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Symptoms of attention deficit hyperactivity disorder (ADHD) among rural primary school children in southeastern Nigeria: comparison of school and home settings

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Abstract*: Background:* Diagnosis of ADHD depends on manifestation of symptoms in at least two different settings. This therefore emphasizes the importance of multiple informants, parents and teachers. However perception could differ because of differences and inconsistencies across different settings. This is particularly important in rural settings in Africa where the educational attainment and outlook of teachers are very different from those of the parents.
The study is aimed at comparing the presentations of children with ADHD in the rural area, across two different settings: home and school.
Methods: The teachers of 181 rural primary school children in Ogberuru in Imo state, south eastern, Nigeria completed the school version of ADHD rating scale-IV, and their parents completed a Socio demographic questionnaire and the home versions of the ADHD rating scale-IV.
Results: Of the 18 symptoms of the condition, there were significant differences in the rate of identification in eight symptoms. These symptoms include 'being easily distracted' (p=0.0427), 'difficulty following through on instruction' (p=0.0026), 'fails to give close attention to details (p=0.0001), 'avoids tasks necessary for tasks' (p=0.0013), 'difficulty playing quietly (p=0.0059), 'talks excessively' (p=0.0023), 'intrudes on others' (p=0.0004), and 'seems not to listen when spoken to directly' (p=0.0002). They were all consistently more manifest in school settings than in their homes.
Conclusion: Teachers identified ADHD symptoms more commonly than parents. They could therefore play critical roles in programs aimed at improving early identification and management of children with ADHD especially in rural Africa where healthcare facilities are scarce.

Introduction

Attention deficit hyperactivity disorder (ADHD) is a common childhood neurodevelopmental disorder with serious consequences for the patients, their families and the society[1,2]. It is associated with tremendous financial burden and impairment in multiple domains of functioning, maladaptive interpersonal interaction and low self-esteem[3,4]. As health care providers are becoming increasingly aware of the burden ADHD places on the health care system, ADHD is likely to become increasingly important in primary health care[5].

Available data suggest that ADHD is prevalent among Nigerian children. For instance, Bakare[6] in a review of African literature observed that the prevalence of ADHD among African school children range from 5.4% to 8.7%. Adewuya and Famuyiwa[7] in the Southwestern and Ambuabunos et al[8] in the South-south part of Nigeria reported prevalence of 8.7% and 7.6% respectively among children in urban school settings. In Benin City, Egbochuku and Abikwi[9] reported a prevalence of 23.15% among school children. There appear to be variation in the prevalence of ADHD among Nigerian children across the six geopolitical zones. Like most other African studies, these researchers explored the urban centers[7, 10 -13]. However, Ndukuba et al[14], reported a rate of 6.6% in a population of rural school children in Nigeria suggesting that children in rural areas are also prone to manifesting the disorder at a rate

comparable with those in the urban centers.
The diagnosis of this condition relies on the identification of the symptoms in multiple settings. In both DSM-IV (and DSM 5 the symptoms of ADHD have to be present in at least two different settings for the diagnosis to be made[15,16]. This recognizes the fact that this condition could present differently and inconsistently across different settings. The ability to recognize the symptoms of this condition in the different settings therefore could affect early diagnosis and treatment of the disorder. With reliability of child self-report before the age of nine being questionable and even when over the age of ten, they are found to report more of internalizing symptoms and underplay the externalizing ones[17]. There is therefore need to obtain information from adults who have significant contacts with the ADHD child especially as no laboratory investigation for now clearly identifies children with this condition.

Early identification and early intervention for children with this condition is of paramount importance given the serious negative consequences of this condition on the child and the family. This in turn depends on the keenness of the observation of the child's behaviour by the adults that live and interact with the child. These adults are bound to relate differently with them and often vary in their responses to the child's behaviour and thus differ in the symptoms which they observe. These differences could influence the rate at which the symptoms of this condition are identified in the different settings. It has been reported that the degree of agreement among these adult informants is far from being perfect [17] and this has serious consequences for the early identification and treatment of children with ADHD. It remains an issue when multiple informants are not available and which informant carries more weight in the identification of the ADHD symptoms. There is therefore need to evaluate the presentation of the disorder in the two major settings where most children in our environment naturally find themselves- the school and at home.

Despite the serious negative consequences of the symptoms of ADHD, very few studies have focused on the presentations of this condition in different settings especially in the rural areas where the majority of the population reside. This study aims to evaluate the presentations of this condition in two different settings – school and home- by children manifesting with symptoms of this condition in a rural setting. It is hoped that this study will contribute in understanding the presentation of this condition especially among the rural dwelling children of Africa.

Methodology

Design and setting

This study was a cross-sectional descriptive epidemiological survey that was carried out in Ogberuru, a homogenous Igbo speaking rural community in Orlu Local Government Area of Imo State in the southeastern Nigeria.

Sample

A sample size of 200 children was calculated based on a prevalence rate of 5%, allowing for 20% attrition rate. All school children in the community were eligible to be enrolled in the study but only those who were selected and whose parents consented to the study were included in the study.

Instruments

The instruments used in the study included a Socio demographic questionnaire designed by the authors to collect information such as age, gender, religion, domicile, family size, birth order, and parental educational level and the school and home versions of the ADHD rating scale-IV.

The school and home versions of ADHD Rating Scale-IV was developed by DuPaul et al [18] and has been shown to have adequate psychometric properties for use as screening, diagnostic and treatment outcome measures. It is an 18-item instrument in a 4-point Likert scale (not at all, just a little, pretty much and very much, with scores 0, 1, 2 and 3 respectively). The items of the questionnaire reflect the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV) items for the diagnosis of the condition. The authors of the instrument have developed norms for the scores. This study adopted the method of interpretation given by the authors of the manual, in which a symptom endorsed to be 'pretty much' or 'very much' present is adjudged to be present.
The instruments were pretested in 10 parents and 10 teachers who were not part of the study respondents and they were found to have well understood the items on the questionnaire. All the instruments were first, translated into Igbo language. Then, the Igbo versions were back-translated into English language by another translator who is fluent in both English and Igbo languages. The original and the back-translated English versions were then compared and were found to be similar. Both versions of the instrument demonstrated good internal consistency, with a Cronbach alpha of 0.89 for the school version and 0.88 for the home version.

Procedure

Approval for the study was obtained from the ethical committee of the Jos University Teaching Hospital. The researchers also obtained the permission of the headmasters of the schools and held two meetings with the teachers. In the first meeting, the roles of the teachers in the study were explained and their consent to participate was obtained. The teachers also practiced how to fill the questionnaire with the right information about their pupils, and clarifications were given on areas that were not very clear to them. This was done to ensure that they understood the items on the questionnaire very well in order to give the appropriate response to the questions. The school teachers well understood all the items of the

instrument. In the second meeting, the children to be enrolled into the study were selected through balloting. In this process, 'yes' or 'no' were written on small pieces of papers that were folded and pooled into an open-ended sack for them to pick from. Only those who picked the papers marked 'yes' were enrolled. Their names were taken, and copies of the school version of the ADHD Rating Scale IV were given to their teachers to complete. Letters requesting parents to come to the school with respect to the study were then distributed to the selected school children. The authors also took time to talk to the parents of the pupils who were selected and who presented for the study about the illness and the relevance and nature of the study. Their informed consent to participate in the research was obtained.

After obtaining the informed consent from the parents, they were then interviewed with the Socio demographic questionnaire, and the home version of the ADHD Rating scale-IV. The preferred version (Igbo or English) of the questionnaires were administered by ACN, who is fluent in both Igbo and English languages. Home visits were scheduled to reach those parents who did not turn up for the school visits. The parent information was adjudged to be unavailable when the parent could not be reached after three visits.

Data analysis

The data collected, which were double-checked for accuracy were analyzed using the GraphPad Prism version 5. Chi-square tests were used to test the differences between categorical variable and their associations in a cross tabulation.

Results

One hundred and eighty-one participants, who were made up of 97(53.6%) boys and 84(46.4%) girls with a mean age of 9.39 years (SD +/- 1.97), had both school and home information completed. The remaining 19 (11 boys and 8 girls) whose parents could not be reached were excluded from the analysis.

The modal age group was 6-8 years, and 42% of them fell within this age group. All but four (2.2%) of the participants lived in the community where the study was conducted. As shown in table 1, majority (86.7%) of the participants were from monogamous homes and most (65.2%) of them were living with both parents. None of the participants lived with the father alone whereas 21 (11.6%) lived with the mother.

Table 1: Family characteristics of participants

Variable	Frequency n (%)
Family type	
Monogamous	157(86.7)
Polygamous	20(11.0)
Single mother	4(2.3)
Family size	
Small (4 children and below)	26(14.4)
Large (5 children and above)	155(85.6)
Living with	
Both parents	118(65.2)
Father	-
Mother	21(11.6)
Grand parents	16(8.8)
Other arrangements (Uncles, aunts etc)	26(14.4)
Parents assessment of health of marriage	
Very poor	7(3.9)
Poor	28(15.5)
Good	74(40.9)
Very good	40(22.1)
No comment	32(17.7)

Twelve (6.6%) parents had no formal education, while 42(23.2%), 87(48.1), 31(17.1%), 9(5.0%) of the parents had primary, secondary, tertiary and other job specific forms of education respectively. One hundred and eleven (55.8%) of the mothers had at least a secondary education while 10(5.5%) of them had no form of education.

The prevalence of the individual ADHD symptoms in the two settings is as shown in table 2. In both home and school settings, the least frequently identified symptom was "seems not to listen when spoken to directly" which was identified by 9.8% of the parents. This symptom was significantly more identified at school, with 41 (22.6%) of the teachers identifying it in the children (p=0.0002).

The least identified symptom in the school setting is "loses things necessary for tasks, which was reported by 26(14.4%) of the teachers. Though more parents 34 (18.8%) identified this symptom at home, there is no significant difference in the expression of this symptom at home and in school (p=0.26).

At school, " failure to give close attention to details" was significantly more commonly identified symptom of ADHD in the children, being reported by 72(39.8%) of the teachers compared to 38(20.4%) of the parents (p=0.0001).

At home, "often being forgetful" was the most commonly identified symptom which was reported by 73 (40.4%) of the parents. There was however no significant difference between the rate of identification in the school and at home (p=0.5899).

Of the 18 symptoms of the condition, eight showed significant differences in the two settings. There was significant difference in the rate of symptom identification between the parents and the teacher in nearly half of the symptoms which included 'being easily distracted' (p=0.0427), 'difficulty following through on instruction' (p=0.0026), 'fails to give close attention to details' (p=0.0001), 'avoids tasks necessary for tasks'(p=0.0013), 'difficulty playing quietly'(p=0.0059), 'talks excessively' (p=0.0023), 'intrudes on oth-

ers' (p=0.0004), and 'seems not to listen when spoken to directly' (p=0.0002).

Five out the eight symptoms which showed difference in their identification in the two settings were from the inattentive group while three were from the hyperactive impulsive group. Of the remaining 10 symptoms which did not show any difference in the two settings, six of them were from the hyperactive impulsive group while four were from the inattentive subtype. Across all these symptoms, the teachers were more likely than parents to identify them in the children.

Table 2: Prevalence of individual ADHD symptom in school and home setting

Symptom	School setting n(%)	Home setting n(%)	P – value
Often fidgets	34(18.7)	30(16.6)	0.5816
Difficulty remaining seated	37(20.4)	25(13.8)	0.0941
Easily distracted	48(26.5)	32(17.7)	0.0427*
Difficulty awaiting turn in groups	36(19.9)	28(15.5)	0.2704
Blurts out answers	38(21.0)	25(13.8)	0.0715
Difficulty following through on instruction	59(32.5)	34(18.8)	0.0026*
Difficulty sustaining attention	42(25.4)	38(20.4)	0.6124
Fails to give close attention to details	72(39.8)	38(20.4)	0.0001*
Avoids tasks requiring sustained mental effort	60(33.2)	31(17.1)	0.0013*
Difficulty playing quietly	42(23.2)	22(12.2)	0.0059*
Talks excessively	47(25.9)	24(13.2)	0.0023*
Intrudes on others	46(25.4)	20(11.1)	0.0004*
Seems not to listen when spoken to directly	41(22.6)	15(9.8)	0.0002*
Loses things necessary for tasks	26(14.4)	34(18.8)	0.2582
On the go as if driven by a motor	35(19.4)	23(12.7)	0.0855
Often forgetful	68(37.6)	73(40.4)	0.5899
Runs about excessively	30(16.8)	19(10.5)	0.0910
Difficulty organizing tasks	58(36.0)	43(23.7)	0.2481

Discussion

Attention deficit hyperactivity disorder (ADHD) is a disorder that manifests in childhood with symptoms of hyperactivity, impulsivity, and/or inattention. The symptoms affect cognitive, academic, behavioral, emotional, and social functioning. [16] It manifests with symptoms of hyperactivity, impulsivity and/or inattention. The symptoms manifest in various settings and negatively impact many aspects of the individuals' life including academics difficulties, social skills problem and strained relationships. That both parents and teachers readily identified the symptoms of this condition in the children reflects the pervasiveness of the symptoms of this disorder.

The study however finds some variation in the presentation of the symptoms in the two settings. While most of the symptoms were more identified in the school setting, some of them tended to be more identified by the parents. This variation underscores the need for collaboration among the parents, the child, and the school staff, which has been identified as being very important in identifying appropriate target symptoms and functional outcomes and guide management of the affected children[19,20].

The finding in this study that more of the symptoms of this condition were identified by teachers could reflect the comparative advantage of the teachers over the parents in observing children with abnormal behaviours since having children of same developmental level in the class provides them with the opportunity to compare their behaviours. This most likely is in addition to the teachers being relatively more equipped than parents in identifying children with challenges by virtue of their training and experience.

The differences in the identification of the symptoms in the two settings could reflect the varying responses of the adults to the behaviours of the impaired children. The symptoms of inattention and hyperactivity negatively impact many areas of functioning including the academic activities of the impaired child, which Abikwi[21] recognized and suggested ways of helping children with such problems in the classroom setting.

The nature of the symptoms could have contributed to the variation in identifying the symptoms of ADHD in the two settings. For instance, this study finds that parents in this study tended to identify more of the children who lose things necessary for tasks and are often forgetful. The implications of the symptoms for the setting such as costs of replacing the lost items incurred by parents would make them to more readily identify this symptom. It is, therefore, likely that the implications of the symptom for the adult caregiver (parent or teacher) influences the identification of the symptoms as problems.

This study finds that most of the symptoms that showed significant differences in the two settings were from the inattentive groups of symptoms and all of them were more identified by teachers than the parents. It is likely that teachers were more likely to identify inattentive symptoms in the children because of the more enduring negative impact of these symptoms on the classroom activities, which the parents do not have the opportunity of experiencing with their impaired children. That the more disruptive and highly externalizing hyperactive-impulsive symptoms are usually obvious to most people and thus were readily identified by both parents and teachers. This could account for not having significant differences in the identification of these groups of symptoms in both settings. The preponderance of male gender in clinic based studies have been attributed to referral bias among others and the male:female prevalence ratio is found to obliterate in most community based studies. This obliteration is attributable to capturing the more inattention symptoms of the disorder in the community based studies.

Considering that girls with ADHD are reported to have more intellectual impairment and were more likely to have behavioural problems such as substance abuse and these girls were more likely to present with the more internalizing inattention symptoms.[22-24] It is obvious that the nature of symptoms manifested by children with

ADHD has serious outcome implications. This study reports inattention symptoms to be more reported in school setting. Since diagnosis of this condition depends on the report of various informants, the finding of this study suggests that serois weight should be given to the observations made at school.

Conclusion

This study highlights the significance of multiple informants in evaluating children with ADHD and the need for collaboration and communication between homes and schools in the early identification of children with this problems. With the teachers identifying ADHD symptoms more commonly than parents, they could play critical roles in programs aimed at improving early identification and management of children with ADHD especially in rural Africa where healthcare facilities are scarce.

Limitations

The results of this study cannot be generalized to the entire country or people of south-eastern Nigeria. The number of children studied is relatively small. The use of only one instrument for the assessment of ADHD in the children is also a limitation in this study. However, assessing both parents and teachers is strength of the study. The Igbo versions of the instruments that were used were not standardized, and this could affect the result of the study. Direct observation of the children's behaviour in the settings would further improve the quality of the study.

Authors' contributions
CAN and PCO conceived the study,
ACN, RCI and MNI designed the study.
CAN, RCM, JTO and OO collected the data.
ACN and RCI did the data analysis. All the authors wrote, edited and approved the final manuscript.
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