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Maternal fat mass may predict overweight/obesity in non-instituzionalized women with intellectual disability

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Abstract

Introduction: **Previous studies have found a significant correlation between parents and offspring regarding overweight and obesity in general population at early life stages. However this issue has received no attention in people with intellectual disability (ID). Therefore, the present study was designed to find out potential correlations in overweight/obesity between young adult women with ID living in the family and their parents.**

Material and methods: **In the present observational cross-sectional study, a total of thirty-four women with Down syndrome (n = 34; 22.6 ± 2.1 years; 29.6 ± 3.3 km/m²) were recruited through different community support groups for people with intellectual disabilities. Furthermore, biological mothers (n = 34; 59.6 ± 4.9 years; 28.5 ± 3.2 km/m²) and fathers (n = 34; 61.5 ± 5.3 years; 26.2 ± 2.7 km/m²) volunteered for this study. They all underwent an anthropometric assessment to determine body mass index (BMI). This protocol was approved by an Institutional Ethics Committee.**

Results: **In the studied population, a total of 26 (76.5%) women with ID were overweight/obese. Furthermore, there were 22 (66.6%) overweight/obese mothers and 16(53.3%) fathers. Results also showed significant correlations between participants BMI and their father (r = 0.327; p = 0.0116) and mother BMI (r = 0.412; p < 0.001). Lastly, overweight/obese women presented a stronger correlation with overweight/obese mothers (odds ratio 4.3; 95%CI 2.9-7.3) than fathers (odds ratio 3.1; 95%CI 1.6-4.4).**

Conclusion: **Parental overweight/obesity, especially maternal one, was strongly associated to overweight/obesity in young adult women with DS. Accordingly, there is an urgent necessity of incorporating parents in the intervention programs designed to the prevention and treatment of overweight and obesity in people with ID.**

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Key words: *Intellectual disability. Obesity. Overweight. Parents. Offspring.*

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LA MASA GRASA MATERNA COMO PREDICTOR DE SOBREPESO/OBESIDAD EN MUJERES CON DISCAPACIDAD INTELECTUAL NO INSTITUCIONALIZADAS

Resumen

Fundamento y objetivo: **Recientes estudios han encontrado en la población general una correlación entre la incidencia de sobrepeso/obesidad de padres e hijos, especialmente a edades tempranas. Sin embargo, este asunto no ha recibido atención en el caso de hijos adultos con discapacidad intelectual no institucionalizados. El presente estudio pretende determinar una posible correlación entre el sobrepeso/obesidad de padres respecto a sus hijas adultas con discapacidad intelectual que viven en el domicilio.**

Material y método: **Se diseñó un estudio de tipo transversal observacional en el que participaron 34 mujeres adultas con síndrome de Down (22,6 ± 2,1 años; 29,6 ± 3,3 km/m²). Asimismo 34 madres (59,6 ± 4,9 años; 28,5 ± 3,2 km/m$_2$) y 34 padres (61,5 ± 5,3 años; 26,2 ± 2,7 km/m²) biológicos participaron voluntariamente. Todos los participante se sometieron a un estudio cinenatropométrico en el que se obtuvo el índice de masa corporal (IMC). Este protocolo fue aprobado por un Comité de Ética Institucional.**

Resultados: **El 76,5% de las mujeres con discapacidad intelectual estudiadas presentaba sobrepeso/obesidad. En cuanto a los progenitores, el 66,6% de las madres y el 53.3 de los padres también presentó sobrepeso/obesidad. El IMC de las participantes se correlacionó significativamente con el de sus madres (r = 0,412; p < 0,001) y padres (r = 0,327; p = 0,0116). Por último, las participantes con sobrepeso/obesidad presentaron una fuerte correlación con sus progenitores con sobrepeso/obesidad, especialmente las madres (odds ratio 4,3; 95%CI 2,9-7,3) y en menor medida sus padres (odds ratio 3,1;95%CI 1,6-4,4).**

Conclusión: **La masa grasa de los padres, especialmente la materna, podría recomendarse como predictor de sobrepeso/obesidad de hijas adultas con discapacidad intelectual no institucionalizadas.**

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Palabras clave: *Discapacidad intelectual. Obesidad. Sobrepeso. Padres. Hijos.*

INTRODUCTION

A significant increase in the life expectancy of people with Down syndrome (SD) has been observed over the last decades. In a more detailed way, the number of individuals with Down's syndrome aged over 50 years has been predicted to increase by 200% between 1990 and 2010[1]. However, it has also caused a higher incidence of morbidity as they age which causes a significant rise in the cost of healthcare[2]. Many of these disorders have been associated with obesity, which is a major health problem for people with intellectual disability (ID)[3,4] that, if undiagnosed, impose an additional but preventable burden of secondary disability[5]. Accordingly, an early identification should be useful for prioritizing primary or secondary preventive health strategies and planning long-term care for people with SD.

With regard to the general population, it is accepted that obesity tends to aggregate within families as a result of interaction between genetic and environmental factors. In a more detailed way, previous studies have found a significant correlation between parents and children regarding being overweight/obese[6,7]. Similar significant associations have been also found with grandparents[8].

However, this issue has received no attention in people with intellectual disability (ID). Therefore, the present study was designed to find out potential correlations between overweight/obese young adult women with ID and their parents. The rationale was that parental overweight or obesity may be recognized as an early marker of families at risk, allowing early healthy interventions before offspring become resistant to change.

Material and methods

In the present observational cross-sectional study, a total of thirty-four women with Down syndrome (n = 34; 26.2 ± 2.1 years; 29.6 ± 3.3 km/m^2) were recruited through different community support groups for people with intellectual disabilities and their families. All subjects met the following inclusion criteria: (1) Women (2) Young adults (18-30 years); (3) Premenopausal; (4) An intelligence quotient range of 50-69, determined by Stanford-Binet Scale; (5) Living in the family. On the other hand, exclusion criteria were: (1) Participation in a training program in the last 6 months; (2) A concurrent medical condition in addition to a diagnosis of Down syndrome that might impact on body composition (i.e hypothyrodism). Furthermore, biological mothers (n = 34; 59.6 ± 4.9 years; 28.5 ± 3.2 km/m^2) and fathers (n = 34; 61.5 ± 5.3 years; 26.2 ± 2.7 km/m^2) volunteered for this study.

The following equation was used to calculate the Body Mass Index (BMI = weight (kg)/height (m)^2) being expressed as kg/m^2. Height was determined with an accuracy of 0.1 cm by precision stadiometer. Body weight was assessed with an accuracy of 0.1 kg using an electronic balance. According to the International Obesity Task Force (IOTF), overweight and obesity were defined as 25 ≥ BMI<30 kg/m^2 and BMI ≥ 30 kg/m^2 respectively.

The present research has been conducted in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki (version, 2002). Written informed consent was obtained from all participants. Further, this protocol was approved by an Institutional Ethics Committee.

SPSS procedures (SPSS Inc, Chicago, US) were used for data analysis. The Shapiro-WIlk test was used to assess whether data of BMI were normally distributed. Accordingly, Pearson's "r" correlation coefficient was also determined between BMI of women with ID and their parents. Furthermore, logistic regression analysis was run with BMI of the women with SD as dependent variable and BMI of mothers and fathers as independent variables. In this respect, odds ratio (OR) was determined as a measure of risk factor for being overweight or obese. For all tests, statistical significance was set at an alpha level of 0.05.

Results

In the studied population, a total of 26 (76.5%) women with ID were overweight/obese. Furthermore, there were 22 (64.7%) overweight/obese mothers and 16 (52.9%) fathers.

In a more detailed way, in the group of overweight/obese women with SD, there were 80% overweight/obese mothers and 68.1% fathers. In the group of normal weight women with SD, there where 25% overweight/obese mothers and 12.5% fathers.

Lastly, results also showed significant correlations between participants BMI and their father ($r = 0.327$; $p = 0.0116$) and mother BMI ($r = 0.412$; $p < 0.001$). Similarly, overweight/obese women presented a stronger correlation with overweight/obese mothers (OR 4.0; 95%CI 2.8-6.6) than fathers (OR 3.2; 95%CI 1.6-4.4).

Discussion

Despite a previous study from 90 s concluded obesity was significantly associated with living in the family home compared to supervised community units[9], the correlation between the BMI of individuals with ID and the BMI of their parents has not been thoroughly studied. Accordingly, to the best of our knowledge, the present study was the first to find out significant correlations between parents and young adult women with ID in overweight/obesity.

As was hypothesized, having parents, especially mothers, who are overweight or obese, may increase the risk of women with DS of being overweight or

obese too. Similar results have been previously published in children[6] and adolescents[7] without intellectual disability. In fact, the latter authors reported that the impact of parental BMI on the severity of obesity in children is strengthened as the child grows into adolescence[7]. Furthermore, several twin studies have concluded that genetic factors influencing weight, BMI and body size become more apparent from birth to early adulthood[10]. In a more detailed way, Magarey et al.[11] concluded that the risk of overweight at 20 years-old increased further with increasing weight status of parents. Despite these studies focused on general population found that during adolescence the parental impact on daily life declines, there is an urgent need to specifically study cohorts of people with intellectual disability.

In a more detailed way, a stronger and earlier relationship between higher maternal concern and child weight than between father and child weight has been seen in previous population-based studies[12,13]. Consistent with this observation, a second key finding of the current study was that these results were maintained at early adulthood in women with DS given that they showed a stronger correlation with overweight/obese mothers. These findings may indicate the key role of the mother in obesity prevention given their higher influence in the family food environment[14].

However, O'Neill et al.[15] found that parents employed certain controlling feeding practices more frequently for children with DS than for children without DS and that these practices were associated with differences in BMI. It was suggested that excessive control in feeding trains children to ignore hunger and satiety cues, exacerbating obesity-proneness. Despite this model was derived from research focused on non-disabled children[16] based on the premise that parents are more likely to impose control in feeding when they perceive their offspring to be at risk of becoming obese, it was also appropriate for children with Down syndrome[15].

Furthermore, Jobling and Cuskelly[17] found young people with DS and their families had a limited knowledge of most aspects of healthy eating and pointed to a gap in the preparation of these young people for independent living.

As was previously reported in general population[6,7,13]. our results also suggested that parental overweight or obesity should be recognized as an early marker of families at risk. This is concerning, given that the adverse effects of obesity can be ameliorated if discovered in a timely fashion by using adapted strategies[18]. In this respect, exercise programs have significantly improved body composition in people with DS[19]. Furthermore regular exercise positively affects the overall health of adults with DS, thereby increasing the quality of life and prolonging the years of healthy life for these individuals[20-23].

However, in order to promote sustainability of these healthy programs it is necessary to explore the facilitators and barriers to physical activity for this group. Recent studies have found that support people, such as parents, play a key role as facilitators to physical activity in people with Down syndrome[24]. Therefore, it would be essential targeting not only participants but also their parents, caregivers, educators, etc. in order to give them the confidence to continue exercising after the trial finishes.

Finally, the present study had some limitations that should be considered too. A possible limitation of our study is the low sample size, which may decrease its external validity. We decided to limit our investigation to female subjects and therefore only a small number of participants could be recruited. Accordingly, there is a clear need for future studies with male adults and larger sample sizes. These studies should be also focused on peers at early life stages in whom, improvements in health behaviors, should be a priority before they become resistant to change. Furthermore, the present analysis did not examine food intake and/or physical activity measures so that future studies assessing these parameters are still required.

On the other hand, a major strength was that both participant parents were included in this design in contrast to previous studies that included one guardian per each participant[25]. Furthermore we directly measured both parents were measured by the same long-experienced researcher, given that previous epidemiological studies found that self-reports are known to underestimate the BMI given that heights are generally overestimated while weights are underestimated[7]. In this respect, Wardle et al.[26] also concluded that the underestimation of the BMI is greater in obese parents than for normal weight subjects.

It was concluded that parental overweight/obesity, especially the maternal one, was strongly associated to overweight/obesity in young adult women with DS. Accordingly, there is an urgent necessity of incorporating parents in the intervention programs designed to the prevention and treatment of overweight/obesity in people with ID.

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References

1. Baird AP, Sadovnick AD. Life expectancy in Down syndrome adults. *Lancet* 1988; 2:1354-6.
2. Tenenbaum A, Chavkin M, Wexler ID, Korem M, Merrick J. Morbidity and hospitalizations of adults with Down syndrome. *Res Dev Disabil* 2012; 33: 435-41.
3. De Winter CF, Magilsen KW, van Alfen JC, Penning C, Evenhuis HM. Prevalence of cardiovascular risk factors in older people with intellectual disability. *Am J Intellect Dev Disabil* 2009; 114: 427-36.

4. González-Agüero A, Ara I, Moreno LA, Vicente-Rodríguez G, Casajús JA. Fat and lean masses in youths with Down syndrome: gender differences. *Res Dev Disabil* 2011; 32: 1685-93.
5. Henderson A, Lynch SA, Wilkinson S, Hunter M. Adults with Down's syndrome: the prevalence of complications and health care in the community. *Br J Gen Pract* 2007; 57: 50-5.
6. Brali I, Vrdoljak J, Kovaci V. Associations between parental and child overweight and obesity. *Coll Antropol* 2005; 29: 481-6.
7. Svensson V, Jacobsson JA, Fredriksson R, Danielsson P, Sobko T, Schiöth HB, Marcus C. Associations between severity of obesity in childhood and adolescence, obesity onset and parental BMI: a longitudinal cohort study. *Int J Obes* (Lond). 2011; 35: 46-52.
8. Davis MM, McGonagle K, Schoeni RF, Stafford F. Grandparental and parental obesity influences on childhood overweight: implications for primary care practice. *J Am Board Fam Med* 2008; 21: 549-54.
9. Prasher VP. Overweight and obesity amongst Down's syndrome adults. *J Intellect Disabil Res* 1995; 39: 437-41.
10. Pietilainen KH, Kaprio J, Rasanen M, Rissanen A, Rose RJ. Genetic and environmental influences on the tracking of body size from birth to early adulthood. *Obes Res* 2002; 10: 875-84.
11. Magarey AM, Daniels LA, Boulton TJ, Cockington RA. Predicting obesity in early adulthood from childhood and parental obesity. *Int J Obes Relat Metab Disord* 2003; 27: 505.
12. Safer DL, Agras WS, Bryson S, Hammer LD. Early body mass index and other anthropometric relationships between parents and children. *Int J Obes Relat Metab Disord* 2001; 25: 1532-6.
13. Valerio G, D'Amico O, Adinolfi M, Munciguerra A, D Amico R, Franzese A. Determinants of weight gain in children from 7 to 10 years. *Nutr Metab Cardiovasc Dis* 2006; 16: 272-8.
14. Evans A, Chow S, Jennings R, Dave J, Scoblick K, Sterba KR, Loyo J. Traditional foods and practices of Spanish-speaking Latina mothers influence the home food environment: implications for future interventions. *J Am Diet Assoc* 2011; 111: 1031-8.
15. O'Neill KL, Shults J, Stallings VA, Stettler N. Child-feeding practices in children with down syndrome and their siblings. *J Pediatr* 2005; 146: 234-8.
16. Costanzo P, Woody E. Domain-specific parenting styles and their impact on child's development of particular deviance: the example of obesity proneness. *J Social Clin Psychol* 1985; 4: 425-45.
17. Jobling A, Cuskelly M. Young people with Down syndrome: a preliminary investigation of health knowledge and associated behaviours. *J Intellect Dev Disabil* 2006; 31: 210-8.
18. Jensen KM, Taylor LC, Davis MM. Primary care for adults with Down syndrome: adherence to preventive healthcare recommendations. *J Intellect Disabil Res* 2013; 57: 409-21.
19. Ordonez FJ, Rosety M, Rosety-Rodriguez M. Influence of 12-week exercise training on fat mass percentage in adolescents with Down syndrome. *Med Sci Monit* 2006; 12: 416-9.
20. Barnhart RC, Connolly B. Aging and Down syndrome: implications for physical therapy. *Phys Ther* 2007; 87: 1399-406.
21. Mendonca GV, Pereira FD. Influence of long-term exercise training on submaximal and peak aerobic capacity and locomotor economy in adult males with Down's syndrome. *Med Sci Monit* 2009; 15: 33-9.
22. Ordonez FJ, Rosety MA, Camacho A, Rosety I, Diaz AJ, Fornieles G, Garcia N, Rosety-Rodriguez M. Aerobic training improved low-grade inflammation in obese women with intellectual disability. *J Intellect Disabil Res* 2013 Jun 7. [Epub ahead of print].
23. Rosety-Rodriguez M, Rosety I, Fornieles-Gonzalez G, Diaz A, Rosety M, Ordonez FJ. A 12-week aerobic training programme reduced plasmatic allantoin in adolescents with Down syndrome. *Br J Sports Med* 2010; 44: 685-7.
24. Mahy J, Shields N, Taylor NF, Dodd KJ. Identifying facilitators and barriers to physical activity for adults with Down syndrome. *J Intellect Disabil Res* 2010; 54: 795-805.
25. Ramos-Jiménez A, Wall-Medrano A, Hernández-Torres RP. Physiological and social factors associated with increments of body mass of Mexican young people with intellectual disabilities. *Nutr Hosp* 2012; 27: 2020-7.
26. Wardle J, Guthrie C, Sanderson S, Birch L, Plomin R. Food and activity preferences in children of lean and obese parents. *Int J Obes Relat Metab Disord* 2001; 25: 971-7.