

Validity of the Neoclassical Facial Canons in Adult Bulgarians

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Sophisticated surgical planning and detailed knowledge of the facial proportions became indispensable with rapid advancement in the techniques of reconstruction of facial defects. Validity of four neoclassical facial canons and their variations was tested in 218 healthy young adult Bulgarians (112 males and 106 females). Low validity was found for all neoclassical canons. The lowest value was found for the naso-orbital canon present only in 4.59% of the subjects. In most cases the nose width was greater than the intercanthal distance. Naso-oral canon also showed low validity (12.38%) and mouth width narrower than 1.5 times nose width was significantly more frequent. Naso-facial canon showed also low validity (13.30%) with nose narrower than one-quarter the face width most dominant (52.29%). Although the canons should be regarded as arbitrary directives in reconstructive and esthetic surgery, the data obtained offered a reliable piece of information about the facial proportions of the Bulgarian population.

Key words: neoclassical canons, validity, variations, Bulgarians.

Introduction

Neoclassical facial-proportion canons developed by the Renaissance scholars [4] and regarded as precursors of the present-day anthropometric proportion indices greatly influenced the plastic and esthetic surgery in the last century [1, 2, 3, 11, 12, 14]. These canons proclaimed that equality between certain proportions of the face was required to achieve harmony. Later anthropometric studies of neoclassical canons in different populations [5, 7, 9] discovered a variety of proportional relationships in the face indicating that these canons cannot be further regarded as a valid guide in reconstructive surgery.

Many surgeons have stressed on the importance of seeing the face in proportions [6, 8]. Sophisticated surgical planing along with the rapid advancement of techniques for correcting multiple facial anomalies has made the knowledge of the exact relationship between the various head and face areas indispensable. The aim of this study is to test the validity of four horizontal neoclassical facial-proportion canons and demonstrate the incidence of the canon variations in healthy young adult Bulgarians.

Subjects and Method

The study included 218 (112 males and 106 females) healthy young adult Bulgarians of mean age 19.10 years (Range 18-25 years). Five horizontal measurements - intercanthal distance (en-en), length of the (right) eye fissure (en-ex), width of the face (zy-zy), width of the nose (al-al), and width of the mouth (ch-ch) - were taken from each subject (Fig. 1). The measurements were done according to the rules defined by Martin, Saller [12]. These measurements produced four horizontal facial-proportion canons:

- Orbito-nasal canon ($en-en = al-al$) indicates that the intercanthal distance is equal to the nose width.
- Orbital canon ($en-en = en-ex$) denotes equality between the intercanthal distance and the eye fissure.
- Naso-oral canon ($ch-ch = 1\frac{1}{2} al-al$) defines that the mouth width is by $1\frac{1}{2}$ times greater than the nose width.
- Naso-facial canon ($al-al = \frac{1}{4} zy-zy$) suggests that the nose width should be equal to $\frac{1}{4}$ of the face width.

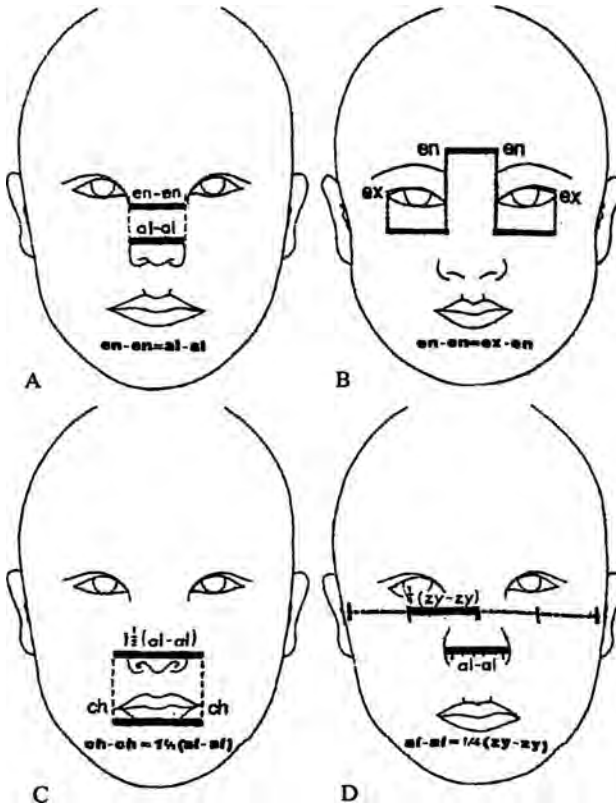


Fig. 1. The four horizontal neoclassical facial-proportion canons
 A – Orbito-nasal canon ($en-en=al-al$); B – Orbital $en-en=en-ex$); C
 – Naso-oral canon ($ch-ch=1\frac{1}{2} al-al$); D – Naso-facial canon ($al-$
 $al=\frac{1}{4} zy-zy$)

Analysis

As *valid* cases were regarded those in which the difference between the predicted and actual measurements did not exceed 1 mm. Variation from the canon was used to subcategorize the *non-valid* cases. The data were analyzed using descriptive statistics, chi-square test and standard error of difference (SED) method introduced by Hughes [10]. Statistical significance was defined as $p < 0.05$, two-tailed. Frequency comparisons between valid and non-valid canons were evaluated by the SED method. Difference was considered significant if the difference between the sample percentages was at least twice the SED value. Findings obtained were compared to those reported earlier and studied for gender effect as well.

Results

The neoclassical canon found most frequently to be valid was the orbital canon (16.97%), followed by naso-facial (13.30%) and naso-oral (12.38%) canons (Table 1). The orbitonasal canon was the least frequently met canon (4.59%). Variations of the same facial proportion index were more common ranging between 26.60% and 68.81%. The orbitonasal canon variation showing wider intercanthal distance or narrower nose was found significantly more frequently than the opposite case (68.81% vs. 26.60%, $p < 0.05$). Statistically significant difference was also observed in the naso-oral canon variations: the wider nose/narrower mouth variation occurred more frequently than the opposite case (60.55% vs. 27.06%, $p < 0.05$).

The most balanced variation frequencies were in the orbital proportions in which the intercanthal distance is greater (45.41%) or smaller (38.07%) than the eye length.

The largest mean difference (4.4 mm) in actual measurements was found for mouth narrower than $1\frac{1}{2}$ nose width variation of the naso-oral canon.

Table 1. Occurrence frequencies of four horizontal neoclassical facial-proportion canons and their variations in Bulgarian sample population

Facial-proportion canons and variations	Incidence (%)	Mean difference from canon (mm)	Range of differences (mm)
Orbitonasal canon			
en-en < al-al	38.07	2.7	1-13
en-en = al-al	16.97	-	-
en-en > al-al	45.41	2.9	1-10
Orbital canon			
en-en < ex-en	68.81	4.2	1-14
en-en = ex-en	4.59	-	-
en-en > ex-en	26.60	1.8	1-5
Nasooral canon			
ch-ch < $1\frac{1}{2}$ al-al	60.55	4.4	1-14
ch-ch = $1\frac{1}{2}$ al-al	12.38	-	-
ch-ch > $1\frac{1}{2}$ al-al	27.06	3.0	1-9
Nasofacial canon			
al-al < $\frac{1}{4}$ zy-zy	52.29	2.4	1-7
al-al = $\frac{1}{4}$ zy-zy	13.30	-	-
al-al > $\frac{1}{4}$ zy-zy	34.40	2.4	1-8

Table 2. Occurrence frequencies of four horizontal neoclassical facial-proportion canons and their variations in Bulgarian sample population by gender

Facial-proportion canons and variations	Incidence (%)		Statistics	
	males	females	χ^2	<i>p</i>
Orbitonasal canon			15.78	.000
en-en < al-al	80.36	56.60		
en-en = al-al	5.36	4.72		
en-en > al-al	15.18	38.68		
Orbital canon			1.69	.43
en-en < ex-en	33.93	42.45		
en-en = ex-en	17.86	16.04		
en-en > ex-en	48.21	41.51		
Nasooral canon			21.59	.000
ch-ch < 1 ½ al-al	74.11	47.17		
ch-ch = 1 ½ al-al	12.50	12.26		
ch-ch > 1 ½ al-al	13.39	40.57		
Nasofacial canon			11.97	.003
al-al < ¼ zy-zy	41.96	62.26		
al-al = ¼ zy-zy	12.50	14.15		
al-al > ¼ zy-zy	45.54	23.58		

Between-gender comparisons

Statistically significant differences were seen between genders in the canons including nose width – orbito-nasal ($p < .001$), naso-oral ($p < .001$), naso-facial ($p < .01$) canons (Table 2). Variations of the naso-facial canon occurred in reverted pattern in males and females indicating considerably wider face/narrower nose in females and slightly wider nose/narrower face in males (Table 2). The other two proportions indicated significantly greater prevalence of variations with larger nose width in males than in females. Mean values within the prevailing orbitonasal and naso-oral variations were larger in males (4.7 and 5.0, respectively) than in females (3.5 and 3.9, respectively).

Discussion

The facial-proportion formulae are valuable indices that provide a useful guide for determining the quality of relations between the major features of the face. Indices seem to have higher value than metric data when judging deviations from facial harmony in an individual. Our findings concur denoting the neoclassical facial-proportion canons of the Renaissance scholars and artists as rather obsolete for present-day norms in healthy face. Earlier studies of North American Caucasian people and Chinese subjects [5, 7, 9] have revealed that the original facial proportions occur in relatively small incidence in modern populations. Some of the canon discrepancies and the present findings could result from differences between the antecedent Italian and German populations and current mixed Caucasian population. Methodological differences should also be considered a source of bias. It is however evident that facial-proportion canons have to be adjusted to the contemporary anthropometric population findings. The most influential contribution to the frequency differences between valid and non-valid canons is due to

the quality of relationship between the mouth and nose width: a narrow mouth/wide nose disproportion and small intercanthal distance relative to the eye fissure/or nose width.

Regarding sex-related differences in facial relationships our findings disagree with other reports [9] by the significant difference in the variation occurrence between the male and female faces. This difference includes not only the incidence but also the pattern facial-proportion canon variations.

Testing the validity of the neoclassical facial canons appears a convenient approach for screening the main facial characteristics in population. Simple proportion formulae seem a reliable index for objective determination of morphological changes based on the norms of their racial/ethnic origin.

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