



Spinal and limb abnormalities in adolescents with intellectual disabilities

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ABSTRACT

There are not many studies pertaining to the spinal or limb abnormalities in people with intellectual disabilities, without a clear profile of these deformities of them, efforts to understand its characters and improve their quality of life will be impossible. Therefore, this paper aims to describe the prevalence and related factors of spinal and limb abnormalities in adolescents with intellectual disabilities. The participants who participated in health examinations as they enrolled into special schools at the first year, a total of 822 aged 15–18 years adolescents with ID were recruited to this study. The results showed that there were 14.5% and 8.5% cases had spinal and limb abnormalities based on the physician's observation and X-ray test. Factors of BMI level and limb abnormalities were significantly predicted the spinal abnormality occurrence in those adolescents with ID. Gender, disability level and have a spinal abnormality were variables that can statistically correlate to limb abnormality condition. The study highlights that in order to ensure people with intellectual disabilities receive an appropriate quality of care, it is important to have a precise understanding of the ways in which the needs of them who have spinal or limb deformities differ from the sole intellectual disability and the general population as a whole.

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1. Introduction

There has not been much published literature pertaining to the spinal or limb abnormalities in people with intellectual disability (ID) in the previous decades. One earlier study by G.B. Solitare described "The spinal cord of the Mongol" in 1969. He reported four autopsies on Mongols (now Down syndrome) to examine their spinal cord lesion (Solitare, 1969). Smith, Schindeler, Elbualy, and Shear (1970) indicated that limb abnormalities are occasionally found in populations of ID individuals. A recent study by Tangerud, Hestnes, Sand, and Sunndalfoll (1990) indicated that there was a significant increase in degenerative changes in the upper part of the cervical spine in persons with Down's syndrome. Maclachlan et al. (1993) also concerned that adults with Down syndrome were high risk of high prevalence of degenerative disease of the cervical spine and consideration should be given to this diagnosis in the appropriate clinical setting.

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The consequences of spinal or limb abnormalities in people with ID are complicated. Mori et al. (2005) examined the correlation between spinal characteristics and respiratory function in patients with severe physical disabilities and ID. These observations suggest that the spinal abnormalities affect respiratory patterns in a restrictive manner and increase the respiratory change rate during tidal breathing. Lutkenhoff and Oppenheimer (1997) described the adolescents with spina bifida “Young people with spina bifida with have many questions about themselves and their futures which they may not want to ask of their parents or doctors. Even if they do ask, there is likelihood that the person asked won’t know the answer”. However, without a clear profile of spinal or limb deformities in people with ID, efforts to understand its characters and improve their quality of life will be impossible. Therefore, the purposes of this paper were to describe the prevalence and related factors of spinal and limb abnormalities in adolescents with ID.

2. Methods

This sample group was part of a retrospective, cross-sectional study examining the health examination results for children and adolescents with ID (Lin, Lin, Chen, et al., 2010; Lin, Lin, Lin, et al., 2009, 2010). Participants were recruited from three special educational schools, the adolescents with ID who participated in health examinations as they enrolled into schools at the first year. The examination included body physical exam, biochemical (blood, urine and stool specimen) and X-ray check-up. The study was designed to analyze all the health examination charts which included all eligible adolescents aged 15–18 years with ID from all three special schools. Research ethical approval and written informed consent were obtained from all the study special schools.

The present study aimed to analyze the conditions of spinal and limb abnormalities and to examine the determinants of these two characteristics. There were 822 participants whose data were analyzed. Those data included demographic characteristics (age and gender), disability condition (type and level), body mass index (BMI; kg/m²), hands, feet and spinal abnormalities. Hands and feet abnormalities (called limb abnormalities) were based on the medical physicians’ observations, and an X-ray was used to determine spinal abnormalities. Finally, those abnormalities which showed in medical charts were based on the diagnosis results of medical physicians in the study. Data were analyzed by SPSS 14.0. Analyses included frequency distributions and percentage for the demographic characteristics and the prevalence of spinal and limb abnormalities among adolescents with ID. Chi-square tests were obtained for the relationship between demographic characteristics, BMI value and spinal and limb abnormalities. Logistic regression procedures were used to examine the risks of having spinal and limb abnormalities.

3. Results

The mean age of study participants was 15.69 ± 0.75 years old, 60.7% of the participants were boys and 39.3% were girls. In our samples, most of the people with ID had a moderate level of disability (52.7%) and severe and profound disability accounting for 29.6%. There was nearly 70% of the study participants evinced ID solely, while 30.5% were affected by multiple disabilities (ID accompanied with other disabilities). With regard to the physical figure of the participants, the results of BMI analysis indicated their average score was 22.2 and 34.1% subjects were normal, 13.7% were overweight, 24.9% were obese and 27.3% were underweight. The physical observation and X-ray test results showed that there were 14.5% and 8.6% cases had spinal and limb abnormalities in the study (Table 1).

Tables 2 and 3 analyzed chi-square relation between personal characteristics and spinal or limb abnormalities in the bivariate analysis. BMI was significantly correlated to spinal abnormalities ($p < 0.001$). Underweight adolescents with ID (prevalence = 22.9%) were more likely to have spinal abnormalities than the other BMI level groups. Those factors of gender, disability type and level were not correlated to spinal abnormalities in adolescents with ID. However, the factors of disability type and disability level were statistically correlated to limb abnormalities in adolescents with ID. Those adolescents with multiple disabilities (abnormal prevalence = 19.3%) were more than five times more likely to have limb abnormalities than the ID solely cases (abnormal prevalence = 3.7%). In addition, the more serious of the disability level, the more prevalent of the limb abnormalities in adolescents with ID in the study ($p < 0.001$). Table 4 also found that spinal abnormality was significantly correlated to limb abnormality in the study subjects ($p < 0.001$).

Table 5 tested the logistic regression model of spinal abnormality occurrence of adolescents with ID. The BMI level ($p = 0.035$) and limb abnormalities ($p < 0.001$) were significantly predicted the spinal abnormality occurrence in those adolescents with ID ($p < 0.05$). The spinal abnormality cases tends to be more prevalent in the underweight group than in the normal weight group (OR = 1.82, 95% CI = 1.04–3.18), and the limb abnormality cases were more likely to have spinal abnormalities than those adolescents do not have limb abnormalities (OR = 6.12, 95% CI = 3.15–11.9). With respect to the risk factors of limb abnormality occurrence in adolescents with ID, we found that the factors of gender, disability level and spinal abnormality were variables that could significantly predict a limb abnormality condition after controlling factors of disability type, age and BMI (Table 6). Those boys adolescents were less chance to have a limb abnormality than girl cases (OR = 0.47, 95% CI = 0.25–0.90). However, those subjects with multiple disabilities (OR = 3.63, 95% CI = 1.72–7.58) and a spinal abnormality (OR = 5.90, 95% CI = 3.01–11.56) were more likely to have a limb abnormality.

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