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## Management of adhd-related behaviours in children using homoeopathic medicines selected based on prenatal maternal mental state

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### Abstract

ADHD is the most common childhood neurodevelopmental illness that significantly impacts individuals, families, and society. This study was intended to assess the effectiveness of Homoeopathic medicines selected based on the maternal prenatal mental state in managing ADHD-related behaviours in offspring and to analyse maternal prenatal mental states contributing to ADHD pathogenesis. 15 children having ADHD-related behaviours were identified symptomatically and diagnosed by the Vanderbilt ADHD Diagnostic Parent Rating Scale & Strengths and Difficulties Questionnaire (SDQ) from OPDs of SKHMC, Kulasekaram. Prenatal maternal psychological state and adverse events were recorded by giving a questionnaire to mothers of ADHD children. The homoeopathic medicinal intervention was made considering the maternal prenatal mental state as a causative modality. After Homoeopathic intervention, all cases improved with which 2 cases with marked improvement (>80% improvement), 11 with moderate improvement (40-80% improvement), and 2 with minimal improvement (<40% improvement). On analysis of maternal prenatal states contributing to ADHD pathogenesis, it was observed that mothers reported brooding in grief, sadness, crying alone, anger, depression, suppressed anger, irritability, guilty for anger, forsaken feeling, fear, hatred, restlessness, sleeplessness, anxiety, suicidal thoughts/attempt in response to various adverse life events during pregnancy. The study concluded that Homoeopathic Medicines selected based on the maternal prenatal mental state can effectively manage ADHD-related behaviours in children. Study findings highlight the significance of early pregnancy screening for stressful events to offer prenatal psychosocial support to mothers.

**Keywords:** ADHD, clinical study, CGI-I, epigenetics, homoeopathy, maternal prenatal mental stress, SDQ, vanderbilt

### Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a common psychiatric disorder characterised by inattention, hyperactivity, and impulsivity [1]. Although ADHD is commonly regarded as a qualitatively independent diagnostic category, it is now considered a continuing pattern of ADHD-related behaviours (i.e., inattention, hyperactivity, and impulsivity) [2,3]. The incidence of ADHD has risen dramatically over the last few decades [4,5]. The high prevalence of the disorder is concerning since it negatively influences all neurodevelopmental domains and the affected children's psychosocial interactions. Clinical diagnosis of ADHD is made as per the DSM-V criteria, based on the clinical history of the child and the effects of the behavioural symptoms on their relationships network [6]. Neuropsychological assessment complements clinical diagnosis, which assesses the magnitude of the deficits and detects impairments in other functional areas.

The exact cause of ADHD is yet to be unravelled. According to studies, ADHD is brought on by a gene-environment combination that affects the growing brain, causing structural and functional abnormalities [7]. ADHD has a significant genetic basis, according to twin, family, and adoption studies, with heritability ranging from 60 to 90

% [8,9,10]. In the pathogenesis of ADHD, prenatal, perinatal, and postnatal environmental factors play a pivotal role? Family dysfunction, absence of psychosocial support, unfavourable incidents and disputes during the prenatal period were linked to ADHD [11]. According to research, epigenetic systems modulate the effects of environmental factors linked to ADHD [12].

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**Need for the study**

ADHD is a prevalent childhood neurodevelopmental illness that significantly impacts individuals, families, and society [13]. The global prevalence of ADHD varies greatly, ranging from 1% to nearly 20% [14], depending on the diagnostic criteria and evaluation methodologies used [15]. Nevertheless, it is a frequent childhood mental illness and has a worldwide-pooled prevalence of 5.3 per cent. In India, the prevalence has been

Estimated to be 1.6 to 17.9 per cent [16]. In most cases, ADHD-related behaviours persist into adolescence and adulthood (50-80 per cent) [17].

Apart from genetics, several environmental factors play a substantial role in ADHD pathogenesis. Epigenetic markers, for instance, DAT1-methylation, may explain essential components in gene-environment interactions and in what manner these interactions affect brain development [18] [19] [20]. However, research relating to epigenetics and ADHD is still in its infancy, and more multidimensional investigations are needed to understand how epigenetic mechanisms affect the development of behavioural traits [21].

In Homoeopathic Literature, there are clues to Epigenetic Inheritance. Although the term 'epigenetics' is not mentioned in many of the works by stalwarts, we can see many examples of trans generational inheritance of acquired parental states by offspring being noted, where the environmental factors or miasma affect one generation, the effects seen in the following generations is recognised. Even while taking a patient's case history, we must look into the family history for tuberculosis, trauma, or other inherited tendencies that run in the family. In a footnote to §284 in the Organon of Medicine 6<sup>th</sup> edition, Dr. Hahnemann discussed protecting posterity from psora (the cause of most chronic diseases) by giving anti-psoric medicine (sulphur dynamisations in 50 millesimal potencies) to expectant mothers [22]. He furthermore claims that pregnant women who were treated this way gave birth to children who were generally healthier and stronger [23].

Homoeopathy is a holistic medical system that considers both internal and environmental factors in the genesis and progression of the disease and the choice of the remedy. Hence, investigating the maternal prenatal mental state and its impact on the child may provide insight into the causation of illness and construction of the case portrait and aid in selecting a similimum. Recent studies highlight the need for early identification of environmental risk factors and the importance of maternal mental health and early evidence-based focused maternal support to facilitate early intervention in those children at risk of developing ADHD.

Parents frequently use complementary and alternative medicine (CAM) therapies for their children who have ADHD-related behaviours or autism spectrum disorders, and parents prefer homoeopathic treatment for ADHD [24-27]. However, presently, there are only a limited number of studies on the homoeopathic management of ADHD.

**Aim and objectives****Aim**

To evaluate the efficacy of Homoeopathic medicines selected based on the prenatal maternal mental state in managing ADHD-related behaviours in children.

**Objectives**

To analyse the prenatal maternal mental states contributing

to the pathogenesis of ADHD.

To find out the maternal psychological factors most frequently related to ADHD.

**Materials and Methods****Study setting**

A sample of 15 cases diagnosed to have ADHD-related behaviours using the VANDERBILT ADHD PARENT RATING SCALE & Strengths and Difficulties Questionnaire (SDQ) was taken from the OPDs of Sarada Krishna Homoeopathic Medical College and Hospital, Kulasekharam.

**Selection of Sample**

Sample Size-15 cases.

Sampling Method - Purposive sampling.

**Inclusion criteria**

Patients in the age group 5 to 15 years who have ADHD-related behaviours.

Children of both genders.

**Exclusion criteria**

Patients aged less than five years and more than fifteen years.

Children with other severe systemic illnesses.

**Study design**

A clinical study on ADHD and prenatal maternal mental state and Homoeopathic management of ADHD-related behaviours.

A sample of 15 cases of children having ADHD-related behaviours was selected from the OPDs of SKHMC.

A pre-structured standardized case format was used for recording the case details.

The diagnosis was made based on clinical history, clinical presentation, and by using the Vanderbilt ADHD Diagnostic Parent Rating scale [28] (VADPRS) & Strengths and Difficulties Questionnaire (SDQ) [29].

A questionnaire was given to the mothers of patients, and they were asked to recall the prenatal maternal psychological state and adverse events. In addition, to avoid recall bias, whenever it is possible, prenatal events were cross-checked with the mother's close relative and the mother's medical documents were reviewed to confirm the occurrence of the event.

Then the case analysis was done, and the totality was constructed for each case.

The prenatal maternal mental state was considered a causative modality for selecting similimum. Dose, potency, and follow-up were according to homoeopathic principles in the Organon of medicine.

Remedy repetition and potency change were made, when necessary, based on principles of Homoeopathic Organon.

Post-treatment assessment was done once in 3-6 months using the Vanderbilt ADHD Diagnostic Parent Rating Scale, Strengths and Difficulties Questionnaire (SDQ) and CGI-Improvement (CGI-I) scale [30].

Data were analysed at regular intervals, and a conclusion was drawn at the end of the study.

The study parameters were statistically analysed, and the hypothesis was tested employing the paired t-test.

**Intervention**

For each case, homoeopathic medicine was selected based on their mother’s prenatal mental status besides their symptom totality.

**Selection of tools**

- Vanderbilt ADHD Diagnostic Parent Rating Scale.
- Strengths and Difficulties Questionnaire (SDQ).
- Pre-structured SKHMC case format.
- Questionnaire to assess prenatal maternal mental state.
- CGI-Improvement (CGI-I) Scale.

**Outcome assessment**

The efficacy of homoeopathic medicines selected based on the prenatal maternal mental state in managing ADHD-related behaviours was evaluated according to improvement in ADHD scores on Vanderbilt ADHD Parent Rating Scale & Strengths and Difficulties Questionnaire (SDQ) and by using CGI-Improvement (CGI-I) scale.

**Statistical techniques and data analysis**

Pre and post-evaluation employing VADPRS and SDQ. CGI-Improvement (CGI-I) scale to assess improvement. T-test. Data representation includes charts, tables and diagrams.

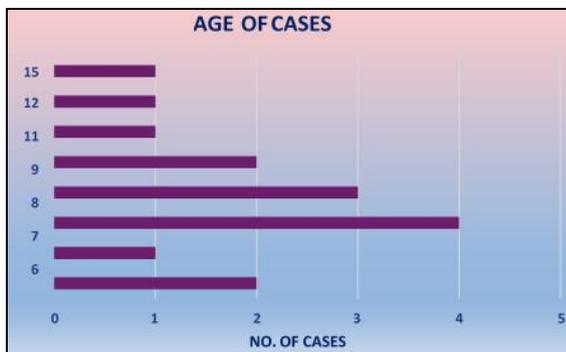
**Ethical issues**

Ethical approval was given by Sarada Krishna Homeopathic Medical College Institutional Ethics Committee.

**Observations and results**

**Table 1:** Age of cases

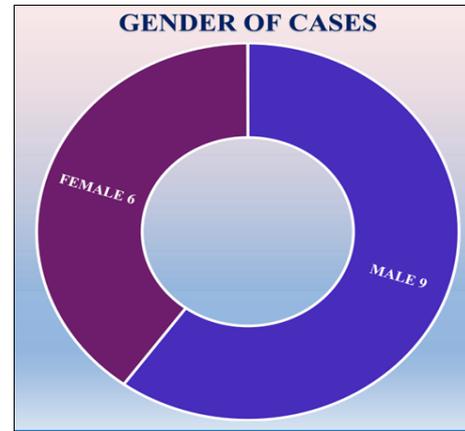
S. No.	Age in years	No. of cases
1	5	2
2	6	1
3	7	4
4	8	3
5	9	2
6	11	1
7	12	1
8	15	1



**Fig 1:** Age of cases

**Table 2:** Gender of cases

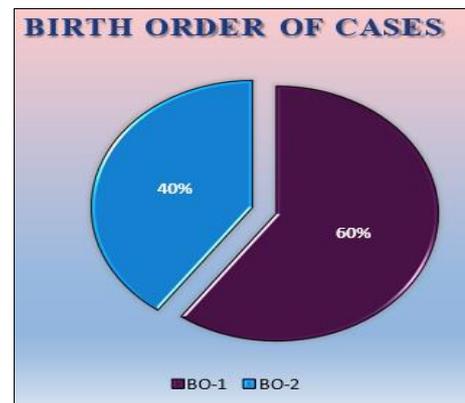
Gender	No. of cases
Male	9
Female	6



**Fig 2:** Gender of cases

**Table 3:** Birth order of cases

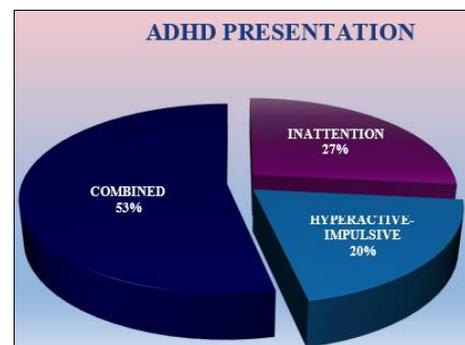
Birth Order	No. of Cases
1	9
2	6



**Fig 3:** Birth order of cases

**Table 4:** ADHD presentation of cases

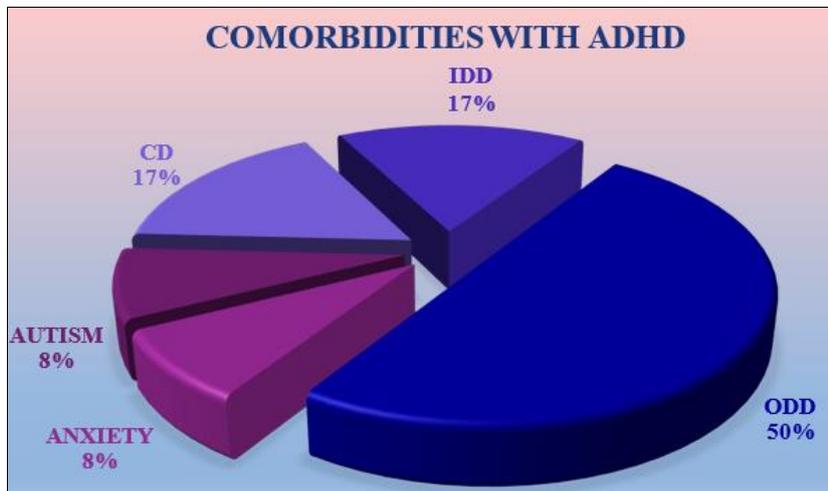
ADHD Presentation	No. of Cases
Hyperactive-Impulsive	3
Inattention	4
Combined	8



**Fig 4:** ADHD presentation of cases

**Table 5:** Comorbidities Associated With Adhd

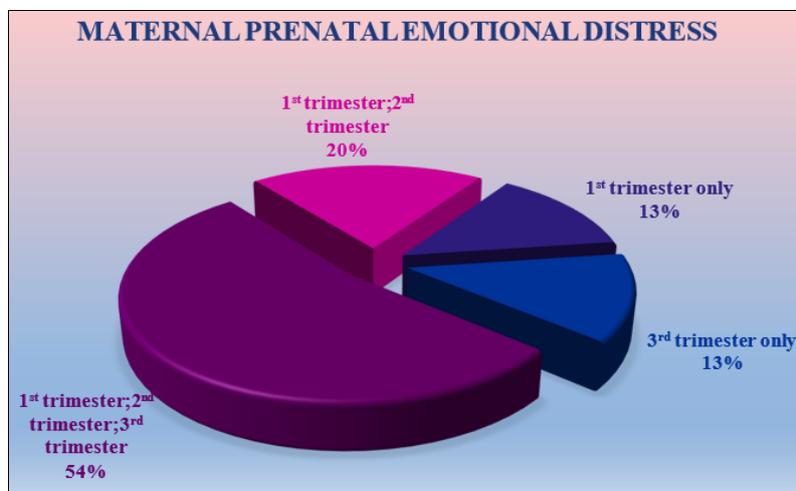
Comorbidity	No. of Cases
Anxiety	1
Autism	1
CD	2
IDD	2
ODD	6



**Fig 5:** Comorbidities associated with ADHD

**Table 6:** Maternal emotional distress during different trimesters

Emotional upset or imbalance during different trimesters	Frequency
1 <sup>st</sup> trimester; 2 <sup>nd</sup> trimester; 3 <sup>rd</sup> trimester	8
1 <sup>st</sup> trimester; 2 <sup>nd</sup> trimester	3
1 <sup>st</sup> trimester only	2
3 <sup>rd</sup> trimester only	2



**Fig 6:** Maternal emotional distress during different trimesters

**Table 7:** Adverse life events during pregnancy

Adverse life events during Pregnancy	No of response
Lack of care and support from husband and/or family	11
Health issues	6
Mental torture by in-laws	5
Family member's death	2
Alcoholism in husband	1
Cheating by husband	1
Financial crisis	1
Husband forced sexual intercourse during pregnancy	1
Husband insisted abortion	1
Husband's accident	1
Interference by in-laws	1
Physical abuse by husband	1
Sexual assault	1

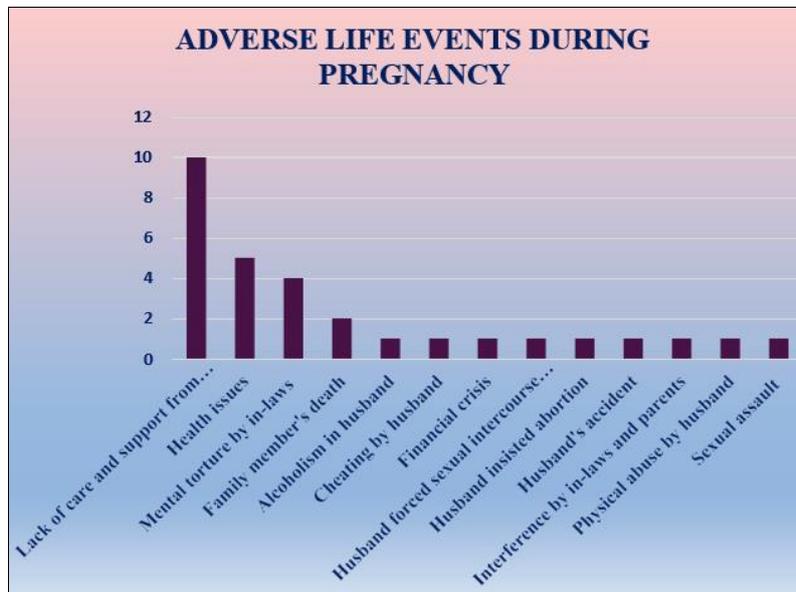


Fig 7: Adverse life events during pregnancy

Table 8: Maternal mental states during different trimesters

Maternal Mental State	Frequency	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester
Brooding in grief	12	7	9	9
Sadness	12	6	8	8
Crying alone	11	9	8	8
Anger	11	8	10	11
Depression	10	7	8	9
Suppressed Anger	9	6	9	7
Irritability	9	7	9	7
Guilty for anger	9	7	9	7
Forsaken feeling	9	8	7	6
Fear	9	3	3	8
Hatred	9	6	6	8
Restlessness	9	5	6	8
Sleeplessness	7	2	2	5
Anxiety	6	2	2	6
Suicidal thoughts/attempts	4			

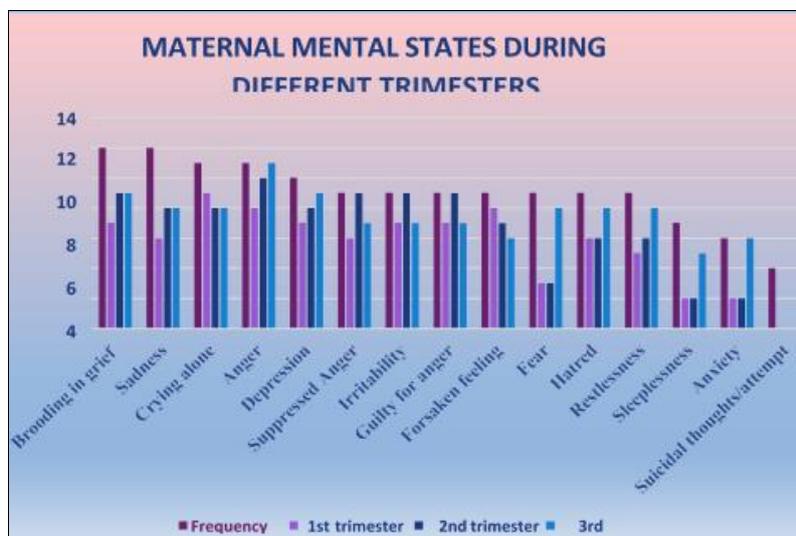
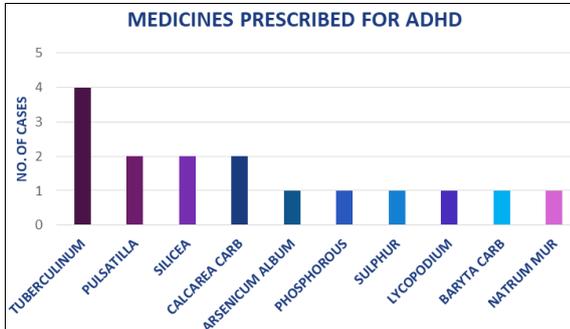


Fig 8: Maternal mental states during different trimesters

**Table 9:** Homoeopathic medicines prescribed

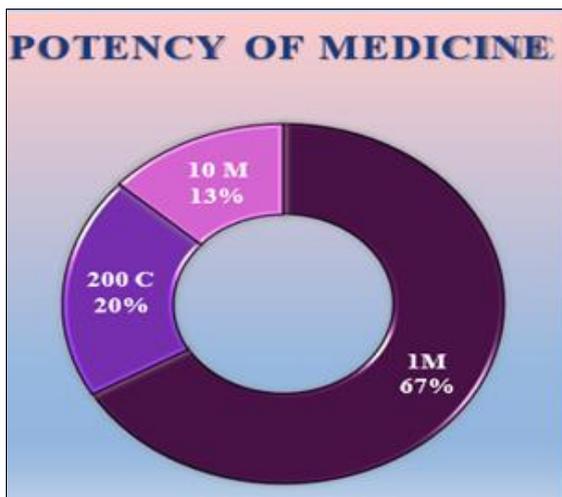
S. No.	Medicine	Frequency
1	Tuberculinum	4
2	Pulsatilla	2
3	Silicea	2
4	Calcarea carb	2
5	Arsenicum album	1
6	Sulphur	1
7	Lycopodium	1
8	Baryta carb	1
9	Natrum mur	1



**Fig 9:** Medicines prescribed for adhd

**Table 10:** potency of homoeopathic medicines

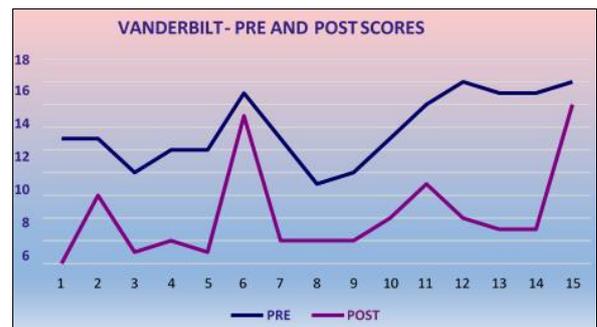
S. No.	Potency	Frequency
1	1 M	10
2	200 C	3
3	10 M	2



**Fig 10:** potency of homoeopathic medicines

**Table 11:** Vanderbilt - pre and post scores

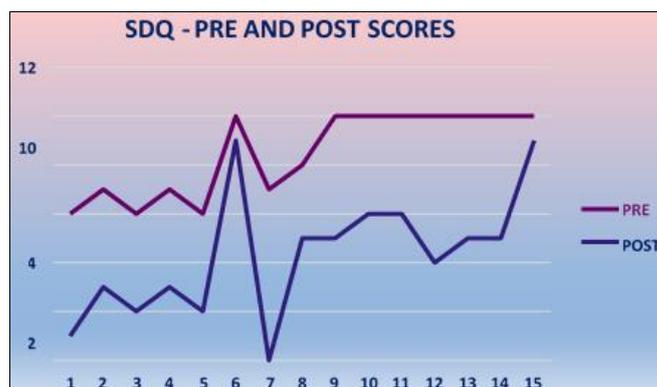
Vanderbilt Score		
S. No.	Pre	Post
1	11	0
2	11	6
3	8	1
4	10	2
5	10	1
6	15	13
7	11	2
8	7	2
9	8	2
10	11	4
11	14	7
12	16	4
13	15	3
14	15	3
15	16	14



**Fig 11:** Vanderbilt - pre and post scores

**Table 12:** SDQ - pre and post scores

SDQ Score		
S. No.	Pre	Post
1	6	1
2	7	3
3	6	2
4	7	3
5	6	2
6	10	9
7	7	0
8	8	5
9	10	5
10	10	6
11	10	6
12	10	4
13	10	5
14	10	5
15	10	9



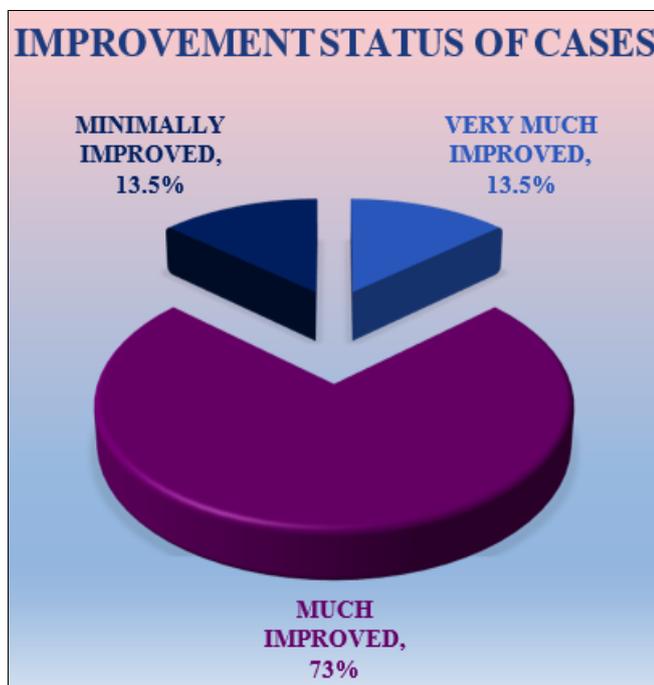
**Fig 12:** SDQ - pre and post scores

**Table 13:** CGI-i scores of cases

S. NO.	CGI-I	Inference
1	1	Very much improved
2	2	Much improved
3	2	Much improved
4	2	Much improved
5	2	Much improved
6	3	Minimally improved
7	1	Very much improved
8	2	Much improved
9	2	Much improved
10	2	Much improved
11	2	Much improved
12	2	Much improved
13	2	Much improved
14	2	Much improved
15	3	Minimally improved

**Table 14:** improvement status of cases

Improvement Status	No. of Cases
Very much improved	2
Much improved	11
Minimally improved	2



**Fig 13:** improvement status of cases

**Statistical Analysis**

**Question to be answered:** Whether Homoeopathic Medicines selected based on the prenatal maternal mental state are effective in the management of ADHD- related behaviours in children

**H0:** Homoeopathic medicines selected based on the prenatal maternal mental state are ineffective in managing ADHD-related behaviours in children.

**Ha:** Homoeopathic medicines selected based on the prenatal maternal mental state effectively manage ADHD-related behaviours in children

**Table 15:** t-Test paired two samples for men's

t-Test: Paired Two Samples for Means	Pre-test	(Vanderbilt) Post-test
Mean	11.866667	4.26666667
Variance	9.4095238	17.4952381
Observations	15	15
Pearson Correlation	0.6209161	
Hypothesized Mean Difference	0	
Df	14	
t Stat	8.8864363	
P(T<=t) one-tail	1.974E-07	
t Critical one-tail	1.7613101	
P(T<=t) two-tail	3.948E-07	
t Critical two-tail	2.1447867	

**Table 16:** t-Test paired two samples for men's

t-Test: Paired Two Sample for Means	Pre-test	(SDQ) Post-test
Mean	8.46666667	4.33333333
Variance	3.123809524	6.80952381
Observations	15	15
Pearson Correlation	0.800169078	
Hypothesized Mean Difference	0	
Df	14	
t Stat	10.02012899	
P(T<=t) one-tail	4.55577E-08	
t Critical one-tail	1.761310136	
P(T<=t) two-tail	9.11154E-08	
t Critical two-tail	2.144786688	

**Comparison with tabled value:** The critical ratio *t* precedes a dispersion with 'n-1' df. The *t* tabled value at the 5 % level of significance is 2.1447867(*t* Critical two-tail) and at the 1% level of significance is 2.976843 for 14 df. The two-tailed P-value is < 0.0001. Since obtained *t* Stat values 8.8864 (Vanderbilt pre and post scores) and 10.02012 (SDQ pre and post scores) are greater than the tabled value at 5% and 1% levels of significance, H0 is rejected

**Inference:** The study verifies considerable improvement in Vanderbilt Parent Rating Scores and SDQ scores after homoeopathic medicines selected based on prenatal maternal mental state. The two-tailed P-value is less than 0.0001. Therefore, this study shows that homoeopathic medicines selected based on the prenatal maternal mental state effectively manage ADHD-related behaviours in children.

**Discussion**

Compared with the existing literature, the following inferences were done:

**Age, gender & adhd presentation**

Among 15 cases, most patients (12 out of 15) were below ten years of age. However, the highest number of cases (4 cases) belonged to age 7. Males (9 cases, 60%) outnumbered females (6 cases, 40%), which is consistent with previous studies [45] [46]. 4 out of 6 girls presented with inattention and 2 girls presented with combined ADHD, similar to the previous findings [49] [50]. In addition, 3 out of 9 boys presented with predominant hyperactive-impulsive

symptoms, and 6 were with combined inattention-hyperactive-impulsive symptoms. Altogether, 4 (girls) cases presented with inattention (27%), 3 (boys) hyperactivity-impulsivity (20%) and 8 (2 girls and 6 boys) with Combined symptoms (53%).

### Birth order

It was observed that ADHD is more in first-born children rather than in second-born, which is consistent with a previous study that showed a twofold risk of ADHD in first-born children<sup>[88]</sup>. 9 cases (60%) were first-born, and 6 (40%) cases were second-born.

### Comorbidities

It was noted that 9 out of 15 cases (60%) have one or more comorbidities associated with ADHD-related behaviours. Comorbidities include ODD (6 cases), CD & IDs (2 Cases each) and anxiety disorder & autism (1 case each). Thus, among the comorbidities associated with ADHD, ODD constituted 50%, followed by CD & ID (17% each) and anxiety & autism (8% each).

### Maternal prenatal emotional distress

54% of mothers of children with ADHD symptoms (8 out of 15) experienced various emotional distress throughout their pregnancy. 20% (3 mothers) experienced emotional distress during the first and second trimesters, 13% in the first and 13% in the third trimester (2 each). All mothers of cases included in the study faced some form of adverse life events. For example, 10 mothers (66.6%) reported a lack of care and support from their husbands and family during their pregnancy. In addition, 5 of them (33.3%) had health issues, and 4 (26.6%) faced mental torture from in-laws during pregnancy. Other adverse life events reported by mothers include family member's death, husband's alcoholism, cheating, physical abuse, financial crisis & sexual assault. Furthermore, mothers reported brooding in grief, sadness, crying alone, anger, depression, suppressed anger, irritability, guilty for anger, forsaken feelings, fear, hatred, restlessness, sleeplessness, anxiety, and suicidal thoughts/attempt in response to various adverse life events during pregnancy. Of which, brooding in grief (12 mothers), sadness (12), crying alone (11), anger (11), & depression (10) were the mental states observed more frequently during the prenatal period. As a matter of concern, 4 of them had suicidal thoughts during pregnancy, and one attempted suicide.

### Homoeopathic medicine and potency

Tuberculin was the medicine prescribed for 4 cases, followed by Pulsatilla, Silicea and Calcarea Carb (2 each). Other medicines prescribed were Arsenicum Album, Sulphur, Lycopodium, Baryta Carb, and Natrum Mur (1 each). 1 M was the choice of potency in most of the cases (10 cases-67%), followed by 200 C (3 cases-20%) and 10 M (2 cases-13%).

### Improvement status

In Vanderbilt Parent Rating Scale and SDQ scores, 2 cases (13.5% approx.) showed marked improvement (>80% improvement), 11 cases (73%) with moderate Improvement (40-80% improvement), and 2 (13.5%) with minimal improvement (<40% improvement). CGI-I scores were consistent with the above findings; 2 cases with very much

improvement, 11 with much improvement and 2 with minimal improvement. On further analysis of 2 minimally improved cases (one male and one female), it was observed that both presented with combined ADHD symptomatology and associated comorbidity of DBD (Disruptive Behaviour Disorder) in the girl and autism in the boy. These comorbidities of DBD and autism might hinder their improvement beyond a limit. Simultaneous cognitive behavioural therapy might be helpful in such cases.

### Statistical inference

Statistical analysis showed extreme significance (The two-tailed P value <0.0001) for Vanderbilt and SDQ pre and post-scores. Since the obtained t Stat values 8.8864 (Vanderbilt pre and post scores) and 10.02012 (SDQ pre and post scores) were more than the tabled values 2.1447867 (t Critical two-tail) at a 5% significance level and 2.976843 at a 1% significance level for 14 df, H<sub>0</sub> was rejected. This study verifies substantial improvement in Vanderbilt Parent Rating Scale Scores and SDQ scores after homoeopathic medicines selected based on prenatal maternal mental state.

### Limitations

- The Covid-19 pandemic situation rendered it difficult in enrolling the cases during the initial phase of the study.
- The cases that came to OPD during the late phase of the study could not be included in the study due to time constraints.
- The generalisation of the results and inference need to be done cautiously as the sample size in this study is small.
- Lack of control group due to limited sample size.
- Since this study focuses on maternal prenatal mental state, other environmental factors contributing to ADHD pathogenesis were not considered.

### Conclusion

This study was intended to assess the effectiveness of homoeopathic medicines selected based on the maternal prenatal mental state in managing ADHD-related behaviours in offspring. After Homoeopathic intervention, all cases improved with which 2 cases with marked improvement (>80% improvement), 11 with moderate improvement (40- 80% improvement), and 2 with minimal improvement (<40% improvement). CGI-I scores were consistent with the above findings. Furthermore, statistical analysis showed extreme significance (The two-tailed P value <0.0001) for Vanderbilt and SDQ pre and post-scores. Therefore, this study concluded that Homoeopathic Medicines selected based on the maternal prenatal mental state can effectively manage ADHD-related behaviours in children.

On analysis of maternal prenatal states contributing to ADHD pathogenesis, it was observed that mothers reported brooding in grief, sadness, crying alone, anger, depression, suppressed anger, irritability, guilty for anger, forsaken feeling, fear, hatred, restlessness, sleeplessness, anxiety, suicidal thoughts/attempt in response to various adverse life events during pregnancy. Of which, brooding in grief, sadness, crying alone, anger, & depression were the mental states observed more frequently during the prenatal period of mothers of ADHD children. As a matter of concern, 4 of

them had suicidal thoughts during pregnancy, and one attempted suicide. Study findings highlight the significance of early pregnancy screening for stressful events to offer prenatal psychosocial support to mothers. In addition, interventions to reduce stressors that a woman faces during pregnancy could minimise the risk of developing ADHD-related behaviours in the offspring.

### Recommendations

Treating mothers who experience psychiatric and emotional imbalance during pregnancy with suitable homoeopathic medicines might be beneficial for preventing neurodevelopmental disorders in their offspring.

As the epigenetic perspective of ADHD and Homoeopathy is evolving, a large sample multidimensional study focusing on all the prenatal, natal & postnatal factors contributing to ADHD pathogenesis and a homoeopathic treatment modality based on these causative factors is recommended.

Future perspective- Further advanced study on the therapeutic effects of homoeopathic medicines on the epigenetic level might form a scientific explanation of the action of homoeopathic medicines.

### Conflict of Interest

Not available

### Financial Support

Not available

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