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RESEARCH ARTICLE

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FACTORS ASSOCIATED WITH OBESITY IN ADOLESCENTS WITH AUTISTIC SPECTRUM DISORDER: AN INTEGRATIVE LITERATURE REVIEW

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ABSTRACT

Introduction: Obesity is a reality among adolescents today, and it is no different among those with autism spectrum disorder (ASD), but with greater representation due to several factors that culminate in this accumulation of fat. **Objective:** The objective of this study was to identify, through an integrative literature review, the factors associated with obesity in adolescents with ASD. **Method:** A bibliographic survey of research was carried out that evaluated these factors in the period from 2014 to 2020 at the Virtual Health Library and Pubmed. **Results:** This review included 13 articles developed in the USA, Canada, Brazil, Ireland and the United Arab Emirates, with the main results of the low level of physical activity and the high body mass index of these adolescents. Adolescents with ASD were more likely to increase their body mass index and obesity than adolescents without ASD. **Conclusion:** Sleep disturbance, physical inactivity, poor eating habits and medication use were associated with increased body mass index and obesity in adolescents with ASD.

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INTRODUCTION

Autistic Spectrum Disorder (ASD) is an imbalance in neuro-development with stereotyped behavior patterns and repetitive or restricted development, generating difficulties in communication and social interaction, with irregular intellectual development with frequent mental retardation (Araújo *et al.*, 2014; SBP, 2019; Toscano and Becker, 2019). ASD manifests itself in a variety of ways, with no pathognomonic signs as it varies according to the individual and the degree of severity of the disorder (Guedes and Tada, 2015). The general health problems of people with ASD are common to those of typical people, however those with ASD are more vulnerable to chronic non-communicable conditions due to behavioral habits, in which many can become risk factors for comorbidities, among them the physical inactivity, a diet low in nutrients and high energy consumption (PAHO, 2017; Mintz, 2017; Nor NK *et al.*, 2019, Srinivasan *et al.*, 2014).

Adolescents with ASD are more susceptible to obesity when compared to other adolescents, presenting a higher rate of obesity and overweight (Ogden *et al.*, 2014; Kummer *et al.*, 2016; Tybor *et al.*, 2018). Given this reality, this study aimed to carry out an integrative literature review to better understand the factors associated with obesity in adolescents with ASD.

MATERIALS AND METHODS

Eligibility Criteria: Cross-sectional, case-control and cohort studies that included the age group for adolescents, according to the World Health Organization (WHO), published between 2014 and 2020, in English, Spanish or Portuguese, and which answered the following guiding question were included: What are the factors associated with obesity in adolescents with ASD? Dissertations, theses, case studies and reviews were excluded.

Search Strategy: This review was conducted according to the information collected in the VHL (Virtual Health Library) and Pubmed databases, following the guidelines of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The descriptors used were: autism spectrum disorder, autistic disorder, obesity, adolescent and autism spectrum disorder and obesity, in the VHL and Pubmed, respectively, using the OR or AND boolean operators.

Study Selection: The selection was carried out in two phases. In the first phase, two independent evaluators (A.C.P.G and H.S.X.) read the titles and abstracts of the studies identified in the researched databases. Studies that did not meet the inclusion criteria were discarded. In the second phase, the same researchers applied the eligibility criteria for the full text of the articles. During the searches, the disagreements were resolved by a third reviewer (S.C.M.V).

Data Collection Process: One author (A.C.P.G) collected the data of interest from the articles and these data were verified by two more authors (C.M.M.R and M.V. H). The qualitative data collected were: author / year / country, study design, age group, result and conclusion.

RESULTS

Selection of studies: The search reported a total of 428 articles in the searched databases. After excluding duplicates (9), 419 were assessed by reading titles and abstracts. 29 were selected for full reading.

After applying the eligibility criteria, 13 articles were excluded for several reasons and 03 were excluded for being present in the VHL and Pubmed. Thus, 13 articles were part of the data extraction and qualitative synthesis. The process of identification, inclusion and exclusion of studies is shown in Figure 1.

Study characteristics: 13 articles were selected, of these, 10 were studies conducted in the United States of America (USA) (Mccoy and Morgan, 2019; Healy *et al.*, 2019; Tybor *et al.* 2019; Healy *et al.*, 2019; Must *et al.* , 2017; Corvey *et al.*, 2016; Shedlock *et al.* 2016; Dreyer Gillette *et al.*, 2015; Broder- Fingert *et al.*, 2014)), having been a multicampi in Canadá (Hill *et al.*, 2015) , a study was conducted in Brazil (Kummer *et al.*, 2016) and the others in the United Arab Emirates (Atlee *et al.*, 2015) and Ireland (Healy *et al.*, 2017). Regarding the design of the studies, of the studies carried out in the United States, one was a case-control type (Shedlock *et al.* 2016), four were cross-sectional studies of primary data (Healy *et al.*, 2017; Kummer *et al.*, 2016 ; Hill *et al.*, 2015; Atlee *et al.*, 2015) and eight secondary data (Mccoy and Morgan, 2019; Healy *et al.*, 2019; Tybor *et al.* 2019; Healy *et al.*, 2019; Must *et al.* ., 2017; Corvey *et al.*, 2016; Dreyer Gillette *et al.*, 2015; Broder-Fingert *et al.*, 2014) with a large sample and, in their majority, used data from the National Survey of Childrens Healt (NSCH). This is a population-based cross-sectional survey of the health and well-being of American children ”(Healy *et al.*, 2019). The vast majority of studies assessed the nutritional status of adolescents using the body mass index (BMI) based on the percentiles for the corresponding age.

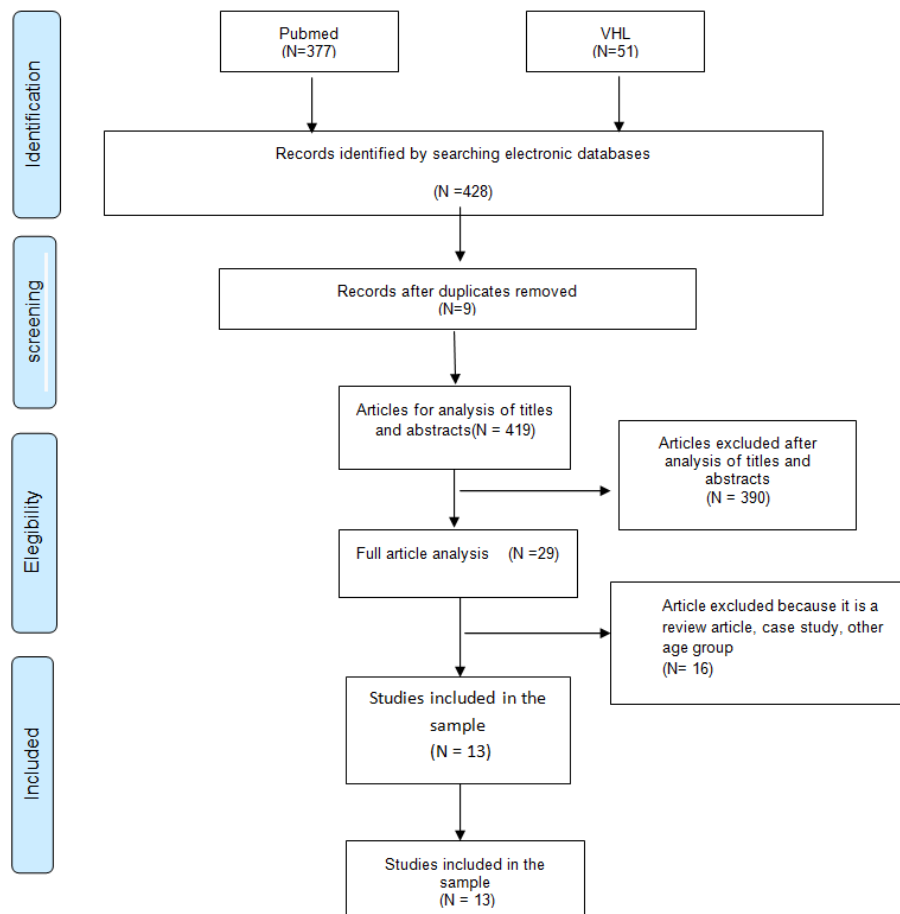


Figure 1. Study selection flow diagram, according to a Prism scale

As the level of physical activity, screen time and sleep quality in adolescents with ASD was also assessed, analyzing their relationship with weight (Healy *et al.*, 2019; McCoy and Morgan *et al.*, 2019; Healy *et al.*, 2017; Corvey *et al.*, 2016; Dreyer-Gillette *et al.*, 2014; Broder- fingert *et al.*, 2014). Only three studies evaluated the presence of metabolic disorder or eating habits (Shedlock *et al.*, 2016; Hill *et al.*, 2015; Broder- fingert *et al.*, 2014). All of these aspects were related to the use of medication and the severity of ASD and thus associated with the development of obesity in adolescents with this diagnosis, as shown in Table 01.

Morgan, 2019; Must *et al.* 2017; Healy *et al.*, 2019; Kummer *et al.*, 2016; Hill *et al.*, 2015). In addition, they had about 53% less chance of having ideal weight (Dreyer-Gillette *et al.*, 2014). Tybor *et al.* (2019) identified in their study that parents of adolescents with ASD were more concerned with the weight of their children, when compared to the parents of those of typical development. In a national health survey, with the aim of identifying the age and prevalence of overweight adolescents with ASD compared to typical adolescents, the authors concluded that sociodemographic factors, such as sex, age, race, were related to the presence of obesity in adolescents

Table 1. Distribution of studies according to factors associated with obesity in adolescents with ASD

Author/ year/ country	Study design	Sample/ Age Group (years)	Evaluation	Conclusion
Healy et al., 2019 EUA	Cross-sectional	N=507 13 a 18 years	Compare adolescents with ASD and TD regarding PA, screen time and sleep duration	Adolescents with ASD had longer screen time and lower prevalence in PA practice when compared to adolescents with TD
McCoy e Morgan, 2019 EUA	Cross-sectional	N=1036 10 a 17 years	He compared BMI, level of physical activity, screen time among adolescents with ASD and TD	They are more prone to obesity (OR-1.94) and television time (OR = 1.25)
Tybor et al., 2019 EUA	Cross-sectional	N=699 10 a 17 years	Evaluated BMI and medications	High probability of obesity in adolescents with ASD (OR- 1.54)
Healy et al., 2019 EUA	Cross-sectional	N=875693 10 a 17 years	Associated BMI, among adolescents with ASD and TD, in addition to the use of medications and severe symptoms	Adolescents with ASD are more likely to be obese (OR- 1.49) when compared to those with TD
Must et al., 2017 EUA	Cross-sectional	N=925 10 a 17 years	Compared BMI among adolescents with ASD and TD	Adolescents with ASD are more prone to obesity, which is more pronounced with advancing age (P <0.001)
Healy et al., 2017 Irlanda	Cross-sectional	N=67 13 years	Compared physical activity, sports participation, screen time, BMI and reason for not participating in team games among adolescents with ASD and TD	Adolescents with ASD are less prone to PA (P <0.001) and this lack of PA is negatively related to longer television time (P-.0009) when compared to adolescents with TD
Shedlock et al., 2016 EUA	Case-control	N=48762 02 a 18 years	Evaluated the presence of DM, BMI, SAH, dyslipidemia, medication use	Adolescents with ASD are more likely to be obese (OR- 1.85) and, consequently, more likely to have a metabolic disorder
Kummer et al., 2016 Brasil	Cross-sectional	N=69 2 a 18 years	Compared the BMI of adolescents DT and ASD, in addition to the association of obesity with medication use	Adolescents with ASD have a higher BMI when compared to those with TD (P <0.01). The use of medicines, genetic and environmental factors influence the onset of obesity
Corvey et al., 2016 EUA	Cross-sectional	N=1385 6 a 17 years	Compared BMI, medication use, PA level among adolescents and their peers	Adolescents with ASD are more likely to be obese when compared to adolescents with TD (P = 0.001 / OR-2.25)
Hill et al., 2015 EUA- Canadá	Cross-sectional	N=5053 2 a 17 years	Compared BMI between adolescents with ASD and their peers	Obesity is higher among adolescents with ASD and TD (P = 0.010 / OR 1.03)
Attle et al., 2015 Emirados Árabes	Cross-sectional	N=23 5 a 16 years	Assessed BMI, eating habits	It found a higher prevalence of obesity in adolescents with ASD, due to the difficulty in maintaining a healthy diet
Dreyer- Gilete et al., 2015 EUA	Cross-sectional	N=900 10 a 17 years	Compared BMI, PA, sleep and screen time of adolescents with and without ASD	Higher obesity rate when compared to adolescents with TD (P <0.01)
Broder- Fingert et al., 2014 EUA	Cross-sectional	N=812 12 a 20 years	Compared the BMI of adolescents with ASD and DT, in addition to sleep quality	Higher risk of obesity in adolescents with ASD with advancing age (OR- 1.87-12 to 15 years; 1.94-16-16 years) when compared to adolescents with TD. Worsening sleep quality associated with obesity (OR-1.23)

Abbreviation list

ASD- Autistic spectrum disorder
 BMI- Body Mass Index
 HAS- Systemic Arterial Hypertension
 PA- Physical Activity
 TD- Typical Development

DISCUSSION

Adolescents with autism spectrum disorder (ASD) are more prone to obesity and overweight when compared to adolescents of typical development (TD) who are about twice as likely to develop this condition, and average of approximately 23% of obese and 19% of overweight among young people with ASD (Tybor *et al.*, 2019; McCoy and

with TEA (Must *et al.*, 2017; Tybor *et al.*, 2019). However, in the study by Healy *et al.* (2019), there was no significant relationship between race and sex when related to obesity. And for Corvey *et al.* (2016) a specific etiological study would be necessary for each racial group in adolescents with ASD. Adolescents with ASD, in addition to being overweight and obese, were more prone to exacerbated screen time, as well as less adherence to physical activity, with only 11% performing such activity (McCoy and Morgan, 2019; Healy *et al.*, 2019; Healy *et al.*, 2017). Corroborating with Corvey *et al.* (2016) who found 45% of adolescents with ASD as sedentary and with a longer screen time than recommended. Reinforced by Healy *et al.* (2017), when they concluded that 37% had never practiced any team sport and were more adept at computer games. For Healy *et al.* (2019) the greater the severity of the disorder, the greater the chances of developing obesity.

Disagreeing with Corvey *et al.* (2016) that in their research carried out between 2011 and 2012 with American families, with the objective of identifying obesity and overweight in children and adolescents with ASD, concluded that the diagnosis and severity of ASD were not independently associated with obesity or overweight. When analyzing sleep duration among adolescents with ASD and typical adolescents, it was identified that they had similar amount of hours, however when analyzing the severity of ASD, the higher the degree, the lower the hours of sleep (Healy *et al.*, 2019). As well as, the older the age, the greater the chances of the development of obesity and overweight in adolescents (Broder-finghter *et al.*, 2014). In contrast to these studies, Dreyer-Gillete *et al* (2014) found no difference in sleep quality in adolescents with ASD and their peers. Another factor that can corroborate for the development of obesity was the use of medication (Hill *et al.*, 2015; Shedlock *et al.*, 2016), such as psychotropics, mood stabilizers, antipsychotics, antiepileptic drugs and selective serotonin reception inhibitors (Shedlock *et al.*, 2016), these being used in about 35% of adolescents with ASD (Tybor *et al.*, 2019), with risperidone having been used more frequently (Kummer *et al.*, 2016; Healy *et al.*, 2019). In a case - control study, aiming to assess the increased risk for type 2 diabetes mellitus, obesity, hypertension, the authors identified that the use of medications increased the adolescents' chances of developing diabetes and hyperlipidemia (Shedlock *et al.*, 2016). Unlike the findings by Broder - Fingert *et al* (2014).

Final Considerations

Adolescents with ASD were more likely to increase their BMI and the consequent high obesity rate. There were associated factors for the increase in these rates, as shown by the studies, among which could be identified those associated with sleep disorders, poor eating habits, the absence / difficulty in performing physical activities, and the use of medications in the adolescent's routine. With ASD, enabling the development of iatrogenic obesity. Parents and guardians are important parts of actions to combat obesity rates in the studied population, considering that accountability for the routine of eating habits, opportunities for integration in physical activities, can be facilitated with the joint interaction between family and health professionals the multidisciplinary team in order to intervene and develop health promotion actions for the specific group of adolescents with ASD, minimizing the obesity rates among them.

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