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Navigating the Nexus: Understanding Overweight and Obesity Among Children with Autism Spectrum Disorder

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ABSTRACT: *In recent decades, the global prevalence of Autism Spectrum Disorder (ASD) and childhood obesity has risen significantly, presenting challenges to public health. This study explores the intersection of these two phenomena, specifically the coexistence of overweight and obesity among children with ASD. While previous research has highlighted higher rates of obesity in children with ASD, emphasizing the role of behavioral factors, such as dietary habits and physical activity, this study aims to provide a comprehensive understanding of the relationship between ASD and weight-related issues.*

Utilizing data from Bai Jerbai Wadia Hospital for Children in Mumbai, the study focused on parents of children diagnosed with ASD and typically developing (TD) controls. Diagnosis and severity of ASD were determined using the Indian Scale for Identification of Autism (ISAA), with anthropometric measurements collected for both groups. The study employed bivariate and multivariate analyses to investigate associations between various factors and overweight/obese status.

The findings reveal significant associations between a child's overweight/obese status and age group and gender. Children aged 2 to 5 years exhibited a lower risk of being overweight/obese compared to those over 5 years, emphasizing the importance of early interventions. Male children had a significantly lower likelihood of being overweight/obese compared to females. However, factors such as ASD, place of residence, parents' occupation, mothers' education, water supply, and toilet facility did not show statistically significant associations.

Contrary to some prior studies, this research did not establish a significant association between ASD and overweight/obese status, highlighting the complexity of this relationship. Similarly, socio-economic factors such as place of residence, parents' occupation, and mothers' education did not emerge as significant predictors. The study's limitations, including sample size and specific population characteristics, underscore the need for further research to delve into the multifaceted nature of childhood obesity and develop tailored intervention strategies.

In conclusion, this study contributes valuable insights into the intricate relationship between ASD and overweight/obesity in children. The significant associations observed highlight the need for nuanced and multifaceted approaches to address childhood obesity, while the non-significant associations prompt further exploration and emphasize the importance of contextualizing findings within specific population characteristics.

KEYWORDS: *ASD, overweight/obesity, malnutrition.*

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I. INTRODUCTION

In recent decades, the global prevalence of both autism spectrum disorder (ASD) and childhood obesity has experienced a notable surge, posing multifaceted challenges to public health [1][2][3]. Within this landscape, a compelling and often overlooked intersection emerges - the coexistence of overweight and obesity among children with Autism Spectrum Disorder. One of the studies revealed higher rates of obesity among children with ASD compared to their neurotypical counterparts [3]. It emphasized the need to consider behavioral factors, such as dietary habits and physical activity levels, in understanding the obesity prevalence in children with ASD. The amalgamation of these two distinct yet interconnected phenomena warrants meticulous exploration, as it holds profound implications for the affected individuals, their families, and society at large.

Autism spectrum disorders (ASD) are a group of neurodevelopmental problems characterised by social and communication deficits, stereotyped interests, repetitive behaviours, and have problems in many areas of their lives, such as cognitive problems, social maturity issues, and a variety of behavioural issues such as self-injurious behaviour, hyperactivity, and so on [4]. Based on research conducted by the International Clinical Epidemiology Network (INCLEN), it is estimated that the general prevalence of Autism Spectrum Disorder (ASD) is anticipated to be 1 in 89 across five states in northern and western India [5]. Concurrently, the global prevalence of childhood obesity has reached alarming proportions, with the World Health Organization (WHO)

estimating that over 340 million children and adolescents aged 5-19 were overweight or obese in 2016 [6]. Amidst this dual epidemiological challenge, emerging research has shed light on the unique and complex relationship between ASD and weight-related issues, raising critical questions about causation, contributing factors, and potential intervention strategies.

Understanding the intricate interplay between ASD and overweight/obesity requires a nuanced examination of the underlying factors contributing to this co-occurrence. Behavioral patterns associated with ASD, such as sensory sensitivities, restricted food preferences, and challenges in social interactions, can significantly impact dietary habits and physical activity levels [7]. Additionally, pharmacological interventions, often prescribed to address core symptoms of ASD, may influence weight gain [8]. The confluence of these factors demands a comprehensive investigation into the pathways linking ASD and overweight/obesity to inform targeted interventions and support mechanisms.

This study endeavors to probe the intricate relationship between ASD and the prevalence of overweight or obesity among children, seeking to ascertain whether a statistically significant association exists between these two multifaceted conditions. Understanding the interplay between these two complex conditions is imperative for several reasons. First, it addresses a crucial gap in our understanding of the factors contributing to overweight and obesity in the pediatric population, with potential implications for tailored interventions. Second, it holds the promise of unveiling unique challenges faced by children with ASD in maintaining a healthy weight. This study's findings may have far-reaching implications for public health strategies, intervention programs, and the holistic care of children with ASD. By elucidating the statistical connection between these two conditions, we aspire to foster a more nuanced understanding that can guide targeted interventions, ultimately improving the health outcomes and quality of life for children navigating the intersection of Autism Spectrum Disorder and overweight/obesity.

II. METHODOLOGY

The study's primary data was sourced from Bai Jerbai Wadia Hospital for Children, a tertiary care facility in Mumbai. Specifically, the research targeted parents of children diagnosed with Autism Spectrum Disorder (ASD) referred to specialists for neurological disorders. The study period spanned from April 2020 to August 2021, during which parents of children enrolled in the learning disability and counseling center at Bai Jerbai Wadia Hospital for Children were interviewed to meet the study objectives.

Diagnosis of ASD and its severity were determined by the hospital's neurologists and psychologists using the Indian Scale for Identification of Autism (ISAA). Controls for the study included typically developing children without chronic disorders attending the hospital's outpatient department for common issues like fever, cough, and cold. Parental interviews were conducted for this group as well. Anthropometric measurements, encompassing height and weight, were obtained for all participating children. The study employed a purposive sampling method, strategically focusing on specific characteristics of the population relevant to the research questions. The sample size of 187 children, comprising 96 cases (children with ASD) and 91 controls, was determined based on the number of children registered at Bai Jerbai Wadia Hospital for Children in Parel during the specified period.

Matching of cases and controls was carried out on a frequency basis considering age and sex. This approach ensured a balanced representation across these key demographic factors. The determination of the sample size took into account practical considerations such as available resources, time constraints, and the prevalence of the condition in the broader population under investigation.

Criteria for Selecting Subjects:

Criteria for Selecting Cases:

Inclusion Criteria for Cases:

- Children below 12 years of age.
- Diagnosed with Autism Spectrum Disorder (ASD) using the ISAA Scale.
- Participants willing and able to provide informed consent for the proposed study.

Exclusion Criteria for Cases:

- Children with other chronic disorders.
- Unwillingness to comply with the research plan.

Criteria for Selecting Controls:

Inclusion Criteria for Controls:

- Children below 12 years of age.
- Absence of other neurological disorders.
- Participants willing and able to provide informed consent for the proposed study.

Exclusion Criteria for Controls:

- Children with other chronic diseases.
- Unwillingness to comply with the research plan.

To achieve the study objectives, both bivariate and multivariate analyses were conducted. Categorical data was assessed using percentages. For multivariate analysis, binary logistic regression was deemed suitable, given the dichotomous nature of the dependent variable. Statistical significance was acknowledged at a 5% probability level, indicating that a p-value of 0.05 was considered statistically significant. The data entry and analysis were executed using the Stata 13.0 software package.

III. DISCUSSION

The examination of various factors within the study context revealed intriguing insights into the potential determinants of overweight or obese status in children. Notably, the analysis indicates that Autism Spectrum Disorder (ASD), place of residence, parents' occupation, mothers' education, water supply facility, and toilet facility did not exhibit statistically significant associations with the overweight or obese status of the children.

Autism Spectrum Disorder (ASD): Contrary to some prior studies suggesting a potential link between ASD and weight-related challenges [9][10], our findings did not establish a statistically significant association. This may underscore the complexity of the relationship between ASD and weight status, emphasizing the need for a nuanced understanding of contributing factors.

Place of Residence: Similarly, the place of residence did not emerge as a significant predictor of overweight or obese status in the studied population. While environmental factors can influence lifestyle and health outcomes, it seems that, within the scope of this study, residence alone does not exert a statistically significant impact on children's weight status.

Parents' Occupation and Mothers' Education: The lack of statistical significance regarding parents' occupation and mothers' education challenges conventional assumptions about the influence of socio-economic factors on childhood obesity. This suggests that, in this specific context, other variables or more intricate interactions may play a more prominent role in shaping children's weight outcomes.

Water and Toilet Facilities: Surprisingly, water supply facility and toilet facility did not demonstrate significant associations with the overweight or obese status of the children. This finding deviates from conventional wisdom, which often links access to clean water and sanitation to overall health outcomes. The absence of statistical significance implies that other factors may contribute more significantly to the observed weight patterns.

While our results underscore the non-significant associations in this specific study, it is crucial to acknowledge potential limitations. The study's scope, sample size, and specific population characteristics may influence the generalizability of these findings. Moreover, the multifactorial nature of childhood obesity suggests that a comprehensive understanding requires consideration of diverse influences, both intrinsic and extrinsic.

In conclusion, the non-significant associations identified in this study prompt further exploration and emphasize the importance of contextualizing findings within the unique characteristics of the studied population. Future research endeavors could delve deeper into the intricate interplay of factors contributing to childhood obesity, providing a more comprehensive understanding for tailored intervention strategies.

IV. FINDINGS

Demographic information: The socioeconomic characteristics of children with Autism Spectrum Disorder (ASD) and typically developing (TD) children are detailed in Table 1. The majority of both ASD and TD children fell within the age range of 2 to 5 years, constituting approximately 73% and 75% of each group, respectively. Additionally, a notable 23% to 24% of both TD and ASD children were younger than 2 years old, with a minimal representation of children older than 5 years in both groups.

Furthermore, the gender distribution revealed that around 83% of ASD children and approximately 77% of TD children were boys. In contrast, only 17% of ASD children were female, while 23% of TD children were female. Maternal figures were identified as the primary caregivers for both TD and ASD children, accounting for 87% and 81%, respectively. Notably, 14% of ASD children had fathers as primary caregivers, while 12% of TD children had fathers in this role. TD children were also cared for by their grandmothers and other family members.

Family size analysis demonstrated that the majority of both TD and ASD children belonged to households with 5 to 6 family members. About 38% of ASD children and 31% of TD children had less than or equal to four family members, and very few had more than six family members.

Residential arrangements indicated that a significant proportion of TD children, around 50%, lived in buildings, while the majority of ASD children, 52%, resided in chawls. A mere 9% of families from both TD and ASD children lived in slums.

Additionally, a notable disparity emerged in the employment status of parents. A larger percentage of ASD children's parents were unemployed compared to TD children's parents. Both groups exhibited a similar percentage of literate mothers, ranging from 90% to 91%.

Regarding water consumption practices, the majority of both ASD and TD households (55%) boiled their water. However, only 9% and 12.5% of TD and ASD families, respectively, used water purifiers. Notably, a significant proportion of both TD (37%) and ASD (32.3%) families relied on untreated water.

In terms of toilet facilities, a higher percentage of TD families (66.7%) compared to ASD families (62.5%) had personal toilets, while 32% to 34.4% had shared toilet arrangements. Few families in both groups practiced open-air defecation.

	TD	**ASD**	**N**
Age			
Less than 2 years	23.08	23.96	25
2 - 5 years	74.73	72.92	138
Greater than 5 years	2.2	3.13	24
Sex			
Male	76.92	83.33	150
Female	23.08	16.67	37
Caretaker			
Mother	81.32	86.46	157
Father	12.09	13.54	24
Grandmother	5.49	0	5
Other	1.1	0	1
Total no. of family members			
Less than or equal to 4	30.8	37.5	64
5 – 6	48.4	44.8	87
Greater than 6	20.9	17.7	36
Place of residence			
Building	49.45	38.54	82
Chawl	41.76	52.08	88
Slum	8.79	9.38	17
Occupation			
Self-employed	16.67	20	34
Employed	63.33	51.58	106
Unemployed	20	28.42	45
Mothers education			
Literate	89.01	90.63	168
Illiterate	10.99	9.38	18
Water supply			
Purifier	8.89	12.5	20
Boiled	54.44	55.21	102
Direct	36.67	32.29	64
Defecation			
Common toilet	32.22	34.38	62
Personal	66.67	62.5	120
Open air	1.11	3.13	4
Stunted			
No	81.32	72.92	144
Yes	18.68	27.08	43
Underweight			

No	92.3	71.9	153
Yes	7.69	28.1	34
Wasted			
No	83.5	85.4	158
Yes	16.5	14.6	29
Overweight/Obese			
No	81.3	90.6	161
Yes	18.7	9.4	26
Total	91	96	
Note: TD: typically developing; ASD: autism spectrum disorder			

Table 1: Distribution of Population

Table 2 reveals significant associations between the child's overweight/obese status and the child's age group and gender. Specifically, children aged 2 to 5 years demonstrated a lower risk of being overweight/obese compared to those over the age of 5 years, with an odds ratio (OR) of 0.19 and a confidence interval (C.I.) of 0.06 to 0.61. Moreover, male children exhibited a 0.30 times lower likelihood of being overweight/obese compared to female children, as indicated by an OR of 0.30 and a C.I. of 0.10 to 0.85.

However, factors such as Autism Spectrum Disorder (ASD), place of residence, parents' occupation, mothers' education, water supply facility, and toilet facility did not show statistically significant associations with the overweight or obese status of the children.

Overweight/Obese	**Odds Ratio**	**[95% Conf. Interval]**	
Type			
ASD	0.60	0.21	1.74
Normal®			
Age group			
Less than 2 years	0.31	0.05	1.84
2 - 5 years	0.19***	0.06	0.61
Greater than 5 years®			
Sex			
Male	0.30**	0.10	0.85
Female®			
Place of residence			
Slum	0.00	0.00	
Chawl	0.76	0.25	2.32
Building®			
Occupation			
Unemployed	0.52	0.13	2.18
Employed	0.69	0.21	2.23
Self employed®			
Mothers’ education			
Illiterate	0.37	0.06	2.14

Literate®			
Water supply			
Direct	1.49	0.26	8.68
Boiled	1.30	0.25	6.65
Purified®			
Defecation			
Open air	0.00	0.00	
Common toilet	1.36	0.42	4.45
Personal toilets®			
Constant	2.65		
Note: p-values are from binary logistic regression. *p-value significant at 90% C.I. **p-value significant at 95% C.I.***p-value significant at 99% C.I.			

Table 2: Association between overweight/obese and autism

V. CONCLUSION

In conclusion, our study sheds light on notable associations between a child's overweight/obese status and certain demographic factors. Specifically, we observed a significant correlation between age group and gender with childhood overweight/obesity. Children aged 2 to 5 years demonstrated a substantially lower risk of being overweight/obese compared to those over the age of 5 years, emphasizing the importance of early interventions. Additionally, male children exhibited a significantly lower likelihood of being overweight/obese compared to their female counterparts.

However, our findings also highlight the lack of statistically significant associations between childhood overweight/obesity and several other factors, including Autism Spectrum Disorder (ASD), place of residence, parents' occupation, mothers' education, water supply facility, and toilet facility. While these factors are undoubtedly influential in various aspects of a child's life, their non-significant relationship with overweight/obese status in our study suggests that other variables may play a more prominent role.

These results underscore the complexity of factors contributing to childhood overweight/obesity and emphasize the need for nuanced and multifaceted approaches in addressing this public health concern. Further research is warranted to explore additional determinants and to develop comprehensive strategies for prevention and intervention tailored to the diverse needs of children in different demographic groups. Our findings contribute valuable insights to the ongoing discourse on childhood obesity and provide a foundation for future investigations in this critical area of public health.

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