Tohoku J. Exp. Med., 2000, **192**, 291-299

Retrospective Study of Factors Affecting Employability of Individuals with Cerebral Palsy in Japan

Yoshiko Tobimatsu and Ryuichi Nakamura[1]

Department of Rehabilitation Medicine for the People with Disability, Tohoku University Graduate School of Medicine, Sendai 980-8575, and [1]National Rehabilitation Center for the Disabled, Tokorozawa 391-8555

Tobimatsu, Y. and Nakamura, R. *Retrospective Study of Factors Affecting Employability of Individuals with Cerebral Palsy in Japan.* Tohoku J. Exp. Med., 2001, **192** (4), 291-299 —— The purpose of this study was to investigate the characteristics of individuals with cerebral palsy that affected their ability to find a job in Japan. A retrospective nonrandomized descriptive study was performed. Subjects were 99 individuals with cerebral palsy who were eligible to have a vocational training at the National Rehabilitation Center for the Disabled after graduation from high school. All of them were able to perform ADL unassistedly. The mean age of the subjects was 19.9 years (range, 18 to 33) and the mean intelligence quotient measured by WAIS-R was 78.5 (range, 46 to 110). Walking ability, being female and experience of learning in a regular middle high school were significant explanatory variables in the multiple regression equation. The ability of individuals with cerebral palsy to get a job in Japan in the 1990's was largely determined by being able to walk and having an education in a regular school. ———— cerebral palsy; rehabilitation; outcome

The ultimate purpose of the rehabilitation of individuals with cerebral palsy is to allow them to be as independent as possible and for them to be able to participate in social, cultural, and economic activities. To achieve employment among adults with cerebral palsy is thus one goal of such rehabilitation and vocational rehabilitation centers have been founded throughout Japan in order to help such people gain employment.

The ability to gain employment is determined not only by personal attributes such as intelligence and physical condition, but also by social and economic conditions. Investigations into the employment in Japan of individuals with

Received August 29, 2000; revision accepted for publication December 28, 2000.

Address for reprints: Yoshiko Tobimatsu, Department of Rehabilitation Medicine for the People with Disability, Tohoku University Graduate School of Medicine, 2-1 Seiryo-machi, Aoba-ku, Sendai 980-8575, Japan.

e-mail: tobi@mail.cc.tohoku.ac.jp

cerebral palsy in the 1960's to the 1970's showed that those who were able to perform activities of daily living (ADL) independently, could walk unassistedly, and had an intelligence quotient (IQ) of more than or equal 80 (measured with WAIS-R) could get a job after graduation from senior high school (including both regular schools and special schools for students with disabilities) (Gomi 1984; Tsuyama 1985). The social and economic situation in Japan in the 1990's is more mature and developed compared with that in the 1960's to the 1970's. Accordingly, the requirements for employment of people with cerebral palsy may have changed.

There have been several studies reflecting the social and economic circumstances in western countries, which are different from those in Japan. In 1969, Pollock and Stark (1969) reported that physical handicap and intelligence were the most eminent factors affecting employability for people with cerebral palsy. In the 1960's and the 1970's, positive indicators for employment were reported, which included regular schooling (Bachman 1972), mobility (Bachman 1972), good hand function (Bachman 1972) and spastic type (O'Reilly 1975). On the other hand, negative indicators reported included mental retardation (Bachman 1972; O'Reilly 1975) and severe handicap (Cohen et al. 1966). In the 1980's, the role of family members (Cohen and Kohn 1979) and social, cultural and economic circumstances (Bleck 1984; Thomas et al. 1985) were also reported to affect the employability of people with cerebral palsy. From these indicators, Bleck stressed goal-oriented management (Bleck 1987).

The purpose of the present study was to determine the attributes of individuals with cerebral palsy who were able to gain employment in the 1990's.

Methods

Subjects

Ninety-nine individuals with cerebral palsy who were eligible to have vocational training at the National Rehabilitation Center for the Disabled and finished the training course between 1993 and 1997 were studied (Table 1). People with physical disabilities who are permitted to enroll at the center for vocational rehabilitation should be able to perform most basic activities of daily living (ADL) and move independently. Any mode of movement, including walking with or without assistive devices or the use of a wheelchair, is allowed. Thus, all of the study subjects could perform basic ADL. All of them had graduated from senior high school (including both regular schools and special schools for students with disabilities) before entering the center. The subjects included 54 males and 45 females. There were 56 spastic type subjects and 43 athetotic type cerebral palsy subjects. Although individuals with seizure are allowed to enter the vocational rehabilitation center, none of the subjects had epileptic attack in the period of their training. Some of the subjects had latent epilepsy which was well controlled. The subjects whose locomotion was walking with or without crutches

TABLE 1. *Subject profile (n = 99)*

Characteristics	Category	Numbers	Minimum	Maximum	Mean	S.D.
Sex	Male	54				
	Female	45				
CP Type	Spastic	56				
	Athetotic	43				
Locomotion	Walking	71				
	Wheelchair	28				
IQ	≧80	47				
	<80	52	46	110	73	14.8
Elementary school	Regular	62				
	Special	37				
Middle high school	Regular	51				
	Special	48				
Senior high school	Regular	23				
	Special	76				
Age (years old)	—	—	18	33	19.8	3.21
Japanese[1]	—	—	1	9	6.3	2.51
Mathematics	—	—	1	8	5.2	1.83

[1] Learning level (grade in an compulsory education school).

and/or ankle foot orthosis (AFOs) in the community were defined as a walking group and those who used wheelchairs were defined as a wheel chair group. Intelligence quotient (IQ) was measured using Wechsler Adult Intelligence Scale revised version (WAIS-R) (Wechsler 1981) when the subjects began to have vocational training at the National Rehabilitation Center for the Disabled. Abilities of Japanese (reading and writing) and mathematics of the subjects were also measured using Kyoukenshiki New Reading Ability Scale (publisher; Toshobunkasha Tokyo) and TK-shiki mathematics Ability Scale (Publisher; Taken Shuppan, Tokyo), respectively. The abilities were graded according the achieving level in Japanese compulsory education level. Japanese compulsory education system consists 9 years including 6-year-education in an elementary school and 3-year-education in a jounior high school. The level one in this study meant the ability level of first grade of an elementary school and the level 7 meant the ability level of the first grade of a jounior high school. The mean ability in Japanese of these subjects was 6.3, i.e., the 6th level of an elementary school indicating the ability to read and write ordinary articles including Kanji (Chinese characters). The mean ability in mathematics was 5.2, i.e., the 5th level in an elementary school indicating the ability to understand the four rules of arithmetic, decimals and fractions. In the center, the individuals had training in social skills in a working environment and vocational hand-skill training such as office work,

data entry, laundry and weaving according to aptitude and capability. For example, individuals who could walk without any aid but did not fit office work had laundry training. They had training of each process of laundry. Ironing was final stage of laundry and the most difficult thing for individuals with athetotic cerebral palsy. The course took about a year depending on the individual situation.

Study design

The study was based on a retrospective cohort design. The mode of locomotion (walking or wheelchair), type of cerebral palsy (spastic or athetotic), IQ, ability of reading writing and sex of each subject were recorded when they entered the center. The subjects were divided into three groups (job categories): those who got a competitive job after vocational training (employed group), those who got a welfare job (welfare group), and those who did not get a job or entered a sheltered workshop (unemployed group). The competitive job included both full-time work and part time work. A welfare job means the job in which the employee gets an income according to their job ability and the employer gets money or assistance from their local government for employing people with disabilities. Those who received an in-cottage work were included in the unemployed group.

The significance of differences attributed to discrimination between the groups was assessed by Kruskal Wallis test, and the correlation between variables was calculated by Spearman's rho. Multiple regression analysis was performed to predict the employability of the subjects. A p-value of less than 0.05 was considered statistically significant. These statistical analyses were performed using SPSS.

Results

The profile of the subjects included each job category, the employed, the welfare-employed and the unemployed, is shown in Table 2. From the Kruskal Wallis test, locomotion type, the experience of learning in a regular elementary school, IQ and ability of mathematics were significantly different according to job category (Table 2), however the ability of Japanese was not different significantly. The rate of the subjects who could walk and or had an experience of learning in a regular elementary school in the employed group was significantly higher than others. The mean IQ of the employed group was also higher than others, but the mean IQ of welfare group was lower than that of the unemployed group. In the 1960's and 1970's in Japan, IQ of more than or equal 80 was one of the important factors for getting job so that we statistically compared the numbers of the subjects between the two groups; whose IQ was more than or equal 80 or whose IQ was less than 80 (Gomi 1984; Tsuyama 1985). The numbers of the subjects whose IQ was more than or equal 80 or less than 80 did not differ significantly

TABLE 2. *The subjects profile in each group*

Characteristics		Job category			
		Employed	Welfare	Unemployed	Sum
Sex	Male	29	11	14	54
	Female	34	3	8	45
CP Type	Spastic	36	9	10	55
	Athetotic	27	5	12	44
Locomotion*	Walking	51	9	11	71
	Wheelchair	12	5	11	28
IQ	≧80	34	3	9	46
	<80	29	11	13	53
Elementary school*	Normal	47	6	9	62
	Special	16	8	13	37
Jounior high school	Normal	38	6	7	51
	Special	25	8	15	48
Senior high school	Normal	14	4	5	23
	Special	49	10	17	76
Age (years old)	Mean	19.3	20.1	20.9	
	S.D.	2.4	3.7	4.6	
	Minimum	18	18	18	
	Maximum	27	29	30	
IQ	Mean	80.6	72.8	76.2	
	S.D.	14	15.7	14.1	
	Minimum	46	51	57	
	Maximum	110	110	110	
Japanese	Mean	6.8	5.5	5.7	
	S.D.	2.42	2.53	2.61	
	Minimum	2	1	1	
	Maximum	9	9	9	
Mathematics[1]	Mean	5.6	4.7	4.6	
	S.D.	1.9	1.55	1.74	
	Minimum	1	2	2	
	Maximum	8	8	8	

* Indicates that there is a significant difference among the 3 groups.
[1] Learning level (grade in compulsory education).

among the job categories.

Listed multiple regression analysis was performed to predict employability using job category as a dependent variable, and sex, the experience of learning in a regular jounior high school, and locomotion as explanatory variables. The other variables shown in Table 3 were excluded because of the significant correlation among the variables listed by analysis using spearman's rho (Table 3). The multiple regression equation was significant (F value; 5.673, $p<0.01$), however

TABLE 3. *Correlation matrix (Spearman's rank correlation coefficient)*

	Type	Locom.	Sex	Age	El.	jounior	Senior	IQ	Jap.	Math
Locom.	*									
Sex										
Age										
El.		*								
Middle					*					
Senior	*		*	*	*	*				
IQ										
Jap.					*		*	*		
Math.					*		*	*	*	
Emp.		*	*		*	*		*	*	*

Locom, locomotion; El., Experience of having learned in a regular elementary school; Middle, Experience of having learned in a regular middle high school; Senior, Experience of having learned in a regular senior high school; Jap., learning level of Japanese taught in compulsory education; Math., learning level of Japanese taught in compulsory education; Emp., Employment.

* Significant at $p<0.05$.

the adjusted square of the multiple correlation coefficient was 0.160 (Table 4). The subjects who could walk and or had experience of learning in a regular school and or were females tended to be included in the employed group. The IQ did not contribute to the regression equation significantly.

DISCUSSION

The study subjects underwent vocational rehabilitation at the National Rehabilitation Center for the Disabled and were basically able both to perform ADL unassisted and to move independently by walking or with the use of a wheelchair. All the present study subjects had graduated from senior high schools, and this is common in Japan. More than 95% of students with or without disabilities enter senior high schools (including both regular schools and special schools for students with disabilities) in Japan. Even though some of the

TABLE 4. *Multiple regression analysis*

	PRC	SPRC	OSL
Constant	1.716		
Locomotion	0.492	0.267	0.006
Middle	0.355	0.214	0.025
IQ	−0.009	−0.16	0.089
Sex	−0.385	−0.231	0.015

Middle: Experience of having learned in a regular middle high school.

PRC, partial regression coefficient; SPRC, standardized partial regression coefficient; OSL, observed significance level of the test.

subjects had a low IQ (the lowest was 46), they were able to finish vocational rehabilitation. Currently, in Japan, only those disabled individuals who can perform ADL and move independently are permitted to undergo vocational rehabilitation. ADL and mobility would mean more people receiving vocational training with a greater impact on the employability of people with cerebral palsy. Accordingly, therapy focused on ADL and mobility in childhood would be important to get a job.

Reading and writing ability is essential to get job. However, ability of Japanese was not significantly different among job categories. The reason was supposed that Japanese ability of three groups classified by their resultant job categories was basically enough to get job and/or employment especially welfare-employment does not require high ability of Japanese. Our data indicated that the ability to walk was the most important attribute of individuals with cerebral palsy in determining whether they would get a job and the experience of learning in a regular school was the next. The results also indicated that females had more chance to get a job. We did not have a clear reason why, however, jobs offered to the subjects might have been those in which females more easily adapted than males.

Our results were similar to those of studies performed in the 1960's to the 1970's with one exception. Whereas in the 1960's to the 1970's both the ability to walk and a regular IQ (more or equal to 80) were required for individuals with cerebral palsy to gain employment, in the 1990's, as the present study showed, the ability to walk was required but IQ was not a significant factor in getting a job. The chances of finding employment for people with cerebral palsy are greater in the 1990's than in the past. The development of a welfare employment system and economic status contribute to greater opportunities for people with cerebral palsy to get job than ever before. Being able to walk is important factor to access working place, but not essential factor to perform some kinds of jobs such as data entry and so on. The changing of social bias for walking might be one of important factors to increase employment rate of people with disabilities in addition to that the opportunity to choose more kinds of jobs in the 1990's than before might contribute that individuals with good intelligence but without walking ability. If employment is to be valued as an important factor in quality of life, then our data indicated that rehabilitation for children with cerebral palsy should focus on improving walking ability, with or without aids. Walking ability contributes to them having the opportunity to have a regular school education. We have no system of supported employment in Japan (Wehman et al. 1985, 1989; Thomas et al. 1993). If we had such a system, the opportunities for individuals with cerebral palsy to get job would increase.

Having had an education in a regular school was also an important factor in getting job. A regular school situation is nearer to the "real world" and more competitive than that of special schools. We suspect that children with disabil-

ities could acquire social skills in a regular school more than in a special school. The multiple regression performed in this study was not sufficient enough to predict employability. It is possible that the explanation lies in psychosocial factors such as social adaptation, interpersonal relations, and behavior, which we did not analyze.

The rate of getting job of the subjects was 63.6%. Almost all young adults without disabilities can get job after their education if they do not hope to get special one. The main purpose of vocational training centers for people without disabilities in Japan is to get special skills to get high skilled jobs, so it is difficult to assess the rate of employability of the subjects comparing with people without disabilities under the same kind of situation. However, the latest unemployment rate in Japan is 4.5% in January 2000, and it implies that the rate of getting job is quite low even if we did not consider that many of people with cerebral palsy have multiple disabilities such as physical and mental disabilities, the percentage of those who can perform ADL unassisted is not high, and many adults with cerebral palsy need medical and rehabilitation treatment (to control epilepsy is one of them) (Bleck 1984; Kokkonen et al. 1991). Thus, we should also consider the quality of life of those individuals with severe cerebral palsy who have little possibility of getting a job.

In this study, we showed that mobility (walking ability) and having had education in normal school was important for people with cerebral palsy to get job. On the other hand, we were not able to show how the vocational rehabilitation worked for the people with cerebral palsy to get job. We did not show directly, however, these factors, e.g., walking ability and having had education in regular school could have affected the subject's vocational rehabilitation and the vocational training might have been more effective in the subjects who could walk and had had education in regular school than those who could not walk and had not had education in regular school. To investigate what and how vocational rehabilitation works for people with disabilities should be and how performed.

Conclusion

The ability of individuals with cerebral palsy to get a job in Japan in the 1990's is largely determined by being able to walk and having had an education in a regular school.

References

1) Bachman, W.H. (1972) Variables affecting post-school economic adaptation of orthopaedically handicapped and other health impaired students. *Rehab. Liter.*, **33**, 98–114.
2) Bleck, E.E. (1984) Where has all the CP children gone? The needs of adults. *Develop. Med. Child. Neurol.*, **26**, 674–676.
3) Bleck, E.E. (1987) Orthopaedic Management in Cerebral Palsy. Mac Keith Press.
4) Cohen, P. & Mustacchi, P. (1966) Survival in Cerebral Palsy. *J. Am. Med. Assoc.*,

195, 642-644.
5) Cohen, P. & Kohn, J.G. (1979) Follow-up study of patients with cerebral palsy. *Western J. Med.*, **130**, 6-11.
6) Gomi, S. (1984) The outcome of CP after graduation from special school. *Sogo Reha.*, **12**, 191-196.
7) Kokkonen, J., Saukkonen, A.L., Timonen, E., Selro, W. & Kinnunen, P. (1991) Social outcome of handicapped children as adults. *Develop Med. Child. Neurol.*, **33**, 1095-1100.
8) O'Reilly, E.D. (1975) Care of the cerebral palsied: Outcomes of the past and needs for the future. *Develop. Med. Child. Neurol.*, **17**, 141-149.
9) Pollock, G.A. & Stark, G. (1969) Long-term results in the management of 67 children with cerebral palsy. *Develop. Med. Child. Neurol.*, **11**, 17-34.
10) Thomas, A., Bax, M., Coombes, K., Goldson, E., Smyth, D. & Whitmore, K. (1985) The health and social needs of physically handicapped young adults: Are they being met by statutory services ? *Develop. Med. Child. Neurol.*, Suppl., **50**, 986.
11) Thomas, D.F., Menz, F.E. & McAlees, D.C. (1993) Community-based employment following traumatic brain injury. University of Wisconsin-Stout, Menomonie, Wisconsin.
12) Tsuyama, N. (1985) The Research of Cerebral Palsy. Dobun Shoin, Tokyo.
13) Wehman, P., Revell, W.G., Kregel, J., Kreutzer, J.S., Callahan, M. & Banks, P.D. (1985) Supported Employment: An alternative model for vocational rehabilitation of persons with severe neurologic, psychiatric, or physical disability. *Arch. Phys. Med. Rehabil.*, **72**, 101-105.
14) Wehman, P., Kreutzer, J., Wood, W., Stonnington, H., Diambra, J. & Morton, M.V. (1989) Helping traumatically brain injured patients return to work with supported employment: Three case studies. *Arch. Phys. Med. Rehabil.* **70.**, 109-113.
15) Wechsler, D. (1981) WAIS-R manual. Psychological corporation, New York.