

## **Brazilian Epidemiological Profile of Stuttering**

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### **Introduction**

It is important that clinicians, researchers, and health administrators (of public and private Institutions) know the prevalence, incidence and risk factors of a disorder in the community in order to allocate sufficient resources for managing problems associated with that disorder (Craig et al., 2002). Stuttering is a speech disorder characterized by involuntary syllable repetitions, syllable prolongations, or interruptions, known as blocks, in the smooth flow of speech (World Health Organization, 1992; Bloodstein, 1995), causing a reduction in speech rate (Andrade, 2003). Stuttering typically arises in young children -  $\geq 15\%$  of children in the age range of 4-6 years - (Bloodstein, 1995). Stuttering often resolves spontaneously before adolescence, leading to a population prevalence of 1-2% among adults (Drayna et al., 1999). Stuttering occurs in all cultures and ethnic groups (Andrews et al., 1983; Zimmermann et al., 1983), although prevalence might differ (Büchel & Sommer, 2004).

Stuttering can be classified as idiopathic (or developmental), acquired or psychogenic. Developmental stuttering is a disorder that arises during childhood (mainly between 18 months and 7 years, but can arise until 12 years), during the period of language acquisition and development (Andrews & Harris, 1964; Andrews et al., 1983; Franken, 1997; Andrade, 2003; Büchel & Sommer, 2004). It is characterized as a chronic disorder, even though it can present cyclic periods of fluency.

It is estimated that 55 millions of people stutter all around the world. The prevalence of stuttering in children is of 1.29 (Craig et al, 2002). Van Borsel et al (2006) investigated the prevalence of stuttering in regular and special schools, using questionnaires distributed among teachers. The overall prevalence in the regular school population was 0.58% and 2.28% in the special school population.

Most cases are diagnosed at an early stage, around 2 years of age, and can become chronic for 20% of those individuals that stuttered during childhood (Andrews, 1983; Bloodstein, 1995). Therefore resources should be allocated for the control of stuttering at all ages (children, adolescence and adults). However, the total number of people who stuttering during life is not clear once the prevalence of stuttering in a community is estimated based on studies with children (Bloodstein, 1995).

Regarding gender, several studies suggest an uneven distribution between gender (Kidd, 1983 and 1984; Ludlow & Dooman, 1992; Yairi & Ambrose, 1992; Ambrose et al., 1993), with a variability in proportion according to age. The ratio male/female, in adults, considering stuttering as chronic, is of 4:1. For children below 5 years of age, considering stuttering as primary, the ratio boy/girl is of 2:1. In epidemiological terms, Ambrose et al. (1997), Andrade (1997 and 1999) and Van Borsel et al. (2006) point that a significant reduction between the incidence and prevalence of stuttering can exist independently of gender.

The aim of this study is to determine the prevalence of stuttering in São Paulo (Brazil), considering gender and age.

## Method

The data of the present study were collected between January 1997 and January 2007 among children, adolescents and adults that presented in the clinic of the hospital with stuttering. São Paulo the largest city in Brazil having Brazilian Portuguese as its official language and counting almost 20 million inhabitants of a total population of more than 170 million. Our clinic is the only one in Brazil specialized in stuttering, receiving patients from all regions of São Paulo city.

All of the participants were submitted to a data gathering session – spontaneous speech – according to the methodology proposed by Andrade (2000). This protocol was based on the studies of Lutz & Mallard (1986), Schwartz & Conture (1988), Ryan (1992), Yairi & Ambrose (1992), Yairi, Ambrose & Niermann (1993), Kelly (1994), Campbell & Hill (1994), Throneburg, Yairi & Paden (1994), Franken, Boves, Peters & Webster (1995), Zebrowski (1995), Howell, Sackin & Glenn (1997) and, Ingham & Riley (1998). The following measures were obtained from these:

1. Type of disfluencies – identification of the number of occurrences of each type of disfluency. Disfluencies were classified as SLD (sound and/or syllable and/or word repetitions, prolongations, blocks, pauses) or as OD (hesitation, interjection, revisions, non-finished words, phrase repetitions);
2. Speech rate – identification of the number of words per minute (index of information production) and number of syllables per minute (rate of articulation);
3. Frequency of disruptions – identification of the percentage of speech discontinuities and percentage of stuttered syllables.

Data gathering only began after the standard ethic procedures: Prior approval from Research Ethics Committee of the Institution and informed consent were obtained from all participants and/or their respective guardians.

Criteria used for the inclusion of the participants were: diagnosis of stuttering; absence of general health deficits; negative screening results for communication disorders (language, hearing, neurologic, cognitive, etc.). The inclusion criterion was based on the Stuttering Severity Instrument (SSI-3/ Riley, 1994) and percentage of stuttered syllables.

Spontaneous speech samples containing 200 expressed syllables (fluent) were gathered. These samples were digitized (Portable Digital Recorder Sony MZ-R37) and also recorded on camera (Panasonic NVRJ-28).

The methodology used to gather the speech samples was that proposed in the Speech Fluency Assessment Protocol (Andrade, 2000), based on the presentation of a visual stimulus (picture). Speech was only interrupted by questions and/or comments when there was need to motivate speech production in order to obtain a minimum of 200 syllables. Speech samples were literally transcribed (fluent and disfluent syllables)

To obtain the number of syllables per minute, the total number of fluent syllables uttered (200) were divided by the total time used to produce speech including intersentence pause time. A stopwatch was used to determine time (Duchin & Mysak, 1987). Words per minute were obtained by calculating the total number of words uttered by the subject and dividing them by the subject's total speech time including intersentence pause time.

In order to verify that there were differences between the phases of adolescence and between genders with regard to the variables analyzed by the Speech Fluency Profile, independent t-tests were performed. The adopted level of significance was of 5%. Significant results are marked with an asterisk.

### Reliability Measures

Intrajudge and interjudge reliability measures were obtained for determining speech disruption typology (SLD and OD), speech rate, in words and syllables per minute, and frequency of speech disruptions (percentage of speech discontinuity and of stuttered syllables) two to six months after the initial measures. The complete conversational samples of five randomly selected subjects from each of the groups were reevaluated using the Sander Agreement Index formula (Sander, 1961). Intrajudge reliability, for both the investigator and the one judge, ranged from 0.94 to 0.99. Interjudge reliability ranged from 0.93 to 0.98. Both the intra- and the interjudge agreement values were comparable to those reported in previous research involving non-stuttering speakers (e.g., Yairi & Clifton, 1972; Manning & Monte, 1981; Duchin & Mysak, 1987, Leeper & Culatta, 1995; Searl, Gabel & Fulks, 2002).

### **Results**

Table1 presents the number of patients seen during the studied period. The number of patients diagnosed per year did not change. It is important to consider that the clinic where these patients were seen belongs to a University and therefore the number of appointments presented a small variation from one year to the next. What can be observed is that during the last four years the waiting list has grown considerably, especially with children.

**Table1. Number of patients per year**

<b>year</b>	<b>f</b>	<b>%</b>
1997	47	7.9
1998	58	9.75
1999	62	10.43
2000	67	11.26
2001	55	9.24
2002	58	9.75
2003	56	9.41
2004	55	9.24
2005	67	11.26
2006	66	11.09
2007 (jan)	3	0.50
TOTAL	594	100

The age of the patients at the moment of the diagnosis varied between 2 and 59:11 years and these were distributed as follows: 235 (39.5%) children; 91 (15.3%) adolescents; 264 (44.4%) adults. Overall, the prevalence of the disorder is higher for males than for females (0.71 and 0.29 respectively). This prevalence agrees with the findings of Yairi et al. (1996), Drayna et al. (1999) and Bloodstein (1995).

Table2 illustrates the results of the statistical analysis considering the age of arrival along the years. ANOVA was used to verify if the age of arrival changed along the years. According to this analysis, during the years of 1997 and 1998 the mean age of arrival is statistically higher when compared with the rest of the studied period. From 1999 onwards a fall in the age of arrival is observed, being the smallest in 2006.

**Table2. Statistics for age along the years**

<b>Year</b>	<b>mean</b>	<b>SD</b>	<b>median</b>	<b>minimu m</b>	<b>maximu m</b>
<b>1997</b>	25.5	9.52	24.0	8.0	45.0
<b>1998</b>	26.07	13.11	24.5	3.0	59.0
<b>1999</b>	15.98	9.5	14.0	3.0	50.0
<b>2000</b>	19.8	11.99	19.0	3.0	49.0
<b>2001</b>	16.98	12.9	13.0	2.0	56.0
<b>2002</b>	15.29	11.85	10.5	3.0	47.0
<b>2003</b>	13.61	8.43	12.0	3.0	36.0
<b>2004</b>	14.54	9.07	12.5	2.0	46.0
<b>2005</b>	14.82	9.51	13.0	3.0	39.0
<b>2006</b>	13.21	11.18	8.0	3.0	25.0
<b>Whole period</b>	17.27	11.57	15.0	2.0	59.0

**F = 6.77; p < 0.001\***

(1997, 1998 >1999, 2001, 2002, 2003, 2004, 2005, 2006)

Table3 illustrates the annual distribution of the age groups along the studied period. What draws the attention is that during the first years adult individuals prevailed (72.34%) and in the last year of the study this changed to children (65.15%). This suggests that parents, educators and health professionals are more alert to the problem of stuttering and therefore are indicating/looking for treatment as soon as the problem is detected.

The number of adolescents seen at the clinic was always very low when compared to the other age groups. Adolescence is a phase of transition between child and adulthood, when several changes occur – emotional, social, biologic, and neurological among others. This revolution of changes is fundamental for personality organization. During this period, the youngster looks for new models of behavior, usually different from the one given by parents/teachers. Different from what is observed during childhood, adolescents seem to have difficulties in assuming responsibility for their treatment probably because the need for treatment is suggested by parents (Levisky & Colli, 1979).

According to Craig et al. (2002) the lower prevalence rate in adolescents should not be unexpected given that the trend in the treatment of children who stutter is to treat the stutter early rather than wait hoping that spontaneous remission will occur. In addition, a significant proportion of children's stuttering is thought to spontaneously remit before adolescence (Yairi & Ambrose, 1992).

It is important to highlight that during the studied period no record of elderly individuals were found. Based on this observation one can suppose that either stuttering ameliorates with the aging process or elderlies may think that there is no use to look for a speech-language treatment at this stage of life. Craig et al. (2002) also found a decrease in prevalence in older ages. According to these authors this decrease cannot yet be explained.

**Table3. Distribution of the age groups**

Year	% children	% adolescents	% adults
1997	6.38	12.77	72.34
1998	22.41	5.17	72.41
1999	35.5	32.25	32.25
2000	29.9	13.4	53.8
2001	43.64	12.73	41.82
2002	51.72	12.07	36.21
2003	46.43	26.79	26.79
2004	41.82	21.82	36.36
2005	49.25	11.94	38.81
2006	65.15	6.06	25.76

### Conclusion

This study was conducted in order to verify how prevalent stuttering is across all ages in a Brazilian community. A change in the profile of the request for intervention was observed, in the beginning we had more adults and now we have more children.

In conclusion, to some extent the results of the present study confirm the findings of previous prevalence studies conducted elsewhere. Like in other studies stuttering prevalence appeared to be higher in males than in females. Further investigation is necessary to explore whether these are typical patterns for the Brazilian population and other countries. Cross-cultural studies are necessary as they will enrich the knowledge about the epidemiology of stuttering.

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