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FUNKCIONALNA ANALIZA PACIJENATA I KORELACIJA SA TIPOM RASTA LICA

FUNCTIONAL ANALYSIS AND CORRELATION WITH FACIAL GROWTH TYPE

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SAŽETAK

Uvod: *Sastvani dio ortodontske dijagnoze je funkcionalno ispitivanje pacijenta. Dejstvo mišića na susjedna dentalna i koštana tkiva ispoljava se tokom raznih orofacijalnih funkcija. U fazama mirovanja koje su mnogo duže, tonus mišića direktno utiče na skelet lica i vilica, a samim tim i na oblik i položaj dentoalveolarnih struktura.*
Cilj *ovog istraživanja je da se utvrdi zavisnost pojedinih funkcija (disanja, gutanja i žvakanja) od tipa rasta lica.*
Materijal i metod: *istraživanje je obuhvatilo djecu uzrasta od 9 do 18 godina koji su se javili na ortodontsku terapiju u Domu zdravlja Tivat. Izabrana su djeca oba pola sa prisutnim svim zubima predviđenim normalnim rastom i razvojem za njihov uzrast. Podjeljena su u dvije grupe: starosti od 9 do 12 godina i od 13 do 18 godina. Za svakog ispitanika urađen je individualni karton koji je pored opštih podataka sadržao anemnestičke podatke i podatke dobijene sa ontopantomografskog i telerendgenografskog snimka.*
Rezultati *su pokazali da jezik, mišići obraza i žvakanje utiču na položaj i inklinaciju mandibularnih molara, da postoji povezanost između različitih tipova rasta i inklinacije mandibularnih molara. Kod različitih tipova rasta funkcija disanja, gutanja i žvakanja je različita.*
Zaključak: *funkcionalna analiza pacijenata je potrebna iz dva razloga. Jedan je u činjenici da se odredi etiološki uticaj orofacijalnih funkcija na razvoj malokluzija. Drugi razlog je terapeutski jer poznavanje orofacijalnih disfunkcija pomaže u otklanjanju etioloških faktora i stabilizuje postignute rezultate.*

Ključne reči: *funkcija orofacijalne regije: disanje, gutanje i žvakanje, tip rasta lica, inklinacija mandibularnih molara.*

ABSTRACT

Introduction: *Functional analysis of patients is a constituent element of orthodontic diagnosis. The effect of muscles function to adjacent dental and bone tissues is manifested in various orofacial functions. During the resting phases, which are much longer, muscle tonus directly affects the shape of face and jaw skeleton and thus the shape and position of dental-alveolar structures.*
Objectives: *The aim of this study was to determine the correlation between various functions such as breathing, swallowing and mastication and facial growth type.*
Materials and methods*: The subjects of this research were children ages 9 to18 who had received orthodontic treatment at the Medical center Tivat. Only the children with all teeth representing normal growth and development for their age of both genders were included in the sample. They were divided into two age groups: the first group children ages 9-12 and the second group children ages 13-18. For each child an individual dental record was made that besides general data contained anamnesis data as well as data obtained from orthopantomographic and teleradiology images.*
Results*: The results showed that the tongue, cheek and mastication muscles affect the position and inclination of mandibular molars and that there was correlation between facial growth types and inclination of mandibular molars. Breathing, swallowing and mastication are different in different facial growth types.*
Conclusion: *Functional analysis of patients is needed for two reasons. The first one is to determine etiological effect of orofacial function on development of malocclusion. The second one is therapeutic because familiarity with orofacial dysfunctions helps with elimination of etiological factors and stabilization of achieved results.*

Key Words**:** *functions of orofacial region: breathing, swallowing and mastication, facial growth type, inclination of mandibular molars*

Uvod

Uticaj mekih tkiva i orofacijalnih funkcija na razvoj kraniofacijalnog kompleksa je bio predmet mnogih istraživanja. U istoriji ortodoncije, naročito u Evropi, postoje periodi kada se smatralo da su orofacijalne disfunkcije dominantne u nastanku malokluzija. Za

Introduction

The effect of soft tissues and orofacial functions on development of craniofacial complex has been the subject of a large number of studies. In the history of orthodontics, particularly in Europe, there were times when it was considered that orofacial dysfunctions were domi-

raznovrsne aktivnosti koje se odvijaju u kraniofacijalnoj regiji, posebno u usnoj šupljini, potrebno je da su usaglašene sve strukture koje učestvuju ili doprinose njihovom nesmetanom obavljanju. Neusklađenost u rastu i razvoju, dela ili cijelog sistema, može poremetiti normalnu funkciju ili više njih i dovesti do neke deformacije zuba i vilica.

Aktivnost mišića tokom maksimalne kontrakcije je u uzajamnom odnosu sa prognatizmom donje vilice, njenom anteriornom inklinacijom i malim gonijalnim uglom[1]. Pacijenti sa miotroničkom distrofijom imaju slabe mišiće žvakanja i njihova kraniofacijalna morfologija je karakteristična po velikom uglu između mandibularne i palateralne ravni[2,3]. Utvrđeno je, da je smjer sile koja se primjenjuje na mandibularne molare u završnoj fazi okluzije vrlo važan za bukolingvalnu inklinaciju mandibularnih molara. Prvobitno mandibularni molari izbijaju lingvalno, a zatim inkliniraju bukalno. Isto tako na njihovu inklinaciju bukalno utiče pritisak jezika i funkcija žvakanja.

Snaga zagrižaja i funkcija žvakanja prouzrokovana mišićima žvakanja utiče ne samo na položaj i obliki alveolarnog luka već i na oblik i strukturu mandibule [4]. Razvijenost alveolarne kosti i položaj mandibularnih molara je od velikog značaja za ortodontsko liječenje. Rezultati istraživanja [5] pokazuju da mandibula u oblasti molara ima strukturu otpornu na primjenu sile iz bukalnog pravca. Stoga alveolarna kost postaje deblja da bi dala potporu mandibularnim molarima. Njihova bukolingvalna inklinacija je u direktnoj vezi sa funkcijom žvakanja i kraniofacijalnim tipom rasta.

Materijal i metod

Istraživanje je rađeno po tipu studije preseka. Pri tome, uzorak istraživanja su činila djeca uzrasta od 9 do 18 godina koji su se javili na ortodontsku terapiju u Domu Zdravlja Tivat. Izabrana su djeca oba pola sa prisutnim svim zubima predviđenim normalnim rastom i razvojem za njihov uzrast. Nisu uzimana u obzir djeca kod kojih se ustanovilo da nedostaje neki od mliječnih ili stalnih zuba usljed prevremene ekstrakcije. Takođe se nisu uzimala u obzir djeca kod kojih se na osnovu kliničkog pregleda, ortopantomografije i telerendgenografije ustanovilo da postoji prisustvo nekog drugog

nant factor in occurrence of malocclusion. It is necessary that all structures taking part or contributing to various activities taking place in craniofacial region, especially in mouth cavity, function well. Mismatch of the growth and development of the whole system or a part of it can disrupt normal function or functions and lead to teeth and jaw deformation.

Muscle activity during maximal contractions is in mutual relationship with mandibular prognathisam, its anterior inclination and small gonial angle[1]. Myotonic dystrophy patients have weak mastication muscles and their craniofacial morphology is characterized by a large angle between mandibular and palatal plane. It was found that the direction of force applied to mandibular molars in the final stage of the occlusion was very important for buccolingval inclination of mandibular molars[2,3]. Primarily mandibular molars erupt lingually and then they incline buccaly. Pressure of the tongue and mastication function also affect their buccal inclination.

Bite force and mastication function is caused by mastication muscles and that affects not only the position and the shape of alveolar arch but also the shape and structure of mandible[4]. Development of alveolar bone and mandibular molar position is of great importance for ortrhodontic treatment. Research results[5] has showed that mandible at the molar region has a structure resistant to the force applied from buccal direction. Therefore the alveolar bone becomes thicker to give support to mandibular molars. Their buccal inclination is directly related to mastication function and craniofacial growth type.

Materials and methods

The research was designed as a cross-sectional study. The sample consisted of children ages 9 to18 who had received orthodontic treatment at the Medical center Tivat. Only the children with all teeth representing normal growth and development for their age of both genders were included in the sample. Children with any deciduous or permanent teeth missing due to early extraction were not included in the sample. Also, children with the presence of any other factor that could possibly affect the position of the mandibular molars determined by clinical examination, orthopantomographic and

faktora koji eventualno može uticati na položaj mandibularnih molara.

Sva ispitivana djeca su podjeljena u dvije grupe:

I grupa - djeca oba pola starosti od 9 do 12 godina i

II grupa - djeca oba pola starosti od 13 do 18 godina.

Za svakog ispitanika urađen je individualni karton koji je osim opštih podataka sadržao:

- anamnestičke podatke koji su se uzimali od roditelja pregledane djece,
- podatke dobijene sa ortopantomografskog snimka i
- podatke dobijene sa telerendgengrafskog snimka.

Funkcionalnim ispitivanjem obuhvaćena je funkcija: disanja, gutanja i žvakanja.

Funkcija disanja je ispitivana na nekoliko načina:

- neopaženo duže posmatranje pacijenta (djeca sa nazalnom respiracijom sve vrijeme drže blago sklopljene usne dok dišu)
- zahtjevano je od pacijenta da duboko udahne vazduh sa zatvorenim ustima (djeca sa nazalnom respiracijom šire više nozdrve pri inspirijumu, a kod djece sa oralnom respiracijom ne mijenja se veličina i oblik nozdrva)
- nazalna funkcija je negdje ispitivana i postavljanjem komadića vate ispod nozdrve ili postavljanjem ogledala. Kod nazalne respiracije zamaglit će se gornja, a kod oralne respiracije magli se i donja strana.

Funkcija gutanja je ispitivana na sledeći način:

- palpacijom mišića poda usne duplje provjerava se da li je akt gutanja izvršen (postoji kod svih oblika gutanja i pravilnog i nepravilnog)
- inspekcijom se utvrdi da li postoji kontrakcija muskulature lica (postoji kod nepravilnog načina gutanja, a ne javlja se kod zrelog gutanja)
- palpacijom kontrakcije elevatora mandibule (m. temporalis-a). Kontrakcija postoji kod zrelog gutanja i tiskanja jezika u frontalnom predjelu, a ne postoji kod atipičnog gutanja.

Funkcija žvakanja je procjenjiva inspekcijom i palpacijom okluzalnih površina molara, da bi se otkrilo postojanje ili nepostojanje abrazije. Tip žvakanja se ispitivao i traženjem da pacijent obavi latero-okluziju. Dete koje žvaće

teleradiology images were not included in the sample.

All children from the sample were divided into two groups:

Group I – children of both genders ages 9 to 12 and

Group II – children of both genders ages 13 to 18

For each child an individual dental record was made that besides general data included:

- anamnesis data obtained from the parents
- data obtained from orthopantomographic images
- data obtained from teleradiology images.

Functional analysis covered the following functions: breathing, swallowing and mastication.

Function of breathing was investigated in several ways:

- unnoticed longer observation of patients (children with nasal breathing pattern all the time kept slightly closed lips while breathing)
- patients were asked to deeply inhale air with closed mouth (children with nasal breathing pattern widened their nostrils more during inspiration and children with oral breathing pattern did not change the shape and size of nostrils)
- nasal function was also investigated, in some cases, by putting pieces of cotton under the nostrils or by placing the mirror. In nasal breathing pattern the top side of mirror would steam up and in oral breathing pattern also the bottom one.

Swallowing function was investigated in the following way:

- palpation of oral cavity floor muscles to check whether the act of swallowing was completed (it is present in all types of swallowing both regular and irregular)
- inspection to determine whether there was contraction of face muscles (it is present in irregular swallowing and it is not present in mature swallowing pattern)
- palpitation of mandible elevator contractions (m. temporalis). Contractions are present in mature swallowing pattern as wall as tongue pressure in frontal region and they are not present in atypical swallowing.

Mastication function was investigated by inspection and palpation of occlusal surfaces of molars in order to determine the occurrence of nonoccurrence of abrasion. Mastication pattern was determined also by asking patients to per-

vertikalnim pokretima tj. temporalnim tipom, ili neće umjeti da napravi ovaj pokret i dovede zube jedne strane u okluziju, ili će bočni zubi balansne strane biti daleko jedni od drugih.

Osnovna obrada podataka predviđena projektom studije dala je odgovarajući sistem tabela, jednodimenzionalnih i dvodimenzionalnih rasporeda, koji su omogućili da se međusobnim upoređenjem dobijenih numeričkih vrijednosti dobije odgovor na neka važna pitanja koja su u studiji postavljena.

Rezultati

Fukcionalna analiza pacijenata uzrasta od 9 do 12 godina

Kako je ANOVA (Kruskal Wallis) (X^2 = 12,601 ; p<0,01) pokazala da postoji statistički značajna razlika između analiziranih kontigenata ispitanika u načinu disanja, te smo njihovim upoređivanjem došli do zaključka da postoji statistički visoko značajna razlika između ispi-

form lateral occlusion. Children who chew by vertical movements i.e. temporal pattern either will not be able to perform this movement and bring teeth of one side into occlusion or lateral teeth of the opposite side will be far from each other.

The data were presented in tables of one dimensional and two dimensional distributions so that numerical values obtained can be compared giving answers to the some important questions formulated in the study.

Results

Functional analysis of patients ages 9 to 12

As ANOVA (Kruskal Wallis) (X^2 = 12.601 ; p< 0.01) showed there were statistically significant difference between analyzed contingents of respondents regarding the breathing pattern. By comparing them we came to conclusion that there was a statistically highly significant dif-

Tabela 1. Pacijenti uzrasta 9 – 12 godina prema tipu kraniofacijalnog rasta i načinu disanja
Table 1. Distribution of patients ages 9 - 12 according to craniofacial growth type and breathing pattern

Disanje Breathing pattern	Tip rasta Growth type						Ukupno Total	
	Horiznotalni (I) Horizontal (I)		Neutralni (II) Neutral (II)		Vertikalni (III) Vertical (III)			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
na nos Through nose	18	90,0	24	85,7	84	59,1	126	66,3
na usta Throug mouth	2	10,0	2	7,1	38	26,8	42	22,1
kombinovano Combined	0	0,0	2	7,1	20	14,1	22	11,6
Ukupno Total	20	100	28	100	142	100	190	100
ANOVA (Kruskal Wallis)					X^2 = 12,601 ; p<0,01			
Značajnost razlika između tipa rasta Significant differences between growth types								
Z test za I i II kontigent Z test for I i II contigent					Z = -0,510		*p>0,05*	
Z test za I i III kontigent Z test for I i III contigent					Z = -2,723		*p<0,01*	
Z test za II i III kontigent Z test for II i III contigent					Z = -2,510		*p<0,01*	

tanika sa horizontalnim i vertikalnim tipom rasta (Z = -2,723 ; p<0,01) i ispitanika sa neutralnim i vertikalnim tipom rasta (Z = -2,510 ; p<0,01).

ference between subjects with horizontal and vertical growth type (Z = -2.723; p<0.01) and subjects with neutral and vertical growth type (Z = -2.510; p<0.01).

Tabela 2. Pacijenti uzrasta 9 – 12 godina prema tipu kraniofacijalnog rasta i načinu žvakanja
Table 2. Distribution of patients ages 9 - 12 according to craniofacial growth type and mastication pattern

Žvakanje	Tip rasta Growth type						Ukupno Total	
	Horiznotalni Horizntal		Neutralni Neutral		Vertikalni Vertical			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
meseterično messeter	12	60,0	10	35,7	86	60,6	108	56,8
temporalno temporal	2	10,0	4	14,3	18	12,7	24	12,6
mješovito mixed	6	30,0	14	20,0	38	26,8	58	30,05
Ukupno Total	20	100	28	100	142	100	190	100
ANOVA (Kruskal Wallis)					***X^2 = 6,666 ; p<0,05***			
Značajnost razlika između tipa rasta Significant differences between growth types								
Z test za I i II kontigent Z test for I i II contigent					Z = -1,607		*p>0,05*	
Z test za I i III kontigent Z test for I i III contigent					Z = -0,140		*p>0,05*	
Z test za II i III kontigent Z test for II i III contigent					Z = -2,573		*p<0,01*	

Kako je ANOVA (Kruskal Wallis) (X^2 = 6,666 ; p<0,01) pokazala da postoji statistički značajna razlika između analiziranih kontigenata ispitanika u načinu žvakanja, te smo njihovim uspoređivanjem došli do zaključka da postoji statistički visoko značajna razlika između ispitanika sa neutralnim i vertikalnim tipom rasta (Z = -2,573 ; p<0,01).

Nema statistički značajnih razlika između ispitanika sa različitim tipom rasta i načinu žvakanja (X^2 = 4,318 ; p>0,05).

As ANOVA (Kruskal Wallis) (X^2 = 6.666 ; p< 0.01) showed there were statistically significant difference between analyzed contingents of respondents regarding the mastication pattern . By comparing them we came to conclusion that there was a statistically highly significant difference between subjects with neutral and vertical growth type (Z = -2.573; p<0.01).

There is no statistically significant difference between subjects with different growth types and mastication pattern (X^2 = 4.318 ; p< 0.05).

Tabela 3. Pacijenti uzrasta 9 – 12 godina prema tipu kraniofacijalnog rasta i načinu gutanja
Tabela 3. Distribution of patients ages 9 - 12 according to craniofacial growth types and swallowing pattern

Gutanje Swallowing pattern	Tip rasta Growtrh type						Ukupno Total	
	Horiznotalni Horizontal		Neutralni Neutral		Vertikalni Vertical			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
infantilno infatile	4	20,0	10	35,7	62	43,7	76	40,0
somatsko somatic	16	80,0	18	64,3	80	56,3	114	60,0
Ukupno Total	20	100	28	100	142	100	190	100

Fukcionalna analiza pacijenata uzrasta od 13 do 18 godina

Functional analysis of patients ages 13 to 18

Tabela 4. Pacijenti uzrasta 13 – 18 godina prema tipu kraniofacijalnog rasta i načinu disanja
Table 4. Distribution of patients ages 13 - 18 according to craniofacial growth type and breathing pattern

Disanje Breathing pattern	Tip rasta Growth type						Ukupno Total	
	Horiznotalni (I) Horiznotal(I)		Neutralni (II) Neutral (II)		Vertikalni (III) Vertical(III)			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
na nos Through nose	92	76,67	106	86,89	220	75,86	418	78,57
na usta Through mouth	20	16,67	12	9,84	38	13,10	70	13,16
kombinovano Combined	8	6,67	4	3,28	32	11,03	44	8,27
Ukupno Total	120	100	122	100	190	100	532	100
ANOVA (Kruskal Wallis)					***X^2 = 7,139 ; p<0,05***			
Značajnost razlika između tipa rasta Significant differences between growth types								
Z test za I i II kontigent Z test fot I i II contigent					Z = -2,070		*p<0,05*	
Z test za I i III kontigent Z test for I i III contigent					Z = -0,378		*p>0,05*	
Z test za II i III kontigent Z test for II i III contigent					Z = -2,642		*p<0,01*	

Kako je ANOVA (Kruskal Wallis) (X^2 = 7,139 ; p<0,05) pokazala da postoji statistički značajna razlika između analiziranih kontigenata ispitanika u načinu disanja, te smo njihovim uspoređivanjem došli do zaključka da postoji statistički značajna razlika između ispitanika sa horizontalnim i neutralnim tipom rasta (Z = -2,070 ; p<0,05) i ispitanika sa neutralnim i vertikalnim tipom rasta (Z = -2,642 ; p<0,01).

As ANOVA (Kruskal Wallis) (X^2 = 7.139 ; p< 0.05) showed there were statistically significant difference between analyzed contingents of respondents regarding the breathing pattern .By comparing them we came to conclusion that there was a statistically significant difference between subjects with horizontal and neutral growth type (Z = -2.070; p<0.05) and subjects with neutral and vertical growth type (Z = -2.642; p<0.01).

Tabela 5. Pacijenti uzrasta 13 – 18 godina prema tipu kraniofacijalnog rasta i načinu žvakanja
Table 5. Distribution of patients ages 13 - 18 according to craniofacial growth type and mastication pattern

Žvakanje Mastication pattern	Tip rasta Growth type						Ukupno Total	
	Horiznotalni Horiznotal		Neutralni Neutral		Vertikalni Vertical			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
meseterično Messeter	48	40,00	62	50,82	158	54,48	268	50,38
temporalno Temporal	24	20,00	10	8,20	42	14,48	76	14,29
mješovito Mixed	48	40,00	50	40,98	90	31,03	188	35,34
Ukupno Total	120	100	122	100	290	100	532	100
ANOVA (Kruskal Wallis)					***X^2 = 6,241 ; p<0,05***			
Značajnost razlika između tipa rasta *Significant differences between growth types*								
Z test za I i II kontigent Z test for I i II contigent					Z = -0,867		*p<0,05*	
Z test za I i III kontigent Z test for I i III contigent					Z = -2,460		*p>0,05*	
Z test za II i III kontigent Z test for II i III contigent					Z = -1,259		*p<0,01*	

Kako je ANOVA (Kruskal Wallis) (X^2 = 6,241 ; p<0,05) pokazala da postoji statistički značajna razlika između analiziranih kontigenata ispitanika u načinu žvakanja, te smo njihovim uspoređivanjem došli do zaključka da postoji statistički značajna razlika između ispitanika sa horizontalnim i vertikalnim tipom rasta (Z = -2,460 ; p<0,05).

As ANOVA (Kruskal Wallis) (X^2 = 6.241 ; p< 0.05) showed there were statistically significant difference between analyzed contingents of respondents regarding the mastication pattern . By comparing them we came to conclusion that there was a statistically significant difference between subjects with horizontal and vertical growth type (Z = -2.460; p<0.05).

Tabela 6. Pacijenti uzrasta 13 – 18 godina prema tipu kraniofacijalnog rasta i načinu gutanja
Tabela 6. Distribution of patients ages 13 - 18 according to craniofacial growth types and swallowing pattern

Gutanje Swallowing pattern	Tip rasta Growth type						Ukupno Total	
	Horiznotalni Horiznotal		Neutralni Neutral		Vertikalni Vertical			
	broj no.	%	broj no.	%	broj no.	%	broj no.	%
infantilno Infantile	34	28,3	40	32,79	104	35,86	178	33,46
somatsko Somatic	86	71,67	82	67,21	186	64,14	154	66,54
Ukupno Total	120	100	122	100	190	100	532	100

Nema statistički značajnih razlika između ispitanika sa različitim tipom rasta i načinu gutanja ($X^2 = 2,189$; $p>0,05$).

Diskusija

Ovo istraživanje je pokazalo, ono što je ispitivano više puta do sada, da mnogi faktori kao što su jezik, mišići obraza i žvakanja [6] utiču na položaj i inklinaciju mandibularnih molara. Isto tako najnovija istraživanja[7] pokazuju da postoji povezanost između različitih tipova kraniofacijalnog rasta i inklinacije mandibularnih molara. Potvrđeno je da kod različitih tipova kraniofacijalnog rasta funkcija disanja, gutanja i žvakanja je različita[8]. Tako je kod horizontalnog tipa kraniofacijalnog rasta najzastupljenija funkcija disanja na nos, maseterični tip žvakanja i somatski tip gutanja. Kod vertikalnog tipa kraniofacijalnog rasta najzastupljeniji je kombinovani način disanja, temporalni tip žvakanja i infantilno gutanje [9].

Zaključak

Analizom dobijenih rezultata istraživanja došlo se do sledećih zaključaka:

1. Ispitujući funkciju disanja kod pacijenata:

- uzrasta od 9 do 12 godina došlo se do zaključka da postoji statistički visoko značajna razlika između ispitanika sa horizontalnim i vertikalnim tipom rasta i ispi-

There was no statistically significant difference between subjects with different growth types and swallowing pattern ($X^2 = 2.189$; $p< 0.05$).

Discussion

This research has shown, what has been investigated many time so far, that there are a number of factors such as tongue, face muscles and mastication muscles[6] that affect the position and inclination of mandibular molars. Also recent research[7] has shown that there is correlation between different craniofacial growth types and inclination of mandibular molars. It is confirmed that in different craniofacial growth types the function of breathing, swallowing and mastication are different[8]. Thus, nose breathing, masseter mastication pattern and somatic swallowing pattern are the most common in horizontal craniofacial growth type. Combined breathing mode, temporal mastication pattern and infantile swallowing pattern are the most common in vertical craniofacial growth type[9].

Conclusion

Analysis of the obtained result led to following conclusions:

1. Investigating the function of breathing in patients:

- ages 9 to 12 there was statistically highly significant difference between subjects with horizontal and vertical growth types and

tanika sa neutralnim i vertikalnim tipom rasta
- uzrasta od 13 do 18 godina došlo se do zaključka da postoji statistički značajna razlika između ispitanika sa horizontalnim i neutralnim tipom rasta i ispitanika sa neutralnim i vertikalnim tipom rasta.

2. Ispitujući funkciju žvakanja kod pacijenata:
- uzrasta od 9 do 12 godina došlo se do zaključka da postoji statistički visoko značajna razlika između ispitanika sa neutralnim i vertikalnim tipom rasta,
- uzrasta od 13 do 18 godina došlo se do zaključka da postoji statistički značajna razlika između ispitanika sa horizontalnim i vertikalnim tipom.

3. Ispitujući funkciju gutanja kod obe grupe pacijenata:
- došlo se do zaključka da nema statistički značajnih razlika između ispitanika sa različitim tipom rasta u načinu gutanja.

subjects with neutral and vertical growth types
- ages 13 to 18 there was statistically significant difference between subjects with horizontal and neutral growth types and subjects with neutral and vertical growth types.

2. Investigating the function of mastication in patients:
- ages 9 to 12 there was statistically highly significant difference between subjects with neutral and vertical growth type,
- ages 13 to 18 there was statistically significant difference between subjects with horizontal and vertical growth types.

3. Investigating the function of swallowing in both groups of patients:
- there was no statistically significant difference between subjects with different growth types regarding swallowing pattern.

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