

# Left-Handedness and Neurotic Disturbances in Adult Urban Population

Sanja Milenković<sup>1</sup>, Milica Brkić<sup>2</sup>, Goran Belojević<sup>1</sup>

<sup>1</sup>Institute of Hygiene and Medical Ecology, School of Medicine, University of Belgrade, Belgrade, Serbia;

<sup>2</sup>Health Center „Dr Simo Milošević“, Belgrade, Serbia

## SUMMARY

**Introduction** Controversial results on the relationship between the left-handedness and neurotic disturbances have been obtained in so far investigations.

**Objective** The aim of this study was to investigate the link between the left-handedness and neurotic disturbances in an adult urban population.

**Methods** A cross-sectional study was performed on 1,202 adult residents of the Stari Grad municipality in Belgrade, out of which 401 were males (33,4%) and 801 were females (66,6%). A questionnaire was used as an investigation instrument, with questions concerning age, gender, writing hand and neurotic disturbances: tension, aggressiveness, anger, nervousness, weepiness and seclusion.

**Results** Left-handedness was found in 60 subjects (5%) and it was statistically more frequent in males (7.7%) compared to females (3.6%) ( $p=0.003$ ). A decreasing trend of proportion of left-handed males was found in relation to aging. In the age group 18 to 39 years, aggressiveness, as a specific neurotic disturbance, was significantly more frequent in left-handed males in comparison to right-handers ( $p=0.035$ ). In the age group 40 to 59 years, neurotic disturbances were more common among left-handed males compared to right-handers ( $p=0.030$ ). There were no significant differences in the proportion of neurotic disturbances between the left-handed and the right-handed females.

**Conclusion** From a public health point of view, left-handed men may be regarded as a relatively vulnerable population category concerning mental health.

**Keywords:** left-handedness; urban population; neurotic disturbances

## INTRODUCTION

Dominant hand is usually defined as a preference to use one hand rather than another, for performing most of the activities and it is considered to be the most obvious example of cerebral lateralization, an exclusive human characteristic. Development of speech and fine motor skills have been related to handedness in the evolution of humans [1]. Hitherto, there is no full agreement between investigators about who is actually considered to be left-handed, what is the percent of left-handers in a population, and what is the etiology of left-handedness [2].

Majority of studies about left-handedness have shown that left-handedness is more frequent in males than in females [2, 3]. However, some investigators claim that there are no gender differences in the prevalence of left-handedness [4].

A link between left-handedness and neurotic disturbances has been rarely studied. Further, problems derive from different handedness scores based on questionnaires [2, 5]. Some studies have found a link between left-handedness in males and psychological disorders [6], neurotic disturbances [2, 7], anxiety [8], depression [9], hypochondriasis [5] and soft behavioral bipolarity [10]. However, no connection between left-handedness and anxiety was found in another study [11].

## OBJECTIVE

Taking into a consideration controversial scientific results, the aim of our study was to investigate the relationship between left-handedness and neurotic disturbances in an adult urban population.

We have hypothesized that: 1) the prevalence of left-handedness in urban adult population is significantly different with regard to sex; and 2) there are significant differences in the prevalence of neurotic disturbances with regard to dominant hand, sex and age in adult urban population.

## METHODS

A cross-sectional study was preformed in adult urban population of a central municipality „Stari Grad“ in Belgrade.

According to census data, about 60,000 residents live in this municipality. In order to obtain a 5% random sample (3,000 people), a step-method with interviewing the residents of every twentieth flat in each street was used. The questionnaires, constructed by the authors for this study, were delivered in post-boxes, according to the number of dwellers. The subjects were not informed about the details of investigation objectives. The response rate was 52.8%, accounting for 1,584 respondents.

## Correspondence to:

Sanja MILENKOVIĆ  
Institute of Hygiene and  
Medical Ecology  
School of Medicine  
University of Belgrade  
Dr Subotića 8, 11000 Belgrade  
Serbia  
[sanjavecko@yahoo.com](mailto:sanjavecko@yahoo.com)

Because of incomplete data related to sex, age, dominant hand and response about neurotic disturbances, 382 questionnaires were not taken into account. Final sample consisted of 1,202 subjects, of which 401 were males (33.4%) and 801 (66.6%) were females.

The questionnaire encountered data on age and gender. Hand dominance was checked with the question about writing hand. The presence of neurotic disturbances in terms of tension, aggressiveness, anger, nervousness, weepiness and seclusion was investigated with closed questions using dichotomous answers.

Data were stratified according to handedness, sex, and age. Chi-square and Fisher exact test were used to examine differences between groups. A two-tailed probability value of 0.05 or less was considered significant. All statistical analyses were performed with the Statistical Package for the Social Sciences, SPSS, version 17.0 for Windows (SPSS Inc., Chicago, IL, USA).

## RESULTS

Left-handedness was found in 60 subjects (5%), and it was statistically more frequent in males (31;7.7%) compared to females (29;3.6%) ( $\chi^2=9.519$ ;  $p=0.003$ ). A decreasing trend of proportion of left-handed males was found in relation to aging (Table 1), while there was no such trend in females (Table 2).

**Table 1.** Distribution of male subjects with regard to age and dominant hand

Age (years)	Dominant hand		Total [n (%)]
	Right [n (%)]	Left [n (%)]	
18–39	161 (89.4)	19 (10.6)	180 (100.0)
40–59	140 (92.7)	11 (7.3)	151 (100.0)
≥60	69 (98.6)	1 (1.4)	70 (100.0)
Total	370 (92.3)	31 (7.7)	401 (100.0)

**Table 2.** Distribution of female subjects with regard to age and dominant hand

Age (years)	Dominant hand		Total [n (%)]
	Right [n (%)]	Left [n (%)]	
18–39	381 (95.7)	17 (4.3)	398 (100.0)
40–59	273 (97.5)	7 (2.5)	280 (100.0)
≥60	118 (95.9)	5 (4.1)	123 (100.0)
Total	772 (96.4)	29 (3.6)	801 (100.0)

In a total of 1,202 subjects, neurotic disturbances were found in 370 subjects (30.8%), out of which there were 122 males and 248 females. The prevalence of neurotic disturbances among males and females was similar (30.4% and 31.0%, Pearson  $\chi^2=0.219$ ;  $p=0.122$ ).

Investigation of relationship between the left-handedness and neurotic disturbances showed that, in the age of 18 to 39 years, aggressiveness, as a specific neurotic disturbance, was significantly more frequent in left-handed males in comparison to right-handers (Table 3).

In the age 40 to 59 years, neurotic disturbances were more frequent in general among left-handed males compared to right-handers (Table 4).

In females, there was no significant difference in the proportion of neurotic disturbances between the left-handers and right-handers, regardless of age (37.9% vs. 31.6% respectively; Pearson  $\chi^2=0.473$ ;  $p=0.298$ ).

## DISCUSSION

Our investigation showed that the prevalence of left-handedness in urban population was 5% which is in accordance with the data from literature about the frequency of left-handers in Serbia (5–10%) [12]. The percentage of left-handers generally increases from rural to urban environments, where the socio-cultural pressure is lower [12].

A decreasing trend of left-handedness with age among males in our investigation may be explained by higher socio-cultural pressure on left-handers in the past. However, it may be also hypothesized that left-handed males have a reduced life span. Left-handedness may be connected with factors that shorten life, such as: alcoholism, smoking, and various neurological and immunological disorders and various accidents [13, 14].

Our finding of more frequent left-handedness among males is congruent with previous studies [3, 4, 15]. The explanation for this may be found in a Geschwind-Behan-

**Table 4.** Distribution of neurotic disturbances in general in male subjects in the age of 40 to 59 years with regard to dominant hand

Neurotic disturbances	Dominant hand	
	Right [n (%)]	Left [n (%)]
Yes	32 (22.8)	6 (54.5)
No	108 (77.2)	5 (45.5)
Total	140 (100.0)	11 (100.0)

DF=1;  $p=0.030$ ; Fisher exact test

**Table 3.** Distribution of specific neurotic disturbances in male subjects in the age of 18–39 years with regard to dominant hand

Neurotic disturbances	Dominant hand				p*
	Right		Left		
	Yes [n (%)]	No [n (%)]	Yes [n (%)]	No [n (%)]	
Tension	29 (18.0)	132 (82.0)	3 (15.8)	16 (84.2)	1.000
Aggressiveness	9 (5.6)	152 (94.4)	4 (21.1)	15 (78.9)	0.035
Anger	20 (12.4)	141 (87.6)	5 (26.3)	14 (73.7)	0.150
Nervousness	30 (18.6)	131 (81.4)	5 (26.3)	14 (73.7)	0.538
Weepiness	3 (1.9)	158 (98.1)	1 (5.3)	18 (94.7)	0.362
Seclusion	6 (3.7)	155 (96.3)	2 (10.5)	17 (89.5)	0.201

\* Fisher exact test

Galaburda (GBG) model, which predicts that asymmetric brain organization is hormonally influenced in utero. The anomalies in cerebral domination in males may be provoked by high testosterone levels in utero [15], or frequent prenatal ultrasound scanning [16]. The etiology of this association remains uncertain.

More frequent neurotic disturbances in male left-handers may be explained by their worse adaptability to stress compared to right-handers, in an environment designed for right-handers. Left-handed males are generally more prone to psychological disorders [6]. There are more males among drivers, soldiers and other risky occupations, so they may be more often frustrated [3]. Head injuries during fighting, accidents and sport activities are more frequent in left-handed males compared to right-handers [17].

In addition, in some sports left-handers achieve better scores compared to right-handers. This may be explained by their higher aggressiveness and lower tolerance [18]. Tennis players are usually in special focus, although the results of a recent study point out that the frequency of higher achievement of left-handers in elite tennis is decreased in

male professionals over time and is almost absent in female professionals [19].

This study has some limitations. Direct interviewing instead of questionnaire delivered in post-boxes would probably enable a higher response rate, that would make the obtained results more reliable. Dichotomous answers in questionnaire on neurotic disturbances have relatively lower validity than the answers on Likert-type scale.

## CONCLUSION

Our study conducted in adult urban population showed that neurotic disturbances, particularly aggressiveness, were more frequently found in left-handed males compared to right-handers. There were no significant differences concerning neurotic disturbances between the left-handed and right-handed females. From a public health point of view left-handed men may be regarded as relatively vulnerable population category concerning mental health.

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## Леворукоост и неуротске сметње код одраслог градског становништва

Сања Миленковић<sup>1</sup>, Милица Бркић<sup>2</sup>, Горан Белојевић<sup>1</sup>

<sup>1</sup>Институт за хигијену и медицинску екологију, Медицински факултет, Универзитет у Београду, Београд, Србија;

<sup>2</sup>Дом здравља „Др Симо Милошевић“, Београд, Србија

### КРАТАК САДРЖАЈ

**Увод** У досадашњим истраживањима о повезаности леворукоости и неуротских сметњи уочава се опречност резултата.

**Циљ рада** Циљ рада је био да се испита повезаност леворукоости и неуротских сметњи код одраслих становника који живе у граду.

**Методе рада** Испитивање је урађено као студија пресека која је обухватила 1.202 одрасла становника општине Стари град у Београду, од чега 401 мушкарца (33,4%) и 801 жену (66,6%). Инструмент истраживања био је упитник с питањима која су се односила на старост и пол испитаника, руку којом пише и неуротске сметње, као што су напетост, агресија, бес, нервоза, плачљивост и повученост.

**Резултати:** Леворукоост је утврђена код 60 испитаника (5%) и значајно је била чешћа код мушкараца (7,7%) у односу на

жене (3,6%) ( $p=0,003$ ). Запажен је тренд смањивања учесталости леворукоости код мушкараца с повећањем животне доби. У доби од 18. до 39. године код леворуких мушкараца, у односу на десноруке, значајно чешће се јављала агресија као специфична неуротска сметња ( $p=0,035$ ). У доби од 40. до 59. године неуротске сметње су се у целини значајно чешће јављале код леворуког мушког становништва у односу на десноруку ( $p=0,030$ ). Код жена није било значајних разлика у погледу појаве неуротских сметњи између леворуких и десноруких особа.

**Закључак** Са становништва народног здравља, леворуки мушкарци се могу сматрати релативно рањивом категоријом становништва у погледу менталног здравља.

**Кључне речи:** леворукоост; градско становништво; неуротске сметње

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