

DOI 10.36074/24.07.2020.v2.27

TO THE QUESTION ON «PATHOLOGICAL ASYMMETRY» STUDY

RESEARCH GROUP:

ORCID ID: 0000-0003-2543-1782

Elena Tkachenko
cand.med.sci., assistant
Ukrainian Medical stomatological academy, Physiology chair

ORCID ID: 0000-0002-2032-629X

Valentina Sokolenko
cand.biol.sci, associate professor
Ukrainian Medical stomatological academy, Physiology chair

UKRAINE

Ahmed Khalafalla
UMSA post-graduator 2019, dentist
Al Kasr Al Aini Hospital, Cairo
ARAB REPUBLIC OF EGYPT

Abdalla Mamazhonov
student
Ukrainian Medical stomatological academy
UKRAINE

Hamed Sartipi
dentist
Tehran

ISLAMIC REPUBLIC OF IRAN

Asymmetry study is realized at alive matter organization different levels beginning from micro- and ending with macro- the most comfortable of which represents population-species which expression is sinistrality. There are so called "left diseases" and other distinguishing features which can be thought as so-called pathological asymmetry. Here are several examples of them: intellectual disability or stuttering (on EEG in the second case) [1, 2], learning developmental disorders [3], dyslexias [4], dysgraphias, attention deficiency and hyperactivity syndrome, autism spectrum disorders [5, 6], mirror writing [7], co-ordination disorders [8] and apraxias [9], epilepsy (left-handed children get sick on it in earlier age and the disease rate is higher in them comparatively to right-handers or even it is absent in right-handers according to another point of view) [10, 11]. There exists handedness neuro-psychiatric pattern [12]. It concerns to schyzophreny, Alzheimer's and Parkinson's diseases dominance in left-handers [13]. Normal brain asymmetry is thought to be connected with VIP gene expression [14]. There is a point of view about pathological right-handedness with temporal epilepsy [15] and heart-vascular problems bigger distribution in dexters. Ambidexters who "can not find which hemisphere to use under

current task solving conditions” are suffered more in enuresis, hippocamp and amygdale atrophy in the old [16]. Asymmetry measurements in vestibular evoked myogenic potentials probably are not indicators of unilateral deficient in saccular pathways of migraine patients, males and females [17]. There are works on tinnitus (hearing was studied taking into account right-left acoustic asymmetry) [18]. There are developmental asymmetries for thumbnails and thus for lateral ventricles during pregnancy and after birth [19].

Pathological asymmetry can be assessed rather well on face for instance at hereditary rare hemifacial microsomia with face left side underdevelopment and preauricular skin tags on the affected side [20], macrosomia development describing ethno-gender-age-constitutional typological aspect [21], maxillar-mandibular inheritant and acquired asymmetry [22], bilaterally impacted mandibular canines [23, 24], maxillary lateral incisors microdontia [25], ameloblastic carcinoma in left mandible angular area [26], anterior mandibular swelling [27], condylar asymmetry at unilateral posterior crossbite [28]. There can be also a complex of symmetry and asymmetry: bilateral buccal radicular groove in maxillary central incisors [29], bilateral central giant cell granulomas of the posterior mandible at Noonan syndrome [30]. Many children with mixed biting have got intra-arch asymmetries that is more serious and is observed more often in transversal plane than in anterior-posterior [31], some – hair lip nasal deformation [32, 33]. Dentists from Iraq emphasize that normal occlusion at face skeletal asymmetry in 100% of the examined was found to be reliably more expressed in the right-handers than in the left-handers [34].

Face right half in the biggest amount of people is more than the left one according to one authors' group and sometimes on the contrary. Data about the question which parts express more asymmetry which ones – less is still not one-digit. As it was proposed asymmetry level correlates greatly with human body elements functional activity – more active parts of human body demonstrate more expressed asymmetry. For example, upper extremities are considered to be more bilateral comparatively to lower ones. Mandible sizes are characterized by bigger asymmetry than maxilla ones which is less active. These data indicate to directed asymmetry functional importance. Mouth right half is more active in 86% of right-handers and 67% of left-handers during conversation. In the majority of people face right half is dominant than left one as for mimical expression. There are genes responsible for face asymmetry [35]. There is a point of view that people with more asymmetrical faces live longer [36]. Although face halves absolute asymmetry is very rare [37] while face average asymmetry is considered to be esthetic harmony feature [38]. Face asymmetry is believed to be an indicator of psychological, emotional and physiological distress [39]. Face told asymmetry depends more on physiognomics of the human being himself/herself than on the representations of the observer telling about his asymmetry and it is so for women in bigger extent [40].

Face abundant asymmetry represents a problem that needs in a medical correction [41]. It was estimated that patients' bigger amount is among the Asians than among the European suffering from abundant face asymmetry [42]. Different peoples and cultures prefer their “own level of asymmetry” [43, 44]. Faces recognition in own and side race is thought to be different [45]. Abundant face asymmetry is a problem which needs to be corrected [46]. It is known nowadays that the Asians have more people with abundant face asymmetry comparatively to the Western [47]. There is a dependence between facial asymmetries and various emotional states: right frontal activation is observed at anxiety state, right parietal activation - at anxiety and happy states while a left parietal activation - at all inactive states (baseline, relaxed

and sadness) [48]. Asymmetry dermatoglyphics patterns become pathological under disease conditions in part at cystic fibrosis [49].

There are multiple computer methodics for face asymmetries assessment [50, 51]. Computer methods demonstrate expressed valuable differences between men and women [52, 53]. Face asymmetry was assessed in right- and left-handed men and women by means of posteroanterior radiographic cephalometry method [54]: areas on the left were significantly larger than those on the right in right-handers; left-handers were inconsistent in asymmetry though they had tendency to have larger facial areas on the right than on the left. It was suggested that some brain regions asymmetric development may be responsible for asymmetric facial regions development. Separate diagnostic methods were applied in young men and women [55].

Malocclusions represent visible expression of pathological asymmetry. It is studied by doctors in many countries, there are different classifications and forms of them because they are rather multiple. For instance, they are studied in Iran [56], Japan [57], Brazil [58], Nigeria [59], Kuwait [60], Greece [61]. Knowledge about them, their proper early diagnostics and treatment is rather important because odontal-jaw anomalies represent real risk factor for parodont tissues and teeth solid tissues diseases development.

Asymmetry as common-biological law is studied in typological aspects [62]. Its average level is a symbol of harmony and beauty, organisms proper natural and social adaptation while excessive (abundant) one – dysadaptation and pathology [63].

References:

- [1] Leconte, P., Fagard, J. (2006). Lateral preferences in children with intellectual deficiency of idiopathic origin. *Dev Psychobiol.* 48(6). 492-500.
- [2] Bahramian, E., Rezaei, M. (2017). Evaluation of hemispheric asymmetry by quantitative analysis of resting electroencephalography in children with developmental stuttering. *Journal of Zanzan University of Medical Sciences And Health Services.* 25(111). 94-103.
- [3] Geshwind, N., Behan, P. (1982). Left-handedness: Association with immune disease, migraine and developmental learning disorder. *Proc Natl. Acad. Sci. USA.* (79). 5079-5100.
- [4] Friedmann, N., Gvion, A. (2012). And even more universal model of reading: various effects of orthography on dyslexias. *Behav Brain Sci.* 35(5). 285-286.
- [5] Preslar, J., Kushner, H.I., Marino, L., Pearce, B. (2014). Autism, lateralisation, and handedness: a review of the literature and meta-analysis. *Laterality.* 19(1). 64-95.
- [6] Sadeghi Bajestani, G., Sheikhan, A., Hashemi Golpayegani, M.R., Ashrafzadeh, F., Hebrani, P. (2016). A Hierarchical model for autism spectrum disorder (HMASD). *Razavi International Journal of Medicine.* 4(3). 1-4.
- [7] Schott, G.D. (2007). Mirror writing: neurological reflections on an unusual phenomenon. *J Neurol Neurosurg Psychiatry.* 78(1). 5-13.
- [8] Darvik, M., Loras, H., Pedersen, A.V. (2018). The Prevalence of Left-Handedness Is Higher Among Individuals With Developmental Coordination Disorder Than in the General Population. *Frontiers in Psychology.* (9). 1-11.
- [9] Goldenberg, G. Apraxia in left-handers. 2013. *Brain.* 136 (Pt 8). 2592-2601.
- [10] Holmes, M.D., Dodrill, C.B., Kutsy, R.L., Ojemann, G.A., Miller, J.W. (2001). Is the left cerebral hemisphere more prone to epileptogenesis than the right. *Epileptic Disord.* 3(3). 137-141.
- [11] Stewart, C.C., Swanson, S.J., Sabsevitz, D.S., Rozman, D.S., Janecek, J.K., Binder, J.R. (2014). Predictors of Language Lateralization in Temporal Lobe Epilepsy. *Neuropsychologia.* 93-102.
- [12] Anticevic, A., Cole, M.W., Murray, J.D., Corlett, P.R., Wang, X.J., Krystal, J.H. (2012). The role of default network deactivation in cognition and disease. *Trands Cogn Sci.* 16(12). 584-592.
- [13] Wiberg, A., Ng, M., Al Omran, Y., Alfaro-Almagro, F., McCarthy, P., Marchini, J., Bennett, D.L., Smith, S., Douaoud, G., Furniss, D. (2019). Handedness, language areas and neuropsychiatric diseases: insights from brain imaging and genetics. *Brain.* 142(10). 2938-2947.

- [14] Tadayon, S.H., Vaziri-Pashkam, M., Kahali, M., Ansari Dezfouli, M., Abbassian, A. (2016). Common Genetic Variant in VIT Is Associated with Human Brain. *Front Hum Neurosci.*(10).236.
- [15] Kim, H., Yi, S., Son, E.I., Kim, J. (2001). Evidence for the pathological right-handedness hypothesis. *Neuropsychology.* 15(4). 510-515.
- [16] Cherbuin, N., Sachdev, P.S., Anstey, K.J. (2011). Mixed handedness is associated with greater age-related decline in volumes of the hippocampus and amygdala: the PATH through life study. *Brain Behav.* 1(2). 125-134.
- [17] Moallemi, M., Hajiabolhassan, F., Fatahi, J., Abolfazli, R., Jalaei, S., Khamseh, F. (2015). Interaural difference values of vestibular evoked myogenic. *Acta Med Iran.* 53(1). 33-38.
- [18] Ghasem Ahmad, Z., Farahani, S., Mahmoudian, S. (2010). The study of the relationship between laterality of tinnitus and thresholds of ASSR in patients with subjective idiopathic tinnitus. *Iranian Journal of otorhinolaryngology. (12th International Congress of Iranian Society).* 24-25.
- [19] Keyhandoust, Z.T., Shariat, M., Rahimian, E., Tehrani, F., Gholamreza, S. (2015). Comparative evaluation between diameter difference of the thumb and asymmetry of lateral cerebral ventricles in children with developmental delay: a new finding. *Iranian Journal of Child Neurology (IJCN).* 9(3). 9-12.
- [20] Janeshin, A. (2017). Hemifacial microsomia: A clonioradiographic report of a case. *Journal of Dentomaxillofacial radiology, pathology and surgery.* 6(2).37-41.
- [21] Maroufizadeh, S., Omani Samani, R., Amini, P., Sepidarkish, M. (2016). Prevalence of macrosomia and its related factors among singleton live-birth in Tehran. *Journal of Isfahan Medical School (I.U.M.S.).* 34(394). 940-945.
- [22] Reyneke, J.P., Tsakiris, P., Kientle, F. (1997). A simple classification for surgical planning of maxillomandibular asymmetry. *Br J Oral Maxillofac Surg.* (35). 349-351.
- [23] Gonzalez, S.M., Spalding, P.M., Payne, J.B., Giannini, P.J. (2011). A dentigerous cyst associated with bilaterally impacted mandibular canines in a girl: case report. *J Med Case Reports.* (5).230.
- [24] Tamgadge, A., Tamgadge, S., Bhatt, D., Bhalerao, S., Pereira, T., Padhye, M. (2011). Bilateral dentigerous cyst in a non-syndromic patient: Report of an unusual case with review of the literature. *J Oral Maxillofac Pathol.* 15(1). 91-95.
- [25] Garib, D.G., Alencar, B.M., Lauris, J.R., Baccetti, T. (2010). Agenesis of maxillary lateral incisors and associated dental anomalies. *Am J Orthod Dentofacial Orthop.* 137(6), Iss.732. 1-6.
- [26] Suomalainen, A., Hietanen, J., Robinson, S., Peltola, J.S. (2006). Ameloblastic carcinoma of the mandible resembling odontogenic cyst in a panoramic radiograph. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 101(5). 638-642.
- [27] Oliveira Neto, P., Sávio, E., Bezerra, T.P., Avelar, R.L., Raimundo Rde, C., Gomes, A.C., Laureano Filho, J.R. Anterior mandibular swelling. (2010). *J Oral Maxillofac Surg.* 68(2). 436-441.
- [28] Kilic, N., Kiki, A., Oktay, H. (2008). Condylar asymmetry in unilateral posterior crossbite patients. *Am J Orthod Dentofac Orthop.* 133(3). 382-387.
- [29] Kerezoudis, N.P., Siskos, G.I., Tsatsas, V. (2003). Bilateral buccal radicular groove in maxillary incisors: case report. *Int Endod J.* 36(12). 898-906.
- [30] Edwards, P.C., Fox, J., Fantasia, J.E., Goldberg, J., Kelsch, R.D. (2005). Bilateral central giant cell granulomas of the posterior mandible in an 8-year-old with Noonan syndrome (Noonan-like/multiple giant cell lesion syndrome). *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 99(3). 334-340.
- [31] Mahmoud, J.K. (2008). Maxillary dental arch asymmetry in the mixed dentition. *Medical Journal of Tikrit.* 1(141). 131-138.
- [32] Arajy, Z.Y., Nawres, A.A.M. (2009). Primary Repair of Unilateral Cleft Lip Nasal Deformity. *Iraqi postgraduate Medical Journal.* 8(3). 212-219.
- [33] Nawres, A.A.M. (2013). Primary Repair of Bilateral Complete Cleft Lip Nasal Deformity: Iraqi Experience. *Medical Journal of Babylon.* 10(2).325-335.
- [34] Ali, S.M., Saloom, H.F., Kadhim, H.A. (2012). The relationship of facial asymmetry and bite force to handedness in Iraqi adult sample. *Mustansiria Dental Journal.* 9(2).190-200.
- [35] Jones, B.C., Little, A.C., Penton-Voak, I.S., Tiddeman, B.P., Burt, D.M., Perrett, D.I. (2001). Facial symmetry and judgements of apparent health: support for a "good genes" explanation of the attractiveness-symmetry relationship. *Evol Hum. Behav.*(22).417-429.
- [36] Henderson, J. J., Anglin, J.M. (2003). A Facial attractiveness predicts longevity. *Evol Hum Behav.*(24).351-356.
- [37] Col, G.K., Col, T.K., Kaushik, S.K. (2005). Non-Syndromal Facial Asymmetry. *MJAFI.* 61(3).297-299.
- [38] Komori, M, Kawamura, S, Ishihara, S. (2009). Averageness or symmetry: which is more important for facial attractiveness? *Acta Psychol.*(131).136 – 142.

- [39] Shackelford, T.K., Larsen, R.J. (1997). Facial Asymmetry as an Indicator of Psychological, Emotional, and Physiological Distress. *Journal of Personality and Social Psychology*.72(2).456-466.
- [40] Chen, A.C., German, C., Zaidel, D.W. (1997). Brain asymmetry and facial attractiveness: Facial beauty is not simply in the eye of the beholder. *Neuropsychologia*. 35(4).471-476.
- [41] Wermker, K., Kleinheinz, J., Jung, S., Dirksen, D. (2014). Soft tissue response and facial symmetry after orthognathic surgery. *J Craniomaxillofac Surg*.(42).339– 345.
- [42] You-Wei, C., Lun-Jou, L. (2011). Facial Asymmetry: Etiology, Evaluation, and Management. *Chang Gung Med J*.(34).341-351.
- [43] Little, A. C., Apicella, C.L., Marlowe, F.W. (2007). Preferences for symmetry in human faces in two cultures: data from the uk and the hadza, an isolated group of hunter-gatherers. *Proc. R Soc. B*.(274).3113–3117.
- [44] Rhodes, G., Yoshikawa, S., Clark, A., Lee, K., McKay, R., Akamatsu, S. (2001). Attractiveness of facial averageness and symmetry in non-western cultures: in search of biologically based standards of beauty. *Perception*.(30).611-625.
- [45] Mondloch, C. J., Elms, N., Maurer, D., Rhodes, G., Hayward, W.G., Tanaka, J., Zhou, G. (2010). Processes underlying the cross-race effect: An investigation of holistic, featural, and relational processing of own-race versus other-race faces. *Perception*.39(8).1065-1085.
- [46] Wermker, K., Kleinheinz, J., Jung, S., Dirksen, D. (2014). Soft tissue response and facial symmetry after orthognathic surgery. *J Craniomaxillofac Surg*.(42).339-345.
- [47] You-Wei, C., Lun-Jou, L. (2011). Facial Asymmetry: Etiology, Evaluation, and Management. *Chang Gung Med J*.(34).341-351.
- [48] Makvand Hossayni, S., Azad Fallah, P., Rasolzadeh Tabataye, K., Ghanadian Ladani, H. (2007). Anterior-posterior asymmetry and emotion. *Research in Psychological Health*. 1(2).17-24.
- [49] Ezzati, A., Batoei, F., Jafari, S.A., Kiyani, M.A., Mahdavi-Shahri, N., Ahanchian, H., Tehranian, S., Kianifar, H.R. (2014). Dermatoglyphic patterns in cystic fibrosis children. *Iran J Pediatr*. 24(5). 609-616.
- [50] Russell, J.H.B., Kiddy, H.C., Mercer, N.S. (2014). The use of SymNose for quantitative assessment of lip symmetry following repair of complete bilateral cleft lip and palate. *J Craniomaxillofac Surg*. (42).454 – 459.
- [51] Kim, J.Y., Jung, H.D., Jung, Y.S., Hwang, C.J., Park, H.S. (2014). A simple classification of facial asymmetry by TML system. *J Craniomaxillofac Surg*.(42). 313 – 320.
- [52] Claes, P., Walters, M., Shriver, M.D., et al. (2012). Sexual dimorphism in multiple aspects of 3D facial symmetry and asymmetry defined by spatially dense geometric morphometrics. *J Anat*. (221). 97– 114.
- [53] Hakim, S.G., Aschoff, H.H., Jacobsen, H.C., Sieg, P. (2014). Unilateral cleft lip/nose repair using an equal bows /straight line advancement technique – a preliminary report and postoperative symmetry based anthropometry. *J Craniomaxillofac Surg*. (42).39-45.
- [54] Keleş, P., Divarbakiri, S., Tan, M., Tan, U. (1997). Facial asymmetry in right- and left-handed men and women. *Int J Neurosci*. 91(3-4).147-159.
- [55] Ercan, I., Ozdemir, S., Etoz, A., Sigirli, D., Tubbs, R.S., Loukas, M. (2008). Facial asymmetry in young healthy subjects evaluated by statistical shape analysis. *J. Anat*.(213).663-669.
- [56] Nikneshan, S., Hosseinzadeh, M., Dehghanpour Barooj, M., Kheirkhani, M. (2017). Localization of impacted maxillary canine teeth: a comparison between panoramic and buccal object rule in intraoral radiography. *Journal of Dental School Shahid Beheshti University of Medical Science*.35(1).31-40.
- [57] Terajima, M., Yanagita, N., Ozeki, K., Hoshino, Y., Mori, N., Goto, T.K., Tokumori, K., Aoki, Y., Nakasima, A. (2008). Three-dimensional analysis system for orthognathic surgery patients with jaw deformities. *Am J Orthod Dentofacial Orthop*. 34(1).100-111.
- [58] Metzger, A.L.T., Campiotto, A.R., Muzy, P.C. (2008). Interference of malocclusion types in mandibular movements measures: a study supported by the Brazilian army. *Rev. CEFAC*. (ISSN). 1516-1846.
- [59] Onyiaso, C. (2003). Prevalence of malocclusion among adolescents in Ibadan, Nigeria. *American Journal of Orthodontics and Dentofacial Orthopedics*.126(5). 604 – 607.
- [60] Behbehania, F., Årtuna, J., Al-Jameb, B., Kerosuoc, H. (2005). Prevalence and Severity of Malocclusion in Adolescent Kuwaitis. *Med Princ Pract*. 14(6).390-395.
- [61] Ioannidou-Marathiotou, I., Papadopoulos, M.A., Gianniou, E., Kolokithas, G. (2000). Congenitally missing teeth in a malocclusion population. *Hellenic Orthodontic Review*.(3). 65-79.
- [62] Tkachenko, E. V., Sokolenko, V. N. (2020). Common-biological phenomenon asymmetry in typological aspects. *Dynamics of the Development of World Science. Abstracts of IX Scientific and Practical Conference.- Vancouver, Canada*. 205-214.
- [63] Ткаченко, Е.В., Соколенко, В.Н. (2020). Роль индивидуального профиля межполушарной асимметрии в механизмах развития заболеваний. *Perspectives of World Science and Education. Abstracts of VIII Scientific and Practical Conference.-Osaka, Japan*. 910-919.