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ASYMMETRY ASSESSMENT APPLIED ASPECTS

Tkachenko Elena

Candidate of medical sciences, Physiology chair assistant Poltava State medical university, Ukraine

Sartipi Hamed Nosratolla

Dentist Tehran, Islamic Republic of Iran

Bagherizadeh Mohammad Amir

Student Poltava State medical university, Ukraine

Asymmetry belongs to common-biological law observed at all alive matter organizational levels beginning from molecular and ending with the biospheric one with changing while human developing and growing, starting with Prokaryotes among the animals, expressing gender difference with dominance in males, with all body systems involvement in it, when having huge applied significance.

Iranian scientists demonstrated that normal population had no identical retinal information in both eyes, and without considering this reality, normal asymmetry in information gathered from both eyes might be interpreted as retinal disturbances [1].

Physiological and pathological occlusion attracts the scientists' attention in many countries. For example Iranian orthopedic dentists found out that mandibular position had changed more at class II 2-nd division by Engl than at the 1-st one with more effective treatment at the II-nd class while widening the data about oral cavity superior-inferior asymmetry [2]. Skeletal malocclusions in turn express superior-inferior asymmetry and moreover are studied taking into account typological aspects: there was a significant correlation between the retromolar space and various vertical skeletal malocclusions in Iranian boys and girls [3].

Iranian psychologists determined that emotional working memory training could be the main axis in EEG beta-waves asymmetry in frontal regions (anterior-posterior asymmetry) in people with borderline personality disorders; it has applied significance in Neurology and Psychiatry [4]. In the 57-yeared Iranian male and female patients after stroke spatiotemporal gait asymmetry may be related to diminished equilibrium during walking in the patients with chronic stroke while considering that that rehabilitation interventions should be focused specifically on spatiotemporal gait asymmetry ameliorating (asymmetry with ethno-gender age typological aspect because the participants' mean age was 57 years in this research) [5].

Injured and dominant leg function led to functional asymmetry in two legs as well as that plyometric training could compensate for this functional asymmetry in Iranian male soccer players with one- or two-grade external ankle sprain (asymmetry with ethno-gender typological aspect taking into consideration) [6]. Lower extremities local and global asymmetry during walking was proposed to be assessed in clinical and

research settings in part in Sport Sciences and during physical education in Iran [7]. Abundant asymmetry is the pathological one as in the cases with Iranian male students (ethno-gender-age typological aspect) concerning to their scapulae position [8]. Korean scientists found out that pelvis asymmetry maintaining body alignment with the spine would have a negative effect on scoliosis development in the 11-18-yeared adolescents (ethno-age typological aspect) [9]. These data have applied significance in Neurology, Pediatry, Sport Medicine. Asymmetrically performed movements can result into dyskinesia by the data of Korean specialists from Physical Therapy Department [10]. Foot orthoses long-term wearing in the Iranian children with flexible flat feet decreased peak positive free movement amplitude asymmetry index without influence on feet medio-lateral components, ground reaction force components indices asymmetry [11]. Asymmetry in functional movement screen individual tests was proposed to be applied in predicting the injury occurrence in Iranian male and female athletes 17-23 years old approximately (asymmetry plus ethno-gender-age typological aspect) [12]. Pelvic asymmetry got decreased after therapeutic intervention on sacroiliac joint with lower lumbar lateral flexion decrease in the Iranian patients with unilateral innominate rotation while widening the data about asymmetry applied aspect with ethnic typological aspect [13].

Asymmetry study with ethno-age typological aspect taking into account was concerning to asymmetry in Iranian children's linguistic production and comprehension ("How is it possible for children to produce correct forms that are not yet understood by them?") taking Bidirectional Optimality Theory in consideration [14]. Asymmetry was studied with ethno-gender-age aspects in Iranian extroverts and introverts (thus, while temperament taking into consideration): verbal fluency performance was improved at positive affect induction, extroverts had better verbal performance comparatively to introverts at positive emotional induction; thus positive emotion induction influenced on cognitive performances with personality traits (extroversion and introversion) modifying action to these effects [15].

Sinistrality represents asymmetry expression at population-species level attracting the attention by specialists from Science different branches in theoretical and applied aspects in the Earth many areas. Sinistrality is studied in a complex with various typological aspects. While being the interhemispherical asymmetry individual profile expression, sinistrality was assessed in ethno-age aspects (in Iranian students, students represent separate age group, together with behavioral strategies taking into consideration the main of which are coping and avoiding). Iranian psychologists found a relationship between handedness with brain behavioral inhibition and activation systems, and avoidant decision-making style. They determined a significant relationship between behavioral inhibition system and decision-making styles all types. Relationships were also detected between behavioral activation system with all three types of avoidant, rational and intuitive decision-making style except the dependent one. It is worthy to mention that both brain behavioral systems were able to predict the decision making styles as well as handedness moderating effect in mediating the relation between behavioral inhibition system and avoidant decision-making styles with conclusion that cognitive processes for example decision-making are directly or indirectly influenced by endogenous and biological factors – brain behavioral systems and hemisphere superiority are among them [16]. Iranian neurologists found the links between computer white screen different-frequented bands and EEG patterns, different-frequented bands amplitude and different mental states development from rest to cognitive challenge in male and female right-handed students while widening the data on applied study of handedness in ethno-gender-age typological aspect [17]. Creativity and its components were found to be in bigger development in ambidextral and left-handed Iranian high school students (interhemispherical asymmetry individual profile plus ethno-age typological aspect) due to right hemisphere stimulation and interaction in the two hemispheres [18]. Questionnaires for sinistrality assessment were created and are still created in many countries and continents with adapted versions in separate regions. There exist versions of Annett's Handedness Test in various countries in part in Turkey [19].

We dedicated many researches to asymmetry study in foreign students for example [20; 21] as well as in the dental patients [22]. Nowadays doubtly there exists tight connection between physiological systems functioning and left-handedness and even its type, because there are real, hidden and non-real left-handers [23], in the foreign students from different countries receiving their education in our educational comprises establishment [24]. Left-handedness only 5% of so-called interhemispherical asymmetry individual profile which indices assessment and taking into consideration attracts the scientists' attention in many countries in part in Pedagogical sciences area; our own works were dedicated also to it in relation to foreign students' non-remote and remote learning [25].

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