

Review article Ανασκόπηση

Association of maternal depression with children's attention deficit hyperactivity disorder

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Family problems are considered to be the main risk factor leading to the development of behavioural problems during childhood and adolescence as well. A well documented fact in the current literature is that psychopathology of any kind in parents may influence behaviour, personality and appearance of psychopathology in their children. The permanent interaction between children's psychopathology or any kind of developmental disorder on one hand and parental psychopathology on the other, is considered to be one of the most important fields of research during the last decades. The aim of the present study was to review research concerning the relationship between maternal depressive disorder and children's attention deficit hyperactivity disorder (ADHD) among members of the same family, the influence that each disorder has in the appearance and development of the other, and the way that the mother-child relationship is influenced by both. We conducted an electronic search through PubMed to detect articles concerning the association of maternal depressive disorder and children's ADHD among the members of the same family published in English from January 1980 to December 2015. The choice was strictly limited to articles concerning exclusively emotional disorders in mothers and ADHD in their children. This process concluded with the electronic research of bibliographic citations of the identified articles, or related articles, in order to locate additional sources. Considering as a fact the interaction between this developmental disorder, ADHD, and mother's psychological profile which is maternal depression for the present research, we report the following: among the 27 articles found, 24 concerned the influence of the mother's depression to the child's ADHD, and the remaining 3 concerned their genetic association. There were important limitations found as well. Despite the fact that all the studies included a control group, many of them did not have a follow-up and were short-term studies. Their results were mostly heterogeneous and therefore their meta-analysis proved impossible. There was evidence concerning the association between the two disorders as both maternal depressive disorder and children's ADHD influence each other through multiple psychosocial and biological factors. Nevertheless, more data is needed from well structured, homogeneous studies, especially in the field of genetics, in order to document this association.

Key words: Depression, mother, child, ADHD, maternal depression, children.

Introduction

Attention deficit hyperactivity disorder (ADHD) is considered to be among the most common (studied) disorders of childhood. Hyperactivity, concentration, attention deficit and compulsivity comprise its most common characteristics under controllable conditions, for example in the classroom, and under non-controllable conditions as well as during school break-time. Those behaviours are not in accordance with the age and the developmental stage of the child and as a result everyday functioning is often severely compromised.

Research based on questionnaires revealed that the prevalence in the general population ranged between 10% and 20%.¹ Research based on DSM-IV or V criteria showed a lower percentage of 5% to 10%,² while research not based on comorbid disorders showed that the incidence in the population was 1–2%. From epidemiological data, we know that ADHD is more frequent among boys (3/1:boys/girls).

The second group of psychiatric disorders studied in this article was Mood Disorders of mothers who raise a child with ADHD. According to DSM-IV criteria, Mood Disorders include Depression Disorders, such as Major Depression Disorder, Dysthymic Disorder and Depression Disorder Not Otherwise Specified, Bipolar Disorders which include Bipolar Disorder I, Bipolar Disorder II, Cyclothymia, Bipolar Disorder Not Otherwise Specified and two disorders based on their causality, which are Mood Disorder due to General Medical Situation and Mood Disorder due to Substance Abuse. The last two were not studied in this review. There is also Mood Disorder Not Otherwise Specified.

Depressed mood for most of the day, in some cases, may influence every single dimension of behaviour, the perception of the world as well as social and interpersonal relationships. Consequently, parent-child relationships and raising a child may be influenced as well.

Often, ADHD is considered to be a result of inappropriate upbringing, which according to scientific data, does not seem to be the case. ADHD symptoms influence parents' behaviour and renders child upbringing difficult. Nevertheless, it is well documented in the literature that ADHD is not related with the quality of upbringing or with the parents' behaviour.

It may provoke problems concerning parent-child relational disorder, problems that may remain unresolved for the rest of life and they demand careful evaluation and appropriate help.

Moreover, according to the literature, when parents suffer from Depression it is more probable for their children to develop ADHD. On the other side, a mother of a child with ADHD is more likely to develop a Depression Disorder during her life than a mother whose child does not suffer from ADHD.

In conclusion, this review aimed to study the association between the two disorders, how each one influences the other's appearance and development, and the way that both influence the mother-child relationship, the intra-familial relationships and family functioning.

Material and method

We performed a systematic literature research using PubMed for studies concerning maternal depression and children's ADHD from January 1980 to December 2015. We used different combinations of "depression", "mother", "maternal depression", "child", "children", "ADHD". References of included articles, related citations and relevant reviews were screened for additional articles. After filtering duplicates, articles were screened by one reviewer (S.S.) on title and abstract using predefined inclusion and exclusion criteria. Inclusion criteria were: (1) sample size of at least ten mothers with depression or at least ten children with ADHD; (2) the diagnosis of depression and ADHD had to be proven by clinical interviews based on accredited assessment tools; (3) only studies written in English were included. The article selection was strictly restricted to those referring to maternal depression and children's ADHD. We excluded those study cohorts that referred to the two disorders as a part of a wider psychopathology and those that did not include the key words in the title. The quality of the studies' methodology was assessed according to the following variables. We defined a study as high quality based on predefined criteria, namely, prospective, population-based sample size, demographic representation of indicators, evaluator credibility and blindness, direct vs indirect assessment, control groups, diagnostic criteria and assessment tools, and follow up.

A total of 206 studies were found, 181 were excluded from the review. 170 were excluded because they did not refer to the key-words of the inclusion criteria and 11 were excluded as they referred to maternal depression or children's ADHD as a part of a wider psychopathology. The data of the included studies proved to be mostly heterogeneous and therefore their meta-analysis proved impossible.

Results

Effects of the two disorders on each other

Twenty two studies were found³⁻²⁴ assessing how the two disorders affect each other. The first three and the sixth one referred to the influence that maternal Mood Disorder (depression included) exerted on the child's ADHD. The seventeenth deals with the same topic as well, by focusing on parental depressive and anxiety symptoms during pregnancy, though. The fourth and fifth studies researched two different family factors that affected both maternal depression and childhood ADHD. From the seventh to the thirteenth, authors studied the way that the child's ADHD influenced the appearance and the development of maternal depression. The eighteenth study deals with the same topic as well, while focusing on maternal self-esteem reactivity among mothers (with a history of depression) of children with ADHD. The fourteenth study deals with the fact that child's ADHD influenced the appearance and the development of depression in the children as comorbidity and on their parents as well. The nineteenth, twentieth and twenty-first deal with the parent-child interactions in families where maternal depression and child's ADHD coexist. The fifteenth, the sixteenth and the twenty-second studied the way that maternal depression under medical treatment influenced the child's ADHD.

The results of the first sub-group showed that maternal (or parental) Mood Disorder, in general, raised the possibility of development of ADHD for at least one of the children of the family (hyperactivity and/or attention deficit). The fourth study showed that parental management of various conditions and the locus of control increased the chances of maternal depression and child ADHD, while in the fifth study factors resulting in a higher chance of developing ADHD were lower socioeconomic status and instability in married life.

The studies from the seventh to the thirteenth showed that children's ADHD correlated with a higher possibility of development of maternal or parental Mood Disorders and especially depression. The seventeenth showed that the apparent intrauterine effect of maternal depression and anxiety on offspring behaviour may be partly explained by residual confounding. There was little evidence of a difference between the strength of association of maternal and paternal symptoms during pregnancy with offspring who has attention problems. That maternal symptoms after childbirth were also associated with offspring behavioural problems may indicate a contribution of genetic influences to the association. The fourteenth study showed that children with ADHD and their mothers developed higher levels of depression than the control groups. As far as the sub-group of studies which deals with parent-child interaction is concerned, the nineteenth study showed that currently depressed mothers were least likely to reinforce child compliance and responded most coercively to child noncompliance relative to the group of depressed mothers who are currently remitted and the group of mothers who have never been depressed. Remitted mothers in this sample were more coercive than never clinically depressed mothers, but were more likely to follow through with commands than never clinically depressed mothers. In the same subgroup the twentieth study showed that children with ADHD whose mothers were depressed were less positive in their parent-child interaction than the group of children with ADHD and mothers without depression and the group of children without ADHD and mothers without depression. The twenty-first study concluded to the fact that mothers who used corporal punishment showed significantly higher scores on the Beck Depression Inventory than mothers who did not.²³ Moreover maternal depression contributed to the use of corporal punishment in ADHD children. The fifteenth study showed that after a course of coping with depression the depressed mothers of children with ADHD improved their symptoms of depression, their self-confidence, their relationship with their children and family functioning. The tenth studied mothers under medical treatment with bupropion during their pregnancy and showed a significant increase in the chance of children suffering from ADHD, compared to those who did not take bupropion. The twen-

ty-second study showed that the Integrated Parenting Intervention for ADHD (IPI-A) produced effects of small to moderate magnitude relative to Behavioural Parent Training (BPT) on maternal depressive symptoms, observed negative parenting, observed child deviance and child impairment at posttreatment and on maternal depressive symptoms, child disruptive behaviour, child impairment and family functioning at follow up. Contrary to expectations, the BPT group demonstrated moderate to large effects relative to IPI-A on observed positive parenting at follow up.²⁴

Depression in mothers of ADHD children affects the assessments of ADHD when completing diagnostic questionnaires

Three articles were found: the first²⁵ studied the fact that parent's and teacher's evaluations of ADHD children via questionnaires had a low informant agreement. They also studied how much the parent's evaluation was influenced by parental depressed mood (or parenting stress). The second²⁶ examined the extent to which indirect maternal references (by completing questionnaires) for comorbid depression in children suffering from ADHD were affected by a history of depression themselves. The first one did not include a control group, while the second one had a control group of non-ADHD individuals. The third one²⁷ investigated the Depression-Distortion hypothesis by examining the effects of depressive symptoms on cross informant discrepancies in reports of child behaviour problems and several measures of parent-child relationships such as child characteristics, self-reports of maternal depressive symptoms, parenting practices and laboratory mother-child interactions.

The first one used questionnaires evaluating children's ADHD, completed by their parents and by their teachers, as well as questionnaires that evaluated parenting stress and depression disorder. The second one used a multivariate regression in order to examine the influence of maternal depression on the direct and the indirect effects concerning Major Depression on children with ADHD.

In conclusion, the first one showed that parenting stress and not maternal depression was responsible for the disagreement between parents and teachers. The second one showed an important interaction between maternal depression and the references, especially for the non-ADHD control group.

ADHD remained a risk factor for the development of major depression independent of maternal references or even the existence of maternal depression. The third one showed that elevations in maternal depressive symptoms were associated with maternal reports of negative parenting style but not with observed laboratory interactions. Mother's levels of depressive symptoms predicted negative biases in their reports of their child's ADHD symptoms, general behaviour problems and their own negative parenting style. Whereas levels of depressive symptoms did not predict observed parenting behaviours, maternal distortions did predict problematic parent-child interactions.

The genetic factor

The possible genetic correlation between maternal depression and children's ADHD was detected in one study.²⁸ This study dealt with the Mood Disorder of parents of adopted teenagers suffering from ADHD. The control group included 692 adopted and 416 non-adopted teenagers. Clinical interviews based on DSM-IV criteria were used in order to evaluate the patients. Teenagers, whose parents suffered from major depression, had higher chances of developing major depression or behaviour disorders in the two sub-groups as well. The presence of paternal depression was not associated with the development of any psychiatric disorder in adolescents, with the sole exception of ADHD in adolescent adoptees. The study concluded that the risk for the development of psychopathology in adolescence was significantly increased in families with depressed mothers, but not in families with depressed fathers

A second study was also a case control study.²⁹ It explored families of mothers suffering from serotonin's composition disorder. Serotonin is indispensable for the development of the human brain. The study included 459 adult patients suffering from ADHD and 187 controls. Clinical interviews based on DSM-IV criteria were used to evaluate the patients. The authors then detected the mother's mutations of TPH1 and TPH2 that caused the serotonin's composition disorder. The results of the study showed that the offspring of mothers with TPH1 mutations showed 1.5 to 2.5 higher ADHD scores in children in structured tests and related symptomatology compared to the control group. In conclusion, the study

showed that reduced maternal serotonin production appeared to increase the risk of ADHD and related symptoms in offspring.

Discussion

Effects of the two disorders on each other

From the studies in this category, as mentioned in the results of this review (as one can examine on the respective table), only ten had a control group and only four had a follow-up. The ages of patients with ADHD varied from toddlers to adults (and this fact impacted all the data included in the studies) and the diagnostic tools that were used differed in all. Specifically, some studies^{3,7,9-12,15,16} used diagnostic tools that based on DSM-III and the rest of the studies –except for one⁸ in which the tool is not mentioned– used DSM-IV. In the second and fifteenth studies, the patients were receiving a medication treatment with stimulants; furthermore in the third and fifteenth the parents were also being treated with medication (in the third lithium, in the fifteenth antidepressant, anxiolytics and antipsychotics). Moreover, the first, third, fourth, seventh, eighth, ninth, tenth, fourteenth referred to parents, while the remaining exclusively to mothers. Finally the first, third, fourth, sixth, eighth, ninth, tenth, fourteenth also referred to emotional disorders in comorbidity with ADHD, the eleventh included mothers exhibiting anxiety disorder in comorbidity with depression and the rest of the studies referred solely to children with ADHD in relation to depression in mothers.

Regarding the limitations of the studies included in this chapter, we emphasise that more than half of the studies, as already mentioned, included disorders in comorbidity with either depression or ADHD and were not exclusive to these two disorders. Several studies even reported additional disorders or a history of various disorders and the respective influence of these disorders were not measured or were not taken into account in the results. Also parental behaviour was not taken into account, or not evaluated in any way. There were several limitations in terms of the statistical results of these works; for example in many of these statistically insignificant effect was found due to the reduced power of the sample.

In addition, environmental factors have not always been taken into account and sometimes the stud-

ies did not involve even the gender of the children, which can potentially affect both different behaviours and the occurrence or progression of various psychopathological conditions. In some studies there was no mention of statements from the children about themselves. Only parents or teachers made statements about the children and in many cases not both, while there were several limiting factors in these measurements. It should also be noted that in many cases the validity or reliability of the diagnoses was disputed. The reason is that in many studies the diagnosis was based on questionnaires and there were no personal psychiatric interviews. In one study¹⁵ it was stated that the interview was conducted by telephone, with the disadvantage of lack of assessment of nonverbal communication, and also lack of assessment of both parents; in addition it was not mentioned if it referred to a single parent family or not, which is mainly important for studies that concentrate exclusively on mothers. Moreover, psychiatric disorders which in some cases might coexist in both mothers and children were not assessed nor measured (sometimes they were mentioned without being taken into account in the evaluation of the results), as well as various behaviours (in children and mothers) or the different ways of parenting.

In most of cases, individually reported symptoms were not categorised and the stage of life of a mother that suffered from a psychiatric condition, whether it was an episode or chronic condition or at what stage of the child's life the condition appeared, were not taken into consideration. Moreover, the data for the studies were collected only during the first year. Symptoms of children are not always objective and in some cases are not typical for the condition, especially when it comes to pre-pubertal children. Moreover, as the same symptoms can occur in ADHD, bipolar disorder, Anxiety disorder, disturbed domestic environment or life event, a significant differential diagnostic problem arises in some of the studies.

Another important observation is that almost none of the studies took into account how the concentration and attention skills were developed in the groups of children under study, nor how parents and teachers contributed to the process during the various stages of their development. Also the socioeconomic background of the families varied in each study and they generally did not include

families from every socioeconomic group, thus the results of the studies cannot be generalised without strong reservations. Furthermore, the study observers –such as health experts (including private doctors)– were not always blinded, and they were often predisposed towards the patients studied or –in some studies– there was only one examiner so that the whole study was based solely on their own knowledge, experience and skills. Finally, in the studies where therapeutic interventions were provided for the mothers, it should be noted that the interventions solely targeted Depression and no other psychopathological conditions which may coexist. According to the twenty seventh study, future studies should examine whether this integrated intervention improves long term developmental outcomes for children with ADHD.

Depression in mothers of children with ADHD affects the assessment of ADHD when completing diagnostic questionnaires

One study²⁵ concerned a sample of 65 parents (58 boys, 7 girls) of children with ADHD aged 8–12 years. Thirty four of the children presented comorbidity with oppositional defiant disorder and 2 of them also with conduct disorder. Sixteen of these children were also under treatment with stimulant medication. In this study, no follow up was conducted. Furthermore, in the limitations of this study it should be noted that only the psychological state of the parents and not that of the teachers was taken into account. Also, the completion of the questionnaires did not take into consideration the fact that the teachers assessed behaviours in school while parents at home.

The second study²⁶ compared the reports of the mothers with those of the children themselves for themselves. It basically involved the presentation of two works (case control family studies).^{30,31} The 1996 study³⁰ had a duration of 16 years, while the study in 1999³¹ had a duration of 6 years. Also the 1996 study had follow ups in 1998 and 2000. As already mentioned above, it had a control group, studying a sample of mothers of children with and without ADHD. The age of the children ranged between 12 and 18 years. The limitations of this study were on the one hand the fact that their hypothesis required that they modelled 2-way and 3-way interactions which

resulted in covariate patterns with 2 subjects. Thus the statistical power to detect small effects was low and non-significant; the findings cannot be considered conclusive. On the other hand, it included reports only from mothers and their children and not from a third party, as for example, the teachers.

Finally, we must also note that different diagnostic tools were used in both studies; the first one was based on DSM-III and the second one was based on DSM-IV. Mainly, because of the limited patients included in the studies found and because of some methodological imperfections in them, it seems that further data is needed from new studies, with larger study populations and better study designs, in order to support their results.

The third one²⁷ investigated a sample included ninety-six 6 to 10 years old diagnosed with ADHD-combined type and their mothers, who provided baseline data before participating in a randomized clinical trial.

The genetic factor

The fact that only two studies were found concerning the genetic correlation between the two disorders is a limiting factor on the generalisation of their results due to the limited number of patients included. One study²⁸ examined adolescents, whereas the other study²⁹ examined adult patients with ADHD and the number of both patients and control group were limited. The young age of patients, in the first study, further limited the reliability of the results, because many of the mental disorders may potentially occur in adulthood. Also, adopted children did not have a common descent but different nationalities and this further complicated the results. In the second study, the reported mutation TPH1 predisposed in many different behaviours and symptoms associated with ADHD and affective disorders, which can also be influenced by other genetic and environmental factors (for example other mutations, maternal stress, diet, hormonal agents etc.). In both studies, it was evident that the characteristics of the children affected both the appearance and the development of depressive disorders in parents. In conclusion, due to the limited number of studies, the genetic correlation of depression and ADHD would be a suitable field of further research

Συσχέτιση της μητρικής κατάθλιψης με τη διαταραχή ελλειμματικής προσοχής και υπερκινητικότητας στα παιδιά

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Τα οικογενειακά προβλήματα αποτελούν παράγοντα κινδύνου για οποιοδήποτε πρόβλημα συμπεριφοράς στο παιδί. Είναι άλλωστε βιβλιογραφικά τεκμηριωμένο ότι η ύπαρξη οποιοδήποτε είδους ψυχοπαθολογίας στους γονείς ενός παιδιού σχετίζεται με τη συμπεριφορά, την προσωπικότητα και –πιθανώς– με την εμφάνιση ψυχοπαθολογίας στο παιδί. Η διαρκής αλληλεπίδραση μεταξύ γονικής και παιδικής ψυχοπαθολογίας ή αναπτυξιακής διαταραχής από τη μία πλευρά και ψυχοπαθολογίας γονέων από την άλλη, αποτελεί ένα από τα σημαντικότερα πεδία ερευνών των τελευταίων χρόνων. Σκοπός της εργασίας είναι η ανάδειξη της σχέσης ανάμεσα στη μητρική καταθλιπτική διαταραχή και στην παιδική/εφηβική διαταραχή ελλειμματικής προσοχής και υπερκινητικότητας (ΔΕΠΥ), μεταξύ ατόμων της ίδιας οικογένειας, και κυρίως η επιρροή που ασκεί η μία στην εμφάνιση και την εξέλιξη της άλλης, όπως και η επιρροή και των δύο στη σχέση γονέα-παιδιού και κυρίως μητέρας-παιδιού. Διενεργήθηκε βιβλιογραφική έρευνα για τον εντοπισμό άρθρων που να συσχετίζουν τη μητρική καταθλιπτική διαταραχή με τη ΔΕΠΥ σε τουλάχιστον ένα από τα παιδιά της ίδιας οικογένειας, δημοσιευμένων στην αγγλική γλώσσα από τον Ιανουάριο του 1980 έως τον Δεκέμβριο του 2015. Η επιλογή περιορίστηκε αυστηρά σε άρθρα που αφορούν στις Συναισθηματικές Διαταραχές στις μητέρες και στη ΔΕΠΥ στα παιδιά τους. Η διαδικασία αυτή συμπληρώθηκε με ηλεκτρονική έρευνα των βιβλιογραφικών παραπομπών των άρθρων που εντοπίστηκαν, ή των συναφών ανασκοπήσεων, ώστε να βρεθούν πρόσθετες πηγές. Με δεδομένη τη διαρκή αλληλεπίδραση ανάμεσα στην εκδήλωση και στην πορεία της συγκεκριμένης αναπτυξιακής διαταραχής (ΔΕΠΥ) και του ψυχολογικού προφίλ της μητέρας, που στην προκειμένη περίπτωση αφορά στην Καταθλιπτική Διαταραχή στις μητέρες, συνοψίζονται τα εξής: Εντοπίστηκαν 27 άρθρα, εκ των οποίων τα 24 αφορούν στον τρόπο με τον οποίο η μία διαταραχή (ΔΕΠΥ στο παιδί/κατάθλιψη στη μητέρα) επηρεάζει την εμφάνιση και την πορεία της άλλης, ενώ οι τρεις αφορούν στη μεταξύ τους συσχέτιση σε γενετικό επίπεδο. Υπάρχουν βέβαια και κάποιοι περιορισμοί. Αν και όλες σχεδόν οι εργασίες περιλαμβάνουν ομάδα ελέγχου, σε πολλές από αυτές δεν υπάρχει επανεξέταση (follow up) και είναι βραχυχρόνιες. Τα αποτελέσματά τους, επίσης, είναι ετερογενή, πράγμα που δυσχεραίνει τη μετα-ανάλυσή τους. Παρά τους περιορισμούς, φαίνεται ότι η παιδική/εφηβική ΔΕΠΥ και η μητρική κατάθλιψη αλληλοεπηρεάζονται με ποικίλους μηχανισμούς, τόσο ψυχοκοινωνικούς όσο και βιολογικούς. Παρόλ' αυτά είναι προφανής η ανάγκη περισσότερων ερευνητικών δεδομένων από καλές δομημένες ομοιογενείς μελέτες, κυρίως σε γενετικό επίπεδο, προκειμένου να τεκμηριωθεί περισσότερο η εν λόγω συσχέτιση.

Λέξεις ευρητηρίου: Κατάθλιψη, μητέρα, παιδί, ΔΕΠΥ, μητρική κατάθλιψη, παιδιά.

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