



Original Article

Prevalence of secondary impairments of adults with cerebral palsy according to gross motor function classification system

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Abstract. [Purpose] This study aimed to investigate the prevalence of secondary impairments in adults with cerebral palsy. [Subjects and Methods] The study sample included 52 adults with cerebral palsy who attended a convalescent or rehabilitation center for disabled individuals or a special school for physical disabilities in South Korea. [Results] The univariate analysis showed that the Gross Motor Functional Classification System level was a significant predictor of spondylopathies, general pain, arthropathies, and motor ability loss. The prevalence of these impairments at Gross Motor Functional Classification System level I and II was low compared with the prevalence found at Gross Motor Functional Classification System level III–V. The prevalence of secondary impairments among adults with cerebral palsy at Gross Motor Functional Classification System level III–V was high: loss of motor ability, 42.3%; spondylopathies, 38.4%; general pain, 32.7%; and arthropathies, 28.8%. [Conclusion] In this study, adults with severe cerebral palsy showed a high prevalence of motor ability loss, spondylopathies, arthropathies, and pain. It is necessary to develop intervention programs to prevent secondary impairments in adults with cerebral palsy.

Key words: Adults with cerebral palsy, Chronic disease, Gross motor function classification system

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INTRODUCTION

The life expectancy of children with cerebral palsy (CP) is increasing rapidly and most live into adulthood¹⁾. Aging and the increase in life expectancy is associated with an increased prevalence of health problems, and this results in an increase in social and economic burdens²⁾. The complex characteristics of CP are a potential cause of the high prevalence of chronic conditions in adults. A variety of disabilities may occur, including difficulty swallowing; excessive salivation; respiratory disorders; eating problems; gastrointestinal disorders such as gastroesophageal reflux disease, constipation, and fecal incontinence; urogenital disorders such as urinary tract infection and incontinence; skin disorders such as bedsores; malocclusion of the teeth; speech and language disorders; communication disorders such as dysarthria; sleep disorders; behavioral problems; and learning disabilities³⁾.

The Healthy People 2020 initiative suggested that individuals with lifelong disabilities of childhood onset, such as CP, should transition from pediatric health care to appropriate, ongoing community-based adult health care⁴⁾. Given the increase in life expectancy of children with CP, physical therapists should be capable of providing appropriate services and interventions that children with CP need to prepare for adult life. Physical therapists working in adult practice settings should be willing and prepared to provide services to people with lifelong disabilities, and several authors have suggested various roles

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Table 1. Characteristics of individuals with CP

Characteristics	Category	Frequency (%)
Gender	Male	33 (62.3)
	Female	20 (37.7)
Age (years)		31.18 ± 14.10*
Level of education	No education	4 (7.6)
	Elementary school	4 (7.6)
	High school	30 (56.6)
	Above college	15 (28.2)
Marriage status	No marriage	39 (73.6)
	Living with spouse	11 (20.8)
	Divorce	3 (5.6)

*Mean ± standard deviation

and interventions for physical therapists to use when working with adolescents and adults⁵⁻⁷).

The starting point is to assess the current status of the problem. Thus, the prevalence of health problems in adults with CP should be determined. However, the evidence-based information available in this area is limited. The data available are focused on health conditions such as change in motor function and orthopedic issues. The decline in motor function has been reported by several studies. The survey results in one report showed that of 221 adults with CP in Sweden, 80% had contractures and 18% had pain every day⁸). The data and reports related to health problems in adults with CP are insufficient compared with those for the general population.

The purpose of this study was to investigate the health problems that develop in adults with CP and the differences in prevalence of health problems across levels of the Gross Motor Functional Classification System (GMFCS). The International Classification of Function, Disability, and Health (ICF) recommends that disabilities be explored in a framework based on activity limitations and participation restrictions⁹). Therefore, if health problems could be presented according to the GMFCS, which is familiar to physical therapists, then the evidence for providing health care services to adults with CP would be more understandable.

SUBJECTS AND METHODS

The study sample was comprised of 53 adults with CP (mean age: 32.18 years; standard deviation: 14.10 years). General characteristics of subjects are presented in Table 1. This study involved a secondary analysis of data on the status of support services and policy for people with brain lesions conducted by the Ministry of Health and Welfare of Korea. The survey was performed according to the laws on the use of statistics in Korea, including those related to confidentiality. The parents of adults with CP provided written informed content. This survey used one-on-one individual interviews. Sampling of the resident area was based on a registry of disabled individuals covered by the Welfare of Disabled Persons Act in Korea. Subjects included: (a) individuals registered as having a brain lesion; (b) individuals diagnosed with CP by a doctor; (c) age greater than 18 years, and (d) GMFCS levels I to V. Although a reason for exclusion, no cases were excluded because of missing data on the survey. The total sample size included 306 individuals with brain lesions and 185 with CP. The subjects were divided into two groups to examine the effect of GMFCS levels I–II and III–V on health.

A univariate logistic regression analysis was performed to examine the influence of GMFCS level on the prevalence of health problems by using SPSS 21.0 software. P values less than 0.05 were considered statistically significant.

RESULTS

The univariate analysis results showed that the GMFCS level was a significant predictor of spondylopathies, general pain, arthropathies, and motor ability loss. The detailed results of the univariate logistic regression analysis are presented in Table 2.

DISCUSSION

The purpose of this study was to investigate the prevalence of secondary impairments among adults with CP. The prevalence of spondylopathies, arthropathies, motor ability loss, and pain at GMFCS level I–II was low compared to the prevalence at level III–V. The prevalence of secondary impairments in adults at level III–V was high: motor ability loss, 42.3%; spondylopathies, 38.4%; general pain, 32.7%; and arthropathies, 28.8%. This result was similar to that of a previous estimate that 31.5% of US adolescents had one or more chronic conditions²).

Table 2. The results of univariate logistic regression analysis

Problem	Category	Yes (%)	No (%)	OR
Spondylopathies	Level 1–2	20 (38.4)	7 (13.5)	
	Level 3–5	12 (23.1)	13 (25.0)	0.289*
General pain	Level 1–2	17 (32.7)	16 (30.8)	
	Level 3–5	3 (5.8)	16 (30.8)	0.176*
Arthropathies	Level 1–2	15 (28.8)	18 (34.6)	
	Level 3–5	2 (3.8)	17 (32.7)	0.141*
Muscle disease	Level 1–2	10 (19.2)	23 (44.2)	
	Level 3–5	0 (0.0)	19 (36.5)	0.000
Obesity	Level 1–2	10 (19.2)	23 (44.2)	
	Level 3–5	4 (7.7)	15 (28.8)	0.613
Loss of motor ability	Level 1–2	22 (42.3)	11 (21.2)	
	Level 3–5	4 (7.7)	15 (28.8)	0.133*
Hypertension	Level 1–2	4 (7.7)	29 (55.8)	
	Level 3–5	5 (9.6)	14 (26.9)	2.589
Allergic Rhinitis	Level 1–2	9 (17.3)	26 (46.2)	
	Level 3–5	4 (7.7)	15 (28.8)	0.711
Depression	Level 1–2	9 (17.3)	24 (46.2)	
	Level 3–5	4 (7.7)	15 (28.8)	0.711
Dental problem	Level 1–2	15 (28.8)	18 (34.6)	
	Level 3–5	7 (13.5)	12 (23.1)	0.700
Gastrointestinal disorder	Level 1–2	7 (13.5)	26 (46.2)	
	Level 3–5	2 (3.8)	17 (32.7)	0.437

*p<0.05

Although many studies have reported secondary conditions such as obesity¹⁰, metabolic dysregulation¹¹, and dental disorders¹², no significant differences according to the severity of CP were observed in this study.

Pain is a common secondary condition in adults with CP, and leads to impaired walking ability and functional activity¹³. Pain in adults with CP is related to musculoskeletal problems, such as contractures, spasticity, orthopedic deformity, weakness, and fatigue, as well as to gastrointestinal disorders¹⁴. In this study, participants at GMFCS level I–II had 0.176 times the prevalence of general pain when compared with those at GMFCS level III–V.

The prevalence of arthropathies and spondylopathies was found to be high. Adults with CP develop spondylopathies and arthropathies with increasing age. Suh et al. reported a significant difference in the sagittal spinopelvic parameters between CP and normal control groups¹⁵. Tosi et al. reported that 27% of adults with CP had osteoarthritis compared to only 4% of non-disabled people¹⁴. Persson-Bunke et al. found that the incidence of scoliosis increased with GMFCS level and age¹⁶. In this study, the prevalence of spondylopathies was 0.288 times higher in participants at GMFCS level I–II than in those at level III–V, and the prevalence of arthropathies was 0.141 times higher for those at GMFCS level I–II. The reasons for the high prevalence were muscle imbalance, spasticity, and postural asymmetry.

In this study, the loss of motor ability was the most common secondary impairment in adults with CP. The degree of motor ability loss was especially high at higher levels of GMFCS. Many studies reported that adults with CP may experience age-related changes earlier in life than their non-disabled peers¹⁴. Change and decline in muscle size and properties during adulthood contribute to an early loss of mobility. Peterson et al. suggested that premature sarcopenia, obesity, and sedentary behavior lead to decreased movement quality¹⁰. In summary, adults with CP are believed to have more chronic disease than their peers. Specifically, adults with CP showed a high prevalence of motor ability loss, spondylopathies, arthropathies, and pain. These changes, as well as premature sarcopenia, contribute to the loss of motor ability. In addition, the increase in spondylopathies, arthropathies, and related pain were major secondary problems. Chronic diseases in adults with CP were more common at higher GMFCS levels. Thus, it is necessary to develop intervention programs to prevent secondary impairments in adults with CP.

The results of this study can be affected by several factors such as age, treatment experience, and parental response to the survey. However, the study was not analyzed on the basis of these factors. Future studies will be needed to identify differences across GMFCS levels according to age and treatment experience.

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