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Correlation Between Obesity and Blood Groups in Indian School Going Children

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ABSTRACT
Obesity serves as a notable risk factor for various health conditions such as hypertension, diabetes, gallbladder diseases, coronary heart diseases and certain cancers. Assessing body mass index (BMI) stands as an economical and straightforward approach to categorize individuals into weight classifications. Limited research has addressed the potential relationship between BMI and blood group among school-aged children. Hence, this study aimed at investigating the correlation between BMI and blood groups among school going children. This cross-sectional study involved 145 school children aged between 10-15 years, enrolled at a private school in Central India. A structured questionnaire encompassing sections on demographics, blood group, dietary habits and family medical history was utilized. Approximately half of the participants were either 13 or 14 years old, with a nearly equal distribution between genders. Around 70% of the participants were classified as underweight, while approximately 15% fell into the overweight category. Notably, children with blood group "A" exhibited a higher prevalence of overweight status, whereas no child with blood group "O" was identified as overweight. This association was statistically significant. The majority of participants were underweight, contrasting with a minority categorized as overweight. Notably, children with blood group "A" were more likely to be overweight, while none with blood group "O" were found in the overweight category.

INTRODUCTION

Obesity constitutes a notable risk factor for the onset of hypertension, diabetes, gallbladder diseases, coronary heart diseases and certain types of cancers, notably hormone-related and large colon cancers. Furthermore, individuals afflicted with obesity encounter various morbidities such as varicose veins, abdominal hernia, osteoarthritis affecting the knee, hip, and lumbar spine, as well as psychological stress during formative schooling years. Obesity also correlates with diminished fertility and heightened surgical risks. A significant portion, around one-third, of obese individuals have grappled with obesity since childhood. The prevalence of overweight and obesity has seen a stark increase in both adults and children over the years. Between 1975 and 2016, the global prevalence of overweight or obese children and adolescents aged 5-19 years surged more than four-fold, from 4-18%[1-4]. To mitigate the health ramifications of obesity in adulthood, it becomes imperative to maintain a healthy weight during childhood. The Body Mass Index (BMI) serves as a cost-effective and straightforward screening tool to classify weight status into categories such as underweight, healthy weight, overweight and obesity. Obesity manifests as a multifaceted phenotype influenced by genetic factors, encompassing polygenic and major gene effects. Consequently, obesity often manifests within families, with obese children frequently having obese parents [5,6]. While limited studies have explored the relationship between BMI and blood groups among school-going children[4,7-9], our study endeavors to swiftly identify children with specific blood groups commonly associated with higher BMI (in the overweight category). Such early identification enables the implementation of preventive measures during childhood, which could prove instrumental in curbing obesity in adulthood.

MATERIALS AND METHODS

This investigation utilized a cross-sectional observational design. A purposive sampling method was employed for participant selection. A total of 145 participants were included in this study. The study was conducted at a private school in central India. Participants were children aged between 10-15 years, enrolled in grades 5th-9th at the study center, who were aware of their blood groups and provided informed written consent. Students who did not meet the inclusion criteria were excluded from the study. A pretested semi-structured questionnaire was used. This questionnaire covered demographic details, blood group, dietary history and family medical history (including diabetes and hypertension). Informed written consent was obtained from the school authorities for eligible participants before data collection, which included anthropometric measurements such as height and weight. The authors conducted personal interviews to fill out the questionnaires and performed anthropometric measurements using standardized equipments. BMI calculations were based on weight (in kilograms) and height (in centimeters) using the BMI quick assessment tool for boys and girls aged 8-18 years. Data were entered into MS Excel, tabulated and statistically analyzed using MedCalc software. Descriptive statistics were used to determine frequencies and percentages. Qualitative data were subjected to Chi-square tests and other relevant analyses to identify associations between BMI and different variables. A significance level of $p<0.05$ was considered statistically significant.

RESULTS AND DISCUSSIONS

(Table 1) presents that approximately 50% of the participants were aged either 13 or 14 years old, with an almost equal representation of both sexes. In (Table 2), the most prevalent blood group among participants was Blood group B, comprising around 40% of the total, followed by Blood group A. The least common blood group observed among participants was Blood group AB. Additionally, approximately 71% of participants were classified as underweight, while about 15% were categorized as overweight. (Table 3) demonstrates that there is no statistically significant association between the participants' BMI categories and their sex. Similarly, there is no significant association observed between different age groups of participants and their BMI categories. However, there is a statistically significant association between blood group and BMI category. The overweight BMI category was most frequently observed in children with Blood group A, whereas it was less common in children with Blood groups AB and B. Notably, no child with Blood group O was found to be in the "Overweight" BMI category.

Our study comprised approximately 50% of participants aged either 13 or 14 years, with 45% falling within the 10-12 years age group. Thus, roughly 95% of the participants belonged to the 10-14 years age bracket. Krishnakanth *et al*.[8] conducted a similar study, encompassing participants solely from the 11-14 years age group. Another study by Chuemere *et al*.[7] involved 1650 students aged 7-21 years, with a mean age of 14 years; male and female students were almost equally represented. In our study, approximately 64% were boys, while 36% were girls, as reported by Krishnakanth *et al*.[8]. Regarding blood groups, the most prevalent among our participants was "Blood group B" (approximately 40%), followed by "Blood group A" (25%). Approximately 20% had "Blood group O," while the least common was "Blood group AB" (16%). In contrast, Chuemere *et al*.[7] found "Blood group O" to be the most common (around 65%), followed by "Blood group A" (18.3%). "Blood group B" accounted

Table 1: Demographic variables of participants

Variable	n	percentage
Age in years		
10	25	17.24
11	16	11.03
12	23	15.86
13	34	23.45
14	40	27.59
15	7	4.83
Gender		0.00
Girls	72	49.66
Boys	73	50.34

Table 2: BMI and Blood group wise distribution of participants

Variable	n	percentage
BMI (kg/m^2)		
Underweight	103	71.03
Normal	20	13.79
Overweight	22	15.17
Blood groups		
A	36	24.83
B	57	39.31
AB	23	15.86
O	29	20.00

Table 3: Association of +BMI and different parameters

Sub group	Underweight	Normal	Overweight	p-value
Age				
10–12 years	44	10	10	0.88
13–15 years	60	10	11	
Gender				
Girls	50	9	13	0.65
Boys	53	11	9	
Blood Group				
A	4	12	20	<0.05
B	19	37	1	
AB	4	18	1	
O	16	13	0	

for 12.5% and "Blood group AB" was the least common at 4.3%. Despite differences in proportions, all studies noted "Blood group AB" as the least prevalent. In terms of BMI categories, our study observed proportions of underweight, normal weight, and overweight children as 70%, 14% and 15%, respectively. Krishnakanth *et al*.[8] reported proportions of 41%, 43% and 16% for underweight, normal weight, and overweight children, respectively. Similarly, Chuemere *et al*.[7] found proportions of 23.5%, 64.5% and 12% for underweight, normal weight, and overweight children, respectively. Notably, the prevalence of under nutrition among Indian children ranged between 40% and 70%, significantly higher than in Nigeria (23.5%). All studies highlighted a similar prevalence range of overweight children (12-16%) in both India and other countries[10-14]. Our study identified a statistically significant association between blood group and BMI category, with "Blood group A" correlating most strongly with the overweight category. Krishnakanth *et al*.[8] and Chuemere *et al*.[7] also observed associations but did not conduct statistical significance tests. Larger, multi-centric studies are warranted to validate and explore these associations further, minimizing biases due to sample size or ethnic differences.

CONCLUSION

Half of the participants were aged either 13 or 14 years old, with an almost equal proportion of participants of both sexes. Approximately 70% of the participants were classified as underweight, while around 15% were categorized as overweight. There was a statistically significant association between blood group and BMI category. The overweight BMI category is most commonly observed in children with blood group A. Notably, no child with blood group O was found to be overweight.

REFERENCES

1. WHO., 2001. Obesity.
2. Park, K., 2019. Preventive medicine in obstet, pediatrics and geriatrics.
3. Jung, R.T., 1997. Obesity as a disease. Br. Med. Bull., 53: 307-321.
4. Bamania, S., H. Banker, N. Patel and S. Menat, 2023. A study on assessment of correlation between obesity and blood groups among school children of gujarat, India. Nat. J. Physiol., Pharm. Pharmacol., 13: 1046-1049.
5. 2022. Centers for disease control and prevention. about adult BMI.
6. Suryakantha, A.H., 2014. Community Medicine with Recent Advances. 3th Edn., Jaypee Brothers Medical Pub, New Delhi, ISBN-10: 9354651259, Pages: 537.
7. Chuemere, A.,N.O.J. Olorunfemi. and J.U. Nwogu 2015. Correlation between blood group, hypertension, obesity, diabetes and combination of prehypertension and Pre-diabetes in school aged children and adolescents in port harcourt. IOSR. J. Dent. Med. Sci., 14: 83-89.
8. Krishnakanth, GVS,U.P. and Lad, 2012. Correlation between obesity ABO blood group in school going children in india. Indian. J. Basic App. Med. Res., 1: 280-284.
9. Qunq, Y.,A.A.Z. and A. Hamid, 2012. Abo blood group associations with obesity in random samples from advanced medical and dental institute staff and students. Bio. Sci. Bull., 4: 18-23.
10. Singh, D.P., A. Arya, K.K. Kondepudi, M. Bishnoi and R.K. Boparai, 2020. Prevalence and associated factors of overweight/obesity among school going children in chandigarh, India. Child. Care. Health. Dev., 46: 571-575.
11. Otitoola, O.,W. and Oldewage-Theron, 2021. Prevalence of overweight and obesity among selected schoolchildren and adolescents in cofimvaba, south africa. South. Africa. J. Clin. Nutr., 34: 97-102.

12. Abdelkarim, O., A. Ammar, K. Trabelsi, H. Cthourou and D. Jekauc *et al.* 2019. Prevalence of underweight and overweight and its association with physical fitness in Egyptian schoolchildren. Int. J. Environ. Res . Pub. Health., Vol. 17 .10.3390/ijerph17010075.
13. Al Shaikh, A., F. Farahat, B. Abaalkhail and I. Kaddam, 2020. Prevalence of obesity and overweight among school-aged children in Saudi Arabia and Its association with vitamin D status. Acta. Biomed., Vol. 91.
14. Bygdell, M., J. Célind, L. Lilja, J. Martikainen and L. Simonson *et al.* 2021. Prevalence of overweight and obesity from 5 to 19 years of age in Bgothenburg, sweden. Acta. Paediatr., 110: 3349-3355.