

BEHAVIORAL TOXICITY IN SILICOTIC PATIENTS (Pilot Study)

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Silicosis is the most common and most severe occupational disease in China. Most silicotic patients complain of amnesia, concentration difficulties and psychomotor slowing, etc. Up to now these problems have not drawn sufficient attention in China. In order to explore the neuropsychological impairment in silica dust-exposed workers, the Wechsler Adult Intelligence Scale—Revised in China (WAIS-RC)¹ and some of the tests on the Wechsler Memory Scale—Revised in China (WMS-RC)² were used. A summary of the use of this battery in detecting the behavioral effects of silicon on silicotic patients is given.

SUBJECTS

Eight men and one woman exposed to silica dust were included in our study. All of these cases were exposed to silica dust for at least 4 years and had been diagnosed as silicosis by the panel of experts authored by national health ministry and Sichuan provincial government. The ages of the cases were from 41 to 68 (55.33 ± 10.56 years). All the cases had grown up in the countryside and had received 1 to 6 years (4 ± 2 years) education. Details of the study subjects are summarized in Table I.

Table I
Details of the 9 Patients with Silicosis

Number of patient	Sex	Age (year)	Education received (year)	Duration of exposure to silica dust (year)
1	male	61	6	24
2	male	64	1	20
3	male	47	4	4
4	male	41	5	4
5	male	68	3	22
6	female	62	1	4
7	male	52	6	6
8	male	42	6	15
9	male	43	4	10
		53.33 ± 10.56	4 ± 2	11.89 ± 8.49

RESULTS

The detailed results of neuropsychological tests are shown in Table II. Almost all the cases got full scores on experience and orientation subtests of WAIS-RC. Seven of nine cases (77.8%) got only zero scaled score on the test of counting from 1 to 100. And none of the cases got more than 7 scaled scores on the test of reversing from 100 to 1. No one could completely recall the short story and no one could get more than 8 scaled scores. There were more than 5 cases (55.6%)

failed to perform some subtests on WAIS-RC, with scores lower than $\bar{X} - D$ according to age-appropriate norms.

DISCUSSION

Unfortunately, we haven't finished the whole controlled trial, so we cannot statistically process the data. The results suggested that patients with silicosis suffered from some impairment of short-term memory, but remote memory was spared. The poor performance on subtests of reversed counting (from

Table II
Results of Behavior Tests on 9 Patients

Variable	Subjects								
	1	2	3	4	5	6	7	8	9
experience	5	4.5	4	5	4.5	4	5	5	5
orientation	5	5	5	5	5	5	5	5	5
1--100 (scaled 0	0	0	8	0	0	0	0	0	3
100--1 score)	4	6	6	0	3	2	4	1	7
short story	6	4	6	1.5	2	2	11	5	2
digit span									
forward	6	6	7	9	8	8	7	7	6
backward	3	3	4	3	3	3	5	6	4
information	14*	11*	16	11*	8*	9*	11*	19	16
comprehension	13*	16	14	15	10*	14*	16	15	14*
arithmetic	8*	11	8*	11*	11	7*	9*	14	8*
similarity	6*	4*	9	3*	2*	2*	5*	18	8*
vocabulary	38	34	14*	36	21	21*	28*	71	38
digit symbol	32	23	19*	19*	25	10*	14*	36	27*
picture com- pletion	9	7*	8*	9*	5*	5*	5*	14	6*
block design	14*	28	20*	26	26	22*	24	26	18*
picture arran- gement	20	12	8*	18	8*	4*	16	24	4*
object as- sembly	10*	22	21	21*	9*	13*	25	24	29

* less than $\bar{X} - D$

100 to 1) and digits backward gave us a deep impression that the mental tracking ability was markedly impaired. Especially when we compare the scores of digits backward with those of digits forward, the difficulties of attention and concentration will be more obvious. All the cases achieved a forward span of 7 or more but recalled much fewer digits reversed, which meant the patient's mental tracking deficits were much more severe than verbal memory difficulties. When doing arithmetic, all the cases asked us to repeat questions for 2 to 9 times (4.78 ± 2.64). We think the lower scores on arithmetic are partly due to attention difficulties and short-term memory disorders.

We found the patients did serial counting from 7 to 100 very slowly and most of them got only zero scaled score. We believe this kind of operation measures speed of response rather than long-term memory. Because digit symbol test is the one most likely to be sensitive to psychomotor slowing,^{3,4} the poor performance of this test indicates some impairment in this aspect. Although the results of other tests showed some impairment, we can't confirm their significance because of lack of controlled group.

According to this pilot study, we could conclude that exposure to silica dust can produce chronic toxic effects on human behavior, which are quite similar to those resulting from organic solvents.^{5,6} We hope the investigation being done by us will give a more clear and definite conclusion.

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