





# Prevalence of overweight and obesity in sedentary children and adolescents with or without intellectual disability in the Democratic Republic of Congo

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**Abstract.** Overweight and obesity in children and adolescents with intellectual disabilities is a major public health problem. The objective of this study is to estimate the prevalence of overweight and obesity in sedentary children and adolescents with intellectual disability (ID) in Kinshasa. A total of 440 children were selected for this study including 240 with ID (110 girls and 130 boys) and 200 children without ID (91 girls and 109 boys). The present study took place in five educational institutions including 4 special and one normal. The weight and height of the children were measured to allow us to calculate their body mass index. The logistic regression test was used to identify the determinants of overweight or obesity, and to measure the association strength of each determinant (odds ratio). This study reveals that boys with ID are at risk of developing overweight at age 12-14 (odd ratio = 1.33 [0.87-1.18]), 15-17 years (odd ratio = 2), 52 [1.61-2.55]) whereas in girls this risk begins already at the age of 6-11 (odd ratio = 1.28 [0.88-1.91]). With respect to obesity, we found that children with intellectual disabilities presented the risk of obesity at ages 6-11 (odd ratio = 1.84 [1.04-1.85]), 12 -14 years (odd ratio = 1.41 [1.07-1.48]) and 15-17 years (odd ratio = 1.48 [1.23-1.73]). In addition, this study shows that ID subjects were significantly more obese than those with typical development. The risk of overweight and obesity is present in children and adolescents with intellectual disability. We suggest that a program based on diet and exercise can be introduced

in Kinshasa special institutions to minimize the risk of overweight and obesity.

**Keywords.** Adolescent, child, intellectual disability, obesity, overweight, sedentary.

## Introduction

Childhood obesity is one of the biggest challenges for public health in the 21st century. This is a global problem affecting many low- and middle-income countries like the Democratic Republic of Congo (DRC). Global trends in childhood obesity have shown profound changes in recent times (Lin et al., 2005). Surveys in 144 countries (in 2010) suggest that 43 million preschool children (35 million in developing countries) are overweight and obese and that 92 million are at risk of being overweight (Grondhuis et al., 2014; Kellou et al., 2014).

The global prevalence of overweight and obesity among children has increased from 4.2% in 1990 to 6.7% in 2010. This trend is expected to continue and to reach 9.1% or 60 million in 2020 if there is no intervention. In Africa, the prevalence of overweight and obesity in children was 8.5% in 2010 and is expected to reach 12.7% by 2020, it is associated with several complications:

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health; early onset of diseases such as diabetes and heart disease; the maintenance of obesity in adulthood and an increased risk of non-communicable diseases, making its reduction a key public health priority at the international level (Curtin et al., 2013; Dowell et al., 2013; Fiese et al., 2012; Kim et al., 2010) and in many high-income countries (Klein, 2010). To reduce the prevalence and inequalities in the distribution of childhood obesity, it will be necessary to develop interventions that are sensitive to the situation of groups of "high-risk" children, including children with intellectual disabilities (ID) who appear to be at risk one of these high-risk groups.

ID refers to a significant overall impairment of intellectual functioning acquired during childhood (Kolko et al., 2017; Gressier et al., 2016). Estimates of the prevalence of ID derived from epidemiological studies vary considerably, with pooled estimates for children suggesting a point prevalence of 1.83% (95% CI confidence intervals of 1.52 to 2.14%) (Gressier et al., 2016). Available data suggest that children with disabilities in general (Gressier et al., 2016; Bazzano et al., 2016; Chen et al., 2010), and children with ID in particular, are at increased risk for overweight and / or obesity (Adams et al., 2010).

The increased risk of obesity among children with ID has been reported in various countries, including Australia (Agerström & Rooth, 2011; Barton, 2010), France (Berge & Everts, 2011; Bleich et al., 2012), Japan (Shields et al., 2008), Korea (Stewart et al., 2009), Taiwan (Dong et al., 2015), United Kingdom (Jasik & Lustig, 2008; Shields et al., 2008; Murphy et al., 1998) and the United States (Larson et al., 1994; Small & Baur, 2008).

In the Democratic Republic of Congo, children with intellectual disabilities (ID) are in an environment that is not conducive to the practice of physical activities, we notice a lack of sports facilities, a lack of encouragement from parents or even educators which makes these children very difficult to practice physical activities. In addition, we found that no studies have been conducted to date to assess the prevalence of childhood obesity with ID, which is what motivated us to conduct this study.

## Methods

We opted for the observational method and conducted an analytical study that consisted of estimating the prevalence of overweight and obesity in a sample of Congolese sedentary children with ID and identifying the risk factors associated with being overweight and obese in these children at the age of 6 to 17 years.

As part of a research protocol approved by the local ethics committee. The parents received all the necessary information explaining the course of the study and its purpose, then parents and children with or without ID signed an informed consent letter to approve their participation in the study.

This study covered the period from 24 January to 24 April 2019. In total, four special schools (Bondeko Tuendeleye Village of Lemba, Bondeko Sembola Village of Matete, Bondeko Cardinal Malula Village of Masina and Bondeko Mabanga Village of Kinshasa) and a Normal School (Bopikiliki Institute of N'sele) of Kinshasa, Democratic Republic of Congo served as a framework for the realization of this study.

The population of this study was composed of 500 sedentary children attending special and normal schools in the city of Kinshasa Province. In this study, we used convenience sampling consisting of children attending special schools and children attending the Kinshasa Normal School.

Out of a total of 500 children, only 440 were selected for this study including 240 children with ID (110 girls and 130 boys) and 200 children without intellectual disabilities (91 girls and 109 boys).

The following inclusion criteria were retained: to be regularly enrolled in the schools selected by our study; have been diagnosed with an ID by a doctor and a psychologist; have an intelligence quotient of less than 70 for children with ID; be between 6 and 17 years old present no genetic syndrome or physical disability; be present on the days of assessments; freely accept to participate in the study.

Excluded were anyone who did not meet the inclusion criteria.

## Measurement

*Measurement of the size (cm):* It was realized with the help of a mark of mark SECA with a precision of 0,1 cm, mounted on a vertical balance, the subject standing, barefoot and having removed any ornament (hat, kepi etc.) of the head. Neck and heel against the vertical branch. The ruler of the board slides vertically on the support branch of the board to the top of the head.

*Weight gain (kg):* The weight was taken on a SECA brand scale calibrated in kilograms (kg) and having an accuracy of 100 mg. The subject with or without intellectual disability was standing, loosened and slightly dressed.

*The body mass index (kg/m<sup>2</sup>):* It was calculated using the formula:  $P \text{ (kg)} / T2 \text{ (m)}$ . In the present study we converted the body mass index according to International Obesity Taskforce (IOTF) while referring to age and sex equivalent values of adult BMI > 25 kg / m<sup>2</sup> (overweight) and BMI > 30 kg/m<sup>2</sup> (obesity).

## Statistical Analysis

Data from this study were captured on Epi data. After quality control and consistency checking, these were exported to SPSS software version 21.0 for statistical analysis. The averages for continuous variables, as well as the 95% confidence interval. The chi-square test was used to compare different qualitative variables. Logistic regression was used to identify the determinants of overweight or obesity, and to measure the association strength of each determinant (odds ratio).

## Results

Regardless of age or sex, we note in Table 1 that in general, subjects with or without ID have a body mass index in the normal range, however, children with ID have a weight and an index of higher body mass than subjects without ID. Boys were more likely to have ID than girls.

However, with regard to Table 2, we observe that the prevalence of overweight subjects is higher

in children with ID than those without ID. Children and adolescents with ID are more obese than those without ID. In addition, ID is a predisposing factor for the development of obesity regardless of age or sex.

**Table 1**

Morphological characteristics of subjects with or without intellectual disabilities.

Age	ID		Without ID	
	Girls	Boys	Girls	Boys
6-11 years	n=40	n=50	n=31	n=39
Height (m)	1.12	1.33	1.22	1.19
Weight (kg)	28.5	29.14	28.81	29.46
BMI (kg/m <sup>2</sup> )	22.8	16.55	19.46	20.89
12-14 years	n=37	n=45	n=30	n=34
Height (m)	1.38	1.36	1.42	1.41
Weight (kg)	32.95	33.14	32.99	33.36
BMI (kg/m <sup>2</sup> )	17.34	18.01	16.41	16.84
15-17 years	n=33	n=35	n=30	n=36
Height (m)	1.51	1.47	1.55	1.51
Weight (kg)	48.32	49.25	45.03	51.08
BMI (kg/m <sup>2</sup> )	21.05	22.809	18.76	22.403

ID: Intellectual Disability, BMI: Body mass index

## Discussion

The present study was initiated to assess the prevalence of overweight and obesity in Congolese children and adolescents with ID and aged from 6 to 17 years and without any genetic syndrome or physical disability.

The main findings show that boys with ID were more present than girls, this is consistent with the global distribution of children with ID (Murphy et al., 1998; Larson et al., 1994; Small & Baur, 2008; Ha et al., 2010). More boys were overweight than obesity in all age groups except for the age group 6 to 11, which was higher than typical developing children in a representative survey (Oh et al., 2008).

**Table 2**

Estimated prevalence of overweight and obesity in subjects with and without intellectual disability by age and sex.

Variables	Overweight			Obese		
	ID	Without ID	OR (avec 95%IC)/p	ID	Without ID	OR (avec 95%IC)/p
<i>6-11 years</i>						
Boys	28.00%	20.55%	0.81 (0.58-1.14)	20.60%	19.13%	1.43* (1.06-2.03)
Girls	27.20%	18.30%	1.28* (0.88-1.91)	17.40%	20.00%	2.05** (0.44-3.01)
Total	26.86%	18.94%	0.87 (0.67-1.21)	18.64%	19.41%	1.84* (1.04-1.85)
<i>12-14 years</i>						
Boys	30.00%	24.00%	1.33* (0.87-1.18)	17.50%	16.20%	0.96 (0.56-1.54)
Girls	30.10%	22.20%	0.66 (0.51-0.94)	22.70%	21%	1.66* (1.19-2.29)
Total	30.05%	23.10%	1.0 (0.38-1.04)	18.53%	18.60%	1.41* (1.07-1.48)
<i>15-17 years</i>						
Boys	33.02%	27.73%	2.52* (1.61-2.55)	17.80%	19.00%	1.56* (1.08-2.22)
Girls	32.40%	25.02%	1.08 (0.97-1.42)	19.20%	17.70%	1.91*** (1.37-2.40)
Total	32.71%	25.96%	1.8 (0.84-1.71)	18.75%	15.85%	1.48** (1.23-1.73)

OR: odd ratio, DI: Intellectual disability, \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

The prevalence of overweight and obesity among children with ID was very different according to gender and age. In previous studies, the results were mixed with respect to gender relations and weight status of children. In a study of the relationship between overweight and overweight American children aged 6 to 17 using the National Health and Nutrition Survey, the prevalence of excess weight among girls was significantly higher than in boys (Bandini et al., 2005). In a study in Korea of 183,159 children in typical development, boys (11.3%) were significantly more obese than girls (8.0%) and the overweight rate for boys (19.7%) was slightly higher than girls (18.2%) (Oh et al., 2008).

Our results showed that the proportion of girls with ID of 6-11 years old who were overweight was significantly higher than those without ID. For boys, this study found that the proportion of overweight 12-14 year old boys with an ID was statistically higher than those of typical development. Girls and boys with ID showed a higher proportion of obesity than those with atypical development. Choi et al. (2012) showed

that girls with ID were more obese than boys, and girls aged 15 to 18 had the highest proportion of obesity. The transition period from childhood to adolescence is associated with an increased risk of weight gain, which could explain why groups of older children with ID have a higher prevalence of overweight. However, we still do not know why more children with ID develop overweight and obesity. More appropriate studies for children with ID are needed because health-related behaviors and risk factors contributing to overweight and obesity in children with ID may be different from those of typical developing children. The prevalence rate of 18.5% in obese children revealed in this study was lower than that of previous literatures. Previous studies have shown proportions ranging from 13% to 29% (Oh et al., 2008; Bandini et al., 2005; Choi et al., 2012; Fox et al., 1985). Some of the previous studies included children with Down syndrome who were likely to explain why researchers found a higher proportion of overweight and obesity in their studies (Bandini et al., 2005; Jasik & Lustig, 2008). In a study where the proportion of children with overweight or obese ID was 29%, researchers included both

children with ID and children with a broader range of disabilities, including physical and mental disabilities. Down syndrome (Fox et al., 1985).

The present study showed that ID was a determinant of obesity and overweight, the more a child had an ID the more likely he was to develop either overweight or obesity compared to a typical developing child. This probability increased with the age of the child. A significant positive association with age and overweight or obesity in children with ID was noted in previous studies where overweight was observed more in older girls than in younger girls (Oh et al., 2008; Bandini et al., 2005). Furthermore, in a Korean study of typically developing children aged 2 to 18, there was a positive relationship between age and overweight (Oh et al., 2008). Korean adolescents aged 13 to 18 were more likely to have a high BMI than children aged 7 to 12 years. 16.3% of adolescents aged 13 to 18 years were obese, compared with 8.6% of children aged 7 to 12 (Murphy et al., 1998). Other studies have not supported a relationship between the increasing age and overweight of children with ID (Larson et al., 2000; Choi et al., 2012). This study found that the proportion of obese children aged 15 to 17 was higher than that of children aged 6 to 11 and 12 to 14 years.

The major strength of this study lies in the fact that this is the first study conducted in the city of Kinshasa province on the prevalence of overweight and obesity in children and adolescents aged 6 to 17 years with ID and not presenting specific genetic syndromes or physical disabilities. The study is limited to the use of a convenience sample from a metropolitan city of the Democratic Republic of Congo, which will probably reduce the possibility of generalizing the results. Rural participants were not recruited for this study. It is possible that the characteristics of participants living in metropolitan areas are different from those of ID children living in rural areas or small towns in the Democratic Republic of Congo.

Therefore, a future study of a more representative sample of children with ID from different geographic areas of the Democratic Republic of Congo is needed to potentially increase the generalizability in the country.

## Conclusion

Overweight and obesity are more prevalent in children and adolescents with ID than without ID.

Having an intellectual disability increases the risk of developing either overweight or obesity. However, overweight and obesity in children and adults with ID is a major health threat (Janicki et al., 2002). It is well known that mortality among children and adults with ID is about three times higher than that of the general population (Decoufle & Autry, 2002; Tyrer et al., 2007). The common cause of death in this population is cardiovascular disease due to risk factors, including physical inactivity and obesity (Patja et al., 2001; Draheim, 2006). As a result, the high rates of overweight and obesity among children with ID in this study highlight the need for interventions to help children with ID achieve a healthy weight. School weight management interventions, including physical education and nutrition programs, may be the most effective resource for children with intellectual disabilities, as in many Central African countries, it is estimated that Children with ID should receive intensive and individualized instruction in specialized schools.

## Conflict of Interest

The authors declare that there are no conflicts of interests.

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