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The Efficacy of Maternal Empowerment on Aggressive Behaviors in Children with Autism Aged 6 to 12: A Randomized Clinical Study

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Abstract

Background and Objective: Aggressive behaviors, including self-directed aggression and aggression toward others, affect approximately children with autism spectrum disorder (ASD), severely disrupting family adaptation. Maternal empowerment, defined as enhancing mothers' knowledge, competence, and control, is crucial for managing these behavioral challenges. This study aimed to examine the effect of an intervention based on the Family-Centered Empowerment Model (FCEM) on reducing aggressive behaviors in autistic children aged 6 to 12 years.

Methods: This randomized clinical trial was conducted from October 2, 2021, to December 16, 2021. A total of 60 mothers of children with ASD were recruited during this period. In Part I, 30 mothers (Group 1) received eight structured educational sessions based on the FCEM, while 30 mothers (Group 2) received standard care. In Part II, the groups were reversed. Aggressive behaviors and empowerment were measured at baseline, post-intervention, and follow-up.

Results: Statistical analysis revealed that the groups were homogenous at baseline across all demographic and clinical variables. Post-intervention, the Family-Centered Empowerment Model significantly reduced all domains of child aggression compared with the control group ($P< 0.01$). Specifically, within the intervention group, scores for aggression towards oneself significantly decreased from 40.13±10.18 at baseline to 33.10±10.89 post-intervention ($P< 0.001$). Similarly, significant reductions were observed for aggression towards others) from 40.83 ±10.42 to 30.00±10.45, $P< 0.01$) and aggression towards the environment (from43.20±10.26 to 29.17±10.42, $P< 0.01$). Conversely, the control group showed no statistically significant changes in any of the aggression domains ($P> 0.05$).

Conclusion: These findings highlight the clinical value of integrating family-centered educational programs into routine autism care to empower parents and effectively mitigate behavioral challenges in children with ASD.

Key Words: Aggressive Behaviors, Autism Spectrum Disorder, Family-Centered Empowerment, Model Maternal Empowerment.

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1- INTRODUCTION

Autism spectrum disorder (ASD) is a multifaceted neurodevelopmental condition characterized by persistent deficits in social communication and interaction, coupled with restricted and repetitive behaviors (1, 2). The global prevalence of ASD stands at approximately one in 160 children, with a significantly higher incidence observed among boys (2). Children with ASD frequently exhibit severe behavioral challenges, including self-injury, emotional outbursts, and aggressive behaviors directed toward family members and peers (3-6). The existing literature indicates that aggressive behaviors are substantially more common in individuals with autism than in those with other developmental disorders or the general population (6). These disruptive behaviors are often exacerbated by profound sensory processing disorders (SPDs), which affect up to 92% of this population, leading to hypersensitivity, hyposensitivity, and severe frustration due to communication hurdles (7-10). Uncontrolled aggressive behaviors in young children with ASD are not only predictors of a poor long-term prognosis (11-13), but they also inflict profound psychological distress on caregivers. Mothers of children with autism face the extraordinary challenge of balancing their children's complex needs with daily family management, which severely compromises family function, reduces autonomy, and triggers intense feelings of anger, embarrassment, and chronic caregiver burden (14-17). Consequently, the presence of persistent aggression disrupts the fundamental family adaptation, the crucial process through which a family system maintains equilibrium and well-being in response to chronic disability stress. Therefore, establishing family adaptation is paramount; yet, research on targeted interventions remains critically limited in the Middle East and specifically in Iraq, where ASD is recognized as a disability requiring urgent specialized behavioral support (7, 10). Emerging pediatric research underscores that mitigating child aggression and fostering family adaptation cannot be achieved by addressing the child's needs in isolation; instead, it demands the education and empowerment of primary caregivers (18-20). Family-centered empowerment initiatives provide vital opportunities for mothers to acquire the specific clinical knowledge and behavioral skills necessary for optimal family management, thereby restoring balanced family relationships and improving their overall quality of life (21-23). A highly structured approach to achieving this is the Family-Centered Empowerment Model (FCEM) (Figure 1), originally developed as an operational framework to facilitate family adaptation in chronic conditions through collaborative partnerships and mutual engagement between healthcare providers and families (24, 25). Within the context of the FCEM, empowerment is explicitly conceptualized as the facilitation of family adaptation, unfolding systematically across four interconnected stages: threat perception, problem-solving, instructional participation, and evaluation (26, 27). By promoting a shared responsibility, the FCEM equips mothers to understand, anticipate, and systematically manage behavioral crises. Given the lack of cohesive interventional studies in this region, this study aims to investigate the impact of maternal empowerment based on the FCEM on the reduction of aggressive behaviors in children aged 6 to 12 with autism in Karbala, Iraq.

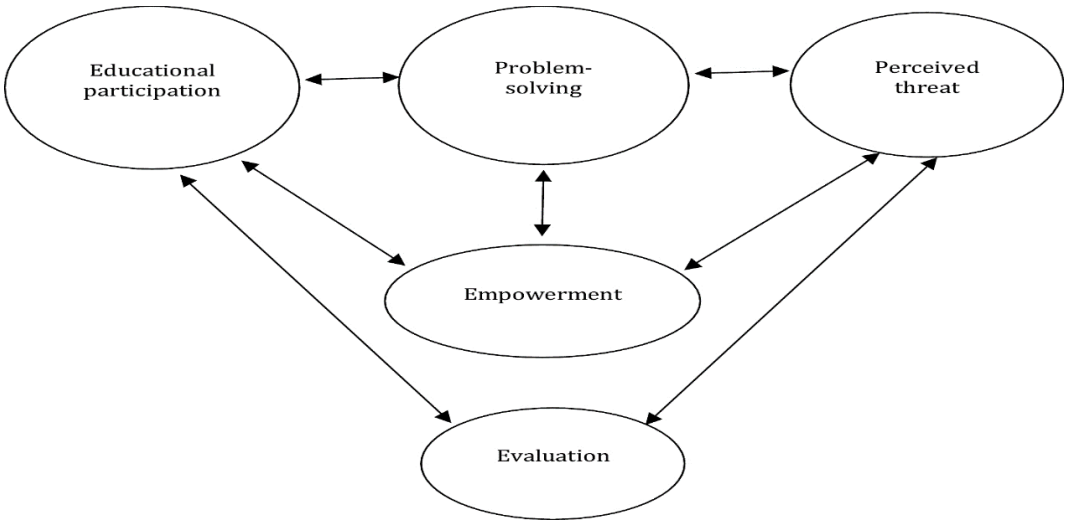

Figure-1. Family-centered empowerment model (22).

2- MATERIALS AND METHODS

2-1. Study Design

This randomized, parallel-group clinical trial was registered in the Iranian Registry of Clinical Trials under the code Iranian Registry of Clinical Trials IRCT20210602051482N1.

2-2. Participants and Eligibility

This randomized, parallel-group clinical trial assessed mothers of children diagnosed with ASD for eligibility. To be included in the study, participants had to be mothers actively caring for a child aged 6 to 12 years with a confirmed diagnosis of ASD. The diagnosis had to be established at least two years before the study by a child psychiatrist according to the International Classification of Diseases, 10th Revision (ICD-10) criteria, WHO, 2001. Additional inclusion criteria required that the children had not experienced major stressful life events during the previous six months. To ensure sample homogeneity, children with co-occurring diagnosed psychiatric disorders or severe intellectual disabilities were excluded. These conditions were verified through a review of electronic medical records and prior psychiatric evaluations rather than maternal self-report. All participating mothers provided written informed consent before enrollment.

Participant recruitment and sampling were conducted from October 2, 2021, to December 16, 2021. According to the CONSORT flow diagram, a total of 76 mothers were initially screened for eligibility. Of these, 6 mothers were excluded during the initial screening because they did not meet the predefined inclusion criteria. The remaining 70 eligible mothers were randomly allocated into two equal groups: the intervention group (n = 35) and the control group (n = 35). During the follow-up period, 4 participants were lost after randomization. In the intervention group, 2 mothers discontinued the intervention because they were absent from more than two educational sessions. In the control group, 2 mothers were lost to follow-up because they did not complete the questionnaires. Ultimately, data from 66 participants (33 in the intervention group and 33 in the control group) were included in the final statistical analysis, in accordance with the CONSORT flow diagram (Figure 2).

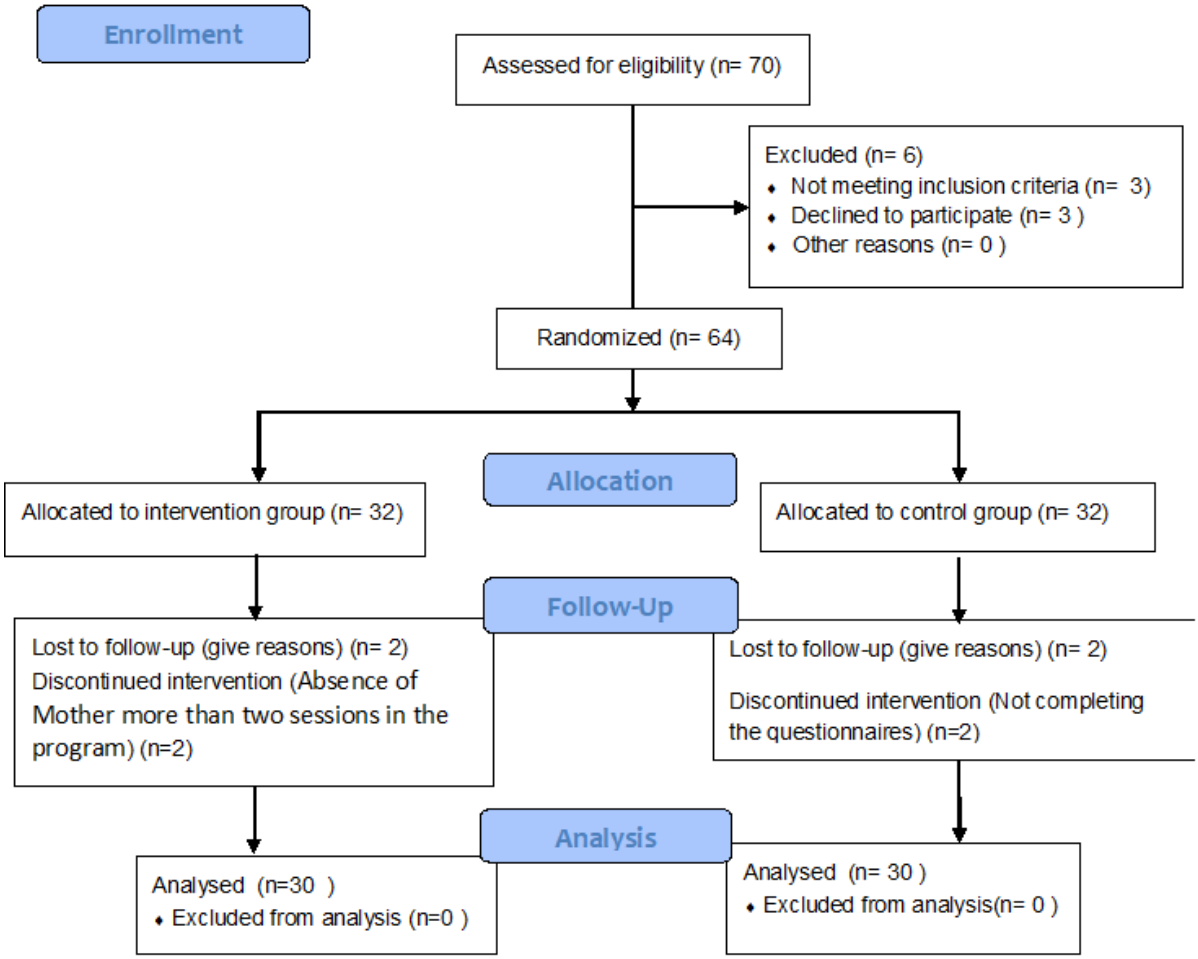

Figure 2. CONSORT 2010 flow diagram.

2-3. Procedure

The study commenced after obtaining approval from the Institutional Review Board and the Research Ethics Committee of Mashhad University of Medical Sciences (Code: IR.MUMS.NURSE.REC.1400.042). An official letter of introduction was submitted to the management of the Thi-Qar Health Department to obtain administrative permission. The study was conducted at the Thi-Qar Autism Center, a specialized regional center providing therapeutic services for children with ASD and support for their family caregivers. Recruitment and data collection were carried out between October 2, 2021, and December 16, 2021. Eligible mothers attending this center were recruited using convenience sampling because of the single-center design and the limited accessibility of the target clinical population within the region. After baseline assessment and completion of the pre-test questionnaire, eligible participants were randomly assigned to either the intervention or control group using a computer-generated randomization table. Randomization was performed by an independent researcher who was blinded to the study objectives, ensuring a 1:1 allocation ratio. To minimize detection bias, the psychologists responsible for post-test assessments and the data analysts remained blinded to group allocation throughout the study. The study did not include a separate qualitative or quantitative needs-assessment phase. Instead, a standardized educational curriculum based on the FCEM was directly implemented for the intervention

group. Baseline pre-test scores from the Aggression Behavior Questionnaire were used solely as baseline clinical measures for evaluating subsequent behavioral changes. The intervention group received the standard FCEM program consisting of eight sessions conducted twice weekly, with each session lasting approximately 45-60 minutes. Sessions were scheduled to coincide with the mothers' visits to the autism center for their children's care. To comply with COVID-19 social distancing requirements and facilitate effective interaction, the intervention group was divided into three smaller cohorts of 13 participants each. The educational program was delivered through interactive lectures, group discussions, question-and-answer sessions, practical demonstrations, and brainstorming activities. Participants were encouraged to discuss caregiving challenges and propose practical solutions at the end of each session. The Family-Centered Empowerment Model was implemented through four sequential components:

The Family-Centered Empowerment Model was implemented through four sequential components:

Threat Perception: This component focused on mothers' perceptions of distress and included education regarding ASD characteristics, common behavioral problems, triggers of aggressive behavior, feelings of guilt, fear of the future, frustration, and caregiver exhaustion, with emphasis on the family's role in treatment.

Self-Efficacy and Problem Solving: Sessions were designed to strengthen coping skills and problem-solving abilities by encouraging mothers to identify and discuss practical solutions to caregiving challenges.

Self-Esteem and Educational Participation: Mothers participated in guided peer group discussions where they shared caregiving experiences, autism related concerns, and supportive strategies under researcher supervision.

Evaluation: Both formative and summative evaluations were conducted. Formative evaluation included brief oral assessments at the beginning of each session to assess perceived threat and self-efficacy, while summative evaluation was conducted after completion of the intervention. The control group received only the routine services provided by the autism center, including standard clinical care, occupational therapy, and speech therapy for the children during scheduled visits. Mothers in the control group did not receive any structured educational, psychological, or empowerment intervention during the study period and did not participate in any concurrent clinical trials.

2-4. Instruments and Measurements

Data were collected using the 40-item Aggression Behavior Questionnaire, which evaluates three domains of aggressive behavior in children with ASD: self-directed aggression (Items 1-13), aggression toward others (Items 14-27), and aggression toward property/environment (Items 28-40). Items are rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). Total scores range from 40 to 200, with higher scores indicating greater frequency and severity of aggressive behaviors. Baseline assessments were conducted face-to-face at the autism center by a blinded research assistant before randomization. Post-test assessments were performed one month after completion of the eighth educational session for both groups under comparable clinical conditions. Content validity of the questionnaire was confirmed by a panel of pediatricians and faculty members from the Faculty of Nursing at Mashhad University of Medical Sciences. Reliability analysis demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.97.

2-5. Data Analysis

Data were analyzed using SPSS software version 25. To ensure the comparability of the two groups in terms of contextual variables, the Chi-square test was employed for categorical variables, while the independent t-test was utilized for quantitative variables following a normal distribution, and the Mann-Whitney test was applied for quantitative variables lacking a normal distribution. The primary study objectives were addressed through intergroup comparisons using the independent t-test or Mann-Whitney test, as appropriate. Due to the repetitive measurement of aggression scores and their dimensions in autistic children, analysis of variance with repeated measures was used. All statistical tests were conducted at a 95% confidence level.

3-RESULT

The mean age of mothers in the intervention group was 37.07±7.13 years, while the mean age in the control group was 38.63±6.93 years. An independent t-test revealed no statistically significant difference between the two groups ($p = 0.39$), indicating homogeneity in age distribution. The majority of mothers in the study were married and were caring for their children aged 6 to 12 years (Tables 1 and 2).

As shown in Table 3, there were no statistically significant differences between the intervention and control groups at baseline regarding self-directed aggression (40.13 ± 10.18 vs. 45.50 ± 11.87, $p = 0.57$), aggression toward others (40.83 ± 10.42 vs. 40.30 ± 10.47, $p = 0.84$), or aggression toward the environment (43.20 ± 10.26 vs. 43.37 ± 11.08, $p = 0.95$). Following the intervention, the mean score of self-directed aggression significantly decreased in the intervention group compared with the control group (33.10 ± 10.89 vs. 42.47 ± 13.11, $p < 0.01$). Similarly, aggression toward others was significantly lower in the intervention group than in the control group after the intervention (30.00 ± 10.45 vs. 40.10 ± 10.83, $p < 0.001$). In addition, aggression toward the environment significantly decreased in the intervention group compared with the control group at post-test assessment (29.17 ± 10.42 vs. 41.60 ± 10.91, $p < 0.01$). Within-group analysis using paired t-tests also demonstrated significant reductions in the intervention group for self-directed aggression ($p < 0.001$), aggression toward others ($p < 0.001$), and aggression toward the environment ($p < 0.001$) after completion of the FCEM program.

4- DISCUSSION

The present study demonstrated that implementation of the FCEM significantly reduced self-directed aggression among children with ASD in the intervention group compared with the control group. This finding suggests that empowering mothers through structured education and coping-skills training may improve behavioral management strategies and emotional regulation in children with autism.

Table-1. Distribution of demographic characteristics of children in the control and intervention groups.

Variable	Control Group (n=30)	Intervention Group (n=30)	p
Child age (years), M ± SD	8.07 ± 1.86	7.87 ± 2.01	0.69*
Mothers' age (years), M ± SD	38.63 ± 6.93	37.07 ± 7.13	0.39*
Age gap with previous child (years), M ± SD	2.17 ± 1.21	2.30 ± 1.34	0.69*
Time since diagnosis (years), M ± SD	1.57 ± 4.33	4.17 ± 1.82	0.49*

Note. Values are presented as mean ± standard deviation (M ± SD). * Independent t-test.

Table-2. Frequency distribution of demographic characteristics of children in the control and intervention groups.

Variable	Category	Intervention n (%)	Control n (%)	p
Child gender	Male	21 (70.0)	21 (70.0)	1.00**
	Female	9 (30.0)	9 (30.0)	
Maternal occupation	Employee	18 (60.0)	16 (53.3)	0.67**
	Freelance	5 (16.7)	6 (20.0)	
	Housewife	6 (20.0)	7 (23.3)	
	Retired	1 (3.3)	1 (3.3)	
Maternal education	Elementary	7 (23.3)	7 (23.3)	0.21**
	High school	6 (20.0)	8 (26.7)	
	Diploma	2 (6.7)	5 (16.7)	
	Undergraduate	15 (50.0)	10 (33.3)	
Father education	Illiterate	3 (10.0)	5 (16.7)	0.92**
	High school	4 (13.3)	5 (16.7)	
	Diploma	1 (3.3)	2 (6.7)	
	Undergraduate	22 (73.3)	18 (60.0)	
Residency	Village	4 (13.3)	7 (23.3)	0.15**
	City	26 (86.7)	23 (76.7)	
A Child lives with their parents	Yes	25 (83.3)	25 (83.3)	1.00**
	No	5 (16.7)	5 (16.7)	
Family income	Much less than needed	5 (16.7)	6 (20.0)	0.58**
	Somewhat less	9 (30.0)	8 (26.7)	
	As much as needed	9 (30.0)	10 (33.3)	
	Somewhat more	6 (20.0)	5 (16.7)	
	Much more	1 (3.3)	1 (3.3)	
Another autistic child	Yes	4 (13.3)	6 (20.0)	0.31**
	No	26 (86.7)	24 (80.0)	

Note: Values are presented as a number (percentage). ** Chi-square test.

Table-3. Mean and standard deviation of aggression scores in children with autism before and after intervention.

Aggression Domain	Time	Group	Mean ± SD	CV (%)	P*
Towards oneself	Before	Control	45.50 ± 11.87	26.1	0.57
		Intervention	40.13 ± 10.18	25.4	
	In-group p		0.10**		
	After	Control	42.47 ± 13.11	30.9	< 0.01
		Intervention	33.10 ± 10.89	32.9	
	In-group p		< 0 .001**		
Towards others	Before	Control	40.30 ± 10.47	26.0	0.84
		Intervention	40.83 ± 10.42	25.5	
	In-group p		0.81**		
	After	Control	40.10 ± 10.83	27.0	< 0.001
		Intervention	30.00 ± 10.45	34.8	
	In-group p		< 0.01**		
Towards environment	Before	Control	43.37 ± 11.08	25.5	0.95
		Intervention	43.20 ± 10.26	23.7	
	In-group p		0.13**		
	After	Control	41.60 ± 10.91	26.2	< 0.01
		Intervention	29.17 ± 10.42	35.7	
	In-group p		< 0.01**		

Note: Values are presented as M ± SD. * Independent t-test. ** Paired t-test.

The current findings are consistent with those reported by Niditch et al., who identified strong associations between anxiety, social understanding, and aggressive behaviors among children with ASD (28). Their study suggested that behavioral dysregulation in ASD may be influenced by psychosocial stressors and emotional difficulties. In the present study, mother-focused empowerment training may have indirectly reduced children's anxiety-related behavioral responses by improving maternal coping abilities and caregiving interactions. Unlike previous correlational studies, the current research provides interventional evidence demonstrating that a structured family-centered empowerment program can reduce self-directed aggressive behaviors in children with ASD (29-31). This represents an important contribution to the literature, particularly in low-resource clinical settings where parent-focused interventions may be more feasible than intensive individualized behavioral therapies.

Effect on Aggression Toward Others: The study also revealed a significant reduction in aggression toward others among children in the intervention group following completion of the FCEM program. This finding supports the assumption that improving parental knowledge, communication skills, and behavioral management strategies can positively influence children's interpersonal behaviors. These findings are supported by the work of Mazurek et al., who reported high rates of aggression among children with ASD and identified sleep disturbances, sensory problems, and communication deficits as major correlates of aggressive behavior (32). Similarly, Singh et al. demonstrated that parent-focused behavioral interventions reduced challenging behaviors and improved compliance among adolescents with ASD (33). However, the present study extends previous findings by focusing specifically on mothers of children aged 6 to 12 years and by applying the FCEM as a structured empowerment framework rather than mindfulness-based behavioral support alone. This distinction highlights the potential value of family-centered empowerment approaches in improving behavioral outcomes through increased parental participation and self-efficacy.

Effect on Aggression Toward the Environment: Another important finding of this study was the reduction in aggression toward the environment after the intervention. This improvement may reflect enhanced maternal supervision, improved problem-solving skills, and greater consistency in behavioral responses following empowerment training. Previous literature has shown that parental stress, poor coping mechanisms, and inadequate behavioral management skills contribute to behavioral dysregulation among children with ASD. Kostiukow et al. identified aggression, tantrums, and adaptive functioning deficits as major contributors to family stress (34). The current findings support these observations and suggest that empowering caregivers may improve the family environment and reduce environmentally directed aggressive behaviors.

Maternal Empowerment as a Mechanism for Behavioral Improvement: The effectiveness of the FCEM observed in this study may be explained by its emphasis on increasing mothers' self-efficacy, participation, and problem-solving abilities. Empowerment-based interventions encourage caregivers to become active participants in managing the child's condition rather than passive recipients of healthcare services. This interpretation is supported by Kolbadinezhad et al. and Abolwafa, who demonstrated that empowerment-based educational interventions improved self-care behaviors, maternal participation, and

health-related outcomes across different clinical populations (35, 36).

Novel Contribution of the Study: The present study contributes new evidence to the growing literature on family-centered interventions for ASD in several ways. First, it evaluated all three dimensions of aggression (self-directed aggression, aggression toward others, and aggression toward the environment) using a multidimensional assessment tool. Second, it applied the FCEM specifically to mothers of children with ASD in an Iraqi clinical setting, a population that remains underrepresented in the literature. Third, the study provides interventional evidence supporting the role of maternal empowerment in reducing aggressive behaviors among school-aged children with ASD. These findings suggest that family-centered empowerment programs may serve as practical, low-cost, and culturally adaptable interventions for improving behavioral outcomes in children with ASD and reducing caregiver burden.

4-1. Limitations

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted in a single autism center in Iraq using convenience sampling, which may limit the generalizability of the findings to other populations and healthcare settings. Second, the relatively small sample size may have reduced the statistical power for detecting smaller intervention effects. Third, aggressive behaviors were assessed primarily through maternal reports using a questionnaire, which may have introduced reporting or social desirability bias. In addition, because of the nature of the educational intervention, blinding of participants was not feasible, which may have affected participant responses. Finally, the follow-up period was relatively short; therefore, the long-term sustainability of the intervention effects could not be determined. Future multicenter studies with larger samples and longer follow-up periods are recommended to confirm and extend these findings.

5- CONCLUSION

The findings of this study demonstrated that the FCEM effectively reduced caregiving burden among mothers and decreased aggressive behaviors in children with autism. The positive outcomes may be attributed to the tailored educational sessions, active participation of mothers, and the practical structure of the empowerment program. Involving caregivers in educational and supportive interventions improved knowledge, coping skills, and caregiving practices, which may ultimately enhance family quality of life and promote positive behavioral outcomes in children with ASD. The results also highlight the importance of community-based and family-centered empowerment approaches as cost-effective and practical strategies for health promotion. Such interventions may support families of children with autism by strengthening caregiver participation, improving behavioral management, and reducing psychosocial stress. Therefore, integrating empowerment-based educational programs into autism care services may contribute to better outcomes for both children and their caregivers.

5-1. Recommendations

This study supports the implementation of structured educational and empowerment-based interventions for mothers of children with autism in clinical and community healthcare settings. The Family Centered Empowerment Model can be integrated into autism care services through trained nursing and healthcare staff because it is practical, low-cost, and does not require specialized equipment. Additionally, providing educational materials such as evidence-based booklets and informational brochures may further

improve mothers' awareness, caregiving skills, and ability to manage behavioral challenges in children with ASD.

6- ACKNOWLEDGEMENT

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7- FUNDING

This research received financial support from Mashhad University of Medical Sciences.

8- ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of Mashhad University of Medical Sciences, IR.MUMS.NURSE.REC.1400.042. In the present study, all procedures were conducted adhering to the pertinent guidelines and regulations, particularly the Declaration of Helsinki. Before their involvement, informed consent was procured from all participants. Participants were explicitly informed about their voluntary participation and their right to withdraw from the study at any stage. To ensure confidentiality and privacy, questionnaires were anonymously completed, employing unique identifiers for each respondent.

This study is a clinical trial registered under the code IRCT20210602051482N1.

9- AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the research deputy of Mashhad University of Medical Sciences, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are, however, available from the corresponding author upon reasonable request and with the permission of the research deputy of Mashhad University of Medical Sciences.

10- COMPETING INTERESTS

The authors declare that they have no financial and non-financial competing interests.

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