DATA ABOUT AN ANTHROPOMETRICAL COMPARATIVE STUDY IN TWO FEMININE POPULATIONS OF BIHOR COUNTY, ROMANIA (ORADEA AND BORUMBLACA LOCALITIES)

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Abstract. This paper is about the differences of fingers lenghts in two feminine populations of two different localities. These localities are: Oradea and Borumlaca, in Bihor county (Romania). Oradea is a locality with over two hundred thousands of inhabitants, which means the variability of some phenotipical features must be a large one. Borumlaca is a smaller locality (has under five thousands inhabitants), which means the variability of some phenotipical features is lower than in Oradea. This fact is showed in our study. We investigated 100 women from each locality. It were measured the lenghts of the 2nd, 3rd and 4th digits. The results are important: the digit lenghts are very different in the two studied populations.

Keywords: fingers lenght, feminine populations, Oradea, Borumlaca.

INTRODUCTION

In a genetically heterogenous population, many genotypes will be formed by the processes of segregation and recombination. The study of inheritance in humans made necessary the appearance of a particular methods for genetic analysis [15]. Making some special measurements is very important to detect some morphological traits [6]. Some traits have a special inheritance which is not like a mendelian inheritance. We can mention some examples: colour of skin, eyes and hair, dermatoglyphics, intelligence, height, weight etc. There are some factors which interact with the frequency of genes in a population. So, they can increase or decrease the alleles frequencies from a generation to an other. These factors are: non-randomised marriages, alteration of mutation rate, selection, small populations, genetic isolated population and migration [1, 4, 5]. Human population can have some changes in sizes and traits (hair form, colour of eyes, hair, skin, lip firmness etc). These traits are determined by the interaction of genotype, environment, geographic area, climate conditions etc. [7-9].

Many traits that are important in human genetics are determined by the effects of many genes and by the environment. Many of these are influenced not only by the alleles of two or more genes but also by the effects of environment. Such traits are called quantitative traits, and with quantitative traits the phenotype of an individual is potentially influenced by genetic factors and environmental factors. Making some special measurements is very important to detect some morphological traits [6].

Some traits have a special inheritance which is not like a mendelian inheritance. We can mention some examples: colour of skin, eyes and hair, dermatogliphics, inteligence, height, weight etc. There are some factors which interact with the frequency of genes in a population.

So, they can increase or decrease the alleles frequencies from a generation to an other. These factors are: non-randomised marriages, alteration of mutation rate, selection, small populations, genetical isolated population and migration [1, 4, 5]. Human population can have some changes in sizes and traits (hair form, colour of eyes, hair, skin, lip firmness etc). These traits are determined by the interaction of genotype, environment, geographic area, climate conditions etc. [7, 8, 16, 17].

There is a lack of information about digit ratio. Recently, some researchers start to investigate this feature of human race: digit length and digit ratio. Many of them linked the results of some environmental factors (geographic area, relatives etc) or other normal and abnormal human traits (dermatogliphics, inteligence, height, weight, malformations, sexual behaviour, autism, schizophrenia etc) [2, 18-20].

MATERIALS AND METHODS

We investigated 200 women. We measured the length of the 2nd, 3rd and 4th fingers of 100 women from each locality (Oradea and Borumlaca). They were randomised choosed. We measured the length of the fingers, from the finger basis to the superior bound of the phalanx. Then we calculated the average, standard deviation, variances, variation coefficient. Also, we calculated F distribution and z-test.

RESULTS

The results of our research are presented in the following tables.

In Table 1 are presented the results of data analysis in the feminine population of Oradea. We notice the low variability of all fingers lengths. The phenomenon is observed either in right and left hand.

The F distribution of data from feminine population of Oradea (Table 2), shows that the collected measurements proceed from very similar or identical populations. We may say that because the obtained values of F are distributed under the critical value calculated for one hundred subjects for each populations, value which is between 1.53 and 1.43. Calculating the z-test, we noticed that the averages are not significant different. All values are lower than p=0.05 or p=0.01.

Table 1. Presentation data about fingers length in a feminine population of Oradea locality.

Parameters	Right hands (RH)			Left hands (LH)		
	Index finger	Median finger	Ring finger	Index finger	Median finger	Ring finger
Average	1.005442	0.916181	1.096054	1.005416	0.916155	1.095514
Standard deviation	0.038179	0.027684	0.034413	0.038106	0.028676	0.036938
Variance	0.001457	0.000766	0.001184	0.001452	0.000822	0.001364
Variation coefficient	3.797248	3.02172	3.13974	3.790104	3.130081	3.371791

In Table 3 are presented the results of data analysis in the feminine population of Borumlaca. We can notice also the low variability of finger lengths.

In the feminine population of Borumlaca (Table 4), the results show that data proceed from very similar or identical populations (right and left hands). All values are under de critical value situated under 1.53 and 1.43 for one hundred subjects in each population.

After the z-test was calculated for each finger, we noticed that there are significant differences between the two hands. All values exceed the values of p=0.05 or p=0.01.

Comparing the finger lengths of the two populations, we obtained, in general, results alike those already related.

In the case of comparison of the two localities averages, the situation is very different than in each population, separately. After z-test calculation, we noticed that the two studied populations are very different, in all cases the obtained values exceeding the 1.96 value which coresponding to p=0.05.

Table 2. Presentation of the Right hands-Left hands comparison in a feminine population of Oradea locality. F distribution and z-test.

Fingers	Right hands-Left hands	
	F	z-test
Index fingers	1.075075	0.369347
Median fingers	1.023370	0.149
Ring fingers	1.459356	0.1761

Table 3. Presentation data about fingers length in a feminine population of Borumlaca locality.

Parameters	Right hands (RH)			Left hands (LH)		
	Index finger	Median finger	Ring finger	Index finger	Median finger	Ring finger
Average	6.645	7.386	6.751	6.638	7.351	6.736
Standard deviation	0.535295	0.592209	0.577787	0.530062	0.571988	0.580755
Variance	0.286541	0.350711	0.333837	0.280965	0.327170	0.337276
Variation coefficient	8.055601	8.017989	8.558534	7.985266	7.781096	8.621665

Table 4. Presentation of the Right hands-Left hands comparison in a feminine population of Borumlaca. F distribution and z-test.

Fingers	Right hands-Left hands	
	F	z-test
Index fingers	1.019379	0.092921
Median fingers	1.071953	0.425273
Ring fingers	1.010301	0.183103

Table 5. Presentation of the Right hands and Left hands comparison in the two feminine populations of Oradea and Borumlaca. F distribution and z-test.

Fingers	Right hands (RH)		Left hands (LH)	
	F	z-test	F	z-test
Index fingers	1.533296	1.27	1.398468	1.043478
Median fingers	1.578947	0.44923	1.439324	0.120967
Ring fingers	1.227806	0.5198	1.236698	0.487179

DISCUSSIONS

Finger length patterns differ between men and women. In men, the 2nd finger is shorter than the 4th finger, while in women this difference is not evident, note Fleur R Cattrall from Monash University in Melbourne, Victoria, and her colleagues. The disparity might be explained by differences in the hormones that men and women are exposed to before birth, the researchers explain in their paper in the December issue of Fertility and Sterility. This idea is supported by the fact that women with conditions characterised by elevated levels of the male hormone testosterone during fœtal development often have a masculine finger length pattern. To determine whether women with PCOS (polychistic ovarian syndrom) have masculine finger length patterns, Cattrall's group conducted a comparison study involving 70 women with PCOS and 70 women without the condition, between the ages of 18 and 40. The investigators measured the 2nd to 4th finger length ratio on the palms of the left and right hand. Compared with the other women, PCOS patients had finger length patterns on the right hand that more closely resembled those of men. The team suggests that the masculinised finger length pattern they identified could be considered evidence of testosterone exposure in fetuses destined to develop PCOS.

Measuring people's finger patterns may reveal some surprising information. Animal models have indicated that androgenic steroids acting before birth might influence the sexual orientation of adult humans In women, the index finger (2D, second digit) is almost the same length as the ring finger, the fourth digit (4D), although it may be slightly longer or shorter; in men, the index finger is more often shorter than the fourth. The greater 2D:4D ratio in females is established in two-year-olds.

This sex difference in 2D:4D is greater on the right hand than on the left, indicating that the right-hand 2D:4D is more sensitive to fetal androgens than the left-hand ratio. The right-hand 2D:4D ratio of homosexual women was significantly more masculine (that is, smaller) than that of heterosexual women, and did not differ significantly from that of heterosexual men. Although it is possible that the maternal influence on finger growth of subsequent sons occurs after birth, a prenatal influence seems more likely because of the extensive physiological pairing of mother and fœtus. The locus of the maternal "memory" for previous sons, and the mechanisms by which fœtal development of subsequent sons is altered, remain unknown. The sex hormones are thought to govern brain development as well as finger length. Manning and Baron-Cohen found that autistic children had extremely long ring fingers compared with their index fingers. Children with Asperger's also had abnormal index-to-ring finger ratios, though less so than full-blown autistics. Even the unaffected siblings and parents of the autistic children had ratios that differed significantly from the normal controls. That may sound surprising, but high levels of testosterone in the womb have been linked to several other brain-related phenomena, including left-handedness, dyslexia and female homosexuality. Manning thinks that the families of autistic children are genetically predisposed to produce high levels of testosterone during early development. (The foetus makes most of the testosterone itself. In males, it comes from the testes and adrenal glands; in females from the adrenals alone. Only a small amount, if any, comes from the mother.)

The Beck Depression Inventory (BDI) - widely used to detect depression in the population as a whole, as well as psychiatric patients - was then deployed to identify those who suffered from depression, and to score the severity of their depression[2, 3, 11]. The results showed that in men - but not women - a high BDI score was positively related to long digits, particularly the fourth digit (the ring finger). Dividing digit length by height, to take account of the fact that taller men tend to have longer limbs, fingers and feet, gave an even stronger predictor of high BDI scores in men. Fœtal testosterone concentrations are the most likely explanation, given the sex-dependent pattern of the data. Manning says "Testosterone has strong influences on the development of the male nervous system - not all of them beneficial. It is believed that excess testosterone promotes the growth of the right hemisphere of the brain at the expense of the left hemisphere. This can lead to impaired reading ability, but also to enhanced mathematical and musical abilities. Unfortunately, there seem to be other, less welcome effects: excess testosterone has already been implicated in the origins of migraine, autism, stuttering, schizophrenia - and now depression, too. "Interestingly, the study's results suggest that depression in women has a different and as yet undetermined origin."

Having relatively long ring fingers does not necessarily mean that a man will, in fact, suffer from depression - just as people with high cholesterol levels do not necessarily have a heart attack. However, since the symptoms of depression can discourage sufferers from acknowledging their condition and seeking treatment, ring finger length could offer a simple, objective indicator of susceptibility in men.

Manning links the proximate causes of digit ratio sexual dimorphism to the effects of sex hormones during early fetal development [13, 14]. He believes the evidence is persuasive, but not yet definitive, that higher levels of testosterone during this critical developmental stage facilitates the growth of the ring finger, while higher levels of estrogen facilitates the growth of the index finger. He also suggests that hypermasculinization increases the likelyhood of homosexuality or bisexuality, in both males and females.

Somewhat surprisingly, the effect size for digit ratio between the sexes varies substantially as a function of geography and race. Surprisingly, the females in some cultures may have a lower digit ratio than males of other cultures, although men have a lower digit ratio than women within populations in all cultures for which there is data. It is unclear why the effect size of the digit ratio of the sexes varies between different populations [21-24]. This is a curious fact, one for which Manning provides little in the way of definitive conclusions -- and the reader may be left to wonder whether some of Manning's interpretations are threatened by this between population variability in effect sizes. However, the fact that the average height of men of some populations is lower than women of other populations doesn't negate the sex difference in height, nor does the fact that the gender effect size of height varies in different populations. It has been suggested that autism may arise as the result of exposure to high concentrations of prenatal testosterone. There is evidence that the ratio of the lengths of the 2nd and 4th digit (2D:4D) may be negatively correlated with prenatal testosterone [12]. Others [16] related that neuro-hormonal theories of sexual orientation emphasize the organizational effects of testosterone on the developing brain.

We may conclude the following: low variability of all fingers lengths in feminine population of Oradea, for both hands. We noticed that the averages are significant different. We can notice also the low variability of finger lengths in the feminine population of Borumlaca. We noticed that there are significant differences between the two hands. In the case of comparison of the two localities averages, the situation is very different than in each population, separately. After z-test calculation, we noticed that the two studied populations are very different, in all cases the obtained values exceeding the 1.96 value which coresponding to p=0.05.

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