A Comparison of Intelligence Quotient between Primary School-Aged Children with and without Bronchial Asthma

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Original Research Article

ABSTRACT

Aims: The aim of this study is to compare the IQ of children with asthma with that of children without.
Place and Duration of Study: Sample: Asthma clinic of the University of Nigeria Teaching Hospital Ituku/Ozalla, Enugu State and the schools attended by the children with asthma within Enugu metropolis.
Methodology: One hundred and twenty children with asthma aged 5 – 11 years were consecutively recruited at the asthma clinic of UNTH Enugu and their age-, sec and socio-economic class-matched normal classmates were enrolled as controls. The IQ of children with asthma attending asthma clinic of the University of Nigeria teaching hospital (UNTH) Ituku/Ozalla, Enugu State Nigeria was determined using the Draw-A-Person- test. Their IQ was compared with that of the 120 controls.
Results: The mean IQ of the subjects (123.28 ± 21.45) was similar to that of the controls (118.41 ± 19.87; *p* = .07). Mean DAPQ was found to decline with increasing age in both the subjects and controls (r = -0.377, *p* < .001) and controls (r = -0.492, *p* < .001).
Conclusion: The intelligence quotient of primary school-aged children with asthma does not differ from those of their colleagues without asthma.

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ABBREVIATIONS

C-ACT: Childhood Asthma Control Test
DAPA : Draw-A-Person-Age
DAPP : Draw-A-Person-Point
DAPQ : Draw- A – Person Quotient
IQ   : Intelligence Quotient
SCA   : Sickle Cell Anaemia
WISC : Wechsler Intelligent Scale for Children

1. INTRODUCTION

Asthma is one of the most common chronic illnesses among children, affecting over six million children globally [1] children with asthma, similar to those with other chronic illnesses, are at the intersect of health and education systems and are expected to compete with non-asthmatic counterparts in the same classroom under the same learning conditions [2]. At school, their health needs may be attended to by a school nurse, while their educational needs may be overlooked or under-estimated [3].

Intelligence, measured as the Intelligence Quotient (IQ), is one of the important prognostic variables in the academic performance of a child [4] and many factors including chronic diseases may impact upon it [5]. IQ scores, as has been suggested may be an appropriate guide in the proper placement of school children at the beginning of their education [6] Children with borderline intelligence (IQ 68-83) or mental sub-normality, irrespective of the etiology, are known to present with poor school performance [7]. Studies [8,9] on children with Sickle Cell Anaemia (SCA) have reported a significant correlation between IQ and academic performance. Chodorkoff and Whitten [8] in their study among children with SCA, found a significant correlation between IQ and school grade level placement. Swift and colleagues [9] also reported academic achievement to be commensurate with measured intellectual ability in children with SCA.

Most of the studies [10,11,12] on asthma and academic performance in children with asthma have been in developed countries and despite the high prevalence of asthma among Nigerian school children [13,14] only a limited number of studies have investigated the IQ score of children with asthma. Javad et al. [5] in a comparative study of the overall IQ scores of asthmatics and healthy children found that there were no significant differences in their overall scores as well as in the scores of males compared to females. Daramola et al. [15] *also* found no significant difference in IQ between atopic and non-atopic children. A similar study on IQ [16] among primary school –aged children with SCA did not reveal any significant difference in the intelligence scores between them and their normal controls.

This study was therefore done to determine the IQ of children with asthma and compare with those of children without asthma. The results are expected to contribute to the development of school health programs for children with asthma in Nigeria.

2. MATERIALS AND METHODS

2.1 Study Design

This was a cross-sectional, hospital- and school-based descriptive study.

2.2 Study Area

The study was carried out at the University of Nigeria Teaching Hospital (UNTH), Ituku/Ozalla, Enugu State, Nigeria. Enugu is the capital of Enugu State. Its suburbs include Ituku and Ozalla communities which are about 20 km from the town and are the host communities to the hospital.

2.3 Study Site

The University of Nigeria Teaching Hospital Ituku/Ozalla, Enugu State and primary schools attended by the participants within Enugu metropolis; were the sites for the study.

2.4 Study Population

The study population comprised of school children with asthma (subjects). The control population (children without asthma) was their healthy classmates. The choice of classmates as controls was informed by the need to remove school-related bias and to control for class grade as suggested by Richard and Burlew [17].

2.5 Sample Size

The total number of children with a diagnosis of asthma enrolled into the study was 120. Their age-, sex- and social class-matched controls

were also 120. The total number of study participants therefore was 240.

2.5.1 Inclusion criteria

1. Children aged 5-11 years, attending primary school in Enugu metropolis.
2. Asthma diagnosed by a doctor [18,19].
3. Attendance in the same school for at least one session before study enrolment.
4. Attendance at the asthma clinic for at least 12 months.
5. Consent for the study given by care-giver.

2.5.2 Exclusion criteria

1. Out of school children.
2. Age less than five years or more than eleven years of.
3. Children with other chronic diseases such as sickle cell disease, diabetes mellitus, tuberculosis, congenital heart diseases or with history of neurologic illness like seizure disorders and cerebral palsy.
4. Children attending school outside Enugu metropolis.
5. Attendance of the present primary school for less than one session before enrolment.
6. Refusal of consent by care-giver.
7. Asthmatic children with incomplete data, since some of the information were obtained from the case notes.

2.5.3 Control group

The child next to the asthma patient in the class register was selected as control if he/she met the following criteria:

1. Of same sex, age (within 6 months) and socio-economic class as the child with asthma.
2. Has been in the same primary school and class as the asthmatic child for at least one session before study enrolment.
3. Does not have any of the exclusion criteria as listed for the subjects.

If the next child to the asthmatic in the class register did not meet the criteria, the most suitable child without asthma down the register who meets the criteria was chosen as control.

2.5.4 Selection and evaluation of the subjects

The study was carried out in two phases. Firstly the subjects were enrolled from the clinic while their corresponding controls were enrolled from the schools of the selected Subjects. The subjects and controls were matched for age, sex and socio-economic class.

2.5.5 At the asthma clinic

On presentation at the clinic, the caregiver and the child with asthma were informed of the study and written informed consent obtained from the caregiver. Before enrollment, in order to ascertain eligibility, the asthmatic child's socio-demographic data was obtained and the child subsequently assessed clinically for chronic and debilitating medical conditions such as heart disease, seizure disorders and cerebral palsy that are known to affect academic performance independently [20]. The information obtained was recorded in the questionnaire.

Children who meet the inclusion criteria were enrolled consecutively till the sample size was reached while those excluded were scheduled for consultation. The socio-economic status of the Subjects was determined using the occupation and educational attainment of their parents/caregivers as described by Oyedeji [21]. Their socio-economic class was obtained by finding the mean score for the parents' educational attainment and occupation rounded off to the nearest whole number. Where any of the parents were dead, the social class of the child was assessed using the educational attainment and occupation of the living parent. Socio-economic class I represent the highest socio-economic class and class V, the lowest.

The level of asthma control was ascertained using the Childhood Asthma Control Test (C-ACT) [22]. The C-ACT ^{TM} tool for children 4 to 11 years which is made up of seven questions has a total score of 27 as the highest score obtainable. Each child, as much as possible, was allowed to answer the first four questions unaided while the care-giver answered the remaining three. A score of 19 and below signified poor control while scores above 19 indicate good control [23,24].

The subjects were then given a sheet of paper and pencil and left alone with as much time as they needed with the instruction to draw a person [25,26]. Intelligence Quotient (IQ) was assessed using the Draw-A-Person Test (DAPT) [25]. The IQ of the subjects was calculated using the validated Ziler criteria and the table of DAPQ by Ebigbo and Izuora [25]. The total number of

points scored is the Draw a Person Point (DAPP). DAPQ = DAPA/ Chronologic Age, where DAPA = (DAPP+ 3) / 4. The DAPQ score obtained was compared with the expected DAPQ score for age and sex using the table for average DAPQ scores by Ebigbo and Izuora [25]. A score less than 75% of expected DAPQ for sex and age were regarded as mental dullness or backwardness.

The child with asthma was subsequently reviewed, complaints attended to and future clinic appointment given. However, children with acute exacerbation of asthma were first managed in the Children Emergency Room of UNTH before evaluation for the study.

2.5.6 In the schools

The clearance letter from the Ministry of Education was used to obtain permission for the study at the various schools. At the school/class of each enrolled asthmatic child, the head/class teacher was informed of the study so as to gain access to the child with asthma and also to enroll the child without asthma. The need to obtain the information with regards to the children's school performance was explained to the school teacher.

With the help of the class teacher, the non-asthmatic child, next to the Subject in the class register, who was of the same age and sex as the child with asthma was selected as Control. The child was then informed of the study and given the consent form for the caregiver to fill. The consent form was retrieved on a subsequent visit to the school. The non-asthmatic child whose caregivers gave consent was then interviewed for eligibility for the study and the socio-economic status determined as described for the subjects. The selected control was then enrolled and the questionnaire administered.

The control was also given a sheet of paper and pencil and left alone with as much time as needed with the instruction to draw a person and was scored using the validated Ziler criteria by Ebigbo and Izuora. Any information not properly filled out or missing on the questionnaire was requested for directly from the caregiver through personal and or phone contacts.

Information obtained from the participants was recorded in the questionnaire and subsequently transferred to the data editor of Statistical Package for Social Sciences (SPSS) software for Windows® version 19.0 (IBM Inc Chicago Illinois USA, 2011) for analysis. Descriptive statistics such as mean ± (SD) and median were obtained for continuous variables while categorical variables were summarized using frequencies and percentages. The comparison of the means of IQ which was normally distributed was done using Student's t-test and ANOVA while other variables that were not normally distributed such as the Socio-Economic Class were compared using the Mann-Whitney U test. The significance of the association between categorical variables was determined using chi-square. Tests of relationships were also done using Pearson and Spearman's rho correlation and where appropriate multiple linear regression analysis. All the tests were taken as significant at $p < .05$. Results are presented in tables and prose.

3. RESULTS

A total of 240 children comprising 120 subjects and 120 controls were enrolled in the study. They were selected from 105 primary schools within Enugu metropolis. Of the 105 primary schools, 60 were public schools from where 77 subjects and controls each were enrolled while 45 were private schools from where 43 subjects and controls were enrolled.

There were 81 (67.5%) males and 39 (32.5%) females (male: female ratio 2.1:1) in each group. The age range was 5 to 11 years and the overall mean age ± SD was 8.20 ± 1.92 years. Sixty-nine (57.5%) of the 120 subjects and controls were in early primary school age (5-8 years) while fifty-one (42.5%) were in late primary school age (9–11 years). Out of the 69 subjects and controls in early school age, 45 (65.2%) were male and 24 (34.8%) females while 36 (70.6%) of the 51 subjects and controls in late school age were male and 15 (29.4%) females (χ^2 = 0.39; $p < .54$). The mean age ± SD for males and females was 8.07±1.73 and 8.47±2.26 years, respectively.

Thirty (25%) of the subjects were from socio-economic class I and sixty (50%) from socio-economic class II while only twelve (10%) were from socio-economic class III and eighteen (15%) from class IV. No subject or control studied was from socio-economic class V.

Thirty out of the 120 subjects (25%) had poor asthma control while 90 (75%) had good asthma control.

The mean IQ scores for subjects and controls were 123.28 ± 21.45 and 118.41 ± 19.87, respectively. There was no statistically significant difference in overall mean DAPQ between the subjects and controls (t = 1.82, p = .07) and in mean DAPQ of male pupils (t = 0.05, p = .96). Female subjects however had a higher mean DAPQ than female controls. The difference was highly statistically significant (t = 3.52, p = .001) (Table 1).

There were statistically significant differences between the subjects and controls in all the age groups except at 8 and 9 years of age. Mean IQ was found to differ significantly across the ages in both subjects (F = 7.46, p < .00) and controls (F = 14.41, p < .00) (Table 2). There was also a significant but negative correlation (Pearson's) between age and mean DAPQ in both the subjects and controls (r = -0.377, p < .00; r = -0.492, p < .00) respectively.

The mean ± SD DAPQ scores for children with poor asthma control was 122.91 ± 18.54 while that of children with good asthma control was 123.41 ± 22.54. The difference was not statistically significant (p = 0.215).

4. DISCUSSION

In this study the intelligence scores of children with asthma was comparable with that of age-, sex- and socio-economic class- matched controls. The finding of a male preponderance among the subjects is consistent with the reports from previous studies [13,27,28] that noted that males are more affected by asthma before puberty. The reason suggested was the smaller lung size in males in childhood which however becomes larger in adulthood [13]. The male preponderance may also reflect preferential treatment, even in health matters, given to male children in our environment [29]. The subjects in this study were recruited from the hospital.

Majority of the subjects belonged to socio-economic classes I and II and none of the subjects were in socio-economic class V. This is in keeping with earlier reports [30,31] that noted asthma to be one of the few diseases that are more common in the higher socio-economic classes. The reason could be due to life style encounters like early use of formula feeds, canned foods with additives and other social factors that are more common among people of higher socio-economic class compared to those in the lower socio-economic classes and can predispose to airway hypersensitivity. It could also indicate that more parents in the socio-economic classes I and II, compared to those in the socio-economic classes III and IV, avail themselves of the specialized services offered by the teaching hospital [29].

Table 1. Mean ± SD overall and gender-related DAPQ scores of subjects and control

Status	DAPQ Scores		t-value	P – value
	Subjects (n = 120) Mean ± SD	controls (n = 120) Mean ± SD		
Overall	123.28 ± 21.45	118.41 ± 19.87	1.826	.07
Males	119.18 ± 21.24	119.33 ± 20.37	0.047	.96
Females	131.80 ± 19.52	116.49 ± 18.89	3.521	.00
t-value	3.128	0.734		
p – value	.00	0.46		

Table 2. Age specific comparison of mean DAPQ scores of subjects and controls

Age (years)	N	Subjects Mean ± SD	Controls Mean ± SD	T	p-value
5	18	146.15 ± 30.24	127.21 ± 24.89	2.052	.048
6	3	123.67 ± 0.15	120.60 ± 0.54	9.451	.00
7	18	125.95 ± 12.93	140.02 ± 14.37	3.087	.00
8	30	122.46 ± 19.03	122.59 ± 13.56	0.030	.97
9	24	108.16 ± 13.09	104.24 ± 10.07	1.164	.25
10	3	110.87 ± 0.64	122.54 ± 0.19	30.418	< .00
11	24	121.72 ± 16.66	103.75 ± 14.60	3.973	< 0.00
F- value		7.461	14.416		
P value		< .00	< .00		

All the children in this study had IQs within the normal range for age and sex and there was no difference in IQ between subjects and controls. This is consistent with the findings of Daramola and colleagues [15] at Ibadan, Nigeria as well as Javad et al. [5] in Iran. While this study used the DAPT to assess IQ, Javad used WISC, and Daramola used the Standard Progressive Matrices (SPM). The similarity in the findings from the studies by Javad et al. [5] and Daramola et al. [15] with that of this study despite use of different IQ assessment tools and having been done in three different areas aligns with a report of high correlation between DAPT and other IQ assessment tests [25] .

There was no difference in mean IQ between male subjects and controls however; female subjects had a significantly higher mean IQ compared to their controls. While Javad et al. [5] in his study reported that there was no significant difference in mean IQ in relation to gender, Daramola and colleagues [15], whose work was done in Nigeria as was this study, did not explore gender difference with respect to mean IQ score. The reason for the significantly higher IQ among female subjects compared to female controls is unknown. In addition there was no significant difference in the IQ of children with poor asthma control compared with those with good asthma control. The reason is unclear however the relatively fewer numbers of children with poor asthma control compared to those with good asthma control in this study may have contributed to this finding.

There was a decline in mean IQ scores with increasing age in both the subjects and controls. Although decline in IQ is known to occur over time as people age, such declines were mostly noted to occur at an older age compared to what was found in this study. Such early onset of decline in IQ has been reported in children with disease conditions such as childhood diabetes [32] and obesity [33]. However, Ezenwosu et al. [29] in their study of academic performance of children with sickle cell disease aged 5-11 years also noted a similar trend of early decline in IQ in both children with SCA and their Controls. They suggested that it was due to presence of silent cerebral infarcts that progressed over the years and this has been implicated in cognitive impairment in children with SCA [29]. However, they could not explain the paradox of similar trend of declining IQ with age among the controls. This trend of early decline in mean IQ in both subjects and controls however, may be related to the use of the DAPT and study environment, which are common to this study and that of Ezenwosu et al. [29] This decline in IQ noted in these studies [32,33] that used WISC were said to be based on the properties of WISC test and the changes in the test over various ages. In the WISC, at the early childhood level, there are many items such as single word vocabulary and visual matching tasks. By middle childhood, more abstract thinking and symbolic language are required, and wordings of questions are more complex. While the DAPT is said to demonstrate a high correlation with the WISC tests, [25] some other reports differ by rather demonstrating a low correlation between WISC and DAPT [34], no relationship between human figure drawings and IQ [35], and suggesting that the DAPT should not be used as a substitute for other well- established intelligent tests like the WISC [34,35]. However, the WISC has not been validated for use in our environment and most of the studies so far on IQ done in our environment used the DAPT to assess IQ [29,36].

5. CONCLUSION

The intelligence quotient of primary school-aged children with asthma does not differ from those of their colleagues without asthma.

CONSENT

On presentation at the clinic, the caregiver and the child with asthma were informed of the study and written informed consent obtained from the caregiver.

ETHICAL APPROVAL

Received from Health Research Ethics Committee of UNTH Ituku/Ozalla, Enugu State, Nigeria.

AVAILABILITY OF DATA AND MATERIAL

The datasets used and or analyzed during the current study are available from the corresponding author on reasonable request.

DECLARATION

This is a dissertation research work with different parts some of which has same methodology with this current manuscript. One is already published and two are currently being reviewed for publication by other journals.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Masoli M, Fabian D, Holt S, Beasly R. The global burden of asthma: Executive summary of the GINA Dissemination Committee report. Allergy. 2004;59:469-478.
2. Bateman ED, Hurd SS, Barnes PJ, Bousquet J, Drazen JM, FitzGerald M, et al. Global strategy for asthma management and prevention: GINA executive summary. Eur Respir J. 2008;31:143-178.
3. Thies KM. Identifying the educational implications of chronic illness in school children. J Sch Health. 1999;69:392–397.
4. Karadel S, Kulkarni M. Poor school performance. Ind J Pediatr. 2005;72:961-967.
5. Javad G, Ali A, Masume J. IQ scores of children with moderate asthma: A comparison with healthy children. Oman Med J. 2014;29:71-74.
6. Day S, Chismark E. The cognitive and academic impact of sickle cell disease. J Sch Nurs. 2006;22:330-335.
7. Alikor EAD. Common growth and development problems. In: Azubike JC, Nkanginieme KEO, (Editors). Paeditrics and Child Health in a Tropical Region 2nd ed. Owerri: African Educational Series. 2007;70-82.
8. Chodorkoff J, Whitten CF. Intellectual status of children with sickle cell anemia. J Pediatr. 1963;63:29-35.
9. Swift AV, Cohen MJ, Hynd GW, Wisenbaker JM, Mckie KM, Makari G, et al. Neuropsychologic impairment in children with sickle cell anemia. Pediatrics. 1989;84:1077-1085.
10. Moonie S, Sterling DA, Figgs LW, Castro M. The relationship between school absence, academic performance, and asthma status. J Sch Health. 2008;78:140-148.
11. Krenitsky-Korn S. High school students with asthma: Attitudes about school health, absenteeism, and its impact on academic achievement. Paediatr Nurs. 2011;37:61-68.
12. Lindgren S, Lokshin B, Stromouist A, Weinberger M, Nassif E, McCubbin M, et al. Does asthma or treatment with theophylline limit children's academic performance? N Engl J Med. 1992;327:926-930.
13. Falade AG, Olawuyi F, Osinusi K, Onadeko BO. Prevalence and severity of symptoms of asthma, allergic rhino-conjunctivitis and atopic eczema in secondary school children in Ibadan, Nigeria. East Afr Med J. 1998;75:695-698.
14. Okoromah NC. A study of bronchial asthma among primary school children in Enugu urban area. Part 2 Fellowship Dissertation, National Postgraduate Medical College of Nigeria; 1995.
15. Daramola OO, Ayoola OO, Ogunbiyi AO. The comparison of intelligence quotient of atopic and non-atopic children in Ibadan Nigeria. Ind J Dermatol. 2010;55:221-224.
16. Ezenwosu O, Emodi I, Ikefuna A, Chukwu B. Academic performance and intelligence scores of primary school-aged children with sickle cell anaemia. Pediatr Hematol Oncol. 2013;30(8):733-41.
17. Richard HIN, Burlew KA. Academic performance among children with sickle cell disease: Setting minimum standards for comparism groups. Psychol Rep. 1997;81:27–34.
18. Dolan CM, Frasher KE, Bleecher ER. Design and baseline characteristics of the epidemiology and natural history of asthma: Outcomes and treatment regimens (TENOR) study. Ann Allergy Immunol. 2004;92:32-39.
19. Patel PH, Welsh C, Foggs MB. Improved asthma outcomes using a coordinated care approach in a large medical group. Dis Manag. 2004;7:102-111.
20. Perrin JM. Chronic illness in children. In: Kliegman RM, Arvin AM (Eds), Nelson's Textbook of Paediatrics, 15th Ed. W.B Saunders Co. 1996;124-127.
21. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesha. Nig J Paediatr. 1985;12:111-117.
22. Nathan RA, Sorkness CA, Kosinki M, Schat M, Li JT, Marcus P, Murray JJ, Pendergraft TB. Development of the asthma control test- A survey for assessing asthma control. J Allergy Clin Immunol. 2004;113:59-65.
23. Rimington LD, Davies DH, Lowe D, Person MG. Relationship between anxiety, depression and morbidity in adult asthma patients. Thorax. 2001;56:266-271.
24. Schatz M, Sorkness CA, Li JT, Marcus P, Murray JJ, Nathan RA, et al. Asthma

control test reliability, validity and responsiveness in patients not previously followed by asthma specialist. J Allergy Clin Immunol. 2006;117:549-556.

25. Ebigbo PO, Izuora GI. Draw a person test – standardization, validation and guidelines for use in Nigeria. Enugu: Chuka Printing Company Ltd. 1981;7-32.

26. William TO, Fall A, Eaves RC, Woods-Groves S. The reliability of scores for the Draw-A-Person intellectual ability test for children, adolescents and adults. J Psycoeduc Assess. 2006;24:137-144.

27. Fajt ML, Wenzel SE. Asthma phenotypes in adults and clinical implications. Expert Rev Respir Med. 2009;3:607-625.

28. Detjen P. Allergic bronchopulmonary aspergillosis. In: Lynch JP, Editor. Immunologically Mediated Pulmonary Disease. USA: Lippincott Co. 1991:399-412.

29. Ezenwosu OU, Emodi IJ, Ikefuna AN, Chukwu BF, Osuorah CO. Determinants of academic performance in children with sickle cell anemia. BMC Paediatr. 2013;13: 189-197.

30. Liu AH, Covar RA, Spahn JD, Leung DYM. Childhood asthma. In: Kliegman RM, Berhman RE, Jenson HB, Stanton BF. Nelson Textbook of Pediatrics, 18th Edition. Saunders Elsevier. 2007;143.

31. Littlejohns P, Macdonald LD. The relationship between severe asthma and social class. Respir Med. 1993;87:139-143.

32. Lin A, Northam EA, Werther GA, Cameron FJ. Risk factors for decline in IQ in youth with type I Diabetes Mellitus over the 12 years from diagnosis and illness onset. Diabetes Care. 2014;14:1385.

33. Belsky DW, Caspi A, Goldman-Mellor S, Meier MH, Ramrakha S, Poulton R, Moffitt TE. Is obesity associated with a decline in intelligence quotient during the first half of the life course? Am. J. Epidemiol. 2013;10: 1093.

34. Kana I, Damian S, Henry P, Harlene H. Drawing a close to the use of human figure drawings as a projective measure of intelligence. PLoS ONE. 2013;10:1317.

35. Aikman KG, Belter RW, Finch AJ Jr. Human figure drawings: Validity in assessing intellectual level and academic achievement. J Clin Psychol. 1992;48:114-120.

36. Ibekwe RC, Ojinnaka NC, Iloeje SO. Academic performance of school children with epilepsy. J Coll Med. 2008;13:18-22.

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