaining teeth and addictions

The results of the study shows, that were statistically significant correlation between alcohol consumption and teeth loss ($p < 0.001$), but we did not found statistically significant relationship between smoking and number of remaining teeth. Smoking persons had 12.8 ± 10.7 remaining teeth and non smoking – 12.2 ± 9.6 . Alcohol abused persons had 1.5 ± 2.5 remaining teeth, while the other had 12.6 ± 9.7 remaining teeth.

III.5.4. Connections between the number of remaining teeth and other factors

The relationship between breathing habits, diseases, sleep and nutritional characteristics and the number of remaining teeth was analyzed. Statistically significant relationship was found between the number of remaining teeth and the incidence of respiratory diseases ($p < 0.05$), perverted nasal septum ($p < 0.001$), breathing through the nose ($p < 0.05$), sleeping with open mouth ($p < 0.05$), sleep duration ($p < 0.05$), variety of diet ($p < 0.001$), eating of fresh vegetables twice a day ($p < 0.001$), frequency of consumption of solid food ($p < 0.001$). The aforementioned factors had statistically significant relationship with the number of remaining teeth. The other examined factors, e.g. adenoid surgery, times of use of hot food per day, use of food supplements and the number of remaining teeth did not have statistically significant relationship.

By assessing the overall health status no relationship was found between the number of remaining teeth and use of medicine ($p > 0.05$), although the correlation between the number of remaining teeth and the incidence of some chronically diseases was observed. For example, patients with hypertension had an average of 10.6 ± 9.6 remaining teeth and the rest of participants - 13.1 ± 9.7 teeth, statistically significant relationship was found ($p < 0,05$). Statistically significant reverse relationship was found between women having a diabetes and tooth loss ($p < 0.05$), although such trend was not found in men. In general, participants with chronic diseases had less teeth ($p < 0.001$) than the rest of

participants, average of remaining teeth was 11.1 ± 9.1 and for those having no chronic diseases - 13.8 ± 10.4 .

III.5.5. Dental prosthetic status of study participants

Number of lost teeth was similar in men and women, however women had statistically significant more dental prosthetic treatment ($p < 0.05$) (Tab. 4).

Tab. 4. Number of study participants with dental prosthesis in different age groups

Gender	Age group	Prosthetic treatment				Total	
		yes		no		n	%
		n	%	n	%		
Men							
	45–54	48	60,8	31	39,2	79	100
	55–64	48	61,5	30	38,5	78	100
	65–74	50	58,1	36	41,9	86	100
	>74	51	68,0	24	32,0	75	100
Total		197	61,9	121	38,1	318	100
Women							
	45–54	42	52,5	38	47,5	80	100
	55–64	47	59,5	32	40,5	79	100
	65–74	66	82,5	14	17,5	80	100
	>74	71	84,5	13	15,5	86	100
Total		226	70,0	97	30,0	323	100
Men and women							
	45–54	90	56,6	69	43,4	159	100
	55–64	95	60,5	62	39,5	157	100
	65–74	116	69,9	50	30,1	166	100
	>74	122	76,7	37	23,3	159	100
Total		423	66,0	218	34,0	641	100

n – number of cases

By analyzing the prosthesis types, it was found that the number of removable prosthesis increases with age (Tab. 5).

Tab. 5. Types of prosthetic treatment and percent of persons who had this kind of treatment

Age group	Fixed prosthesis	Removable prosthesis	Fixed and removable prosthesis
45-54	72,1%	11,5%	16,3%
55-64	60,9%	21,7%	17,4%
65-74	16,4%	64,8%	18,8%
>75	11,8%	83,2%	5,0%
Total	38,6%	47,0%	14,4%

By studying the relationship between the social factors and dental prosthetics, we found that the participants with the higher level of education had statistically significantly more dental prosthesis, than participants with lower education ($p < 0.001$). Between those living in the family was found statistically significant ($p < 0.05$) more subjects with the dental prosthesis as between those unmarried and divorced.

III.6. Approach of study participants to oral health

In questionnaire was asked about personal teeth brushing habits, satisfaction with oral health status and how often they are visiting the odontologist. Only 36 % of all respondents brushed their teeth twice a day, 34.3 % once a day and 26.7 % of study subjects don't brush their teeth at all. In all age groups women carried for their teeth better than men. Study participants, cleaning their teeth twice a day or more often, had an average of 15.3 ± 9.9 remaining teeth and those who didn't clean had 9.4 ± 8.5 . There is a statistically significant decrease in teeth brushing with the age for both genders ($p < 0.001$) and statistically significant difference in frequency of tooth brushing between men and women ($p < 0.001$).

69.7 % of study participants assessed their oral health as unsatisfactory, 30.3 % of study subjects were satisfied with personal oral health. Persons positively assessing their oral health had statistically significant ($p < 0.05$) more remaining teeth to compare with those with negative assessment, e.g. 14.3 ± 10.6 and 11.4 ± 9.2 , respectively.

22 % of study participants reported regularly visiting odontologist. We found that a regularly dentist attending individuals had statistically significant ($p < 0.05$) more teeth than the rest. Regularly dentist visiting individuals had an average of 17.6 ± 9.5 remaining teeth, and who did not 10.8 ± 9.3 . Subjects who have treated deciduous teeth (13.6% of all subjects), had a statistically significant ($p < 0.001$) more remaining teeth than those who not. People with dental care has been provided since childhood, the study had an average of 17 ± 9.1 remaining teeth, and those who did not treated deciduous teeth had 11.1 ± 9.5 teeth.

41.7 % of study participants responded being satisfied with their current oral health. Study results showed that women, satisfied with their oral health, have statistically significant ($p < 0.05$) more remaining teeth than men.

III.7. Relationship between facial proportions and dental prosthetic status

To investigate connections between dental prosthetic status and facial proportions all studied participants were divided into those who had a dental prosthetic treatment and those who hadn't. Indices of the face proportions were calculated and presented graphically. The main attention was paid to indices, which reflects the proportionality of anatomical structures of the lower third face, because there is connection to teeth loss and dental prosthesis.

In aging dynamics of nose - face height index in men and women who have dental prosthesis, was observed data reduction. The index value decreased from 44.2 ± 2.2 in the youngest men age group to 30.5 ± 2.3 in the oldest age group, women from 45 ± 2 to 32 ± 4.3 , respectively (Fig. 28). The index value also decreased for subjects who had no dental prosthesis - men from 46 ± 2.6 to 30 ± 3.3 for women - from 45 ± 2 to 31.5 ± 4.4 (Fig. 29).

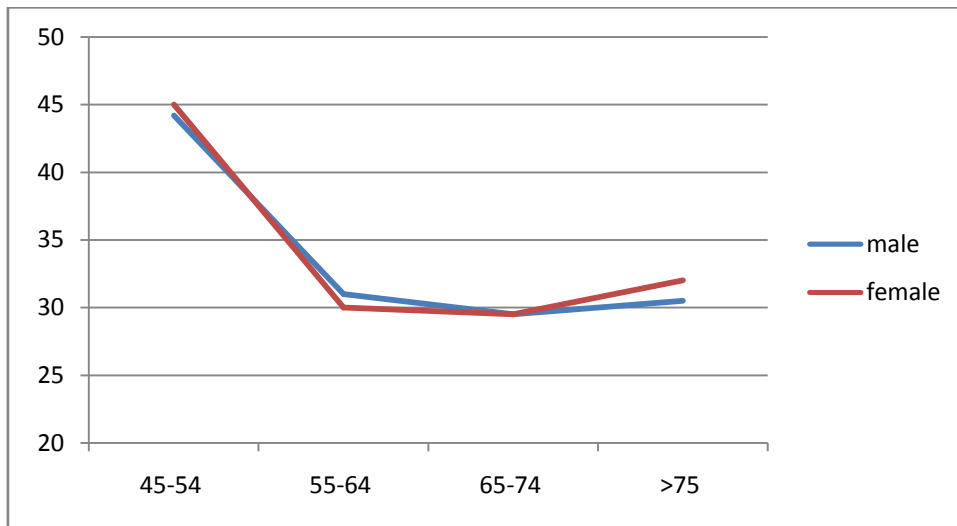


Fig. 28. Aging dynamics of nose – face height index (participants with dental prosthesis)

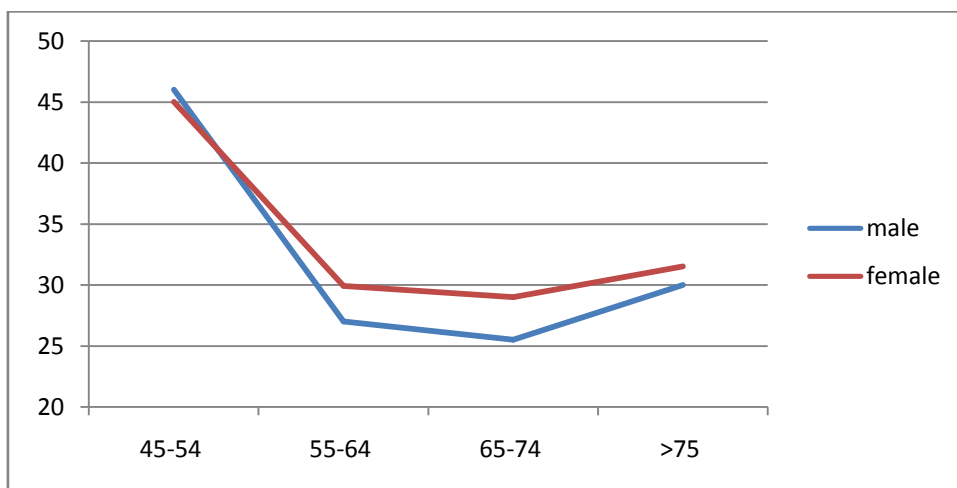


Fig. 29. Aging dynamics of nose – face height index (participants without dental prosthesis)

By comparing age related dynamics between the nose - middle third face index of subjects with or without dental prosthesis (Fig. 30) data shows a slight difference. Index ratio of prosthetically treated subjects (Fig. 31) in 45-54 age group was 71.4 ± 5.5 and 45 ± 2.8 in older than 75 years old among men, in women 73.7 ± 6 and 47.9 ± 4.9 , respectively. In subjects with dental prosthesis, the indicator value among men decreased from 73.2 ± 5.2 to 46 ± 3.4 and in women - from 70 ± 4 to 48.6 ± 3.6 .

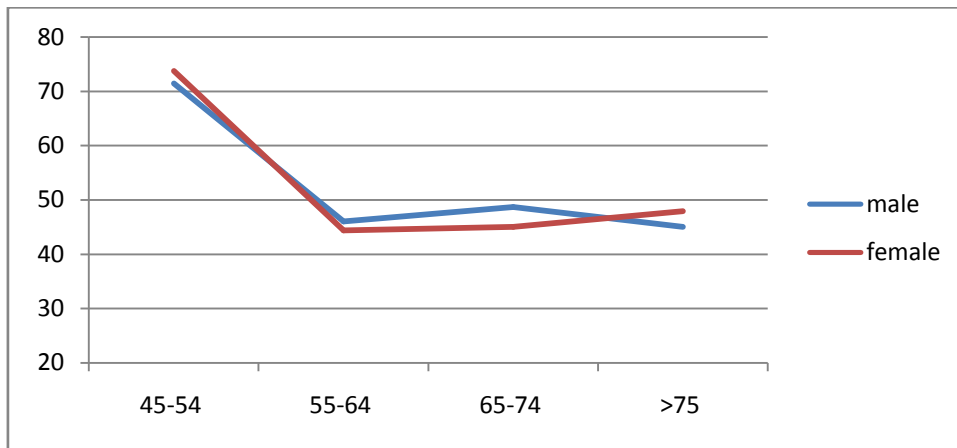


Fig. 30. Aging dynamics of nose – middle third face height index (participants with dental prosthesis)

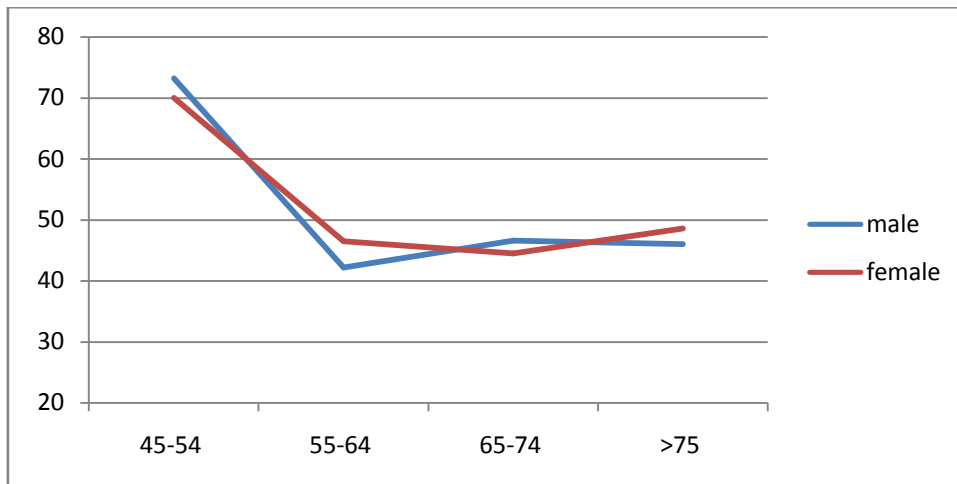


Fig. 31. Aging dynamics of nose – middle third face height index (participants without dental prosthesis)

Middle third face depth - lower third face depth index ratios in both groups varied smoothly, increasing trend was observed. Compared to the youngest age groups and the oldest, in male with dental prosthesis index increased from 83.5 ± 5.9 to 90.6 ± 5.9 ; in female - increased from 85.9 ± 5.2 to 91.2 ± 4.8 (Fig. 32). In subjects with dental prosthesis the index rates increased from 87.7 ± 3.5 in the age group of youngest men to 90 ± 7.3 – in oldest; women from 83.8 ± 1.8 to 90.2 ± 7.2 , respectively (Fig. 33).

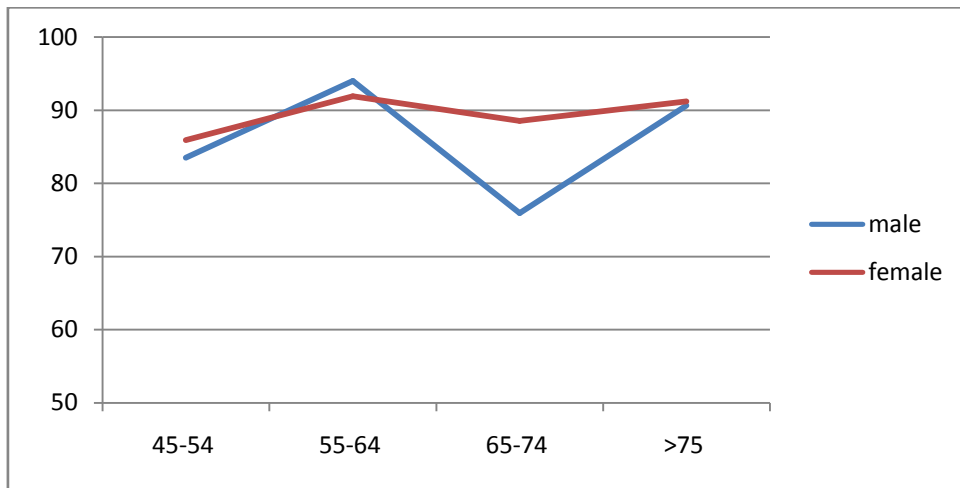


Fig. 32. Aging dynamics of middle third face depth - lower third face depth index (participants with dental prosthesis)

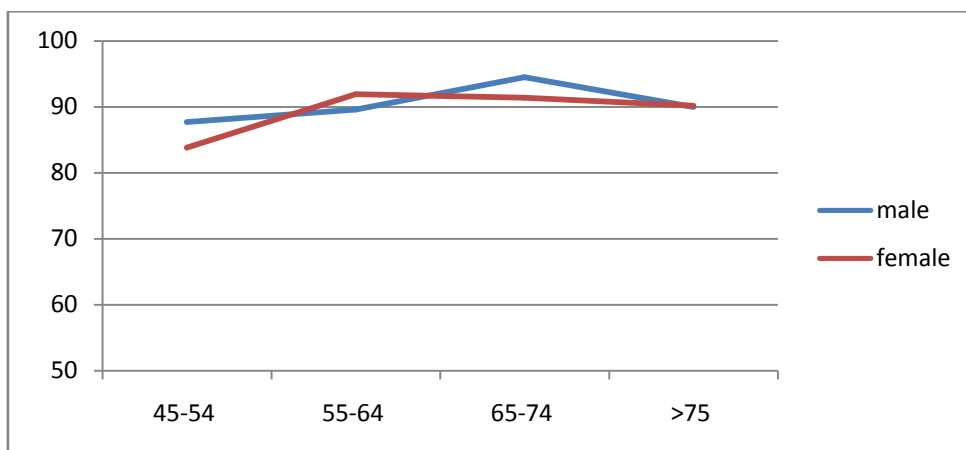


Fig. 33. Aging dynamics of middle third face depth - lower third face depth index (participants without dental prosthesis)

The overall mouth width – face width index increasing trend was observed. In men with dental prosthesis index ratio gradually changed from 90.7 ± 1.8 in 45-54 years age group to 104.3 ± 4.5 in oldest age group. Meanwhile, men who had no dental prosthesis, mouth width – face width index was 92.5 ± 3.1 in youngest age group and 103.8 ± 6.4 in oldest age group. In both groups of women increasing trends in different age groups was noticed (Fig. 34 and 35).

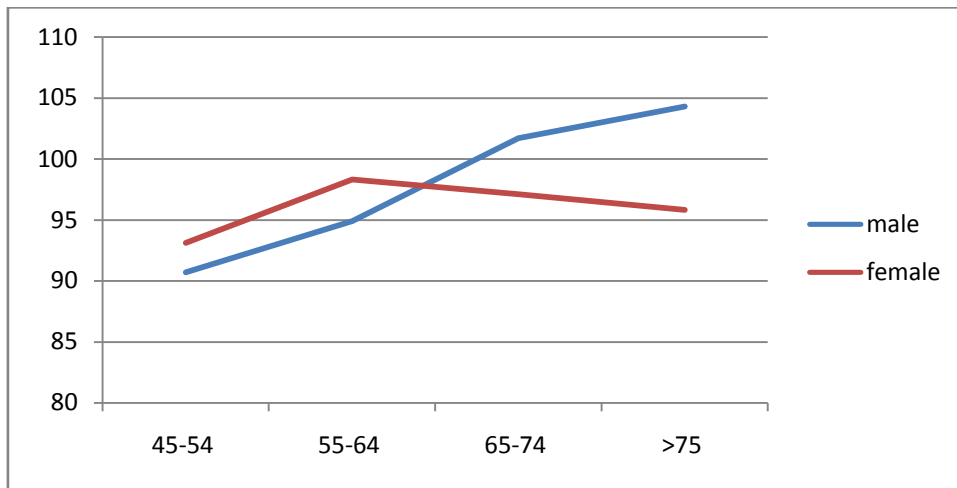


Fig. 34. Aging dynamics of mouth width – face width index (participants with dental prosthesis)

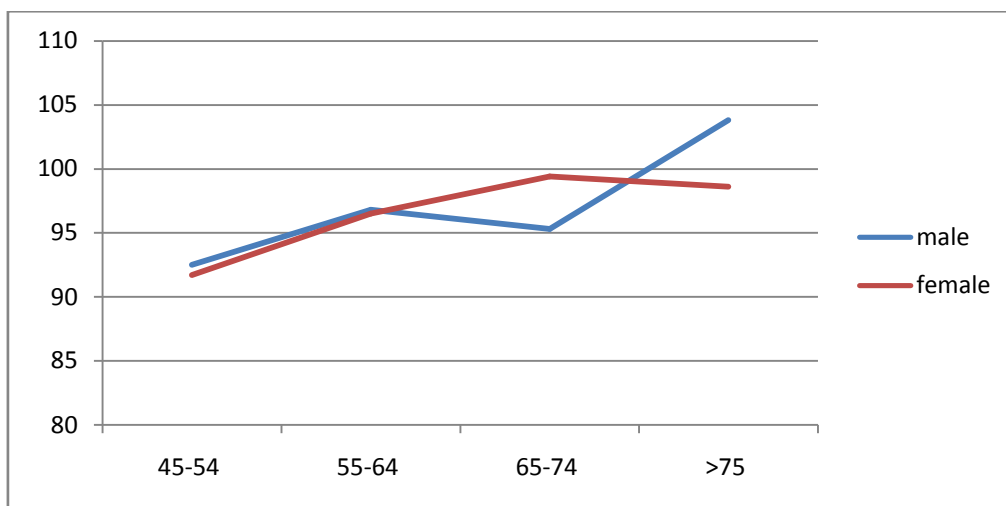


Fig. 35. Aging dynamics of mouth width – face width index (participants without dental prosthesis)

Dynamics of the upper third face - the middle third face index in both men groups, e.g. with and without dental prosthesis showed an increasing trend (Fig. 36 and 37). In youngest men group with dental prosthesis index was 72.5 ± 1.2 , in the oldest men group was 93 ± 1.8 , while in men without dental prosthesis the index ratio increased from 94.5 ± 2.5 to 125 ± 5.3 , respectively. In women without dental prosthesis index was 81.7 ± 1.2 in the youngest age group and 86.9 ± 8.4 in the oldest age group. Meanwhile, in

women with dental prosthesis the index ratio in 45-54 age group was 82.2 ± 1.7 and decreased to 79.9 ± 1.8 in the group of older than 75 years old.

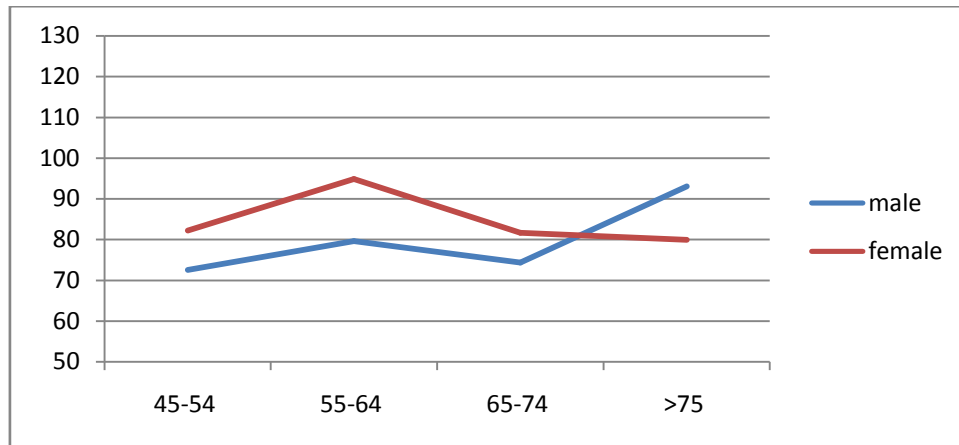


Fig. 36. Aging dynamics of upper third face - the middle third face index (participants with dental prosthesis)

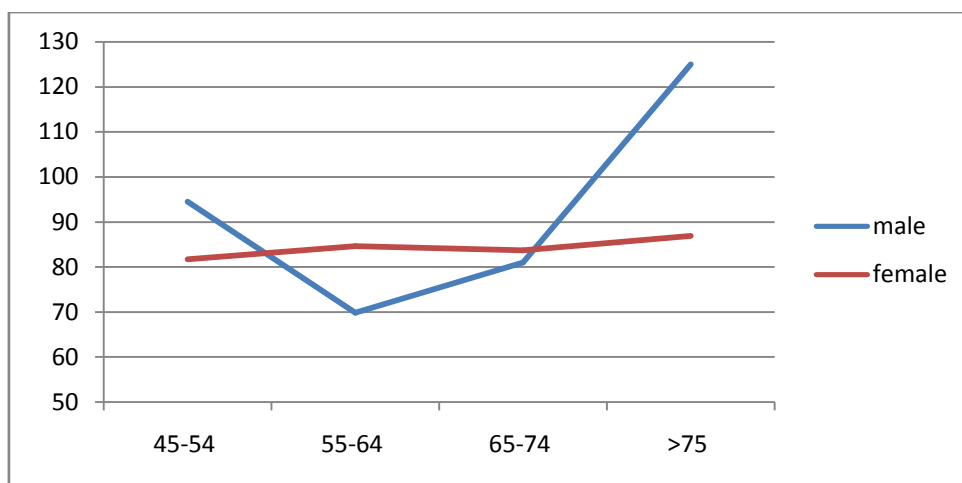


Fig. 37. Aging dynamics of upper third face - the middle third face index (participants without dental prosthesis)

In the dynamics of the upper third face - lower third face index in men and women who have dental prosthesis an increasing trend was observed (Fig. 38 and 39). The index ratio increased from 83.5 ± 15.2 in youngest men age group to 98.2 ± 15.6 in oldest age group, in women increased from 90.8 ± 16.8 to 101.2 ± 17.6 , respectively. The index

value also increased in subjects who had no dental prosthesis – in men from 105.5 ± 22.6 to 146 ± 63 , in women - from 91 ± 13.2 to 104.6 ± 6.2 , respectively.

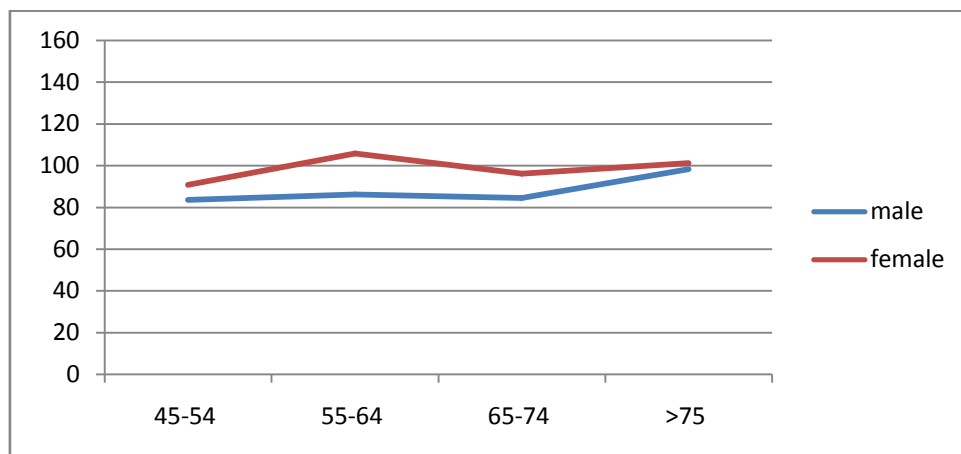


Fig. 38. Aging dynamics of upper third face - lower third face index (participants with dental prosthesis)

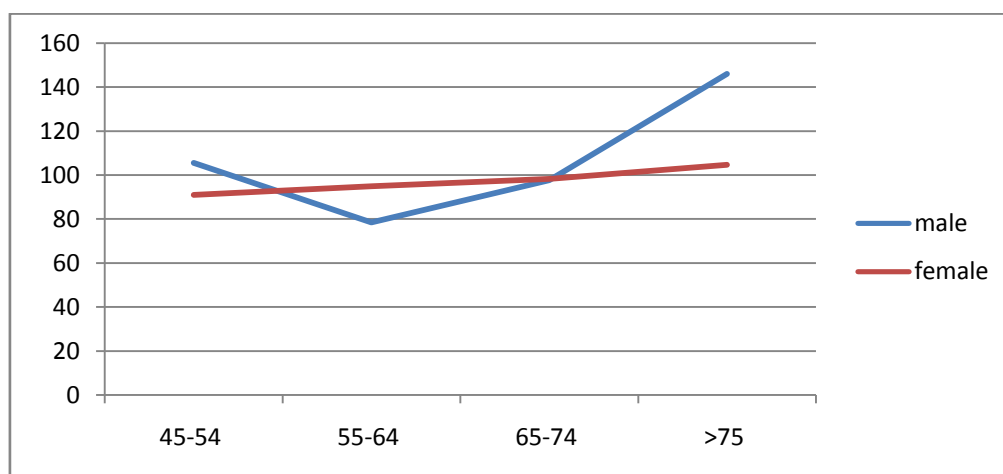


Fig. 39. Aging dynamics of upper third face - lower third face index (participants without dental prosthesis)

We did not find any coherent middle third face index trend in men and women with and without dental prosthesis (Fig. 40 and 41). In men with dental prosthesis the index ratio increased from 54.5 ± 8.5 in 45-54 years age group to 56.6 ± 3.8 in older than 75 years age group. In men without dental prosthesis middle third face index decreased from 59.9 ± 7.1 in 45-54 years age group to 52.8 ± 3.5 in older than 75 years old age

group. In women with dental prosthesis the index ratio was 53.9 ± 2.4 in 45-54 years age group and 51.2 ± 1.9 in older than 75 years age group. In women without dental prosthesis middle third face index ratio decreased from 59.9 ± 7.1 in 45-54 years age group to 52.8 ± 3.5 in over 75 years age group. Index declining trend was also found in women without dental prosthesis, e.g. from 56.6 ± 3.8 to 53.4 ± 3.3 , except for the oldest age group, where the index increased up to 56.9 ± 7 .

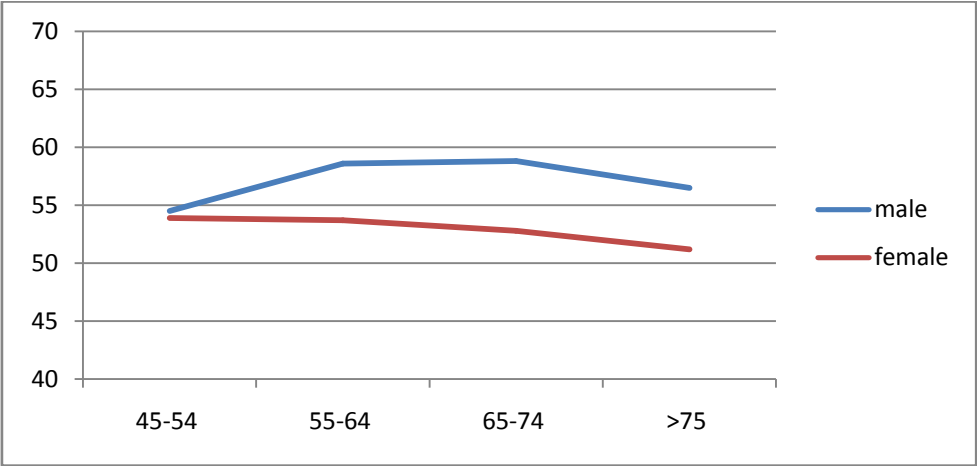


Fig. 40. Aging dynamics of middle third face index (participants with dental prosthesis)

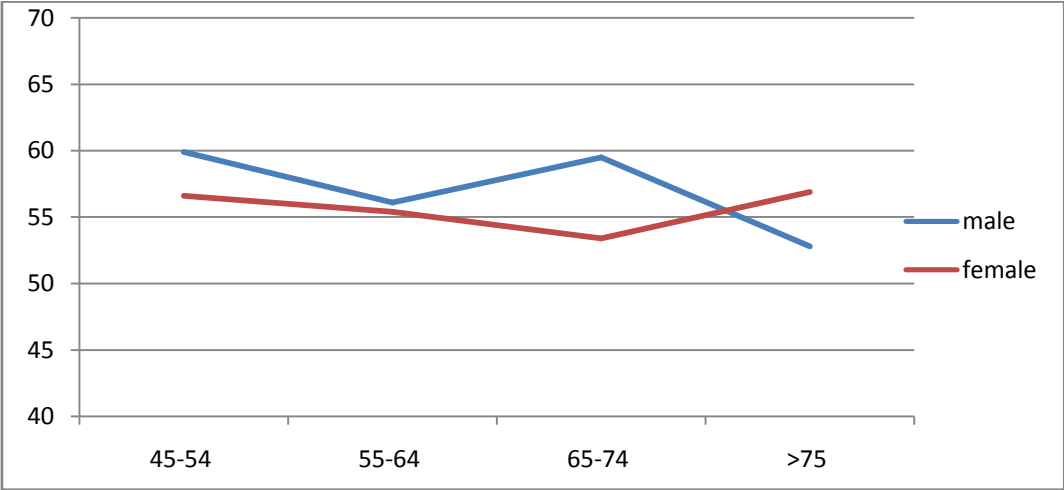


Fig. 41. Aging dynamics of middle third face index (participants without dental prosthesis)

By analyzing the mandibular index in men with dental prosthesis index ratio was 43.4 ± 3.2 in the youngest age group and 40.7 ± 4.2 in the oldest age group; in women - 42.7 ± 4 and 39 ± 4.2 , respectively. (Fig. 42 and 43). In men and women without dental prosthesis index ratio was less distributed: in both men and women the decrease of the index in the 55-64 age groups was noticed. In males, the index decreased from 40.4 ± 5.2 in 55-64 year's age group to 39.2 ± 4.7 in over 75 years age group, in women - from 42.2 ± 2.4 to 40 ± 5.1 , respectively.

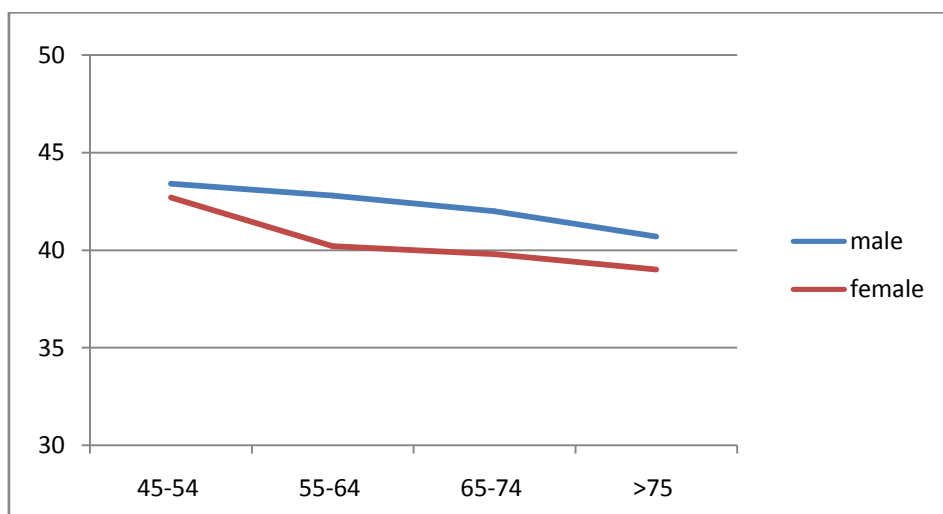


Fig. 42. Aging dynamics of mandibular index (participants with dental prosthesis)

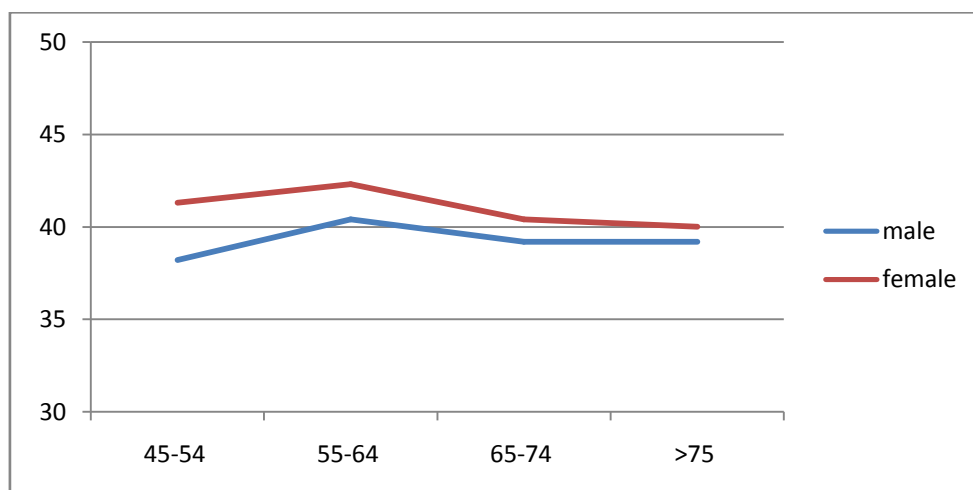


Fig. 43. Aging dynamics of mandibular index (participants without dental prosthesis)

In the aging dynamics of the upper lip height - mouth width index a decreasing trend in men with and without dental prosthesis was noticed (Fig. 44 and 45). The index ratio in men with dental prosthesis was 33.5 ± 4.7 in the youngest age group and 27.6 ± 6.8 in the oldest age group. By analyzing women with and without dental prosthesis, a clear trend of the index dynamics was not noticed in both cases.

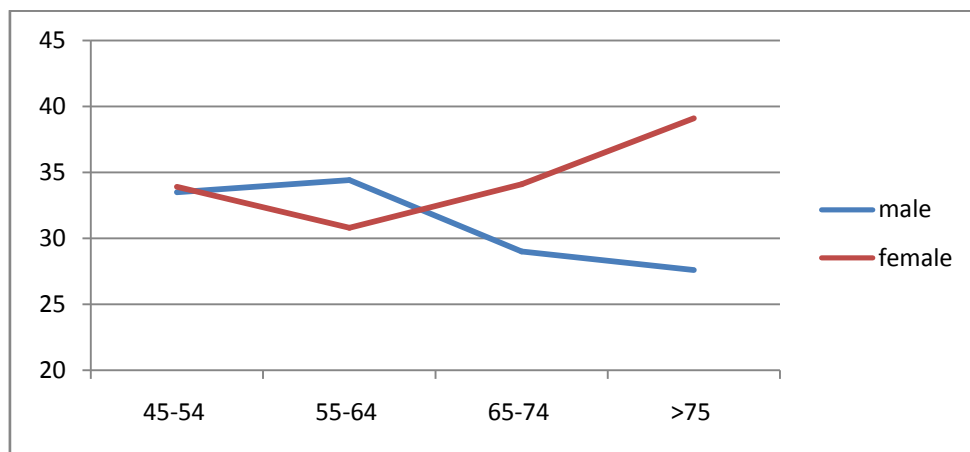


Fig. 44. Aging dynamics of upper lip height - mouth width index (participants with dental prosthesis)

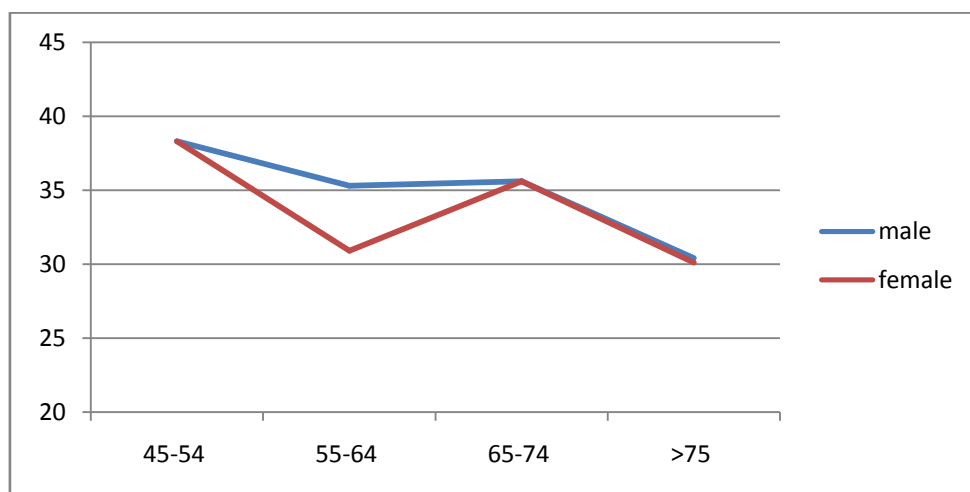


Fig. 45. Aging dynamics of upper lip height - mouth width index (participants without dental prosthesis)

By analyzing the mouth - mandible index data an increasing trend was found in men with and without dental prosthesis and in women without dental prosthesis (Fig. 46 and 47). In men with dental prosthesis, the index ratio increased from 47.9 ± 3.1 in the youngest age group to 54.2 ± 2.2 in the oldest, in men without dental prosthesis an increasing trend from 50.2 ± 5.2 in the youngest age group to 51.3 ± 4.8 in the oldest age group was noticed. In women with dental prosthesis the index had an equal distribution in the age groups from 45 years old to 74 years old. Only in the oldest age group of women mouth - mandible index ratio decrease was found. The index ratio in women without dental prosthesis increased from 50.7 ± 3.6 in the youngest age group to 54.1 ± 4.3 in the oldest.

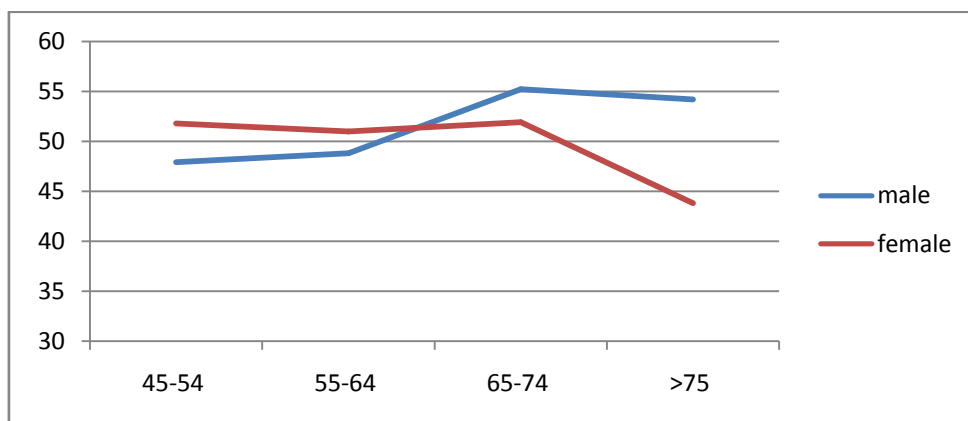


Fig. 46. Aging dynamics of mouth - mandible index (participants with dental prosthesis)

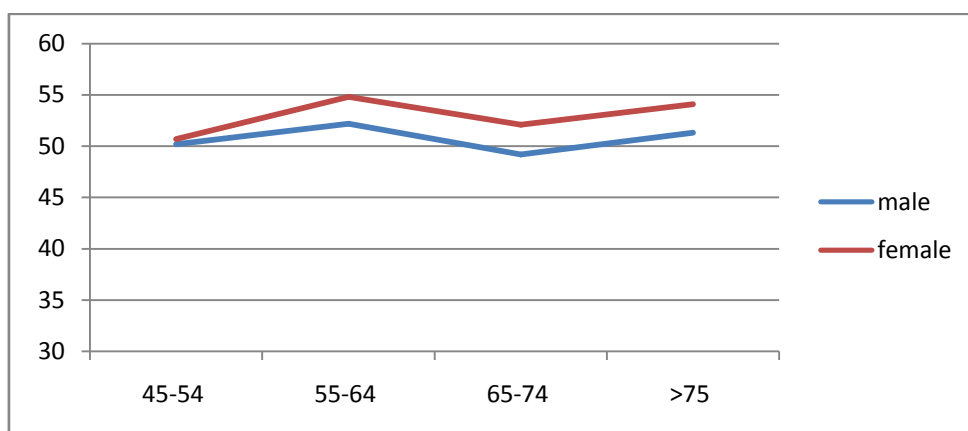


Fig. 47. Aging dynamics of mouth - mandible index (participants without dental prosthesis)

Study has shown that age-related dynamics of the face index rates tend to decrease in subjects with dental prosthesis (Fig. 48). In men with dental prosthesis index ratio was 94.5 ± 7.2 in the youngest age group and 88.9 ± 3.1 in the oldest; in women 88.1 ± 4.8 and 87 ± 4.2 , respectively (Fig. 49). In men and women without dental prosthesis, the facial index ratio varied differently among age groups. The index ratio in women was 88 ± 4.2 in the 45-54 years age group and 80.8 ± 4.8 in over 75 years age group; in men without dental prosthesis the face index ratio increased from 87.2 ± 8.4 to 92.3 ± 6.1 , respectively.

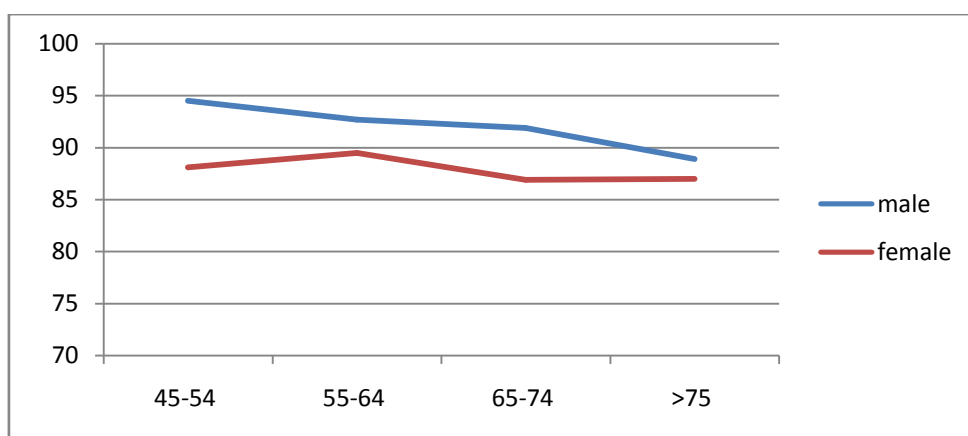


Fig. 48. Aging dynamics of facial index (participants with dental prosthesis)

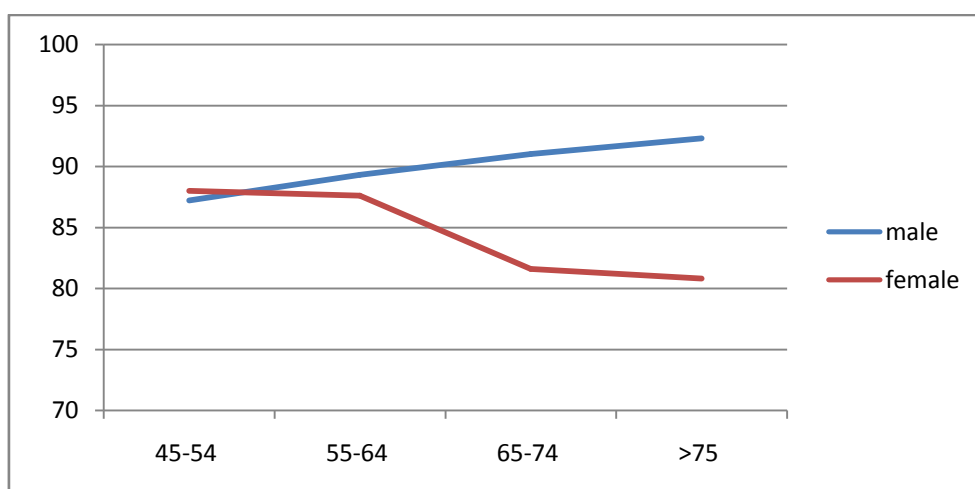


Fig. 49. Aging dynamics of facial index (participants without dental prosthesis)

III.8. Multiplex relationships

III.8.1. Multiplex relationships between number of remaining teeth and social and economic factors

In order to investigate the relationship between the number of remaining teeth and social – economic factors the correlation analysis has been conducted. It was found, that following factors such as education, regular visits to dentist and frequency of teeth brushing had strong statistically significant ($p < 0.01$) correlation with number of remaining teeth. Age and teeth loss had a reverse significant correlation ($p < 0.01$).

By assessing the odds ratio data it was confirmed that age is the main factor affecting teeth loss. Men and women, older than 55 years have 8.65 times higher chance to lose their teeth to compare to the younger persons. Studies data confirmed, that also a greater chance to lose teeth have persons with the basic education and having bad care of oral health.

III.8.2. Multiplex relationships between number of remaining teeth and facial proportions

In order to investigate the relationship between the number of remaining teeth and facial proportions, study participants were divided into two groups according to whether they were prosthetically treated or not. Cluster analysis of correlation matrix was performed (Tab. 18-21). The results are presented in dendrograms (Fig. 50 - 53).

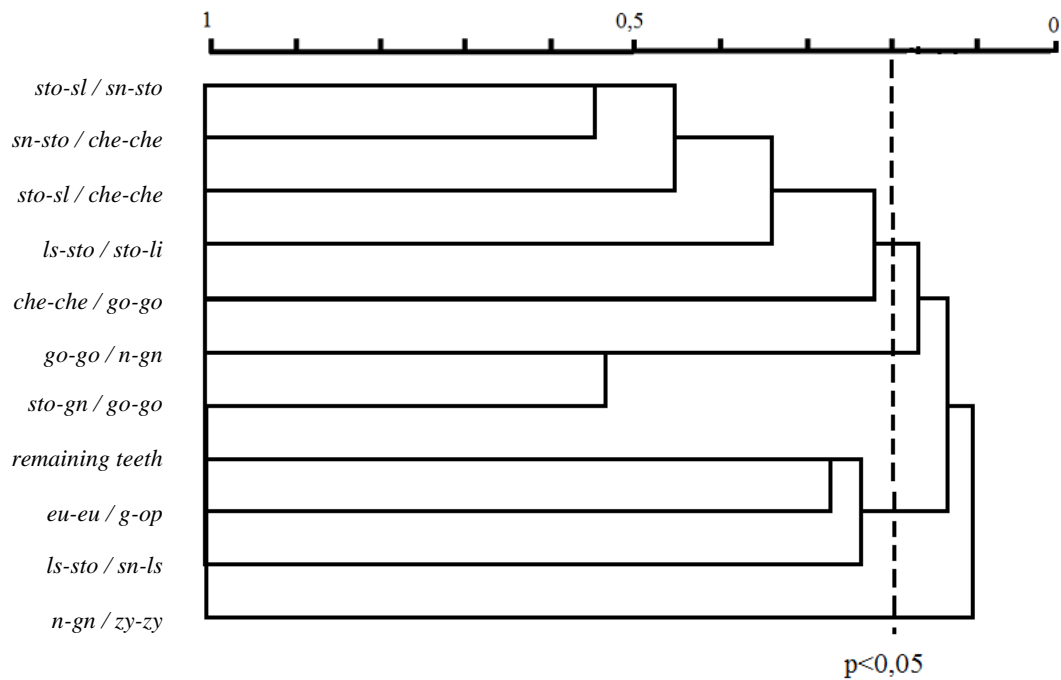


Fig. 50. Cluster dendrogram of correlation coefficients between number of remaining teeth and facial indices (women without dental prosthesis)

By analyzing cluster dendrogram of women without dental prosthesis (Fig. 50) we have noticed, that the features group into two clusters: the first group includes indices such as the lower lip height - upper lip height, upper lip height - mouth width, lower lip height - the mouth width, upper vermilion - lower lip vermilion, mouth width - mandible width, mandible width - face height and mandibular, and the second group consist of the number of remaining teeth, cephalic index and upper vermilion - upper lip cutaneous height index. The face index joined two clusters at the latest, statistically not significant.

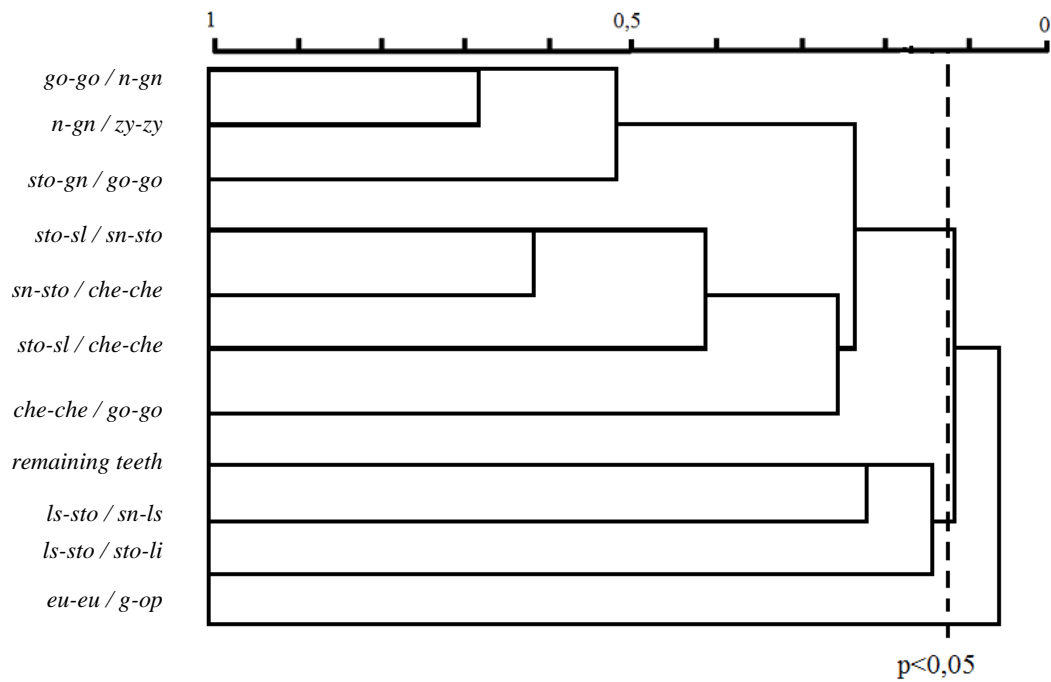


Fig. 51. Cluster dendrogram of correlation coefficients between number of remaining teeth and facial indices (women with dental prosthesis)

By analyzing cluster dendrogram of women with dental prosthesis (Fig. 51) we have noticed two clusters; the first group includes indices such as mandible width - face height, face, mandibular, lower lip height - upper lip height, upper lip height - mouth width, lower lip height - mouth width and the mouth width – mandible width, and the second group consist of the following indices: the number of remaining teeth, upper vermilion – upper lip cutaneous height and the upper height – lower lip height. Cephalic index joined these two clusters as a separate feature. Most of the indices referring to the lower third face proportions joined one cluster, and have no statistically significant correlation with the number of remaining teeth.

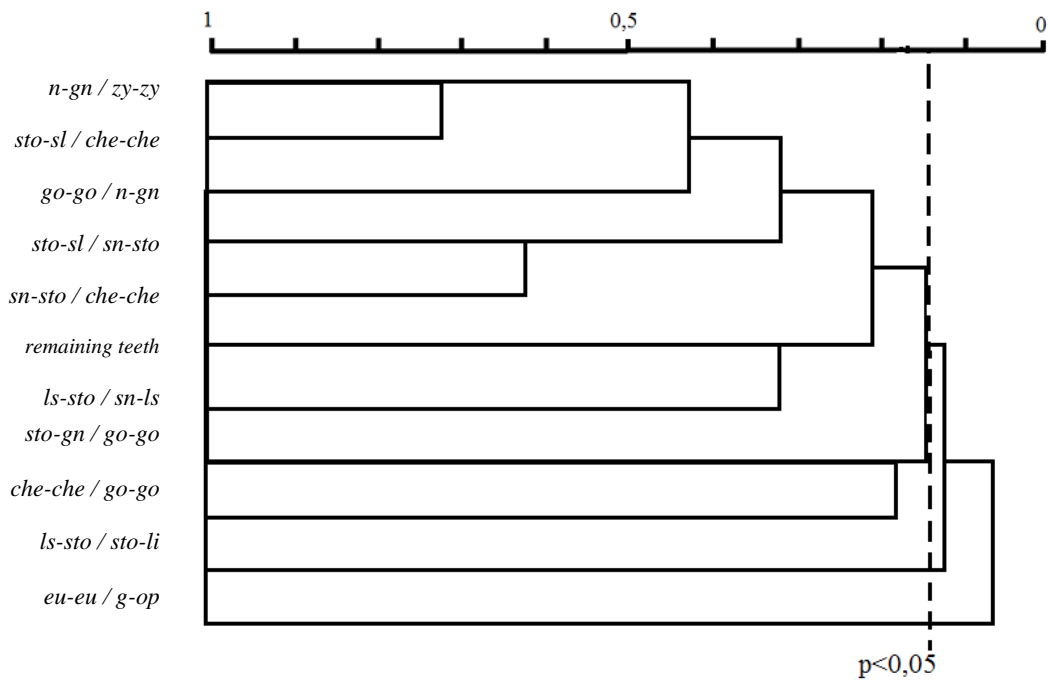


Fig. 52. Cluster dendrogram of correlation coefficients between number of remaining teeth and facial indices (men with dental prosthesis)

By analyzing cluster dendrogram of men with dental prosthesis (Fig. 52) we found that five features form one larger cluster, and the other features are joining as individual factors. The cluster is formed by the facial index, as well as lower lip height - mouth width, mandible width - face height, lower lip height - upper lip height, upper lip height - mouth width indices. The number of remaining teeth and upper vermilion – upper lip cutaneous height, mandibular, mouth width - mandible width, upper vermilion - lower vermilion height and cephalic indices joined to the cluster as separate factors; the correlations were weak or unreliable.

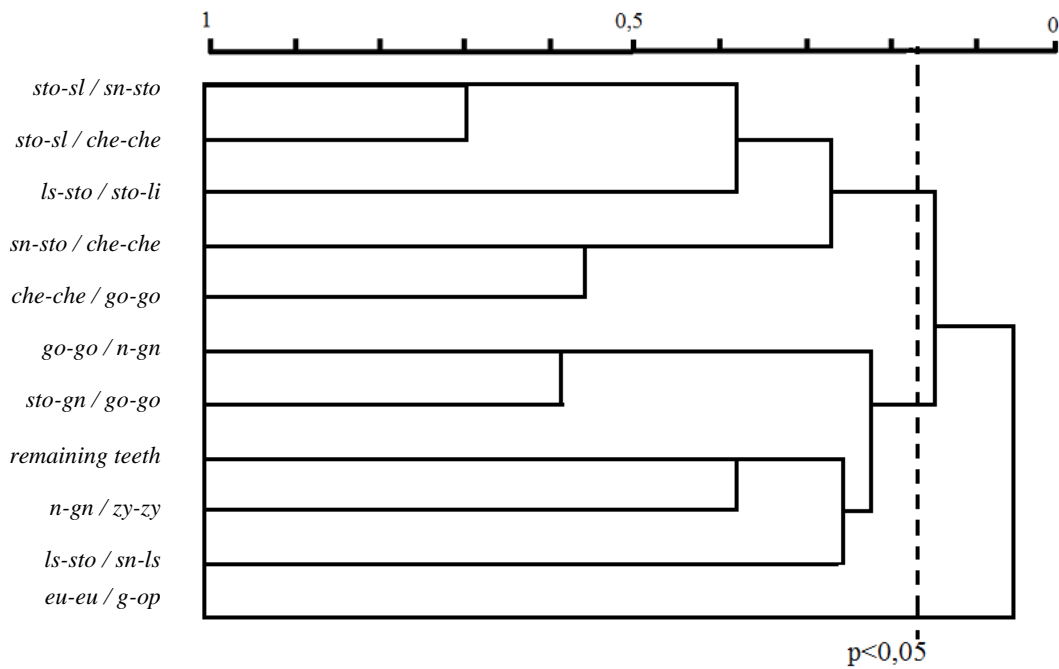


Fig. 53. Cluster dendrogram of correlation coefficients between number of remaining teeth and facial indices (men without dental prosthesis)

By analyzing cluster dendrogram of men without dental prosthesis (Fig. 53), the features form two clusters: the first one is formed by the indices such as lower lip height - upper lip height, lower lip height - mouth width, upper vermilion - lower vermilion height, upper lip height - mouth width, mouth width - mandible width and the second group includes indices as follows: the mandible width - face height, mandibular, facial indices, upper vermilion – upper lip cutaneous height and the number of remaining teeth. Cephalic index joined later as a separate feature. In men without dental prosthesis, the number of remaining teeth had a significant relationship to the facial proportions.

Referring to the data of dendrograms it is to be concluded that the number of remaining teeth has more affected facial proportions to those persons whose teeth were not prosthetically treated. It is to be noted, that for those persons who have undergone oral orthopedic treatment, this effect is weak and statistically insignificant. The study results shows that the facial proportions of those persons, who have lost their teeth and haven't got prosthetics, differed significantly to compare with those having dental prosthesis.

IV. CONCLUSIONS

1. Face aging variation general tendency does not differ between the genders of 45-years and older aged Lithuanian ethnic population of Vilnius residents. Vilnius residents face anthropometric data differ significantly across all age and gender groups. Men's facial anthropometric dimensions of data are larger than females. Facial anthropometric data characteristic of the left and right sides shows the asymmetry.
2. Education and chronic diseases have significant impact on oral health. The participants with the higher level of education had statistically significant ($p < 0.001$) more teeth than people with lower education levels. Higher education individuals had an average of 17.4 ± 9.3 remaining teeth, and persons trained baseline had 7.1 ± 7.3 teeth. The dependence of remaining teeth number on marital status was not found. The participants with chronic diseases had less teeth than the rest of participants, average of remaining teeth was 11.1 ± 9.1 and those having no chronic diseases had 13.8 ± 10.4 teeth.
3. 45 years aged and older Lithuanian ethnic population Vilnius residents focus on oral health and hygiene is not sufficient. The approach of older Lithuanians to oral health and hygiene is different depending on age, sex and social status. 36% of all participants clean their teeth twice a day, 34.3% clean once a day and those who doesn't clean teeth is 26.7% of all subjects. The participants cleaning teeth twice a day, or more than three times a day on average had the most remaining teeth, e.g. 15.3 ± 9.9 and 14.7 ± 10.1 respectively, and those who doesn't clean teeth only 9.4 ± 8.5 remaining teeth. Women of all ages had brushed their teeth more often than men.
4. 34 % of Vilnius population over 45 years old never had a dental prosthetic treatment of any kind, although they possibly need such a treatment, and this situation is unsatisfactory. There is a 20 % of edentulous persons among 45 year old and older ethnic Lithuanian population of Vilnius city. Among participants with the higher level of education was statistically significant more persons with prosthetically treated teeth than in participants with the lower education e.g. 72.7

% and 44.7 %, respectively. Between those living in the family were detected significantly more individuals with prosthetic treated teeth than among unmarried and divorced persons e.g. 70.1 % and 54.3 %.

5. The number of remaining teeth or presence of dental prosthesis has significant effect on facial proportions. Face changes of the participants without dental prosthetic treatment were more individual, characterized by greater variation in the data. The participants without dental prosthetic treatment had an increase of anthropometric data differences between the age groups for both men and women.

V. PRACTICAL RECOMMENDATIONS

The practical recommendations based on the study:

1. There is a need for the preventive programs to improve the oral health status of the elderly.
2. Extra attention should be paid for the elderly dental prosthetic applications, because edentulism significantly increases after 50 years of life. Attention should be paid for the elderly living in hospitals and nursing homes for receiving dental treatment and dental assistance.
3. It is necessary to strengthen the cooperation between dentists and family doctors, as well as cardiologists, endocrinologists, due to the fact, that strong connection appears to be between oral health and chronic diseases.

Publications

1. Sveikata K, Balciuniene I, Tutkuviene J. Factors influencing face aging. Literature review. *Stomatologija*. 2011;13(4): 113-6.
2. Sveikata K, Balciuniene I, Tutkuviene J. Needs for prosthetic treatment in Vilnius population at the age over 45 years old. *Stomatologija* 2012; 14 (3): 81-4.
3. Sveikata K, Balčiūnienė I, Barkus A, Tutkuvienė J. Vyresnių nei 45 metų amžiaus Vilniaus miesto gyventojų dantų netekimo veiksniai. *Laboratorinė medicina* 2013; t. 15, 1 (57): 22-28.

Conference presentations

1. 2009 06 12-13 BOA international congress „Close view to the Changes in modern implantology“. Kaunas. Presentation „Dental implants in esthetic zone, an approach of prosthodontist“.
2. 2010 05 08 OOSK conference “Dogmas in Prosthodontics. Critical view”. Vilnius. Presentation „1. Dogma: It’s worth to save every tooth. 2. Dogma: Do everything right and you will be in success“.
3. 2010 09 10-11 BOA international congress „New achievements in dental implantology“. Kaunas. Presentation „Challenges in treatment of edentulous patients“.
4. 2010 12 03 VU MF conference „Human biology and clinical praxis“. Vilnius. Presentation „Decrease of lower third face and its significance in dentistry“.
5. 2011 03 05 Conference of society of Lithuanian periodontologists: „Infection control in periodontology“. Vilnius. Presentation „Influence of prosthetic materials and constructions to infection in mouth“.
6. 2011 03 19 OOSK conference “Clinical aspects of prosthodontic treatment using dental implants“. Klaipėda. Presentation „Prosthetic treatment of edentulous jaw using dental implants“.
7. 2012 05 11 – 12 conference „Odontology today“. Vilnius. Presentation „Using of small diameter implants in treatment of edentulous jaw“.
8. 2012 06 12 – 15 international conference „Evolutionary medicine: new solutions for the old problems“. Vilnius. Presentation „The prevalence and incidence of tooth loss in Vilnius population at the age over 45 years old“.

SANTRAUKA

Žmogaus sveikatos būklė ir jo fiziniai duomenys keičiasi nuolatos. Amžinė dinamika ypač pastebima žmogaus veide. Kūno matmenų ir veido pokyčiai yra natūralus, neišvengiamas ir nepaliaujamai vykstantis procesas. Todėl nuolat atliekami tyrimai, apimantys žmogaus fizinės būklės raidą nuo gimimo iki senatvės. Duomenų apie lietuviams būdingus veido bruožus, jų matmenis labai stinga, vyresnių nei 45-erių metų amžiaus lietuvių veido antropometrinių populiacinių tyrimų neatlikta, todėl nėra duomenų, atspindinčių veido senėjimo procesus. Tyrime buvo į tai atsižvelgta ir atlikti matavimai leido įvertinti amžinius lietuvių populiacijos veido pokyčius. Tyrimui buvo pasirinkta antropometrija kaip tinkamiausias, brangios įrangos bei specialių sąlygų nereikalaujantis, todėl palyginti pigus, saugus tyrimo metodas, puikiai tinkantis masiniams populiaciniams tyrimams (Meintjes ir kt., 2002; Douglas ir kt., 2003).

Šiame darbe pirmą kartą surinkti ir apibendrinti vyresnio amžiaus lietuvių etninės populiacijos Vilniaus miesto gyventojų veido ir žandikaulių antropometriniai duomenys, pateikta jų dinamika, nustatyta bendrų fizinių matmenų amžinė dinamika, išanalizuoti veiksniai, darantys įtaką fizinių rodiklių bei veido antropometrinių matmenų kitimui.

Tyrimo rezultatai atskleidžia žmogaus veido raidos dėsningumus, suteikia informacijos apie Lietuvos gyventojų dantų protezavimo situaciją ir padeda įvertinti požiūrį į burnos sveikatą.

Gauti apibendrinti veido ir žandikaulių tyrimo duomenys vertingi antropologams, odontologams, burnos, veido ir žandikaulių chirurgams, plastinės chirurgijos specialistams, endokrinologams, genetikams, visuomenės sveikatos specialistams. Jie atskleidžia Vilniaus miesto vyresnio amžiaus lietuvių etninės populiacijos gyventojams būdingus veido bruožus, tai bus pravartu ir teismo medicinos ekspertams, kompleksiskai tiriantiems nežinomo asmens tapatybę.

Tyrimo tikslas – ištirti 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos Vilniaus miesto gyventojų veido ir kai kurių fizinių duomenų senėjimo ypatumus, nustatyti priklausomybę nuo bendros sveikatos būklės, burnos ir dantų būklės, socialinių ir ekonominių veiksnių.

Darbo uždaviniai:

1. Ištirti 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos –Vilniaus miesto gyventojų veido dydžio ir proporcijų rodiklių amžinę dinamiką ir lytinį dimorfizmą.
2. Išaiškinti ir įvertinti Vilniaus miesto gyventojų požiūrį į burnos higieną ir sveikatą.
3. Ištirti 45-erių metų amžiaus ir vyresnių Vilniaus miesto gyventojų dantų protezavimo padėtį ir įvertinti ortopedinio gydymo poreikį.
4. Ištirti 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos veido rodiklių amžinės dinamikos sąsajas su dantų protezavimo būkle.
5. Nustatyti dauginius ryšius tarp Vilniaus miesto gyventojų veido dydžio bei proporcijų rodiklių, socialinių bei ekonominių veiksnių ir burnos sveikatos bei protezavimo būklės.

Tyrimo kontingentas – 45 metų amžiaus ir vyresni lietuvių etninės populiacijos Vilniaus miesto gyventojai. Iš viso ištirtas 641 asmuo, iš kurių 323 (50,4 %) buvo moterys ir 318 (49,6 %) – vyrai. Tiriamieji (vyrai ir moterys) buvo suskirstyti į keturias amžiaus grupes: 45–54 m., 55–64 m., 65–74 m. ir vyresni nei 75 m. Tyrime dalyvių atranka buvo atlikta vadovaujantis šiais kriterijais: lietuvių etninės populiacijos asmenys, kurių abu tėvai lietuviai; asmenys, tyrimo metu buvę 45 metų amžiaus ar vyresni; asmenys, gyvenantys Vilniaus mieste; siekta išlaikyti vienodą vyrų ir moterų santykį. Tyrime nedalyvavo tie neįgalūs asmenys, kurių ligos ar genetiniai sindromai galėjo turėti įtakos veido antropometriniams duomenims. Tiriant pagal antropometrines metodikas buvo išmatuota ir apskaičiuota: matmenys, apibūdinantys veido ir galvos formą, žmogaus ūgis, svoris, kūno masės indeksas, veido proporcijų indeksai. Kiekvienam tiriamajam atlikti 53 antropometriniai matavimai (iš viso 33 973 matavimai), odontologinis tyrimas ir

anketinė apklausa. Duomenų statistinė analizė atlikta naudojant *Excel 2003* ir *SPSS 20 (Statistical Package for Social Sciences)* programas.

Tirdami veido antropometrinių duomenų amžinę dinamiką nustatėme veido antropometrinių duomenų kaitą pagal lyties ir amžiaus grupes. Tyrimas apėmė didelį skaičių tiriamųjų, gauti duomenys rodo, kad p reikšmės svyravimas tarp amžiaus grupių yra netolygus, todėl negalime teigti, kad mūsų tirtai populiacijai būdinga specifinė tam tikrų veido bruožų simetrija. Analizuodami veido antropometrinių duomenų pokyčius pastebėjome, kad mažiau kito duomenys, kurie gauti matuojant greta kaulo esančius taškus, pavyzdžiui, vyrų galvos plotis nepakito, o moterų sumažėjo. Labiausiai mažėjo tie duomenys, kurie gauti matuojant taškus minkštųjų audinių ribose, pavyzdžiui, apatinės lūpos raudonio aukštis. Matuojant veido sritis, kurių pagrindą sudaro kremzlinis audinys, pavyzdžiui, matuojant ausies plotį, duomenų reikšmės turėjo didėjimo tendenciją. Apskaičiuodami Spirmeno koreliacijos koeficientą nustatėme statistiškai patikimą veido apatinio trečdaliao priklausomybę nuo likusių dantų skaičiaus tiek vyrams ($p < 0,05$), tiek moterims ($p < 0,001$).

Siekiant tiksliau įvertinti tiriamųjų burnos sveikatą, surinkti duomenys apie tai, ar jie yra praradę dantų ir dėl kokių priežasčių. Analizuodami duomenis nustatėme, kad 61 % tiriamųjų yra pašalinta dalis dantų, 20 % vyresnių nei 45 metų amžiaus moterų bei vyrų abu žandikauliai yra bedančiai, 17,5 % tiriamųjų – vienas žandikaulis bedantis ir tik 1,6 % vyresnių nei 45 metų amžiaus Vilniaus miesto gyventojų turėjo visus dantis. Kaip pagrindines dantų praradimo priežastis tiriamieji nurodė dantų ėduonį (57,4 %) ir periodonto ligas (34,3 %). 1,7 % vyresnių nei 45 metų amžiaus Vilniaus miesto gyventojų nurodė, kad dantų praradimą sąlygojo finansinės priežastys. Vyrų ir moterų 45–54 metų amžiaus grupėje likusių dantų skaičiaus vidurkis buvo didžiausias ($21,92 \pm 7,58$ dantys) ir su tiriamųjų amžiumi atitinkamai mažėjo $12,94 \pm 8,30$, $9,58 \pm 7,73$, vyresnių nei 75 metų amžiaus tiriamųjų grupėje vidurkis buvo $4,91 \pm 6,32$ dantys. Tirdami socialinių sąlygų įtaką dantų netekimui nustatėme, kad išsilavinimas ir gyvenimo sąlygos yra patikimi likusių dantų skaičiaus veiksniai. Tyrimo duomenimis, aukštesnio išsilavinimo lygio tiriamieji turėjo statistiškai patikimai ($p < 0,001$) daugiau dantų nei žemesnio išsilavinimo lygio. Tyrime analizavome žalingų įpročių – alkoholio vartojimo, rūkymo, kieto daikto (pvz., degtuko kramtymas) ir lūpos kramtymo poveikį

likusių dantų skaičiui. Tyrimo rezultatai atskleidė, kad alkoholio vartojimas yra statistiškai patikimas ($p < 0,001$) veiksnys, turintis didelę įtaką likusių dantų skaičiui. Rūkančių ir nerūkančių tiriamųjų likusių dantų skaičius skyrėsi mažai – atitinkamai $12,8 \pm 10,7$ dantų ir $12,2 \pm 9,6$ dantų. Statistiškai patikimos likusių dantų skaičiaus priklausomybės nuo rūkymo nenustatyta. Tyrimo rezultatai parodė, kad tiriamieji, kurie turėjo žalingą įprotį kramtyti kietą daiktą (pvz., degtuką), turėjo statistiškai mažiau dantų ($12,7 \pm 9,9$ dantys) nei tie, kurių įprotis buvo krampyti lūpą ($19,6 \pm 3,4$ dantų). Statistiškai patikima priklausomybė siejo likusių dantų skaičių ir kitus įpročius, pavyzdžiui, gumos kramtymą ($p < 0,001$), laikomas tvirtai sučiauptas lūpas ($p < 0,001$), griežimą dantimis ($p < 0,05$), maisto kramtymą viena puse ($p < 0,001$). Analizavome su kvėpavimo įpročiais bei ligomis, miego ir mitybos ypatumais susijusių veiksnių įtaką dantų skaičiui. Nustatėme, kad statistiškai patikimas ryšys sieja likusių dantų skaičių ir sergamumą kvėpavimo takų ligomis ($p < 0,05$), iškrypusią nosies pertvarą ($p < 0,001$), kvėpavimo pro nosį ($p < 0,05$), miegojimo praverta burna ($p < 0,05$), sirgimo laiką ($p < 0,05$), miego trukmę ($p < 0,05$), valgomo maisto raciono įvairovę ($p < 0,001$), šviežių daržovių valgymo kartus per dieną ($p < 0,001$), kieto maisto vartojimo dažnumą ($p < 0,001$). Išvardytieji veiksniai turėjo statistiškai patikimą ryšį su likusių dantų skaičiumi. Vertindami bendrą sveikatos būklę nenustatėme priklausomybės tarp likusių dantų skaičiaus ir nuolatinio vaistų vartojimo ($p > 0,05$), nors nustatėme priklausomybę tarp likusių dantų skaičiaus ir sergamumo kai kuriomis ligomis: sergantys arterine hipertenzija vidutiniškai turėjo $10,6 \pm 9,6$ dantų, o nesergantys – $13,1 \pm 9,7$ dantų, šiuo atveju mūsų tyrimas patvirtino statistiškai reikšmingą priklausomybę ($p < 0,05$). Sergantys lėtinėmis ligomis turėjo mažiau dantų ($p < 0,001$) nei nesergantys: sergantys – vidutiniškai $11,1 \pm 9,1$ dantų, o nesergantys – $13,8 \pm 10,4$. Vyrų ir moterų prarastų dantų skaičius yra panašus, bet moterų dantų protezuota statistiškai patikimai ($p < 0,05$) daugiau nei vyrų. Nagrinėdami socialinių veiksnių įtaką dantų protezavimui, nustatėme, kad tarp aukštesnio išsilavinimo lygio tiriamųjų buvo statistiškai patikimai daugiau turinčių protezuotus dantis nei tarp žemesnio išsilavinimo žmonių ($p < 0,001$). Tarp gyvenančių šeimoje taip pat aptikome statistiškai reikšmingai ($p < 0,05$) daugiau asmenų protezuotais dantimis nei tarp nesusituokusių ir išsiskyrusių.

Vertinome tiriamųjų požiūrį į burnos sveikatą. Tik 36 % iš visų tirtų asmenų dantis valo du kartus per dieną, 34,3 % – vieną kartą, o apskritai nevalančių dantų yra net 26,7 % visų tiriamųjų. Nustatėme, kad nevalančiųjų dantų yra daugiau vyresnio amžiaus grupėse, kur yra daug bedančių žmonių. Visų amžiaus grupių moterys valė dantis dažniau nei vyrai, tik vyriausio amžiaus grupėje nebuvo statistiškai patikimo skirtumo tarp visai nevalančių dantų vyrų ir moterų ($p > 0,05$). Valantieji dantis du kartus per dieną ar daugiau nei tris kartus per dieną vidutiniškai turėjo daugiausiai išlikusių dantų – atitinkamai $15,3 \pm 9,9$ ir $14,7 \pm 10,1$, o nevalantys – mažiausiai, tik $9,4 \pm 8,5$. Statistiškai patikimai ($p < 0,001$) nustatėme, kad nors vieną kartą per parą dantis valantys asmenys turėjo daugiau išlikusių dantų negu nevalantys.

Patys tiriamieji, vertindami savo burnos higieną, dažniausiai (69,7 %) ją įvardijo kaip nepakankamą ar blogą, o kiti (30,3 %) – kaip gerą. Teigimai vertinantys savo burnos higieną turėjo statistiškai patikimai ($p < 0,05$) daugiau dantų ($14,3 \pm 10,6$) nei ją vertinantys neigiamai ($11,4 \pm 9,2$). Atsakydami į klausimą „Ar reguliariai lankotės pas gydytoją odontologą?“ tik 22 % tiriamųjų atsakė teigiamai. Moterys pas gydytojus odontologus lankosi dažniau. Reguliariai besilankantys pas odontologą asmenys vidutiniškai turėjo $17,6 \pm 9,5$ likusių dantų, o nesilankantys – $10,8 \pm 9,3$. Siekdami įvertinti subjektyvų tiriamųjų požiūrį į savo burnos sveikatą klausėme: „Ar jūs patenkinti esama dantų būkle?“; į šį klausimą 41,7 % žmonių atsakė, jog yra patenkinti.

Tirdami dantų protezavimo įtaką veido proporcijoms tiriamuosius suskirstėme į protezuotus ir neprotezuotus. Apskaičiavome veido proporcijų indeksus pagrindinį dėmesį skirdami tiems veido indeksams, kurie apibūdina veido apatinio trečdaliao aukščio anatominių struktūrų proporcingumą. Veido apatinio trečdaliao aukščio pokyčiai labiausiai susiję su dantų netekimu, dantų protezavimo būkle. Tiriamiesiems, kuriems dantys buvo protezuoti, stebimi mažesni amžiniai nosies ir veido aukščio indekso pokyčiai vyrų tarpe ir moterų tarpe. Veido viršutinio ir vidurinio trečdaliao indekso rodiklių dinamikoje vyrams ir moterims protezuotais ir neprotezuotais dantimis pastebima augimo tendencija. Moterims, kurioms buvo protezuoti dantys, stebimi mažesni amžiniai veido indekso pokyčiai lyginant su moterimis neprotezuotais dantimis.

Atlikus odontologinės tiriamųjų būklės ir socialinių ekonominių veiksnių koreliacinę analizę paaiškėjo, kad asmens išsilavinimas, reguliarius lankymasis pas odontologą ir dantų valymosi dažnumas ypač patikimai siejosi su dantų išlikimu ($p < 0,05$). Amžius ir dantų netekimas buvo susiję stipriu neigiamu koreliaciniu ryšiu ($p < 0,05$). Atlikta dantų netekimo veiksnių šansų analizė patvirtino, kad amžius yra pagrindinis dantų netekimo veiksnys. Vyresni nei 55 metų asmenys turi 8,65 karto didesnę tikimybę netekti dantų nei jaunesni. Atmetus amžių kaip pagrindinį dantų netekimo veiksni, tolesnė analizė parodė, kad daugiau šansų prarasti dantis turi asmenys, įgiję tik pradinį išsilavinimą ir nesirūpinantys reguliaria dantų priežiūra. Lytis ir šeiminė padėtis yra statistiškai nereikšmingi dantų netekimo veiksniai.

Likusių dantų skaičius labiau veikia veido proporcijas tiems asmenims, kurių dantys nebuvo protezuoti, o asmenims, kuriems buvo taikytas burnos ortopedinis gydymas, ši įtaka yra silpna arba statistiškai nereikšminga. Asmenų, praradusių dantis ir nepasirūpinusių jų protezavimu, veido proporcijos statistiškai patikimai skyrėsi nuo tų tiriamųjų, kurių prarasti dantys buvo protezuoti. Tiriamųjų, kurių dantys nebuvo protezuoti, likusių dantų skaičius daro reikšmingą įtaką veido proporcijoms, jų veido senėjimo procesai vyksta labiau individualizuotai.

Išvados:

1. 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos Vilniaus miesto gyventojų veido amžinių kitimų bendra tendencija nesiskiria tarp lyčių. Vilniaus miesto gyventojų veido antropometriniai duomenys reikšmingai skiriasi visose amžiaus ir lyties grupėse. Vyrų veido antropometrinių matmenų duomenys visose amžiaus grupėse didesni nei moterų. Veido antropometriniais duomenimis būdinga kairės ir dešinės pusių asimetrija.
2. Išsilavinimas ir lėtinės ligos turi reikšmingą įtaką burnos sveikatai. Aukštesnio išsilavinimo lygio tiriamieji turėjo statistiškai patikimai ($p < 0,001$) daugiau dantų nei žemesnio išsilavinimo lygio. Aukštąjį išsilavinimą įgiję asmenys vidutiniškai turėjo $17,4 \pm 9,3$ likusių dantų, o asmenys, kurių išsilavinimas pradinis – $7,1 \pm 7,3$ dantų. Likusių dantų skaičiaus priklausomybė nuo šeiminės padėties

nenustatyta. Sergantys lėtinėmis ligomis turėjo mažiau dantų nei nesergantys: sergantys – vidutiniškai $11,1 \pm 9,1$ dantų, nesergantys – $13,8 \pm 10,4$.

3. 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos Vilniaus miesto gyventojų dėmesys burnos sveikatai ir higienai yra nepakankamas. Vyresnio amžiaus lietuvių požiūris į burnos sveikatą ir higieną skiriasi priklausomai nuo amžiaus, lyties ir socialinės būklės. 36 % iš visų tirtų asmenų dantis valo du kartus per dieną, 34,3 % – vieną kartą, o apskritai nevalančių dantų yra 26,7 %. Valantieji dantis du kartus per dieną ar daugiau nei tris kartus per dieną vidutiniškai turėjo daugiausiai išlikusių dantų – atitinkamai $15,3 \pm 9,9$ ir $14,7 \pm 10,1$, nevalantys – mažiausiai, tik $9,4 \pm 8,5$. Visų amžiaus grupių moterys valė dantis dažniau nei vyrai.
4. 45-erių metų amžiaus ir vyresnių lietuvių etninės populiacijos Vilniaus miesto gyventojų burnos protezavimo situacija yra nepatenkinama – 34 % tirtų asmenų niekada nebuvo protezuoti dantys, nors toks gydymas daugumai jų yra reikalingas. Adentijos paplitimas yra 20 %. Tarp aukštesnio išsilavinimo lygio tiriamųjų statistiškai patikimai daugiau turinčių protezuotus dantis nei tarp žemesnio išsilavinimo žmonių, atitinkamai 72,7 % ir 44,7% . Tarp gyvenančių šeimoje taip pat statistiškai reikšmingai daugiau asmenų protezuotais dantimis nei tarp nesusituokusių ir išsiskyrusių, atitinkamai 70,1 % ir 54,3 %.
5. Likusių dantų skaičius ir dantų protezavimas turi reikšmingą įtaką veido proporcijoms. Neprotezuotiems asmenims veido pokyčiai vyko labiau individualizuotai, duomenims būdingos didesnės variacijos. Neprotezuotiems asmenims nustatyti didesni antropometrinių duomenų skirtumai tarp amžiaus grupių tiek vyrų, tiek moterų tarpe.

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