

ARTICLE TYPE

A report of visual impairment among children with disability

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Abstract:

The visual impairment among children could interfere with visual development and affect the quality of life. Therefore, the status of visual impairment and its correlation with demographic, visual acuity and refractive error among disability children was investigated. A retrospective study was conducted to review the clinical records of children with disability (birth to 18 years old) from the Low Vision and Rehabilitation Clinic of UiTM Visioncare. The age, gender, types of disability and ocular parameters such as visual acuity and refractive errors were extracted and analysed. A total of 27 clinical records were reviewed. A total of 25.9% of children with a disability had a visual impairment. It was higher among boys (17.8%) than girls (7.41%). A strong positive linear correlation was exhibited between visual acuity and visual impairment ($r=0.80$, $p=0.01$). Meanwhile, the visual impairment was poorly correlated with gender, types of disabilities and refractive error. Thus, children with disability prone to have vision impairment. Visual acuity provides information on visual impairment status can be detected and measured in clinical setting. This report could help the clinician to be better prepared when dealing with children with any types of disabilities for early detection of visual disorder and better intervention prognosis.

Keywords: visual impairment, visual acuity, refractive errors, disability children

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1. INTRODUCTION

Early childhood is a crucial phase of growth and development because experiences during early childhood can influence outcomes across the entire course of an individual's life [1]. This provides an opportunity to prepare them for life-long learning and participation, thus, preventing potential delays in development and disabilities. The world report on disability in 2011 stated that approximately one billion people worldwide are living on disability, with at least 1 in 10 children. In Malaysia, there were 445 006 persons with disabilities registered in Malaysia, represented 15% of the population [2]. Out of it was 29 289 children with several types of disabilities accounted for 6.6%. The highest disability among children was learning disability, followed by physical disability, hearing disability, multiple disabilities, visual disability, speech disability and mental disability [2].

Given opportunity is a key for the children with disabilities able to lead fulfilling lives and contribute meaningfully to the community. Society's misperception is the greatest challenge that people with disabilities had to deal with. The report showed that less than 10% of children with disability of school-going age attended school; and those who attend school, do so in segregated settings [3]. With best-corrected vision, those children can be outshined in their education. Therefore, vision screening and eye examination are crucial for this group of children to ensure there is no interruption in their learning.

However, the vision problem was reported to be synonym among those with disabilities. The average visual acuity of Down's Syndrome children was at 6/12 (Snellen fraction) which was reduced than normal vision status [4]. Malaysian children with Down's syndrome had vision impairment ranging from 30% to 45% [4], [5]. A similar pattern was found among adults with intellectual disabilities which 39.7% had a vision impairment or blindness [6]. In other studies, it was also reported that adults with intellectual disabilities had severe low vision in (13.8% to 1.2%), blindness (5.0% to 3.8%) and also reduced near vision (19%) [7], [8]. Previously, much higher undiagnosed vision impairment and blindness was noted which up to 40% [8]. Children with cerebral palsy also showed significant vision reduction (less than 6/9) for best-corrected visual acuity (15.5%) and near visual acuity (8.4%) [9].

Vision impairment happened among children with disabilities could be caused by a various ocular disorder such as uncorrected/untreated refractive errors [4], [7], [9], or ocular pathologies included congenital cataract, glaucoma, retinoblastoma, retinal detachment and others [5], [10]. Even without visual anomalies, they still experience sensory impairment which cannot be treated with optical correction [11]. Also, disabilities itself disturbed to function in daily activities, and visual impairment diminishes the daily functioning even more. It is because additional emotional and behavioural problems will impact the children with disabilities and also visual impairment than other groups of

children with normal vision or even with single disabilities [12]. Therefore, this study intended to investigate the visual impairment status and its correlation with demographic, visual acuity and refractive error among children with disability.

2. METHODOLOGY

A retrospective study was opted by reviewed the clinical records of eye examination in Low Vision and Rehabilitation Clinic of UiTM Visioncare from the year 2012 to 2015. Children with a disability aged between birth to 18 years old were selected. Single or multiple disabilities such as learning disability, intellectual disability, physical disability, hearing disability and mental disability was included and must register with the Welfare Department. However, children that registered as vision disability was excluded.

The data were extracted from clinical records comprised of patient's demographics such as age, type of disability and gender. Then the visual parameters such as best-corrected distance visual acuity for the right eye, left eye and refractive error status were recorded. From the visual acuity, vision impairment was determined. The definition of visual impairment classification was based on the World Health Organization (WHO) [13]. Visual impairment is a presenting visual acuity of less than 6/18 in the better eye using available means of optical correction (with spectacle when available). Blindness was defined as presenting visual acuity of less than 3/60 up to no light perception in the better eye.

Descriptive analysis was done for demographic data including frequency, percentage, mean and standard deviation. The status of visual impairment among children with a disability was determined in percentage. Using Statistical Package for Social Sciences (SPSS) software Version 21.0, Pearson correlation test was chosen to investigate the correlation of vision impairment status with demographics, visual acuity and refractive error.

3. RESULT AND DISCUSSION

A total of 27 clinical records among children with a disability were examined. Four types of disability among children were noted included physical disability, learning disability, hearing disability and multiple disabilities. Learning disability included Downs' syndrome, autism, Attention Deficit Hyperactive Disease (ADHD) and global developmental delay. The multiple disabilities were defined as those who had more than one significant disabilities. Table 1 describes the demographic characteristics including the age, gender, types of disabilities, visual acuity and refractive error status.

3.1. Vision impairment among children with disability

Referring to figure 1, the visual acuity was divided into four categories which normal vision (6/6 to 6/7.5), moderate vision (6/9 to 6/18), mild vision impaired (6/24 to 6/48) and moderate vision impaired (6/60 to 6/120). Vision impairment accounted for 25.93%. The report was observed to be higher in male (17.81%) as compared with the female (7.41%). Among all

Table 1: Demographic characteristics

Parameters	
Age (years)	9.85 ± 4.55 years
Gender (%)	
Boys	44.4%
Girls	55.6%
Types of disabilities (n, %)	
Learning disability	20 (80%)
Physical disability	1 (4%)
Hearing disability	1 (4%)
Multiple disabilities	2 (12%)
Visual acuity (LogMAR)	
Right eye	0.42±0.33 LogMAR
Left eye	0.34±0.33 LogMAR
Refractive error (Diopter)	
spherical equivalent RE	0.22±2.13 D
spherical equivalent LE	0.04±2.03 D

types of disabilities, learning disability was the highest percentage had visual impairment where 5 children (18.52%) had best-corrected visual acuity less than 6/18.

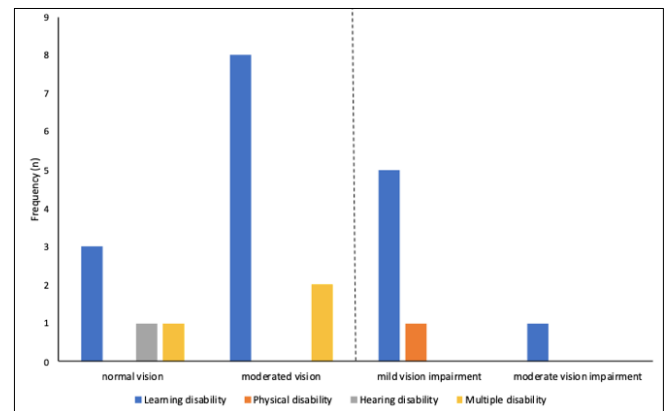


Figure 1: Distribution vision impairment according to visual acuity and types of disabilities

The finding was comparable with other studies as children with disability showed a quite high prevalence of vision impairment. As learning disability which included Down's syndrome, autism, Attention Deficit Hyperactive Disease (ADHD) and global developmental delay were the most, who had vision impairment. A similar pattern was showed previously as the vision impairment happened among children with Down's syndrome was ranging from 30% to 45% [4], [5]. While children with intellectual disabilities also showed some degree of vision impairment and blindness [6]–[8]. Even though vision impairment was defined as visual acuity of less than 6/18, but, referring to figure 1, those with moderate vision (6/9 to 6/18) was also high contributed 37%. The result was higher than the previous study, where those with visual acuity less than 6/9 was accounted for 15.5% among children with cerebral palsy [9]. None of the data reported blindness in our findings that could be due to a limited number of reviewed clinical data. However, blindness was quite common among those with disabilities which accounted for 3.8% to 5% of the population [7], [8].

Vision impairment among children with a disability could be due to ocular disorders that happened during visual growth and development. Usually, children with a disability had significant refractive errors. Down's syndrome and cerebral palsy children commonly to have hyperopia [4], [7], [9] and also astigmatism [5]. The vision impairment could also be due to uncorrected or untreated refractive error since childhood [8] or strabismus, which lead to being amblyopia. Ocular pathologies were also reported among them such as congenital cataract, glaucoma, retinoblastoma, retinal detachment and others [5], [10] that also could be contributed to the vision impairment.

3.2. Correlation of vision impairment with demographics, visual acuity and refractive error

The correlation of vision impairment among children with disabilities was investigated towards demographic data, visual acuity and refractive errors using Pearson correlation test. The demographic characteristics were the age, gender and types of disability. Then the correlation was tested between vision impairment status with visual acuity and refractive errors.

It was found that visual impairment had a weak correlation with age ($r = -0.22$, $p = 0.36$), gender ($r = -0.32$, $p = 0.10$) and types of disability ($r = -0.37$, $p = 0.07$), respectively. Visual acuity was exhibited to be strongly correlated with the vision impairment status. The result showed $r = 0.80$, $p = 0.01$. There was a weak correlation between refractive error and the visual impairment $r = -0.05$, $p = 0.80$. This means that visual acuity measurement could indicate the vision impairment among children with disability.

This study found a weak association of visual impairment status between demographic variables such as age, gender and types of disability. Some of the previous studies on the state of vision impairment were found to be not correlated and correlated with age. In Beranang population study, age factor was not associated with impaired visual acuity [14]. Meanwhile, there was a linear relationship of reduction in visual acuity and increasing of children age in Gombak study [15]. However, both studies were done among a healthy population which not those with disability. This contradictory finding might be due to limited number of reviewed clinical records in this study, which only 27 clinical record whereby, those studies comprised of large number of samples.

Hardly any published journal in open literature had worked on the association of demographic characteristics, visual acuity and refractive error among children with disability. Thus, the findings were unable to be strongly supported by extensive evidence. On the other hand, a strong positive linear relationship was revealed between visual impairment status and visual acuity. It was undoubtedly true because visual acuity determines the severity of visual impairment. Adults with visual acuity of 6/18 or worse had a significant effect on the quality of life [16].

Furthermore, visual acuity of 6/60 or worst diminished the quality of life. Both levels of visual acuity were fallen under the visual impairment category. Reduction in visual acuity was a significant risk factor for self-reported disability in adults [17]. It was because difficulty in performing a task that required excellent resolution and changes in light adaptation was associated with visual acuity. The difficulty increased as

the vision impairment worsen. However, these two previous studies were done on adults without any disability.

In term of refractive error and vision impairment, several studies found that refractive error was common among children or adults with disabilities [4], [5], [7], [8], [10]. The common type of refractive errors was hyperopia and astigmatism. The refractive error was also the leading cause of visual impairment. However, vision impairment caused by uncorrected refractive error could be treated or avoidable.

4. CONCLUSIONS

The prevalence of visual impairment accounted for 25.9% was quite a significant burden to children with disability. Having a single disability will carry a few loads in performing daily activities smoothly, additional vision disability will diminish the daily functioning. Visual acuity that provides information on the visual impairment status can be detected and measured in a clinical setting. Furthermore, some of the causes of vision impairment could be treated and avoidable. The children with disability should have routine eye examination for early detection of a visual disorder and better intervention prognosis.

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