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The Nithsdale Schizophrenia Survey: III. Handedness and Tardive Dyskinesia

R. G. McCREADIE, J. CRORIE, ELIZABETH T. BARRON and G. S. WINSLOW

Summary: Handedness was assessed in 87 per cent (n = 116) of all known schizophrenics from a discrete geographical area, Nithsdale in Dumfries and Galloway Region. Seventy-three per cent were right-handed, a proportion greater than that found in a normal population. It was especially Feighner positive schizophrenics and non-in-patients who produced the excess of right-handers. Within the Feighner positive group, 68 per cent of mixed or left-handers, but only 29 per cent of right-handers, had tardive dyskinesia.

There have recently been several conflicting reports about whether there is an excess of right or left-handedness amongst schizophrenics, or whether the distribution is similar to that found in the general population (e.g. Lishman and McMeekan, 1976; Taylor *et al*, 1980; Chaugule and Master, 1981). Different ways of classifying handedness and defining schizophrenia may have given rise to some of the confusion. Also, former studies have examined only in-patients, who now probably form a small atypical group of schizophrenics (McCreadie, 1982). The present study reports, firstly, handedness patterns in the vast majority of all known schizophrenics from a discrete geographical area, and secondly, an association between handedness and tardive dyskinesia (TD).

Method

The geographical area from which patients were drawn, Nithsdale in Dumfries and Galloway Region, the identification of such patients, and the demographic, social and clinical information obtained have been described elsewhere (McCreadie, 1982). There were 133 schizophrenics, of whom 28 per cent were in-patients, 17 per cent day patients, and 32 per cent out-patients; 23 per cent attended only their general practitioners. All in-patients (except one who was un-co-operative), day patients and out-patients and 46 per cent of general practice patients (n = 116) were assessed for handedness using the Annett Questionnaire (Annett, 1970). Patients were asked to perform 11 tasks: writing, throwing a ball, holding a tennis racket, holding a match to strike it, hammering, using a toothbrush, using scissors, guiding a thread through the eye of a needle, holding a broom, dealing cards, and unscrewing a lid from a jar. A twelfth task, using a shovel, was omitted as it is interchangeable with holding a broom (Annett, 1970). The necessary equipment to perform each task was placed in front of the patient equidistant from his hands. The broad classification of handedness of Fleminger and his colleagues (1977) was used. A patient was defined as right-handed if the right-hand was used for all activities, mixed-handed if the right-hand was used for writing and the left-hand for one or more of the other activities, and left-handed if the left-hand was used for writing.

Full details of the assessment of TD are given elsewhere (McCreadie *et al*, 1982a). Briefly, TD was assessed by the Abnormal Involuntary Movements Scale (AIMS) (US Department of Health, Education and Welfare, 1976), and a patient was defined as having TD if he or she had a rating of at least 'mild' on the global scale.

The psychiatrists who examined the patients for TD were different from the ones who carried out the handedness test, except in the case of general practice patients (n = 14), all assessments on whom were carried out by the senior psychiatrist (R.G.McC.).

Differences between groups were tested by the chi-square test (two-tailed tests throughout).

Results

Table I shows the distribution of handedness for the total population, and also according to age and whether the patients were Feighner positive ('definite' or 'probable') or negative schizophrenics (Feighner *et al*, 1972). It also includes the distribution of handedness in a large normal population aged 16–64 years (Fleminger *et al*, 1977). Seventy-three per cent of the

TABLE I
Distribution of handedness

	Nithsdale schizophrenics							
	Total		Feighner positive schizophrenics		Feighner negative schizophrenics		Normal subjects*	
	n	%	n	%	n	%	n	%
Under 40 years of age:								
Right	35	78	30	86	5	50	189	44
Mixed	9	20	4	11	5	50	195	46
Left	1	2	1	3	0	0	44	10
Total	45	100	35	100	10	100	428	100
40–64 years of age:								
Right	41	75	28	78	13	68	207	56
Mixed	10	18	6	17	4	21	139	37
Left	4	7	2	5	2	11	26	7
Total	55	100	36	100	19	100	372	100
65 years and over:								
Right	9	56	8	57	1	50	–	–
Mixed	7	44	6	43	1	50	–	–
Left	0	0	0	0	0	0	–	–
Total	16	100	14	100	2	100	–	–
All ages:								
Right	85	73	66	78	19	61	392	49
Mixed	26	23	16	19	10	32	336	42
Left	5	4	3	3	2	7	72	9
Total	116	100	85	100	31	100	800	100

* Taken from Fleminger *et al* (1977).

schizophrenics were right-handed, 23 per cent mixed-handed, and 4 per cent left-handed. When compared with the normal population, there were significantly more right-handers in the Feighner positive group in both the under 40 years and the 40–64 years age groups (86 per cent versus 44 per cent, $P < 0.001$; 78 per cent versus 56 per cent, $P < 0.02$). Statistically significant differences were not found between the Feighner negative schizophrenics and normal subjects.

When a comparison was made of the distribution of handedness in in-patients and non-in-patients (Table II) within the Feighner positive group, there were significantly more right-handers among the non-in-patient population (Table II; 85 per cent versus 64 per cent, $P < 0.05$).

Right-handers (dextrals) were compared on the basis of demographic, social and clinical data with those who were left-handed or of mixed-handedness (non-dextrals). An analysis was carried out separately for the Feighner positive and negative groups. The only statistically significant difference was in the proportion of patients in the two groups with TD (Table III). Sixty-eight per cent of Feighner positive non-dextrals, but only 29 per cent of dextrals, had TD ($P < 0.01$). This difference was not apparent in the Feighner negative group. A trend, not statistically significant, was that within the Feighner positive group, non-dextrals showed more flatness of affect and poverty of thought.

Discussion

The decision to compare handedness patterns between Nithsdale schizophrenics and normal subjects needs further comment. It may be argued that cultural differences between Nithsdale and London (from which the normal subjects were taken) might

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TABLE II

Handedness in in-patients and non-in-patients

	Feighner positive schizophrenics				Feighner negative schizophrenics			
	In-patients		Non-in-patients		In-patients		Non-in-patients	
Handedness	n	%	n	%	n	%	n	%
Right	19	64	47	85	4	57	15	63
Mixed	10	33	6	11	3	43	7	29
Left	1	3	2	4	0	0	2	8
Total	30	100	55	100	7	100	24	100

TABLE III

Handedness and tardive dyskinesia

	Feighner positive schizophrenics				Feighner negative schizophrenics			
	Dextrals		Non-dextrals		Dextrals		Non-dextrals	
	n	%	n	%	n	%	n	%
Tardive dyskinesia	19	29	13	68	3	16	1	8
No tardive dyskinesia	47	71	6	32	16	84	11	92
Total	66	100	19	100	19	100	12	100

explain some of the results. Child rearing practices in a largely rural, conservative area might have been directed towards the use of the right-hand in all activities. However, only one half of the schizophrenics were born in Nithsdale and there were no differences in handedness patterns between schizophrenics born in Nithsdale and those born elsewhere. It must also be pointed out that, in the survey of normals, subjects completed a questionnaire but were not asked to perform any of the items. Self-reports of handedness can lead to over-reporting of left-handedness (Satz *et al*, 1967). Furthermore, in the study of normals, the option of 'either hand' was given; an 'either' response was grouped with the left responses. In the present study the hand used to carry out the action was taken to be the preferred hand. Thus there might be a small bias in the present study towards finding a greater number of dextrals. It is most unlikely, however, that this bias would explain the marked difference found in the proportion of dextrals in the Feighner positive group compared with the normal subjects. The proportion in the Feighner positive population, 78 per cent, is somewhat greater than that found in another study which also found an excess of right-handers, 64 per cent (Taylor *et al*, 1980). That study, which also examined Feighner positive patients but confined itself to in-patients, asked only some patients to perform all tasks, and included 'either' responses.

A recent study (Chaugule and Master, 1981) which used the same classification of handedness as in the present study but which used a different definition of schizophrenia (ICD-8; WHO, 1974) found an excess of non-dextrals. Other studies (e,g. Gur, 1977; Nasraliah *et al*, 1981) which found an excess of non-dextrals among schizophrenics examined only in-patients and did not use either the classification of handedness or the definition of schizophrenia employed in the present study. The way in which schizophrenia is defined is probably crucial. This is shown in the present study by the fact that in Feighner negative schizophrenics, who nonetheless had a firm case record diagnosis of schizophrenia, the distribution of handedness patterns was not significantly different from that in normal subjects. It appears that the excess of right-handers is to be found especially among the more chronically ill patients.

Possible reasons for an excess of dextrals in a schizophrenic population have been discussed fully elsewhere (Taylor *et al*, 1980). Briefly, Taylor and her colleagues postulate that the more dominant one hemisphere is, the more vulnerable that individual will be to disease or injury. Full right-handedness correlates with strong left hemisphere dominance for language skills, while mixed or left-handedness is more likely to be associated with bilateral, albeit still unequal, representation of language function.

One possible explanation of the excess of right-handers among Feighner positive non-in-patients suggests itself if the results are looked at from another direction, namely, that relatively more non-dextrals were found among in-patients. In-patients who have a greater prevalence of negative symptoms (McCreadie, 1982) belong especially to the Type 2 Group of schizophrenics (Crow, 1980) where organic brain disease is thought to be an important aetiological factor. Could it be that some cerebral insult has both shifted natural dextrals towards non-dextrality and predisposed schizophrenics to the development of negative symptoms? Might this also explain the high prevalence of tardive dyskinesia amongst non-dextrals, as brain damage might render patients more susceptible to the side effects of prolonged administration of neuroleptics, now widely accepted as the main aetiological factor in tardive dyskinesia (Anonymous, *Lancet*, 1979)? This interpretation of the data is highly speculative, and, as yet, we have no convincing explanations of our results.

If the unexpected association between tardive dyskinesia and non-dextrality can be confirmed in other, larger studies, then assessment of handedness may be a useful predictive test of tardive dyskinesia in schizophrenics. If a patient is non-dextral, caution in the prescription of neuroleptics may be necessary.

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Robin G. McCreadie, B.Sc., M.D., M.R.C.Psych., *Director of Clinical Research and Consultant Psychiatrist*,

John Crorie, M.B., Ch.B., *Senior House Officer*,

Elizabeth T. Barron, M.B., Ch.B., *Registrar*,

George S. Winslow, M.B., Ch.B., *Registrar*,

Crichton Royal Hospital, Dumfries DG1 4TG, Scotland

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