Section: Psychiatry

Original Research Article

PARENT TRAINING OR PHARMACOTHERAPY OR BOTH: WHAT IS BETTER FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER IN PAEDIATRIC OUTPATIENTS: AN OPEN LABEL PRAGMATIC TRIAL.

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ABSTRACT

Background: Attention Deficit Hyperactivity Disorder (ADHD) is a common childhood disorder characterized by inattention, hyperactivity, and impulsiveness. It often persists into adulthood, leading to various challenges in education, relationships, and family functioning. Treatment typically involves behavior therapy and medications, with a focus on addressing both symptoms and associated difficulties.

Materials and Methods: It was an interventional study conducted in a tertiary care hospital wherein children with ADHD and their parents were recruited pragmatically in three treatment arms i.e. parent training, pharmacotherapy and a combined group. Parent training was given using a module in a group setting over six sessions. In the pharmacotherapy group, Atomoxetine was given and in combined group, the above two treatment modalities were combined. P values less than 0.05 was taken as statistically significant.

Results: Parent training was effective in reducing ADHD symptoms and parental stress. Furthermore a combined intervention was more effective. Conclusions: Parent training intervention mediates improvement in childhood ADHD comparable to pharmacotherapy and reduces parental stress moreover a combined intervention was more effective and feasible in a resource crunch nation like India.

Conclusion: The study found that both pharmacotherapy and parent training effectively manage ADHD in children, with the combined approach showing the greatest improvement. Parent training also reduced parental stress, emphasizing its role in a multimodal ADHD management strategy.

Keywords: Attention Deficit Hyperactivity Disorder, Parent Training, Pharmacotherapy, Quality of Life.

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a common disorder that, although most frequently diagnosed during childhood, affects individuals through adolescence and adulthood. It is characterized by core symptoms of inattention, over-activity and/or impulsiveness that are age inappropriate, persistent and pervasive.[1] It is one of the most common behavioral disorder of childhood, estimated to affect 3 to 5 percent of school-age children. In the long term, ADHD is associated with a significant risk of educational failure, interpersonal problems, parental stress, mental illness and delinquency creating a substantial burden on families as well as on health, social care, and criminal justice systems. The exact cause and patho-physiology of ADHD is still obscure. Various biological, psychosocial and a complex interaction of these factors have been posited in varying degrees in the causation of ADHD.[2]

There are two generally used diagnostic criteria for ADHD that includes the International Classification of Diseases and Related Health Problems (ICD-10) 6 and Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria.[3] The ICD-10 presents

details on the diagnosis of hyperkinetic disorders and the DSM-5 criteria define ADHD more broadly to include three subtypes: a combined subtype in which all three core signs are present, a predominantly inattentive subtype in which inattention is present but not hyperactivity/impulsivity and a predominantly hyperactive-impulsive subtype in which hyperactivity/impulsivity are present but not inattention.[4]

Many a times, ADHD remains under/over-diagnosed or mis-diagnosed, due to high rates of co-morbidity, which have overlapping clinical presentation. Overall, 67% of ADHD children have at least one other mental health or neuro-developmental disorder compared to 11% of children without ADHD. According to one meta-analysis, ADHD persists at the rate of 65% during adulthood if ADHD in partial remission is included. Persistence of ADHD is related to symptom severity, ADHD subtype, family history, psychosocial adversity, psychiatric comorbidities, and/or parental psychopathology.[5]

ADHD not only has detrimental effects on the overall development of child, but it also hampers family functioning. Studies have concluded that the presence of a child with ADHD results in increased likelihood of disturbances to family and marital functioning, disrupted parent-child relationships, reduced parenting efficacy, and increased levels of parent stress, particularly when ADHD is co-morbid with conduct problems.[6]

The current clinical practice guideline for ADHD by American Academy of Pediatrics recommends that for children aged 4-5 years, evidence based parent and/or teacher administered behavior therapy should be prescribed as the first line of treatment. FDA approved stimulant medications should be prescribed if behavior interventions do not provide significant improvement and there is moderate to severe continuing disturbance in functioning. For children 6-11 years of age, the guideline recommends that the preferred treatment should be a combination of FDA approved medications and evidence based parent and/or teacher administered behavior therapy. Guideline reports that evidence is strong for stimulant medications and less strong for atomoxetine, extended-release Guanfacine and extended Clonidine.[7]

Besides pharmacotherapy, there are other treatment options available which have been found to be effective and it includes various psychosocial interventions that aim at improving child behavior and help parents as well as teachers to deal with children with ADHD. Psychosocial treatment is a critical part of management for ADHD. Behavioral treatment for ADHD is important for several reasons. First, children with ADHD face problems in daily life that go well beyond their symptoms of inattentiveness, hyperactivity and impulsivity.[8] They face problems like poor academic performance and difficult behavior at school, poor relationships with peers and siblings. Failure to obey adult requests, and poor relationships with their parents leads to poor handling of the child by parents. It is important to handle these problems as it affects course and outcome in terms of developing comorbidities like oppositional defiant disorder, substance use disorder, conduct disorder, and personality disorder.[9]

Psychosocial Interventions include parent Training, school Intervention, and child Intervention. Behavioral parent training programs have been used for many years and have been found to be very effective. Even though many of the ideas and techniques taught in behavioral parent training may appear common sense parenting techniques, most parents need careful teaching and support to learn parenting skills and use them consistently. Help from a mental health professional is often necessary.[10]

School Interventions deals with teaching skills to the school teachers regarding identifying and dealing children with ADHD in the classroom. In the child intervention, the aim is behavior change, such as organizing tasks or schoolwork in a better way or dealing with emotionally charged events when they occur.[11] With this background we undertook this study to With this background, we undertook this study to evaluate the effectiveness of parent training, pharmacotherapy, or a combination of both in managing Attention Deficit Hyperactivity Disorder in pediatric outpatients.

MATERIALS AND METHODS

We conducted this prospective, comparative, open label, pragmatic design study in which Patients were inducted from those attending the Child Guidance Clinic of the department of psychiatry of the Government Medical College and Hospital (GMCH), Chandigarh. The sample consisted of 60 patients with a diagnosis of ADHD according to Diagnostic and Statistical Manual of Mental Disorders-5, who met the inclusion and exclusion criteria.

Seventy eight consecutive patients with the diagnosis of ADHD, moderate to severe type as per DSM-5 were taken up in the study as per inclusion and exclusion criteria. Patients' socio-demographic and clinical details were recorded on the Socio-demographic Performa used in the Department of Psychiatry, and the Clinical Performa designed for the study respectively.

The study offered three treatment options: pharmacotherapy alone, parent training alone, or a combination of both, with 60 patients completing the study.

I. Pharmacotherapy Alone

Patients in this group were prescribed DCGI-approved Atomoxetine, starting at 10 mg/day, and the dose was adjusted based on clinical response and tolerability, with a maximum of 30 mg/day. If

severe adverse events occurred, or there were individual concerns, Methylphenidate was offered as an alternative, starting at 5 mg/day, with a maximum dose of 10 mg/day.

II. Parent Training Alone

This group underwent a structured parent training program designed specifically for managing children with ADHD. The training module was developed after extensive workshops with Pediatricians, Psychiatrists, Psychologists, and feedback from parents. The module consisted of six weekly sessions:

Session 1: ADHD education, symptoms, and treatment options.

Session 2: General behavior modification principles and study/teaching strategies.

Session 3: ABC charting of behaviors and positive reinforcement techniques.

Session 4: Advanced behavior modification techniques (reward systems, time-out, etc.).

Session 5: Exercises to improve inattention, like grain sorting and stringing beads.

Session 6: Activities for managing hyperactivity, including games like snakes and ladders.

III. Combined Group

Patients in this group received both pharmacological treatment with Atomoxetine or Methylphenidate and participated in the full parent training program, integrating both approaches to provide comprehensive management for ADHD.

The study utilized several tools to assess patients and their families. A socio-demographic performa was used to collect basic information, while a clinical performa recorded vital parameters like weight, blood pressure, and pulse, along with laboratory investigations (hemogram, liver, and kidney function tests) and adverse events. The Vanderbilt ADHD Parent Rating Scale (VADPRS)12 assessed ADHD symptoms, oppositional defiant disorder, conduct disorder, and anxiety/depression, alongside academic performance and relationships. The WHOQOL-BREF,[13] evaluated the quality of life across physical, psychological, social, and environmental domains. The Chandigarh Parent Rating Stress Scale (CPRSS),[14] developed for this study, assessed parental stress with 48 culturally relevant items. An Adverse Effects Checklist (AEC) monitored drug-related side effects in the pharmacotherapy and combined treatment groups. Drug changes were required for two patients due to intolerability and poor efficacy.

The subsequent follow-ups were carried out at the end of 2 weeks, 6 weeks and 10 weeks. At each follow-up, improvement in symptoms was assessed using VADPRS and percentage change in scores from the baseline was calculated. In similar manner improvement in parental stress and their quality of life were assessed using CPRSS and WHO-QOL Bref Hindi version scale respectively and percentage change in the scores from baseline was calculated. Furthermore patients from medication and combined groups were assessed for the presence and severity of adverse effects on the adverse effect checklist at 2, 6 and 10 weeks. For statistical purposes p value less than 0.05 was taken as statistically significant.

Inclusion Criteria

1. Patients from 6 to 14 years of age with the diagnosis of ADHD moderate to severe type.
2. Patients whose parents were willing to provide informed consent for participating in the study and assent from the child.

Exclusion Criteria

1. Patients with history of non-response or adverse drug reactions to methylphenidate or atomoxetine in the past.
2. Patients with history of heart disease, seizures, bipolar affective disorder, psychotic illness, pervasive developmental disorder, substance abuse, anxiety, mental retardation or tic disorder.
3. Presence of major mental illness, substance dependence, major adjustment and relationship (interpersonal) issues in the parents.

RESULTS

All 3 groups were comparable regarding age of presentation, gender distribution, religion, type of family, birth order, number of siblings and educational year. However, in Parent training only group, all patients (100%) were from urban background with higher percentage of patients from semi-urban in Combined group (25%) and rural background (25%) in Medication alone group ($X2=23.693$; $df =2$; $p < 0.000$**). [Table 1]

Groups were comparable regarding IQ distribution. Furthermore 35% had at least one comorbid illness. ODD/Conduct disorder being the most frequently observed comorbidity (15%) followed by SLD (10%) in all the patients. Also the three groups were comparable with respect to the comorbid illness. [Table 2]

All the three groups were comparable regarding the age group, education, occupation and marital status of the parents. [Table 3]

The most common subtype of ADHD was severe mixed type in all the three groups. Additionally all the three groups were comparable regarding subtype of ADHD. [Table 4]

The parameters measured were weight, hemoglobin, platelet count, total leukocyte count (TLC), urea, creatinine, total serum bilirubin, alkaline phosphatase, SGOT, SGPT, total serum protein, albumin, pulse rate, systolic and diastolic blood pressure. All the three groups were comparable on all baseline laboratory parameters.

The Vanderbilt ADHD Parent Rating Scale (VADPRS) score parameters measured were inattention, hyperactivity/impulsivity, oppositional defiant disorder, conduct disorder, anxiety and depression, performance, and total score. All the three groups were comparable on Vanderbilt ADHD

Parent Rating Scale (VADPRS) score. At baseline the three groups didn't differ significantly on the VADPRS total and domain wise scores. [Table 5]

Across all groups, significant improvements were observed in the Vanderbilt ADHD Parent Rating Scale (VADPRS) scores from baseline to the end of 10 weeks. In the Medication alone group, there was a marked improvement in the Inattention domain (20.75±4.25 vs 15.70±3.48; p=0.001) and the overall VADPRS score (57.30±15.76 vs 44.15±12.03; p=0.023). In the Parent Training group, highly significant improvement was noted in the Inattention domain (20.70±3.197 vs 15.40±2.93; p=0.000) and hyperactive/impulsivity domain (18.45±5.404 vs 13.55±4.15; p=0.006), with significant overall improvement at week 6 (p=0.029) and highly significant improvement at week 10 (p=0.000). In the combined group, both Inattention (18.65±5.11 vs 12.80±3.02; p=0.001) and hyperactive/impulsivity domains (18.55±5.33 vs 13.65±3.96; p=0.016) showed significant improvement, with significant overall improvement at week 6 (p=0.035) and highly significant improvement by week 10 (p=0.000). [Table 6]

There was highly significant decline in CPRSS stress responses from week 6 onwards (p-value=0.000**) in medication and combined groups and there was highly significant decline in the CPRSS stress responses from week 2 (p-value=0.000**) in Parent training group. [Table 7]

However the scores of the psychological health domain was significantly lower in medication group compared to the other two groups with p value of 0.036*. [Table 8]

The changes in the WHO-QOL BREF total scores was significantly higher in parent training group compared to other two group at week 2 and week 6. However the three groups were comparable for the changes in the scores at week 10. [Table 9]

The most commonly reported adverse events were Headache, decreased appetite, fatigue, pain abdomen and others with decreasing frequency in both Medication and combined groups. Furthermore, the two groups were comparable for the frequency of distribution of adverse effects at first follow-up. Most common adverse event was headache (20% in medication group, 45% in combined group), followed by decreased appetite, fatigue and others in both the groups. Also no significant in-between group differences were noted. Most common adverse event was fatigue (5% in medication group, 15% in combined group). No significant differences were observed. Also the occurrence of adverse effects declined by the end of 10 weeks. [Table 10]

Table 1: Socio-demographic profile of the subjects across the three groups

Socio-demographic variables	Medication group (A) (n=20)	Combined group (B) (n=20)	Parent training group (C) (n=20)	Test value	p-value (df)
Age (years) mean ±SD	9.80±2.24	10.05±1.91	9.10±2.10	1.115[@]	0.335 (57)
Sex n(%)				3.840[#]	0.147 (2)
Male	18(90.0%)	18(90.0%)	14(70.0%)		
Female	2(10.0%)	2(10.0%)	6(30.0%)		
Birth Order n(%)				11.19[#]	0.245 (4)
1	15(75.0%)	13(65.0%)	11(55.0%)		
2	1(5.0%)	7(35.0%)	8(40.0%)		
≥ 3	4(20.0%)	0(0.0%)	1(5.0%)		
No. of Siblings n(%)				5.3[#]	0.257 (4)
0	6(30.0%)	3(15.0%)	7(35.0%)		
1	10(50.0%)	16(80.0%)	11(55.0%)		
≥ 2	4(20.0%)	1(5.0%)	2(10.0%)		
Educational year n(%)				7.33[#]	.835 (12)
1	4(20.0%)	1(5.0%)	4(20.0%)		
2	2(10.0%)	1(5.0%)	3(15.0%)		
3	2(10.0%)	3(15.0%)	4(20.0%)		
4	4(20.0%)	4(20.0%)	4(20.0%)		
5	1(5.0%)	3(15.0%)	1(5.0%)		
6	4(20.0%)	3(15.0%)	2(10.0%)		
≥ 7	3(15.0%)	5(25.0%)	2(10.0%)		
Residence n(%)				16.835[#]	0.002[*] (4)
Urban	15(75.0%)	12(60.0%)	20(100.0%)		
Rural	5(25.0%)	3(15.0%)	0(0.0%)		
Semi-Urban	0(0.0%)	5(25.0%)	0(0.0%)		
Tricity n(%)				23.693[#]	0.000** (2)
Within	7(35%)	17(85%)	20(100%)		
Outside	13(65%)	3(15%)	0(0%)		
SES n (%)				1.56[#]	0.458 (2)
LSES/MSES	18 (90.0%)	15(75.0%)	16(80.0%)		
USES	2(10.0%)	5(25.0%)	4(20.0%)		
Religion n(%)				2.894[#]	0.235 (2)
Hinduism	14(70.0%)	17(85.0%)	18(90.0%)		
Sikhism	6(30.0%)	3(15.0%)	2(10.0%)		
Family n(%)				0.141[#]	0.122 (2)

Nuclear	14(70.0%)	10(50.0%)	16(80.0%)		
Joint/Extended	6(30.0%)	10(50.0%)	4(20.0%)		
Significance * = < 0.05, ** = < 0.01, * = < 0.001, #-Chi-square test, @-Anova test**					

Table 2: Comparison of the clinical variables (IQ and comorbid illness) of the patients across the three groups using Chi-square test.

IQ	Medication group (A) n (%)	Combined group (B) n (%)	Parent training group (C) n (%)	χ^2value	P-values (df)
Average	4(20.0%)	4(20.0%)	5(25.0%)		
Dull Average	7(35.0%)	9(45.0%)	6(30.0%)		
Borderline	2(10.0%)	3(15.0%)	2(10.0%)		
Above average	7(35.0%)	4(20.0%)	7(35.0%)	2.076	0.913 (6)
Comorbid Illness Present	9(45.0%)	8(40.0%)	4(20.0%)	3.077	0.215 (2)
SLD	3(15%)	3(15%)	1(5%)		
ODD/Conduct disorder	3(15%)	4(20.0%)	2(10%)	3.403	0.756 (6)
Depression/Anxiety disorder	2(10%)	1(5%)	0 (0%)		
Others	1(5%)	0 (0%)	1(5%)		
Significance * = < 0.05, ** = < 0.01, * = < 0.001**					

Table 3: Socio-demographic profile of Parents of the subjects across the three groups using Chi-square test

Parent related Variables	Medication group (A) (n=20) n (%)	Combined group (B) (n=20) n (%)	Parent training group (C) (n=20) n (%)	χ^2value	P-value (df)
Father's Age					
31-40 years	13(65.0%)	12(60.0%)	12(60.0%)	0.141	0.932 (2)
41-50 years	7(35.0%)	8(40.0%)	8(40.0%)		
Mother's Age					
31-40 years	15(75.0%)	15(75.0%)	16(80.0%)	0.186	0.911 (2)
41-50 years	5(25.0%)	5(25.0%)	4(20.0%)		
Marital Status					
Married	19(95.0%)	19(95.0%)	19(95.0%)		
Separated and/or Widowed	1(5.0%)	1(5.0%)	1(5.0%)	0.000*	1.000 (2)
Father's Education					
Below 10+2	5(25.0%)	1(5.0%)	1(5.0%)		
10+2	5(25.0%)	5(25.0%)	2(10.0%)		
Graduate and/or Post Graduate	10(50.0%)	14(70.0%)	17(85.0%)	7.88	0.096 (4)
Mother's Education					
Below 10+2	7(35.0%)	3(15.0%)	4(20.0%)		
10+2	5(25.0%)	3(15.0%)	3(15.0%)		
Graduate and/or post-graduate	8(40.0%)	14(70.0%)	13(65.0%)	4.36	0.359 (4)
Father's Occupation					
Professional	13(65.0%)	9(45.0%)	14(70.0%)		
Un-Skilled labour, Private job, Business/Self-employed.	7(35.0%)	11(65.0%)	6(30.0%)	2.92	0.232 (2)
Mother's Occupation					
Employed	4(20.0%)	9(45.0%)	5(25.0%)		
Household	16(80.0%)	11(55.0%)	15(75.0%)	3.33	0.189 (2)

Table 4: Distribution of ADHD subtype across the three groups using Chi-square test

ADHD Subtype	Medication group (A) n (%)	Combined group (B) n (%)	Parent training group (C) n (%)	χ^2value	p-value (df=10)
Moderate Inattention type	1(5.0%)	0(0.0%)	0(0.0%)		
Moderate Hyperactive/impulsive type	0(0.0%)	0(0.0%)	1(5.0%)		
Moderate mixed type	5(25.0%)	7(35.0%)	7(35.0%)		
Severe Inattention type	6(30.0%)	1(5.0%)	1(5.0%)	15.568	0.113
Severe Hyperactive/ Impulsive type	0(0.0%)	0(0.0%)	2(10.0%)		
Severe mixed type	8(40.0%)	12(60.0%)	9(45.0%)		

Table 5: Baseline VADPRS Total and domain wise scores across the three groups using ANOVA and multiple comparisons post hoc tests

VADPRS Scores (domain wise and total)	Medication group (A) Mean ±SD	Combined group (B) Mean±SD	Parent training group (C) Mean ±SD	'f' value	p-values			
					A vs B vs C (df=57)	A vs B (df=38)	A vs C (df=38)	B vs C (df=38)
Inattention	20.75±4.25	20.70± 3.19	18.65±5.11	1.582	0.214	1.000	0.374	0.401
Hyperactive/ Impulsivity	17.20±7.09	18.45± 5.40	18.55±5.33	0.314	0.731	1.000	1.000	1.000
Oppositional defiant disorder	11.80±6.44	11.20± 4.87	10.30±5.06	0.377	0.688	1.000	1.000	1.000
Conduct disorder	3.35±2.70	3.75±2.09	2.75±2.02	0.963	0.388	1.000	1.000	0.521
Anxiety and depression	4.20±4.92	3.25±3.84	2.80±2.48	0.680	0.511	1.000	0.774	1.000
Performance	20.00±2.69	19.85± 2.41	20.70±2.15	0.697	0.502	1.000	1.000	0.820
Total	57.30±15.76	57.35± 11.65	53.05± 12.08	0.690	0.506	1.000	0.949	0.932
Significance * = < 0.05, ** = < 0.01, *** = < 0.001								

Table 6: Changes in total and domain wise VADPRS scores across time in studied groups using ANOVA and Post-hoc multiple comparisons test

VADPRS		Baseline Mean± SD	2Weeks Mean ±SD	6Weeks Mean ±SD	10Weeks Mean ±SD	'f' value	P- values			
							Baseline vs 2 weeks vs 6 weeks vs 10 weeks (df=76)	Baseline vs 2 weeks	Baseline vs 6 weeks	Baseline vs 10 weeks
Medical Alone Group	Inattention	20.75± 4.25	20.15± 4.26	17.60± 3.80	15.70± 3.48	6.974	0.000	1.000	0.084	0.001*
	Hyperactive/ Impulsive	17.20± 7.09	17.55± 6.68	16.50± 6.07	13.75± 5.11	1.504	0.220	1.000	1.000	0.519
	Oppositional defiant disorder	11.80± 6.44	11.60± 5.80	10.35± 5.11	9.15± 4.80	0.975	0.409	1.000	1.000	0.821
	Conduct disorder	3.35± 2.70	2.80± 1.85	2.70± 1.63	2.35± 1.60	0.863	0.464	1.000	1.000	0.703
	Anxiety and depression	4.20± 4.92	4.10± 5.11	3.65± 4.67	3.20± 4.55	0.182	0.909	1.000	1.000	1.000
	Performance	20.00± 2.69	19.60± 1.98	20.40± 2.01	20.95± 2.52	0.649	0.586	1.000	1.000	1.000
	Total	57.30± 15.76	56.20± 14.97	50.80± 12.80	44.15± 12.03	3.714	0.015	1.000	0.872	0.023*
Combined Group	Inattention	20.75± 4.25	20.15± 4.26	17.60± 3.80	15.70± 3.48	6.974	0.000	1.000	0.084	0.001*
	Hyperactive/ Impulsive	17.20± 7.09	17.55± 6.68	16.50± 6.07	13.75± 5.11	1.504	0.220	1.000	1.000	0.519
	Oppositional defiant disorder	11.80± 6.44	11.60± 5.80	10.35± 5.11	9.15± 4.80	0.975	0.409	1.000	1.000	0.821
	Conduct disorder	3.35± 2.70	2.80± 1.85	2.70± 1.63	2.35± 1.60	0.863	0.464	1.000	1.000	0.703
	Anxiety and depression	4.20± 4.92	4.10± 5.11	3.65± 4.67	3.20± 4.55	0.182	0.909	1.000	1.000	1.000
	Performance	20.00± 2.69	19.60± 1.98	20.40± 2.01	20.95± 2.52	0.649	0.586	1.000	1.000	1.000
	Total	57.30± 15.76	56.20± 14.97	50.80± 12.80	44.15± 12.03	3.714	0.015	1.000	0.872	0.023*
Parent Training Group	**Inattention**	18.65± 5.11	18.30± 5.08	15.55± 4.33	12.80± 3.02	7.459	0.000**	1.000	0.188	0.001*
	Hyperactive/ Impulsivity	18.55± 5.33	18.05± 5.66	16.10± 4.87	13.65± 3.96	3.970	0.011	1.000	0.750	0.016*
	Oppositional defiant disorder	10.30± 5.06	9.65± 4.82	8.15± 4.18	7.20± 3.12	2.088	0.109	1.000	0.738	0.165
	Conduct disorder	2.75± 2.02	2.50± 1.73	2.05± 1.61	1.85± 1.39	1.166	0.328	1.000	1.000	0.592
	Anxiety/ depression	2.80± 2.48	2.55± 2.37	1.65± 1.79	1.25± 1.52	2.486	0.067	1.000	0.506	0.126
	Performance	20.70± 2.16	20.75± 2.12	22.05± 2.26	22.50± 1.79	3.824	0.013	1.000	1.000	1.000
	Total	53.05± 12.08	51.05± 11.96	43.50± 10.34	36.75± 7.48	9.856	0.000**	1.000	0.035*	0.000**

Table 7: Changes in the Percentage stress responses of the CPRSS across time for Parent training only group (C) using Mc Nemar Test

	CPRSS item response, "Yes."	Parent training group (C). n (%)	P-values			Overall change and level of significance
			Baseline vs 2 weeks	Baseline vs 6 weeks	Baseline vs 10 weeks	
medication alone group (A)	**Baseline**	382 (39.8%)	0.245	0.000**	0.000**	Significance * = < 0.05, ** = < 0.01, *** = < 0.001
	2 weeks	372 (38.8%)				
	6 weeks	247 (25.7%)				
	10 weeks	116 (12.1%)				
combined group (B)	**Baseline**	437 (45.5%)	**0.383**	**0.000****	**0.000****	Significance * = < 0.05, ** = < 0.01, *** = < 0.001
	2 weeks	432 (45.0%)				
	6 weeks	127 (13.2%)				
	10 weeks	110 (11.5%)				
training only group (C)	**Baseline**	327 (34.1%)	0.000**	0.000**	0.000**	Significance * = < 0.05, ** = < 0.01, *** = < 0.001
	2 weeks	285 (29.7%)				
	6 weeks	135 (14.1%)				
	10 weeks	89 (9.3%)				

Table 8: Baseline WHO-QOL BREF total and domain wise scores across the three groups using ANOVA and multiple comparisons post-hoc tests

WHO-QOL (domain wise and total scores)	Medication group (A) Mean ±SD	Combined group (B) Mean ±SD	Parent training group (C) Mean ±SD	'f' value	p-values			
					A vs B vs C (df=57)	A vs. B (df=38)	A vs. C (df=38)	B vs. C (df=38)
Physical	13.05± 2.29	14.30± 1.56	13.70± 2.11	1.814	0.172	0.055	0.212	0.522
Psychological	12.05± 2.09	13.15± 1.09	13.60± 2.35	3.514	0.036*	0.098	0.012*	0.093
Social relationships	12.47± 2.32	13.00± 1.72	12.25± 2.43	0.627	0.538	0.397	0.898	0.240
Environmental	12.16± 1.80	13.20± 2.19	13.15± 1.79	1.716	0.189	0.075	0.083	0.912
Total	80.20± 11.33	87.20± 9.41	86.60± 10.55	2.751	0.072	0.051	0.083	0.755
Significance * = < 0.05, ** = < 0.01, *** = < 0.001								

Table 9: Changes in WHO-QOL BREF total scores of WHO-QOL Bref scale across time for the three groups

Total scores of WHO-QOL Bref scale	Medication group (A) Mean ±SD	Combined group (B) Mean ±SD	Parent training group (C) Mean ±SD	'f' value	P-values			
					A vs B vs C (df=57)	A vs B (df=38)	A vs C (df=38)	B vs C (df=38)
Baseline	80.20± 11.33	87.20±9.41	86.60±10.55	2.75	0.072	0.116	0.174	1.000
2 Weeks	81.20± 12.41	87.20±9.38	90.05±11.25	3.322	0.043*	0.277	0.043	1.000
6 Weeks	81.45± 10.83	87.15±8.15	88.75±9.35	3.260	0.046*	0.189	0.055	1.000
10 Weeks	82.40± 9.61	86.80±7.56	89.10±8.56	3.124	0.052	0.335	0.051	1.000
Significance * = < 0.05, ** = < 0.01, *** = < 0.001								

Table 10: Frequency of adverse effects in medication alone and combined groups at the end of 2 weeks, 6 weeks and 10 weeks

Adverse event	2 weeks			6 weeks			10 weeks		
	Medication Group (A) n (%)	Combined Group (B) n (%)	p-value	Medication Group (A) n (%)	Combined Group (B) n (%)	p-value	Medication Group (A) n (%)	Combined Group (B) n (%)	p-value
Headache	8(40.0%)	13(65.0%)	0.113	4(20.0%)	9(45.0%)	0.091	0(0.0%)	1(5.0%)	0.311
Decreased appetite	7(35.0%)	10(50.0%)	0.337	4(20.0%)	6(30.0%)	0.465	1(5.0%)	3(15.0%)	0.292
Fatigue	8(40.0%)	7(35.0%)	0.744	4(20.0%)	6(30.0%)	0.465	0(0.0%)	0(0.0%)	-
Pain abdomen	5(25.0%)	6(30.0%)	0.723	1(5.0%)	6(30.0%)	0.091	0(0.0%)	0(0.0%)	-
Others	2(10.0%)	3(15.0%)	0.633	1(5.0%)	1(5.0%)	1.000	0(0.0%)	0(0.0%)	-
Insomnia	1(5.0%)	2(10.0%)	1.000	0(0.0%)	1(5.0%)	0.311	0(0.0%)	0(0.0%)	-
Nausea	1(5.0%)	1(5.0%)	1.000	0(0.0%)	0(0.0%)	-	0(0.0%)	0(0.0%)	-
Vomitting	1(5.0%)	1(5.0%)	1.000	0(0.0%)	1(5.0%)	1.000	0(0.0%)	0(0.0%)	-
Cough	0(0.0%)	0(0.0%)	-	0(0.0%)	0(0.0%)	-	0(0.0%)	0(0.0%)	-
Significance * = < 0.05, ** = < 0.01, *** = < 0.001									

DISCUSSION

The present study aimed to evaluate the effectiveness of parent training as a non-pharmacological intervention for managing ADHD in children and to compare it with pharmacotherapy and a combination of both interventions. The study utilized three treatment arms: pharmacotherapy (Atomoxetine), parent training, and a combination of both, with the goal of determining the comparative efficacy of multimodal interventions. The sample consisted of 78 enrolled patients, out of which 60 completed the study, with a dropout rate of 23%. Notably, the majority of dropouts occurred within the first two weeks due to reasons such as distance from the study center or reluctance to start medication.

Cognitive profiles indicated that 40% of participants had an IQ between 80 and 89, categorized as dull-average intelligence, with none exhibiting intellectual disability. Around 35% of the children had comorbid conditions, with oppositional defiant disorder (ODD) being the most common (15%), followed by specific learning disabilities (SLD) and anxiety/depression. ADHD predominantly presented as the combined/mixed subtype (80%), with mixed subtype being more frequent in the combined group. Ingeborgrud CB et al conducted a longitudinal study to investigate the link between ADHD symptoms and anxiety/depression in children from ages 3 to 8.15 For this purpose, the authors undertook a study involving 783 children from the Norwegian Mother, Father, and Child Cohort Study, assessing parent and teacher reports of symptoms at ages 3 and 8.The study found that early anxiety, depressive, and ADHD symptoms predicted later anxiety and depression, with parent-reported symptoms being the strongest indicators. On the basis of these findings, the authors concluded that early screening for anxiety and depressive symptoms is crucial in children with or without ADHD. Similar connection between cognitive profiles of patients with ADHD was also reported by the authors such as Quenneville AF et al16 and Reimherr FW et al.[17]

Treatment response varied across the three groups. Patients in the medication group were started on Atomoxetine, with significant improvement noted by the 10th week. The total ADHD symptoms reduced by 21%, with the inattention domain showing a 23% decline. These findings were consistent with previous studies that demonstrated Atomoxetine's efficacy, though the slower response in the current study may be attributed to lower initial doses and gradual titration. Ruth Cunill et al conducted a meta-analysis to compare atomoxetine with placebo in adults with ADHD, focusing on discontinuation rates. For this purpose, the authors undertook a study that included 12 randomized controlled trials with 3,375 patients, examining all-cause discontinuation, efficacy in reducing ADHD symptoms, and safety. The study found that discontinuation rates were higher with atomoxetine (OR = 1.39) and adverse events-induced discontinuation was more frequent (OR = 2.57). Atomoxetine showed modest efficacy in symptom reduction. On the basis of these findings, the authors concluded that atomoxetine has a poor benefit-risk balance for ADHD.[18]

IN this study we found parent training was also effective, leading to an 18% and 25% reduction in total ADHD symptoms at weeks 6 and 10, respectively. Inattention and hyperactivity/impulsivity scores improved significantly by the end of the study, consistent with findings from earlier studies on parent training's efficacy. The parent training involved structured weekly group sessions designed to address behavioral, emotional, and educational problems linked to ADHD. The group format facilitated interaction and feedback among parents and therapists, proving efficient in a resource-constrained setting. Similar beneficial effects of parent training were also reported by the authors such as Zwi M et al,[19] and Ciesielski HA et al.[20]

The combined intervention group, which involved both pharmacotherapy and parent training, showed significant improvements in total ADHD symptoms, with a 25% reduction by week 10. This finding aligned with most research supporting multimodal interventions as more effective than individual treatments. However, inattention symptoms were reduced more significantly in the parent training group compared to the other two groups by week 10, a finding that contrasts with previous studies. This discrepancy might be attributed to potential compliance issues with medications, although no objective assessment of compliance was conducted.

van den Hoofdakker BJ et al conducted a randomized controlled study to evaluate the effectiveness of behavioral parent training (BPT) as an adjunct to routine clinical care (RCC) for children with ADHD.[21] For this purpose, the authors undertook a study with 94 children aged 4-12, randomly assigned to either 5 months of BPT plus RCC or RCC alone. The study found that BPT + RCC significantly reduced behavioral ($p = .017$) and internalizing problems ($p = .042$), but not ADHD symptoms or parenting stress. On the basis of these findings, the authors concluded that adjunctive BPT enhances routine ADHD treatment effectiveness.[21] Similar beneficial effects of BPT in cases of children with ADHD have also been reported by the authrs such as Hornstra R et al,[22] and Mah JWT et al.[23]

The study also assessed the quality of life (QoL) of parents using the WHOQOL Bref scale. At baseline, the psychological health domain scores were significantly lower in the combined group, but overall QoL was rated as 'very good' in all groups. Contrary to previous studies that reported ADHD negatively impacting parental QoL, the current study found no significant deterioration in parental QoL, possibly due to higher baseline QoL scores in

this sample. QoL scores remained stable across time, with no significant changes observed in most domains, except for psychological health, where an improvement was seen in the parent training group at week 6. An earlier Indian study, examined the QoL of the parents of children with special needs due to presence of any one of the diagnosable conditions (ADHD, PDD, LD, MR or Down's syndrome). It was found to be poorer as compared to the matched control group. Furthermore it did not vary according to the diagnosis in the child.[24]

Adverse effects of Atomoxetine, including headache, fatigue, decreased appetite, and abdominal pain, were observed in both the medication and combined groups, but these symptoms decreased over time. By the end of the study, only one patient in the combined group continued to report headaches, and most adverse effects had subsided, suggesting good tolerability of Atomoxetine. The adverse effect profile was consistent with previous studies on the drug.[25]

CONCLUSION

This study demonstrated that both pharmacotherapy and parent training were effective in managing ADHD in children, with the combined intervention showing the most significant overall improvement. Parent training, as a non-pharmacological intervention, not only reduced ADHD symptoms but also alleviated parental stress, highlighting its importance as part of a multimodal approach to ADHD management. Further research is required to explore the long-term impact of these interventions on parental QoL and ADHD outcomes.

Conflict of Interest: None.

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