Perception Towards Quranic Intervention and Chapter Al Fatiha Induced Amelioration of Cognitive, Behavioral, and Physical Skills in a Child with Cerebral Palsy: Possible Involvement of Brain Stimulation

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***Abstract*— Background and objectives:** Al Fatiha is the foundation of the Holy Quran. Moreover, it can treat several ailments. Cerebral Palsy (CP) is a neurological disorder that can be an outcome of delayed milestones. The study was set to determine the perception of the effectiveness of Quranic therapy followed by practical implementation of Quranic therapy in a child with CP.

Methods: The reliability of the modified version of the pre-established Questionnaire, proposed by Saged and his co-authors, was assessed using Cronbach alpha. It was found to be reliable to measure the willingness, effectiveness, and responsiveness of the respondents and the father of the child inflicted with CP, towards Quranic sessions. Previous researchers have implemented the role of Quranic intervention on soma and the brain. SPSS version 28 was used for statistical analysis.

Results: The value of Cronbach's alpha was found to be 0.895, which exhibited the high reliability of the modified scale. For the survey, among the 500 respondents, a greater ratio of males (29.6%) aged between 20 to 30 years, 54.6% graduates, and 50.2% jobless was observed. For all factors, a greater percentage corresponded to ''Strongly agree'' and ''Agree'' percentages as compared to the ''Strongly disagree'' Likert scale which had a meager percentage. In the pilot study, the pre-intervention cognition, behavioral, and physical deficits in a CP child, evaluated using Integrated Management of Childhood Illness (IMCI), Early Childhood Screening Assessment (ECSA), and Self-designed Behavioral Analysis Form (SBAF), were ameliorated after auditory sessions of Al Fatiha Chapter. Results discussed in terms of Fatiha chapter-induced alpha brain wave stimulation thus modulating serotonergic functions responsible for improved cognition as evident from the pilot study.

Conclusion: Using the respondents' perception of the effectiveness of Quranic sessions and the pilot case study, Quranic therapy can augment the rehabilitation of CP children.

Keywords*— *Al Fatiha, Behavior, Brain, Cerebral Palsy, Cognition, Physical skills, Questionnaire, Survey

I. INTRODUCTION

The Holy Quran has an audible miracle that presents everlasting emotional and therapeutic effects on listeners [1]. Humans are affected by the Quran in terms of variability in heart rate and breathing behavior that releases some hormones and chemicals which relax the human body [2]. Allah can enhance one's memory and cognition by listening to Quranic verses which can produce excitation of neurons that change the brain waves [3]. Research shows that Quranic verses cure spiritual, physical, or societal problems to bring happiness, a healthy brain, peace, and serenity [4].

A study by Mahsa Vaghefi et al., [5] reported that listening to Holy Quran in a conscious state can increase the relative theta power in most areas of the brain and relative alpha power in the frontal lobe. Conscious listening decreases the correlation and self-similarity of brain signals consequently increasing the complexity and dynamicity of brain signals. Al Fatiha is a beneficial and alternative remedy to cure anxiety as the recitation of Al Fatiha relaxes the person [6]. Enriched environment techniques can help in reinstating brain connections [7], thus Al Fatiha can be added as an intervention to provide an enriched environment for CP-affected patients.

Delayed milestones, which later, transform into CP [8], occur due to the occurrence of brain lesions during pregnancy, delivery, or after a few months/years after birth and affect 2.0/1000 births [9]. The developmental delay affects 5% of the children worldwide below the age of five years which includes delays in the development of speech and language, motor function, social-emotional stability, and cognition. The

identification of developmental delays and the provision of intervention at an early age are essential for improving the developmental progress of children with delayed milestones [10].

II. MATERIALS AND METHOD

Survey: This study is aimed to determine the reliability of the Urdu-translated version of the pre-established English questionnaire to be utilized for the case study later. Gaining an insight of random individuals regarding their faith in listening or believing in Quranic verses was essential to cater to the needs of the pilot study. The questionnaire for the survey was based on an experiment by Saged and other authors [11].

The modified questionnaire was divided into two sections, with twenty questions in all. The first 4 questions of the section were composed of demographics and the second section was composed of 16 questions regarding the perception of Quranic interventions. It had three components as that of the author [11] and was designed on a 5-point Likert scale (i.e, strongly agree, agree, neutral, disagree, and strongly disagree). These were Willingness encompassing 4 questions W1 to W4; Effectiveness ranging from E1 to E6 and Response from R1 to R6. The survey was restricted to the Muslim community only.

Pilot Study: The pilot study of an 18-month-old boy presenting CP was a within-subject, Single-Case experimental design (SCED) for an observational study. Prior approval was taken from the Institutional Bioethics Committee (IBC) of 'University of Karachi' followed by consent from the parents of the subject. The complete family history was collected to probe into the possible causes of CP. The parents of the subject were first cousins and belonged to low status. Mother was only nineteen years old and had a low appetite during pregnancy.

The child's medical history showed that he was born full-term and delivered at home. Prolonged labor was accompanied by a delayed cry. In the early six months, physiologic jaundice and fits twice affected his left side. He was hyperactive, aggressive, attention-seeking, low appetite, and a single-word child. He also had feeding, griping, and sleeping difficulties. His CT scan and MRI performed soon after birth showed periventricular leukomalacia due to hypoxic-ischemic injury. No treatment was provided to him before the Quranic intervention.

The survey revealed that most respondents preferred a calm, bright, and uninterrupted atmosphere for intervention purposes so, concerning the responses the pilot intervention protocol was carefully designed.

The child was made to listen to pre-recorded Surah Al Fatiha by Qari Mishary Rashid Alafasy. It was administered uninterruptedly for 5 months, 3 times a day total of 1 hour in different intervals by connecting a phone to a loudspeaker that was kept at a distance of 6 feet in a calm atmosphere in the presence of either his mother or father. The loudspeaker Space Karaoke model KR-850 was used for the purpose.

Pre- and Post-intervention monitoring was executed in the presence of a psychologist using tools such as Integrated Management of Childhood Illness (IMCI) for 18-24 months, Early Childhood Screening Assessment (ECSA), and Self-Designed Behavioral Analysis Form (SBAF). IMCI was used to assess delayed milestones and ECSA was used for the behavioral and emotional development of children along with the distress level in caregivers. SBAF was self-designed to keep a track of physical and behavioral well-being. The post-intervention assessment was done at the end of each month and the result of 5 monthly analyses has been reported.

MRI or CT scans were not possible as parents did not allow them before or after the administration of intervention.

III. STATISTICAL ANALYSIS

SPSS version 28 was used for the analysis. The component correlation matrix has been measured using the extraction method i.e., "Principal component analysis" to comprehend the correlation between factors. The item-total statistics, descriptive statistics, and response percentages were also calculated.

The reliability factor has been measured using Cronbach's Alpha test. Results of the pilot study results presented as quantitative and qualitative data.

IV. RESULTS

Out of 503 responses 333 were obtained as hardcopies, 167 online while 3 were excluded due to incomplete data thus accounting for 500 valid responses. The value of Cronbach's alpha was found to be 0.895, which exhibited high reliability of the modified scale. Among the five hundred respondents, 148 (29.6%) were males aged between 20 to 30 years, 273 (54.6%), and 251 (50.2%) were graduates and jobless respectively (Table 1).

Component correlation matrix and Item-total statistics are presented in Tables 2 and 3. The descriptive statistics with the mean and standard deviation for the three factors are presented in Table 4. For all factors, a greater percentage corresponded to 'Strongly agree' and 'Agree' percentages, as compared to the 'Strongly disagree' (Table 5).

Based on (Figure 1), 71% of respondents who strongly agreed to the factor effectiveness indicated that the respondents strongly agreed with the six statements: Quranic treatment is now famous and scientifically proven; Quranic treatment aids medical treatment; Listening to Quran heals both body and soul, listening to Quran brings serenity and pleasure, and listening to the Quran with precise tajweed attracts more.

However, Strong agreement on the factor 'Responsiveness' was 57.2% as respondents preferred a bright and comfortable room for the Quranic therapy

session once a day, and they believed that by listening to Quran they can perform well as it helps in the betterment of concentration and memory and alleviate their aggression and agitation. Similarly, strong agreement to factor 'Willingness' was 54.5% indicating a willingness to prefer Quranic therapy for themselves and their families and volunteering in future Quranic therapy gatherings.

Figure 2 presents the schematic presentation of the protocol for the pilot study. The medical history of the child helped us to suggest that cousin marriage, maternal malnutrition, prolonged labor, home delivery, physiologic jaundice, or fits may have precipitated CP in the child. Post-intervention IMCI assessment showed improvement in 3 activities (Table 6) as he tried identifying pictures (Figure 3) and building a 3-block tower (Figure 4) and kicking a ball with assistance. ECSA child's score was decreased from 32 to 19 and was followed by an amelioration of caregivers' distress score (Table 6). SBAF showed positive post-intervention modulation in the child's BMI, head circumference, food/fluid intake, temperature, and sleep. He could speak three words/day as compared to one at the start of the experiment (Table 6).

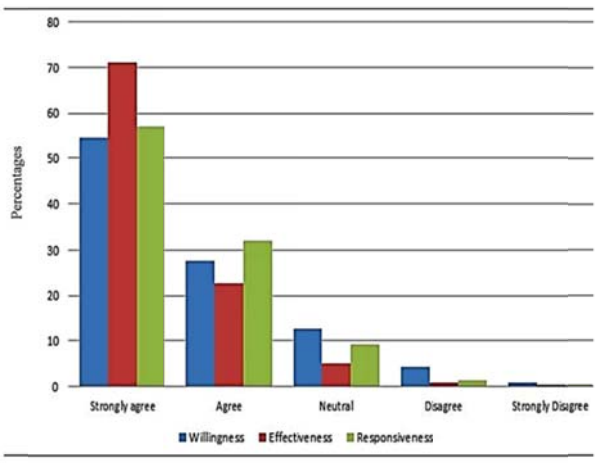

Figure 1: Percentage response to the factors

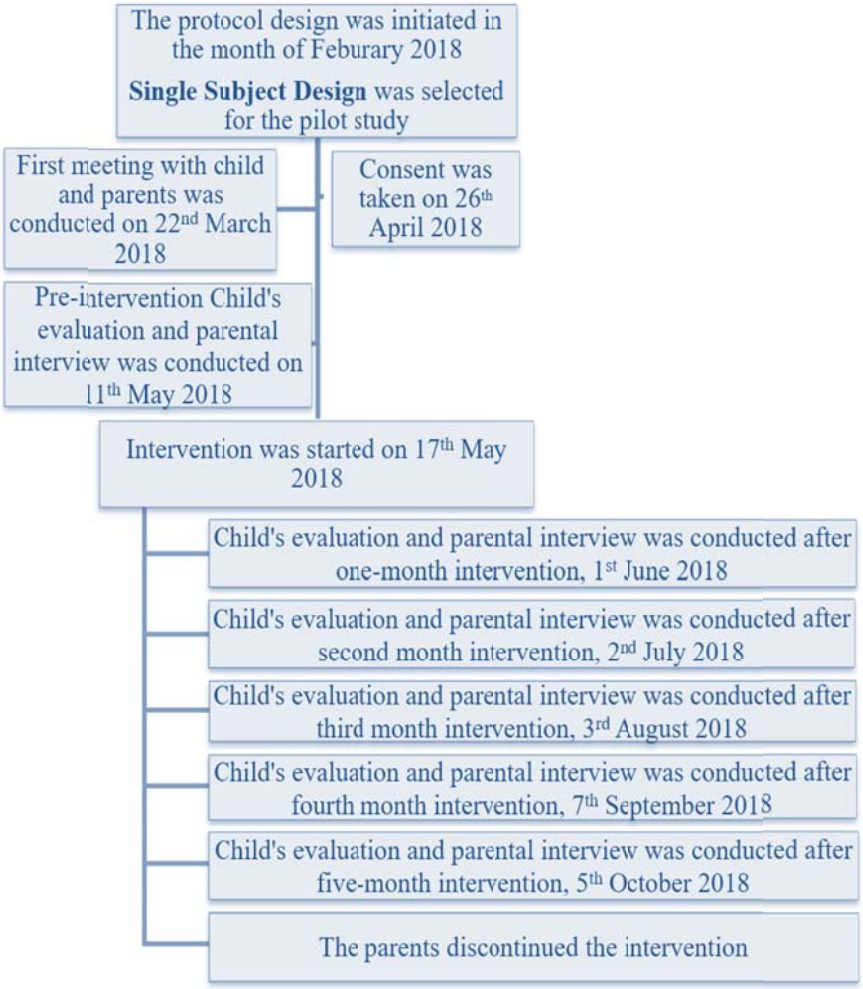

Figure 2: Schematic presentation of the protocol for the pilot study

Figure 3: Child identifying pictures

Figure 4: Child building a three-block tower

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Table 1: Tabular presentation of demographical data in frequencies and percentages

Demographics	***Categories***	***Frequency***	***N%***
Gender	Female	352	70.4
	Male	148	29.6
Age group	Under 10 years	1	0.2
	Between 10 to 20 years	101	20.2
	Between 20 to 30 years	343	68.6
	Between 30 to 40 years	28	5.6
	Above 40 years	27	5.4
Education	Illiterate	7	1.4
	Primary School	17	3.4
	High School	87	17.4
	Graduation	273	54.6
	Post-Graduation	116	23.2
Income	Jobless	251	50.2
	Low	140	28
	Average	55	11
	Handsome	54	10.8

Table 2: Component correlation matrix

Factor	***Willingness***	***Effectiveness***	***Responsiveness***
Willingness	1.000	.653	.456
Effectiveness	.653	1.000	.441
Responsiveness	.456	.441	1.000

Table 3: Item-total statistics

Factors	*Code*	*Scale mean if item deleted*	*Scale Variance if any item deleted*	*Corrected item-total correlation*	*Squared multiple correlations*	*Cronbach's alpha if any item deleted*
Willingness	W1	22.97	46.636	.567	.432	.888
	W2	22.73	44.815	.638	.503	.885
	W3	22.46	44.485	.591	.397	.887
	W4	22.11	44.705	.384	.254	.902
Effectiveness	E1	22.73	44.854	.626	.495	.886
	E2	22.80	46.019	.559	.428	.888
	E3	23.07	47.793	.560	.520	.890
	E4	23.05	47.631	.577	.475	.889
	E5	22.88	47.108	.531	.367	.890
	E6	22.88	47.235	.457	.245	.892
Responsiveness	R1	22.61	46.094	.504	.295	.890
	R2	22.43	45.792	.494	.299	.891
	R3	22.72	44.789	.582	.416	.888
	R4	22.83	45.309	.705	.557	.884
	R5	22.86	45.128	.717	.592	.883
	R6	22.78	44.587	.728	.599	.882

Table 4: Descriptive statistics for the factors and their means (n=500)

Factors	*Mean ± S.D*	*Codes*	*Statements*	*Means*	*S.D*
Willingness	1.69 ± 0.83	W1	Being a Muslim I believe that Holy Quran has a treatment for all diseases or injuries.	1.29	.613
		W2	I am likely to prefer Quranic therapy for myself and my family.	1.53	.747
		W3	I would like to volunteer for future Quranic therapy sessions.	1.80	.834
		W4	I would like to listen to the Quran in gathering to concentrate more.	2.15	1.126
Effectiveness	1.35 ± 0.61	E1	Quranic treatment is now famous and scientifically proven.	1.53	.755
		E2	Quranic treatment aids medical treatment.	1.46	.694
		E3	Listening to Quran heals both body and soul.	1.19	.483
		E4	Listening to the Quran brings serenity and pleasure.	1.21	.488
		E5	Listening to the Quran with precise tajweed attracts more.	1.38	.590
		E6	I believe if I know the translation of Quranic verses then it will be more effective.	1.38	.652
Responsiveness	1.55 ± 0.72	R1	I would prefer a bright and comfortable room for the Quranic therapy session.	1.65	.746
		R2	I believe Quranic therapy once a day is enough.	1.83	.797
		R3	Listening to Quran alleviates my aggression and agitation.	1.54	.811
		R4	Listening to Quran helps me to perform well.	1.43	.637
		R5	Listening to the Quran helps in concentration and boosts memory.	1.40	.645
		R6	Quran helps me with better listening.	1.48	.689

SD is the 'Standard Deviation'

Table 5: Responses and their percentages

Statements	***Strongly Agree n (%)***	***Agree n (%)***	***Neutral n (%)***	***Disagree n (%)***	***Strongly disagree n (%)***
Being a Muslim I believe that the Holy Quran has a treatment for all diseases or injuries.	389 (77.8%)	82 (16.4%)	24 (4.8%)	4 (0.8%)	1 (0.2%)
I am likely to prefer Quranic therapy for myself and my family.	303 (60.6%)	138 (27.6%)	50 (10%)	9 (1.8%)	0
I would like to volunteer for future Quranic therapy sessions.	214 (42.8%)	189 (37.8%)	80 (16.0%)	16 (3.2%)	1 (0.2%)
I would like to listen to the Quran in gathering to concentrate more.	185 (37.0%)	142 (28.4%)	101 (20.2%)	58 (11.6%)	14 (2.8%)
Quranic treatment is now famous and scientifically proven.	305 (61.0%)	136 (27.2%)	50 (10%)	8 (1.6%)	1 (0.2%)
Quranic treatment aids medical treatment.	319 (63.8%)	143 (28.6%)	28 (5.6%)	10 (2.0%)	0
Listening to Quran heals both body and soul.	419 (83.8%)	68 (13.6%)	10 (2.0%)	3 (0.6%)	0
Listening to the Quran brings serenity and pleasure.	412 (82.4%)	72 (14.4%)	15 (3.0%)	1 (0.2%)	0
Listening to the Quran with precise tajweed attracts more.	336 (67.2%)	140 (28.0%)	22 (4.4%)	2 (0.4%)	0
I believe if I know the translation of Quranic verses then it will be more effective.	346 (69.2%)	123 (24.6%)	26 (5.2%)	3 (0.6%)	2 (0.4%)
I would prefer a bright and comfortable room for the Quranic therapy sessions.	248 (49.6%)	188 (37.6%)	55 (11.0%)	9 (1.8%)	0
I believe Quranic therapy once a day is enough.	197 (39.4%)	199 (39.8)	94 (18.8%)	10 (2.0%)	0
Listening to Quran alleviates my aggression and agitation.	300 (60.0%)	153 (30.6%)	27 (5.4%)	15 (3.0%)	5 (1.0%)
Listening to Quran helps me to perform well.	322 (64.4%)	147 (29.4%)	28 (5.6%)	2 (0.4%)	1 (0.2%)
Listening to the Quran helps in concentration and boosts memory.	343 (68.6%)	119 (23.8%)	35 (7.0%)	3 (0.6%)	0
Quran helps me with better listening.	306 (61.2%)	152 (30.4%)	38 (7.6%)	2 (0.4%)	2 (0.4%)

Values are frequencies and percentages.

Table 6: Pre- and Post-intervention observations

Scales	Items	Pre-intervention	Post-intervention				
			1st Month	2nd Month	3rd Month	4th Month	5th Month
IMCI Context	Takes off his or her clothes	Failed	Failed	Failed	Failed	Failed	Failed
	Builds a 3-block tower.	Failed	Failed	Failed	Tried	Tried	Successful
	Points to 2 pictures	Failed	Failed	Failed	Failed	Pointed girl	Pointed girl and a car
	Kicks a ball.	Failed	Failed	Kicked reverse	Unable to kick forward	Kicked using the right leg	Kicked with assistance
ECSA	Child's score	32	32	28	25	20	19
	Caregiver distress score	3	3	3	3	2	2
SBAF	Age (Months)	18	19	20	21	22	23
	BMI (Kg/m^2)	12.9	12.9	12.9	13.2	14.2	14.5
	Temperature (°C)	38.3	37	36	36.8	36.6	37
	Head Circumference (Inches)	16.9	16.95	16.95	17.1	17.1	17.1
	Diet/Fluid Intake	Mother's feed	Mother's feed	Mother's feed	Started solid diet	Rarely took mother's feed	Left mother's feed and dependent on a solid diet
	Sleep (Hours/day)	16-18	16	16	12	8-10	8-10
	Speech (words//day)	1	1	1	1	2	3

V. DISCUSSION

The statistics of five-hundred responses to the survey helped us to suggest that the majority behold the perception of the effectiveness of Quranic therapy and willingly responded to participate in future therapy sessions regardless of their age, education, gender, or income. Primarily, Muslims have faith that it is Allah who sees over everything, All-Seeing, All-Knowing, and All Fair and Wise. Islam provides a complete code of behavior, ethics, and social values, which guides believers in dealing with all sorts of aggression, agitation, problems, and other matters. Quran is a Holy book that reassures believers that the connection between faith and reliance is undeniable and assures its effectiveness (Surah All-i-Imran, verses: 122 and 160; Surah Anfal, verse: 49; Surah Abraham, verse: 11; Surah Maida, verses: 11 and 23; Surah Mujadilah, verse 10; Surah Tauba, verse 51).

Muslim perspectives are defined in Quran as Allah says: *"And for those who fear Allah, He always prepares a way out, and He provides for him from sources he never could imagine. And if anyone puts his trust in Allah, sufficient is Allah for him. For Allah will surely accomplish His purpose: verily, for all things has Allah appointed a due proportion"* (Surah At-Talaq: verses 2-3). Hence, the responses exhibit that the believers of Islam rely on Allah and His Holy book.

Studies have demonstrated the effect of Quranic listening in modulating brain waves [12]. The EEG reading, an index of neuromodulator balance in memory and illness [13], can be classified into frequency bands such as Delta, Theta, Alpha, Beta, and Gamma. The role of alpha has been implicated in cognition [14], vigilance [15], attention [16], memory [17], stress reduction [18], emotion [2, 3], managing depression [19], sleep disorders [20], and decreasing anxiety [21].

Alpha brain waves are suggested to be the sensitive marker of serotonergic actions [13, 22, 23]. Selective Serotonin re-uptake inhibition (SSRIs) have been suggested to play a role in plasticity and might assist in managing CP [24]. The action of SSRIs thus complies with the increased functional availability of Serotonin (5HT). Thus, we predict that Al Fatiha Chapter might have increased the stimulation of alpha waves in the frontal lobe that might have increased 5HT metabolism to improve the fine motor skills of the child as evident from building a three-block tower and identifying pictures (IMCI) following five months post-intervention (Figure 5).

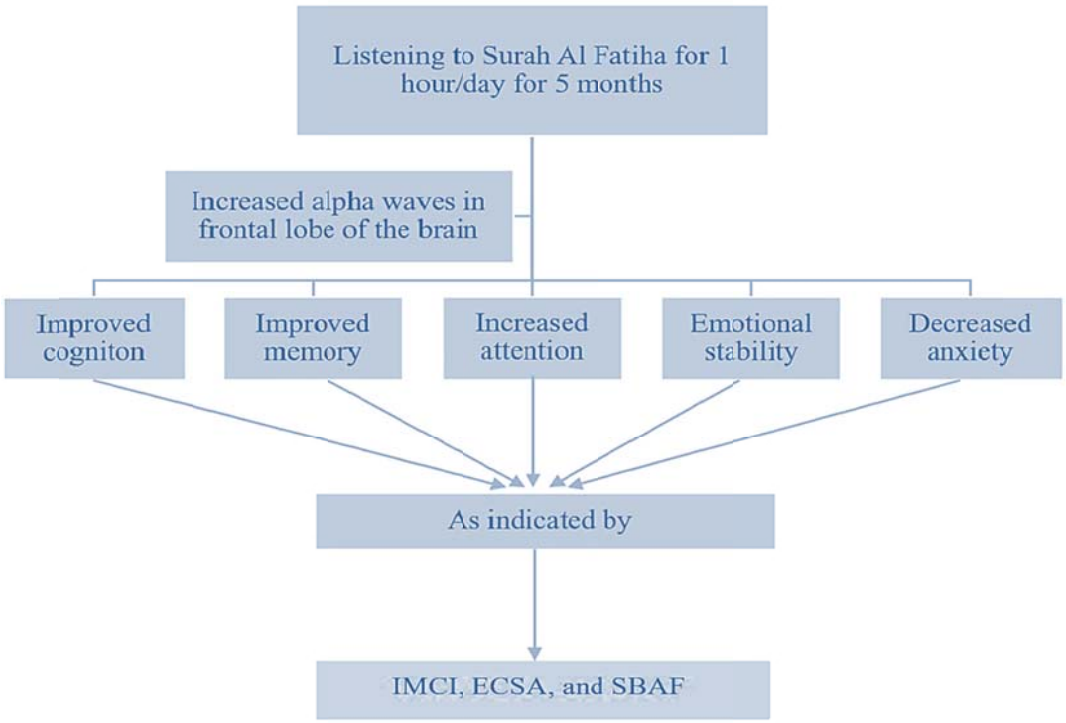

Figure 5: The suggested mechanism by which IMCI, ECSA, and SBAF were improved

The case history showed periventricular injury, such injury alters sensorimotor connections to the motor cortex and corticospinal tracts. Al Fatiha might have helped in reinstating the disrupted connections in the brain; however, the post-intervention assertion can only be done by MRI and CT scan which was not possible because the parents had quit the protocol.

Fine motor skills are fine-tuned by the cerebellum. Cortex, basal ganglia, and thalamus undergo injury in Cerebral Palsy children. The cerebellum and basal ganglia have been long to be involved in motor control [25]. Thus, it might be possible that the reduction of functional deficits (a predominant feature in CP children) could have been reinstated due to cortical plasticity as demonstrated previously by Electromyography (EMG), Transcranial magnetic stimulation (TMS), Functional magnetic resonance imaging (fMRI) [26].

Improvement of speech as evident from the intervention-induced results could have been due to the enhancement of pitch and phonetic comprehension in the middle temporal gyrus and Wernicke's area [27]. A decrease in anxiety as observed in SBAF form, however, cannot be explained by alpha-induced increasing concentration of 5HT because decreasing 5HT functions are anxiolytic [28]. Thus, it could be interesting to elucidate the mechanisms by which the Fatiha chapter induced decreases in anxiety.

The decrease in distress score of the child (ECSA) could have been attributed to the Fatiha chapter acoustic stimulus-induced greater activation of the neural population [29]. Previously we have reported intervention-induced betterment in fine motor skills of CP children [7, 30]. The present study showed favorable effects of the intervention on a male CP child, and previously we reported a dominant ratio of CP in males [31]. It can be envisaged that the Al Fatiha can be an effective approach for rehabilitating male CP-affected patients. However, its exact mechanism of action remains to be elucidated. Thus, based on the present case study and respondent perception findings we suggest that Quranic intervention can be a non-invasive intervention to treat CP children.

VI. CONCLUSION

The perception regarding Quranic intervention encourages us to introduce Al Fatiha as a therapy for many ailments including CP. The intervention of Surah Al Fatiha helped to reinstate the deteriorating condition of the child. It might be envisaged that the prolonged continuation of Al Fatiha might make the child more productive.

Therefore, we suggest the integration of the spiritual dimension along with physical, psychological, and social dimensions to help the amelioration of CP.

CONFLICT OF INTEREST

The author(s) declare no conflict of interest.

DISCLAIMER

This pilot study was presented at the '7th International Conference on Endorsing Health Science Research' (ICEHSR-19) organized by Advance Educational Institute & Research Centre in collaboration with WHO held at Dow University of Health Sciences, Karachi, Pakistan [32]. It was awarded as *'Best Research Paper'.*

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