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Prevalence of Attention Deficit Hyperactivity Disorder Among School Children in the City of Ouagadougou in Burkina Faso

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***Abstract*— Context: The phases of child development are sometimes disturbed by neurodevelopmental disorders marked by inattention and hyperactivity/impulsivity. Admitted under ADHD, attention deficit hyperactivity disorder is very present in children and evolves into adulthood. In Europe, studies conducted in several countries are very well known, but ADHD remains less studied in developing countries. The present study aims to determine the prevalence value of these functional alterations in preschool children in Africa and, more precisely, in Burkina Faso. Methods: This cross-sectional study was carried out in Ouagadougou in March-April 2021. Two short versions of the Conners tests specific to teachers and parents were first used to identify suspected cases, and then the DMS-V in a second phase to determine proven cases of ADHD with a starting sample of 1616 schoolchildren. Result: A total of 375 suspected cases of ADHD designated as pathological out of a total of 1616 schoolchildren were retained after passing the Conners scale and distributed as follows: 139 cases (37.07%) identified only from the version parent, 182 cases (48.53%) identified only from the teacher version and 54 cases (14.40%) identified by both versions of the questionnaire. The clinical interview with 298 parents made it possible to estimate the proven cases of ADHD at 13.74%. A breakdown by ADHD subtypes gives 43.58% for the inattentive, 35.20% for the mixed, and 21.23% for the hyperactivity/impulsivity subtype.**

***Index Terms*— ADHD, prevalence, children, Ouagadougou.**

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INTRODUCTION

Attention deficit hyperactivity disorder, known as attention deficit hyperactivity disorder (ADHD), is a neurodevelopmental condition that impacts the lives of thousands of children around the world [1, 2]. To a recent discovery, medical prescriptions for hyperactivity only appeared at the end of the 19th century [3]. Requests for consultations in child psychiatry for attention deficit hyperactivity disorder have increased sharply in recent years [4]. The symptoms are difficult to bear for those around the child. For the ordinary class teacher, managing the manifestations of the child with ADHD or educating a restless, excited, unstable, distracted, impulsive child constitutes a considerable challenge in terms of his way of acting, thinking, and feeling, who could deviate from the usual functioning of their peers.

The manifestations of ADHD make it possible to distinguish three subtypes: the predominant attention-deficit subtype, the predominant impulsivity/hyperactivity subtype, and the predominant combined (or mixed) subtype [2]. Although common in children, ADHD is a disorder that progresses into adulthood with less marked hyperactivity but persistent inattention [5]. The factors predisposing to the development of ADHD are multidimensional and whose precise causes are notwell known. For diagnosis, several measurement scales are used to assess cases of ADHD. These include the Diagnostic and Statistical Manual of Mental Disorders (DMS), the Conners scale, and the International Classification of Diseases (ICD). The prevalence of ADHD in children and adolescents worldwide has an estimated value of 5.29% [1].

II. METHODS

Study environment and population

This study was carried out in primary schools in Ouagadougou, which has 10 Basic Education Districts (CEB). Out of 926 primary schools, 655 are in the private sector and represent 71% or 2/3 of all primary schools in the city of Ouagadougou [6]). These percentages allowed us to retain ten public schools, i.e., 1/3 and 2/3 represent the quota for private schools, i.e., 20 schools. The stratified sampling

technique was used to determine the number of private or public schools per CEB. Based on the weight of the CEB, we were able to decide on the sample size of each stratum. A deliberate choice of 60 pupils per school was made, i.e., 1800 pupils as a provisional sample.

Material: Materials and techniques used

Two tests were used to determine the prevalence of ADHD in the study population. This is the short version of the Conners scale specific to teachers and parents and the DMS-V.

Procedure

Our study took place in two stages, first an evaluation by the Conners scale and then by the DMS-V. The Conners Scale screening children identified those with a strong suspicion of ADHD. The pathological cases identified are those with an atypical score, i.e., greater than 20. Indeed, the average score being 10, scores greater than or equal to two standard deviations abovethis score, i.e., 20, were considered pathological. The pathological cases on the Conners scale were subjected to the diagnosis of the DMS-V, and those presenting a score greater than 6, following atleast one of the dimensions (Hyperactivity / Impulsivity or inattention), were considered as confirmed cases. The data observed made it possible to determine the prevalence of ADHD in the city of Ouagadougou. The descriptive analysis led to the calculation of frequencies, averages, and associated standard deviations.

RESULTS

Out of 1,800 schoolchildren expected to respond to the questionnaires, we assessed a recovery rate of 89.77%, i.e., 1,616 schoolchildren who participated in this study. According to sex and age, our sample is distributed as follows: 797 girls (49.3%) with an average age of 9.83 ± 1.88 years and 819 boys (51.7%) with an average age of 9, 64 years ±1.98 years. The first stage of identification of pathological cases by the Conners scale gave the results below according to the appreciation of parents or teachers:

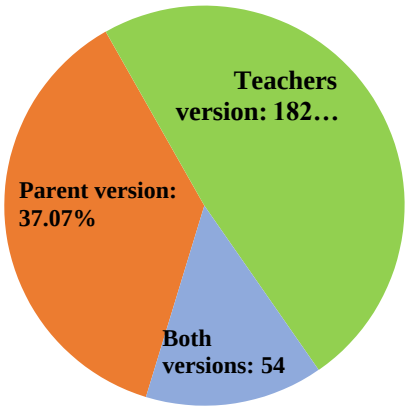

Figure 1: Distribution of pathological cases according to the version of the Conners questionnaire.

After passing on the Conners scale specific to parents and teachers, the cohort of school children retained enabled us to have 375 school children whose scores were abnormal and therefore pathological on at least one of the Conners scales. One thousand two hundred forty-one schoolchildren were not considered out of 1616, their scores being standard on both scales. The distribution of suspected cases gives 139 cases (37.07%) identified only from the parent version, 182 cases (48.53%) identified only from the teacher version, and 54 cases (14.40%) identified byboth versions of the questionnaire simultaneously. The clinical evaluation of the pathological cases by referring to the criteria of the DSM-V allowedus to make a nosographic diagnosis for 298 schoolchildren out of 375, for whom 176 obtained an abnormal score and therefore declared cases of ADHD. Table 2 presents the data according to the subtypes of ADHD according to gender.

Table II: Distribution of students according to the forms of ADHD

	Feminine		Masculine		Total	
	n	(%)	n	(%)	n	(%)
Inattentive	39	(57,35)	39	(35,14)	78	(43,58)
Hyperactivity Impulsivity	12	(17,65)	26	(23,42)	38	(21,23)
Mixed	17	(25,00)	46	(41,44)	63	(35,29)
Total	68	(100,00)	111	(100,00)	179	(100,00)

The application of the DMS-V revealed 179 cases of ADHD, i.e. 68 girls (37.99%) and 111 boys (62.01%). According to a breakdown according to ADHD subtypes without any consideration according to sex, 78 cases (43.58%) were identified as inattentive, 38 cases (21.23%) as impulsive hyperactive and 63 cases (35.20%) of mixed form. The prevalence of ADHD is estimated at 13.74%. The different results are summarized according to the diagram below.

III. DISCUSSION

Prevalence and variability of ADHD

This study aimed to determine the prevalence of ADHD in Burkinabe schools. It is a cross- sectional study with a starting population of 1616 schoolchildren whose average age is 9.73 ± 1.93. The results of this study give an estimate of the prevalence at 13.74%. Several epidemiological studies have been conducted worldwide to determine the frequency of attention deficit hyperactivity disorder in a population. According to the DSM-IV, it is widespread in school-age children, with an estimated prevalence of 3 to 7% [2][7]. Comparing some results of studies carried out in black Africa shows that this prevalence is among the highest rates on the continent and even worldwide (5.29%) [1]. In Kinshasa in the Democratic Republic of Congo (DRC), a study of six to nine-year-old schoolchildren gives an estimated prevalence of ADHD symptoms according to the DSM-IV at 6% [8]. In Nigeria, the majority is

established at 8% within a population with an average age of 8.78 ± 1.96[9]. However, the prevalence found by our results is lower than that of Kenya, which is around 23.7% in an older student population [10]. The majority of ADHD observed in Ouagadougou is close to the results obtained in the Maghreb countries. In Egypt, in the city of Mansoura to the east of the Nile delta, a study indicates a prevalence of 12.60% among primary school children [11]. Another cross- sectional study in schools in the Sfax region in Tunisia gives an ADHD prevalence of 9.94% [12]. The literature is vibrant on studies on the estimation of the prevalence of ADHD in different countries of the world. In the United States, 2.4 million children aged 8 to 15 suffer from ADHD, with 8.7% [13]. In the province of Ontario in Canada, it is estimated at 9% for boys and 3.3% for girls [14]. In El Salvador, a study showed that 6.7% of children were very likely to have ADHD [15]. In Colombia, 17.1% of children aged 4 to 17 were diagnosed using the two Conners scales (parent + teachers). In Iraq, in Erbil, the prevalence of ADHD in children aged over six years has been estimated at 8.75% [16]. In the Emirates, a study conducted on 1110 children aged 5 to 12 diagnosed from the Conners scale only for teachers shows 14.85%. Finally, in Germany, out of 1077 children aged 5 to 12, an estimate on the Conners scale only for teachers gave 17.8% [12]. The observation of the prevalence resulting from our study and the results quoted above indicate variability in prevalence rates. Globally, the variation in prevalence is established between 4% and 10% despite the considerable efforts made on the issue of the validity of diagnostic methods [17]. This variability from one study to another raises questions about its etiology, the multiplicity of factors associated with its appearance, socio-cultural perception, and the different modes of evaluation. The prevalence of ADHD varies with the sample type, the characteristics of the population studied, ethnic and cultural differences, the methodology employed, the diagnostic instruments and criteria adopted, and the source of information obtained in the diagnostic evaluation [12]. For Lalami (2016), this variation could be explained because the clinical population is challenging to select, and recruitment biases are not always controllable, particularly in the pediatric population [18]. According to the American Academy of Child and adolescent psychiatry (AACAP) recommendations of 2007, the prevalence of ADHD in the United States varies between 7% and 10% for samples of children ranging from primary to secondary school. The study population of our research and those of Kashala in the DRC (6 to 9 years old) and Ofovwe in Nigeria (6 to 13 years old) are almost identical. The variation would come from the use of diagnostic tools. Indeed, the two previous studies used DMS-IV while we used DMS-V, which predicted an increase in prevalence according to the literature. Thus, depending on the instruments and diagnostic criteria adopted, it should also be noted that the majority of the disorder has become much higher with the DSM classification. The evolution of this classification, with the differentiation into subtypes in its fourth version, has led to an increase in numbers compared to previous versions [19]. In France, the prevalence was estimated at 9.6% for DSM III, 10.9% for DSM III R, and 17.7% for DSM IV (9% inattentive form, 3.9% hyperactive form, and 4.8% mixed form) [19]. Another study confirms this increase in France with 7.3% for DSM III and 10.4% for DSM IV (5.4% inattentive form, 2.4% hyperactive form, and 2.6% mixed form) [20]. In the United Kingdom, NICE (published in 2008) gives different estimates of the prevalence of ADHD in children: 1% to 2% based on the ICD-10 criteria and 3% to 9% with the DSM-IV standards [18]. A meta-analysis published in 2007, which looked at articles published from January 1978 to December 2005 with references including English, German, French, Spanish, and Portuguese, aimed to identify the causes of variability in the estimation of ADHD prevalences. This study established that the variability of prevalence from one country to another is explained more by the variability of the methods used from one survey to another than by the geographical difference [18][21]. This variation, it should be emphasized, also differs from one city to another (12.60% in Mansoura, 8.75% in Erbil, and 6% in Kinshasa[8] [11]). Environmental factors related to air pollution, considered a predisposing factor for the development of ADHD in certain so-called industrial or non-industrial cities, could explain this difference. The level of PM10 pollution in Ouagadougou is very high (1125µg/m3). Comparing these averages with those of Europe, which is an average of 50 µg/m3 per day and 40 µg/m3 per year, shows a concentration 22.5 times higher in Ouagadougou and 18.4 in the town of Bobo-Dioulasso.

Variation across ADHD subtypes

The results in Table 2 give the following proportions according to ADHD subtypes. In our cohort, ADHD types are 43.58% for the inattentive subtype, 35.20% for the mixed subtype, and 21.23% for the hyperactivity/impulsivity subtype. These results are consistent with Lecendreux (2011), who indicates 46.5% with a predominantly inattentive [22] but contrary to those described in the DMS-IV where the mixed subtype is predominant. Considering only the inattentive subtype, the following proportions according to sex: 57.35% for girls against 35.14% for boys. Higher ratios among girls than among boys. According to the literature, the reduction in symptoms of the inattention subtype is more significant in boys than in girls, which remains more stable over time [18]. However, the proportion of the

hyperactivity/impulsivity subtype is around 17.65% for girls and 23.42% for boys. These results are consistent with those in the literature, which indicates a high proportion of boys' hyperactivity/impulsivity subtype. Indeed, studies have shown that hyperactive/impulsive boys have noisy clinical pictures that are easily identifiable, while girls tend to have attention disorders, which would delay their treatment [18]. In El Salvador, on the other hand, the results indicate that the hyperactive-impulsive subtype is more frequently identified in girls, while the inattentive subtype is more prevalent in boys.[15]. At the same time, these contradictory results raise the conceptual question of ADHD about socio- cultural apprehensions. From all the above, it should be remembered that the data in the literature are controversial as to the prevalence and the distribution according to the subtypes of ADHD.

Limitations of the study

In diagnosing ADHD from the Conners scale specific to parents, several forms filled in were unusable. For a good reason, the high illiteracy rate of parents forced them to use the services of a third party to answer questions. We also note a reasonably high rate (20.5%) of people lost to follow-up after the first test of the Conners scale.

IV. Conclusion

This research was undertaken based on a hypothesis that attention deficit hyperactivity disorder is present in school-aged children in Burkina Faso. The rigorous scientific approach and the valid measuring instruments give reliability of the prevalence data estimated at 13.74%. The inattentive subtype is predominant with 43.58%, followed by the mixed subtype at 35.20%, and finally the subtype at 21.13%. The variability of results from one study to another raises questions about diagnostic methods. The results of this study open up perspectives for other reflections on the factors associated with the development of ADHD in Burkina Faso.

Déclaration de conflit d'intérêts

Les auteurs ne déclarent aucun conflit d'intérêts.

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