AD/HD and criminality: Differential diagnostic and therapetic/prophylactic aspects (A general literature study and a description of Norwegian challeges in the field)

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The impact of AD/HD (Attention Deficit/Hyperactivity Disorder) as a background factor for criminal activity is under discussion, both in the society and among professionals within psychiatry/psychology and other medical disciplines. A central topic in the discussion is whether a useful reduction of such activity can be reached by pharmacological treatment of the disorder. Studies of relevant international literature, mainly through the last 15 years have been made in the Medline/PubMed databases by combination of the terms AD/HD, and ASPD (Antisocial Personality Disorder). Additional literature has also been gathered. The main focus has been on young adult persons and upwards in age, much less on childhood and early adolescence. The literature shows that adult AD/HD and ASPD show distinctly common features, but also definite differences, both in clinical and neuro-physiological/-chemical respects. A priori, a pharmacological treatment of well diagnosed adult AD/HD, even in co-morbidity with ASPD, might be beneficial. Mostly used are the central stimulants methylphenidate and dexamphetamine, but atomoxetine, related to modern antidepressants, has also been introduced and validated. In Norway there has been an initial optimism leading to many, and at times weakly grounded, attempts to treat imprisoned or paroled persons with central stimulants. The results have been varying and often disappointing. This process and a current opinion on state of the art of such treatment will be described in the last part of the article.

Keywords: Attention Deficit, Hyperactivity Disorder, criminal behaviour, pharmacological treatment, Antisocial Personality Disorder, Antisocial traits.

Introduction

Through later years, the Norwegian and international media have had many contributions regarding the possible causal effect from AD/HD (Attention Deficit/Hyperactivity Disorder) on criminal behaviour, and there seems to be uncertainty and partly disagreement among professionals in the psychiatric field regarding to which degree this is a fact. On this background the author has performed studies of relevant recent and older scientific literature, which will be displayed and given reflections to. Only a limited part of the studied literature will be referred specifically. The main focus in the article is AD/HD among adults from young age and upwards; references to studies in child and early youth ages are less focused.

There is both a qualitative and quantitative difference in the occurrence of adult AD/HD in men and women. Trans-nationally, prevalence in men of 4.1 and 2,7 % in women has been reported [16]. Prevalence and characteristics of the disorder in the population of female prisoners (in Norway 5 % of the imprisoned) is an interesting research challenge, but the gender aspect will be treated only to a small extent in this article. Interested readers are referred to a recent German study on this aspect [37]. The core in the literature search has been associations between AD/HD and Antisocial Personality Disorder (ASPD). These terms and others following in the article are chosen from the American psychiatric diagnostic system DSM-IV [1], because this is most often used in international research connections. The official diagnostic system in Norway and many other countries, ICD-10 [49], has related, but not identical names for the corresponding diagnostic groups.

Diagnoses, prevalences, continuities and co-morbidities

Every diagnosis mentioned hereafter is categorical, meaning that the different clinical features, in accordance with the prevailing diagnostic systems, must be present in sufficient strengths and numbers to yield the diagnosis. Herein lies that persons may have traits from the disorders giving impacts on their existence, but not enough to qualify for the diagnosis.

Diagnoses and prevalences in overall populations

Among children and early adolescents

AD/AD consists of three subgroups; a) the predominantly inattentive type (ADD) (unorganized, easily distracted and forgetful), b) the predominantly hyperactive/impulsive type HDD) (restless, impulsive, not following directions), c) the combined type in which the symptoms of a) and b) are clearly present. The last type, the combined, is the main focus in this review. At least six of the nine symptoms from each of the groups a) and b) are required for a diagnosis of the combined group c). Prevalence in childhood is varyingly estimated in the two international diagnostic systems DSM-IV (4.8 %) and the ICD-10 (1–3 %), obviously based on some difference in criteria and cut-offs.

Another condition within the same main disorder group (Attention- Deficit and Disruptive Behavior Disorder) of DSM-IV is Conduct Disorder (CD). This is characterized by a much more severe aggressive violation of social rules than the «usual» child AD/HD, but the conditions seem to be related, maybe with only quantitative differences. If this relies on

a frequent co-morbidity of around 50 % [47], or real relatedness is possibly a philosophical question [32]. The CD and the most related part of AD/HD have been described to constitute «a fledgling psychopathy» [25], marked by low self-control, proneness to extreme boredom, impulsivity, aggressivity and liability to criminal activity.

Still another condition in the same main group to mention is the Oppositional Defiant Disorder (ODD), which coarsely can be said to be an intermediate type between the «pure» editions of AD/HD and CD, with less severe traits of aggression/destructivity than the latter. The prevalence of CD and ODD is less explicitly calculated, but seems to be lower than for AD/HD [15]. For all the three conditions, AD/HD, CD and ODD, there is a generalized tendency to have a low autonomic nervous system arousal (low reactions of fear, low heart rate etc), but this is especially the case in CD [39].

Among adults

AD/HD in adults always appears as a continuation of the condition in childhood [12], and then in 30–70 % [e. g. 24; 35]. Exact diagnosis is more difficult than in children, not least caused by a greater tendency to co-morbidities [28; 51]. Often only a label of «AD/HD-like» symptoms is given, but complete diagnosis is only to be given «by the book» from accepted diagnostic systems, and be clinically integrated.

ASPD (Antisocial Personality Disorder) is a condition in adults, strongly resembling the CD in children and early adolescents, described over. Not all delinquency and criminal behaviour is caused by this condition, but prevalence of ASPD among prison inmates is reported to be almost 50 % in international meta-analyses [18]. For the ordinary society, DSM-IV estimates, a prevalence of 3 % in men and 1 % in women of ASPD. Other studies have concluded with lower prevalence [43].

Continuities and Co-morbidities between the above named disorders

Continuities

As it is stated above regarding diagnosis of adult AD/HD, there is an absolute demand that the condition should be a continuation of the childhood edition. The same regards the association between CD and adult ASPD. The DSM-IV explicitly concludes that without a CD in earlier life, a diagnosis of Antisocial Personality Disorder cannot be confirmed. The continuity is characterized by an average reduction of AD/HD prevalence by 50 % [e. g. 24; 35] from child to adult. The prevalence seems to show a continued reduction from young adult age to disappear as a full diagnosis after 50 years of age [37]. Subsidiary it is stated that only a third of children with CD develop ASPD [36], and further it has been found that around 20 % of children referred with AD/HD to actual clinics go into adulthood with ASPD [27].

Co-morbidities

Co-morbidity is a simultaneous existence in a person of different disorders. The disorders might be very different or closely related. Between the above named disorders there is both a definite co-morbidity, but also very close relatedness. This regards AD/HD and CD in childhood [e. g. 28], reported as «highly intercorrelated», and also with many common etiological factors.

In adulthood a considerable co-morbidity between AD/HD and ASPD has been established [e. g. 42; 44]. Especially, a high prevalence of probable AD/HD in childhood and continued similar traits in grown up prison inmates has been found [23; 34; 38].

With so explicit traits of co-morbidity, relatedness and continuity, it has been promoted that AD/HD, CD and ASPD should be considered as a common diagnostic category [32]. Against this it is stated that the overlap between AD/HD and CD is much more co-morbidity than relatedness between the disorders. This leads to the fact that patients with such co-morbidity more often have been referred to treatment than those only having one set of symptoms [15], further supported by the fact that many AD/HD patients, children as adults, lack antisocial traits [26].

Co-morbidities with other disorders

Substance use disorders

Both adult ADHD [e. g. 11], and especially ASPD [e. g. 26], show a very frequent co-morbidity with Substance Use Disorder (SUD). There is a very common knowledge that the latter disorder definitely has a high independent association with delinquency.

Other psychiatric disorders

Adult AD/HD has been shown to have a strong occurrence of co-morbidity with affective disorders, anxiety, sleep disorders, and especially with personality disorders, also others than ASPD [e. g. 26]. The same pattern with high occurrence of co-morbidities is stated in DSM-IV for ASPD. The reciprocal co-morbidity between the two disorders has been described above in this paper.

Rates of AD/HD and ASPD in imprisoned populations

Regarding AD/HD many studies have been performed using various diagnostic criteria, yielding rates with a great variance. In a review of nine studies Gudjonsson et al. 2009 [21] found a range of 24 to 67 %, while a meta-analysis of 25 surveys by Fazel et al. 2008 [17] reported an AD/HD prevalence among young imprisoned persons; for men 11,7 % (4,1–19.2); for women 18,5 % (9,3–27,7). A German study [38] showed an overall AD/HD prevalence of 45 % with a very high co-morbidity with other mental disorders in young male prison inmates.

For ASPD many studies in prisons have been performed in different nations. A systematic review of 62 surveys comprising 23000 prisoners from 12 countries by Fazel & Danesh in 2002 [18] showed the following prevalences for men: Personality Disorder (PD) in general 65 % (61–68), ASPD 47 % (46–48); for women PD 42 % (38–45), ASPD 21 % (19–23). There is all reason to believe that these rates, bearing a small variance, are representative for ASPD. Further, this also implies that criteria and cut-offs here give more accurate figures than for AD/HD. For psychopathy, described later, reckoned as an extreme variant of ASPD, prevalence in male prisoners has been reported to be around 20 % [7].

Similarities and differences between AD/HD and ASPD

Clinical Picture

Two main components will be discussed:

Impulsivity

This is very important in both disorders, regarding AD/HD especially in the types marked by hyperactivity. For both conditions this is definitely something else than «good and desirable» impulsivity [49], which in «norma» values may bring private and professional success. The negative dimension leads to uncontrolled acts, often with unfortunate results, and this is most often the case in ASPD. If there is a qualitative or only a quantitative difference between the impulsivity in the two disorders, is still not proven, but for uncomplicated AD/HD there is more often a general hyperactivity and definitely less severe acts.

Antisocial traits

Here we find definite differences, because these traits as mentioned, lack or are moderate in patients with uncomplicated AD/HD, while being necessary for the ASPD diagnosis. This implies attitudes and acts violating others, aggressive and deceitful traits with lack of responsibility and remorse. Through the last 15–20 years the term psychopathy has been linked to especially pronounced appearance of these traits. It has become a central concept in forensic psychiatry, where a special instrument has been developed, Psychopathy Checklist (PCL) [22]. Even if the concept does not constitute an independent disorder in DSM-IV and ICD-10, it is reckoned as an extreme edition of ASPD.

A preliminary conclusion in this paragraph is that prevailing antisocial traits in AD/HD patients most probably are due to co-morbidity with varying degrees of ASPD and only to a lesser extent should be considered as a part of uncomplicated AD/HD.

Etiology and pathogenesis

Biological heritability

Both disorders have been considered to have a definite such component, probably stronger for AD/HD, having been shown in numerous family, twin, and adoption studies [e. g. 6]. The biological heritage of AD/HD is characterized as highly polygenic, meaning that many genes constitute this background. These genes generally have a low penetrance, and no single gene seem to have a dominating effect [4]. A comprehensive and modern analysis of the genetics of this disorder is given by Schilling et al. 2010 [40], who also state that in the evolutionary connection, the genetic components of ADHD seem to have survived through the ages. This implies that hyperactivity genes also must represent some useful abilities for survival and success in human life.

ASPD seems to have a greater element of environmental and cultural background, and the biological heritage is estimated to be strongest for the psychopathic dimensions [31].

Psychological, social, and cultural factors

Also here there seems to be definite similarities between the etiologic factors of the disorders. Psychologically; lack of care and support, normative dissolution, and negative learning seem most important. Many societies have experienced a strong growth in rates both of AD/HD and ASPD during the last half century [27; 31]. This is probably caused by the «whip» of modern western culture; restlessness, boredom, libertarianism, and weakening of security-giving structures [27].

Organic and physiological cerebral factors

Many studies with structural and functional brain scanning have revealed volume reduction and dysfunction both in persons with AD/HD [14; 19] and persons with ASPD, included psychopathy [2; 3; 33; 50] in the prefrontal brain cortex (PFC) Some of these studies indicate differences in specific localization of the dysfunction of the PFC between AD/HD and ASPD included psychopathy. These differences seem to be displayed by a stronger dysfunction in ASPD, specifically in the orbitofrontal part of the PFC, an area having the closest connections to the amygdala nucleus in the limbic system. Dysfunction in this nucleus has through many years been considered to give a deficiency in the inhibition of aggressive impulses [2; 3].

It is also assumed that this dysfunctional interaction can be a link in the interpersonal factor 1 in the Psychopathy Checklist («deceitful, arrogant») [42]. The research interest in the amygdala is still very high, being expressed in the title of a recent article:

«The criminology of the amygdale» [10].

Even if the above described localization differences between AD/HD and ASPD in the PFC have been displayed, these may be more of a dimensional than categorical kind, and it must be concluded that definite similarities also exist.

Bio- and neurochemical factors

The stress hormone cortisol appears as established knowledge through many years, elevated in many psychiatric disorders [e. g. 47], but shows only to a limited extent this tendency both in AD/HD and ASPD [8; 45]. Low serum cholesterol has been found statistical correlated to increased impulsivity and aggressiveness [e. g. 46], but for AD/HD it is probable that this may be caused by co-morbid CD or ASPD [41].

The neurochemical signal substances serotonin, noradrenalin, and dopamine are powerful regulators of behavioural and cognitive functions, all of them strongly implicated in the brain metabolism of both disorders.

The most specifically related to AD/HD is dopamine [6], especially its fraction D2. Cortical dopamine is central for the feeling of joy and well-being. It is reported that in AD/HD, there normally is a lowered dopamine level in the PFC, and respectively a surplus in the deeper basal ganglia. The first gives a continuous experience of dissatisfaction, the latter an urge towards unsuitable hyperactivity. A positive effect of central stimulant medication is explained by an inhibition of dopamine reuptake from cortical synapses,

increasing the level there. Thereby also less secretion to deeper brain structures is reckoned to occur [6].

Possible related mechanisms regarding serotonin and noradrenalin are also described [29; 41].

Regarding ASPD, lowered serotonin level in cortical synapses has, in addition to depression been linked to impulsive aggression [20]. This has been disputed, but is still maintained by others [9] in so called explosive violence. Dopamine has also been associated to aggressiveness in the same way as serotonin [5].

Summing up of similarities and differences between the two disorders.

There is definite relatedness in the clinical and etiological picture of the two. To what extent this relatedness is due to a very frequent co-morbidity or to being two editions of the same disorder, is still to be further elucidated.

Treatment challenges

Is pharmacological treatment prophylactic against criminal activity in persons with AD/HD more or less co-morbid with ASPD? A priori reflections.

Firstly, it is important to remember that criminal activity exists in persons without registered psychopathology. Also, many persons with uncomplicated AD/HD go through life without any such activity. However, it is important to notice that a review of 100 studies [13] found that 99 of them reported a positive relationship between the disorder and various antisocial behaviours. As discussed above, much of this can be explained by the co- morbidity with ASPD traits.

Further it must be underlined that psycho-educative and cognitive-related treatment, individually or in groups, has been recommended and tested with certain, but varying benefit [11; 31]. It is impossible to figure any helpful treatment programs, also of pharmacological kind, without concomitant supportive and psychotherapeutic elements.

A very actual discussion topic is the benefit of pharmacological treatment of the AD/HD component in the named frequent co-morbidity. This regards also children; is a rational treatment of the disorder in the two subgroups with marked hyperactivity, prophylactic against the development of CD? This seems logical, but will not be dealt with further here. In cases of AD/HD, also in adults, it is well known that two main groups of medication are proposed. Satisfactory results in uncomplicated AD/HD have been reported in Norway, for many, but not for all patients [30]. The first, and most used group, consists of two different, but related central stimulants, i.e. methylphenidate (Ritalin, etc.) and dexamphetamine (Dexamine, etc): The other group regards atomoxetine (Strattera), a noradrenaline- and dopamine reuptake inhibitor [29] related to modern antidepressants. The latter group has a minimal abuse potential, the two former a well known great such.

There are logical reasons to believe that a well diagnosed AD/HD component in co-morbidity with ASPD could bring a beneficial reduction of the impulsivity and thereby reduce antisocial and criminal activity. On the other hand there has been a definite concern that central stimulants could enhance the problems in a substance use disorder that is very

common in many persons with ASPD. In some publications this fear is considered to be exaggerated. It is claimed that amphetamine does not give euphoric intoxication unless it is administered intravenously or nasal, and that therapeutic use of tablets is relatively safe [6; 27]. As mentioned, atomoxetine is without any such suspicion, and would a priori be a better and safer choice if a good effect could be proven, something that still bears uncertainty for adult AD/HD.

Trends and results in practice and research regarding effect and safety of pharmacological treatment of AD/HD in the Norwegian correctional system

From the mid 1990s some systematic treatment efforts have been performed in Norwegian prisons. These have been described, mainly in not published, unofficial reports. Initially, good results were observed in a limited number of inmates, with reduction of hyperactivity and improvement of concentration ability. However, only very few kept themselves in a stable function after release. In the start of this period, assessment of AD/HD was made by a limited diagnostic repertoire, and often treatment efforts were discontinued by the inmates. Further, a tendency towards misuse of the medicine, e.g. by gathering pills for a stronger intoxication, or selling the stimulants inside the prison environment, seemed to occur. In later years, diagnostic procedures for AD/HD and co-morbid disorders have been improved considerably for many prisons. This has led to some decrease in the number of inmates being offered the treatment, because of a more rational indication. Still, many fall out of treatment due to irregularities, e.g. parallel substance use or re-offending. Of the three pharmaceutical main groups, atomoxetine has been tried, but rarely maintained, due to both lower observed effect and patient preference. This has been a disappointment, because there was a strong hope that an eventual good effect of atomoxetine would remove the dangers of stimulant misuse as a treatment complication. Of the two others, normal procedure is that methylphenidate should be tested out first, before dexamphetamine.

In the start of 2011, I have fulfilled a study of the treatment for AD/HD in all Norwegian greater prisons with well functioning health services. The survey indicates that around 2 % of the inmates receive such treatment. Mean age in our prisons is around 33 years, and internationally (probably also for Norway) the prevalence of AD/HD among young prisoners has been estimated to around 12 % in men and 18 % in women [17]. Our findings indicate that one out of six AD/HD disordered prisoners satisfies a state of the art indication for medication. Methyphenidate is more often used than dexamphetamine, while atomoxetine is almost non-existing on the medications lists. The medical services report also in this study that several patients discontinue their post-release treatment due to irregularities.

A synthesis of the survey regarding Norwegian experiences in pharmacological treatment of AD/HD in prison inmates would be: There exist indications for such treatment after thorough diagnostic procedures. Caveats in treatment follow up however definitely must be remembered.

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AD/HD (СДВГ) и преступность: дифференциально-диагностические, терапевтические и профилактические аспекты

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Статья посвящена анализу исследований, проведенных за последние 15 лет, и посвященных рассмотрению вклада AD/HD (синдром дефицита внимания и гиперактивности (СДВГ)) в качестве фонового фактора криминальной активности. Эта тематика обсуждается как в обществе, так и среди психиатров, психологов и специалистов других медицинских дисциплин. Центральной темой дискуссии является вопрос о возможности снижения криминальной активности при помощи медикаментозного лечения СДВГ. Обсуждается факт схожести взрослых лиц с синдромом СДВГ и лиц с антисоциальными личностными расстройствами по клиническим, нейрофизиологическим и биохимическим параметрам. Описывается эффективность медикаментозного лечения лиц с верифицированным диагнозом СДВГ, даже если он коморбиден антисоциальному личностному расстройству. Критически обсуждается опыт лечения осужденных и условно осужденных лиц с помощью стимуляторов в Норвегии.

Ключевые слова: синдром дефицита внимания и гиперактивности, криминальное поведение, лечение, антисоциальное личностное расстройство, антисоциальные характеристики