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Clinical Assessment of Oral Curcumin Adjuvant in Post-Ischemic Stroke Patients

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Abstract

Background: The assessment of effectiveness curcumin in patients with ischemic stroke is limited in human studies.

Methods: Prospective randomized -controlled open -labeled single -center study was conducted on post stroke patients with or without history of comorbidity from both genders. The eligible patients were allocated into two groups; Group 1 patients on conventional therapy of post-acute ischemic stroke, and group 2:Patients on conventional therapy of post-acute ischemic stroke plus 750 mg Curcumin two capsule single dose daily(1500mg) for 3 months. Muscle Power Scale (MRC), Activism-Stroke Scale, Stroke Specific Quality of Life (SSQOL), and SBP was measured

Results: The results in the present study revealed significant improvement up to (71.30%) in muscle power scale in patients with curcumin adjuvant when compared to convention improvement activity of patients' daily activities, particularly items from 3 to 14 scaling to the most difficult (carrying a heavy bag), improvement SSQOL questionnaire specific domains like(energy, mobility, thinking, extremity function and work productivity), ($p<0.01$), also significant decrease in SBP after 3 months of treatment($p<0.05$).

Conclusion: The improvement in patients' daily activities and subsequent quality of life among patients with post ischemic stroke received curcumin adjuvant treatment. More clinical research can provide new insight into the treatment of stroke with curcumin.

Keywords: Acute ischemic stroke • Curcumin • Muscle Power Scale •ACTIVLIM-Stroke • Stroke Specific

Introduction

In spite of promising advances in treating ischemic stroke, there is a critical need for new drugs that might be of additional benefit in clinical settings [1]. Herbal medicines provide a beneficial effect in most chronic diseases [2,3]. Evidences about different therapeutic effects of curcumin became available throughout the passing years including modulation of inflammation and oxidative stress [1]. The effectiveness of curcumin in animal model of ischemic stroke has been illustrated in previous studies [4,5] ,limited human evidence that explored the effect of oral curcumin adjuvant therapy in ischemic stroke patients, at least, no clinical study reported for Iraqi post ischemic stroke.

Methods

Patients

This study was conducted throughout a period from December 2019 to November 2020.A total of 73 candidate patients diagnosed with newly diagnosed acute ischemic stroke were enrolled under the supervision of neurologist, and were treated according to clinical practice guideline and disease severity. Only 42 patients continue the study intervention. Scientific and Ethics Committee in the College of Pharmacy / Mustansiriayah University reviewed and approved the protocol; also the agreement of Scientific Committee of Medical City was obtained. Patient's oral and written consent was taken after full explanation of the aim of the study and ensure the reliability of the collected information.

Patient's inclusion criteria

•Patient ≥ 18 years old

•Clinical signs of new diagnosed acute ischemic stroke with known symptoms onset or time, or fulfilling the criteria for emergent consent [6].

•Diagnosed as anterior circulation intracranial large vessel occlusion on Computerized Tomography Angiography (CTA) or Magnetic Resonance Angiography (MRA) or (intracranial Internal Carotid Artery (ICA) [6], imaging performed <3 hours from randomization.

•Pre stroke Muscle Power Scale (MRC)<1 (where there is no movement).

•Patients with good mental status to be able to communicate and participate in the study.

•Patients without surgical intervention and on conventional treatment of their co morbid.

Patient's exclusive criteria

•Patients with pre-existing neurological or psychiatric disease that would confound the neurological or functional evaluations.

•Patient diagnosed with hemorrhagic stroke.

•Hospital stays less than 5 days.

•Patients known to have allergy or intolerance to curcumin.

•Patient presents severe or fatal co-morbidities or life expectancy that will likely interfere with the improvement or follow-up.

•Female who is known to be pregnant or lactating.

Study design

The current study is prospective randomized -controlled open -labeled single -center study was conducted on post stroke patients with or without history of comorbidity from both genders. The eligible patients were allocated into two groups:

Group 1: Include 18 patients assigned as control group, received the conventional therapy of post-acute ischemic stroke for 3 months.

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Group 2: Include 24 patients assigned as intervention group, receiving their conventional therapy of post-acute ischemic stroke plus 750 mg Curcumin two capsule single dose daily (1500 mg) for 3 months.

Study intervention started at day 5 of hospital stay. All subjective and objective assessment was done at baseline and following 3 months of treatment. Conventional therapy used in treatment of post ischemic stroke includes [Antiplatelets, statin, neurotics (eg neurobine tab) antihypertensive, antidiabetic] according to patient history of comorbid disease. Patients in the intervention group received Curcumin adjuvant treatment after 3-5 days before patient discharge following the acute attack.

Data collection

A special sheet was designed by the research team to match study goals and the information was collected from patients' case-sheets regarding their demographic data, age, gender, body mass index, family history, comorbidities, laboratory investigations, vital signs, and medication history. Data was collected from patients as face to face interview by researcher. Clinical assessment of muscle power scale which is concise questionnaire of a neurological examination of the upper or lower limb was done direct personal interview or through phone calls. The assessment of health-related quality of life specific to patients with stroke, and measurement of activity limitations in stroke patients were both collected by researcher as well.

Assessment of muscle power scale

The assessment of muscle power using the Medical Research Council's scale (MRCscale) is a key part of a neurological examination of the upper or lower limbs. All patients were clinically evaluated by direct personal interview or via phone calls through clinical assessment questionnaire known as muscle power scale which is concise questionnaire. The MRC scale of muscle strength used to grade the power of a particular muscle group in relation to the movement of a single joint, and then compared with an analogue scale in which power is expressed as a percentage of the maximum expected for that muscle [7]. The MRC grade is more reliable and accurate for clinical assessment of weak muscles of the patients with ischemic stroke it is of 5 items each item is followed by one response. The scoring is from 0–5 (where 0=there is no movement and 5=best outcome), that is for clinical assessment of weak muscles it grades (0-3of the MRC scale or 0-62% on the analogue scale) on the analogue scale. On the other hand, the analogue scale is more reliable and accurate for the assessment of stronger muscles that is grades (4 and 5 of the MRC scale or 62%-100% on the analogue scale). The total score is calculated as the sum of scores from responses to all 5 items.

Assessment of ACTIVLIM-stroke questionnaire

To measure daily activity limitations in post stroke patients was performed using ACTIVLIM-Stroke scale developed by Batcho et al. [8]. ACTIVLIM-Stroke is a cross cultural Rasch-Built Scale of Activity Limitations in Patients with Stroke. The questionnaire assessed activity limitations in patients with stroke and is focused on the (Classification of Functioning, Disability and Health activity) domain. The new ACTIVLIM-Stroke questionnaire is a 20 item scale, each item has 3 response of possibilities; (impossible, difficult, easy).This tool focused on the subjective responses of person without including their objective life conditions. It also included questions about the patient's ability to standing for a long time, carrying a heavy load, standing for a long time without support, asking the patient about using the toilet, taking a shower, and turning in bed. And some questions related to patients movement and activity. For clinical practice, the questionnaire presents good psychometrics qualities and provided accurate questionnaires for all the activities.

Assessment of stroke specific quality of life scale

The Stroke Specific Quality Of Life scale is a patient-centered outcome measure intended to provide an assessment of Health-Related Quality of life (HRQOL) specific to patients with stroke which was published and validated in 1999 by Williams et al. [9]. The SS-QOL consist of 12-domain scale are divided to) Energy, Family Roles, Language, Mobility, Mood Personality, Self-Care, Social Roles, Thinking, Upper Extremity, Function, Vision Work Productivity. Scoring index for each item as in the following key;

1. Total help-Couldn't do it at all - Strongly agree 1

2. A lot of help-A lot of trouble - Moderately agree 2

3. Some help-Some trouble - Neither agree nor disagree 3

4. A little help-A little trouble - Moderately disagree 4

5. No help needed-No trouble at all - Strongly disagree 5

The summation of points for each question gave the final score for each part. Higher scores means (need a lot of help for patient), then decreases gradually with lower score.

Blood pressure measurement

Blood pressure was measured electronically by rossmax apparatus. Systolic and diastolic blood pressure readings were expressed as mmHg. The typical MAP value for ischemic stroke Normal MAP was stated at >80 mmHg due to aimed CP pressure of 70 mmHg and assumed normal intracranial pressure of 10 mmHg [10].

Statistical analysis

The data were analyzed using the following software, Microsoft excel, Minitab Version 17, IBM SPSS Version 24. The results reported in this study were expressed as mean ± SD. Chi square test, ANCOVA were used to examine the degree of significance. Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. Normal range of Cronbach's alpha (0.70-0.99). Probability values less than 0.05 were regarded as significantly different while probability values less than 0.01 were regarded as highly significant.

Results

Patient's demographic data and characteristics

Demographic data of 42 ischemic stroke patients and their disease characteristics are illustrated in Table 1. There was no significant difference between study groups in respect to all demographic data of the enrolled patients and their disease characteristics ($p>0.05$).

Effect study intervention on Muscle Power Scale (MRC)

The mean values of both measured and percentage of Muscle Power Scale (MRC) revealed no significant difference at base line and post treatment between study groups ($p>0.05$), meanwhile significant increase in MRC in group 1 patients ($p<0.05$) and highly significant increase in group 2 patients ($p<0.01$) was noticed after three months of treatment compared to pre-treatment value in both groups (41.10 vs 71.30%) respectively, (Table 2).

Effect study intervention on ACTIVLIM-stroke questionnaire

The result of activity limitations in patients with stroke using ACTIVLIM-Stroke scale obtained from this study is presented in Table 3.The 20-item scale items are ordered according to difficulty level from easiest (opening a door) to most difficult (carrying a heavy bag). The range of difficulties of the 20 items of ACTIVLIM-Stroke questionnaire fit the distribution of the functional abilities of patients with stroke. Results showed significant improvement activity of patients' daily activities after 3 months of treatment in both groups ($p<0.01$), however, higher percent of change reported in group 2 in particularly items from (3 to 14).

Effect study intervention on Stroke Specific Quality of Life Scale (SS-QOL)

The Stroke Specific Quality of Life Scale (SS-QOL) presented in Table 4 demonstrates the following results. There was significant differences in SS-QOL scale in both group 1 and group 2 in most of domains and in the total score after 3 month of treatment ($p<0.01$). Specific domains like (energy, mobility, thinking, extremity function and work productivity) were notable improved in group 2 patients compared to group 1 patients. The Cronbach's αalpha coefficient for group 2 were 0.96 while 0.94 for group 1 suggesting that the items have relatively high internal consistency.

Effect study intervention on blood pressure readings

The blood pressure readings were presented in pair 19 in Table 3. Both Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) readings showed no significant difference between group 1 and group 2 at base line (p>0.05). The step down decrease over the 3 months in SBP was noticed in groups 2 significantly compared to group 1 (p<0.05), nevertheless notable decrease in DBP in both groups 1 and 2 patients over the 3 months though non-significant (Table 5).

Table1. Patient demographic data and disease characteristics at baseline.

Variable	Study groups		P-value
	Group 1 (n=18)	Group 2 (n=24)	
Gender	n(%)	n(%)	0.16^{NS}
Male	9(50%)	17(70.83%)	
Female	9(50%)	7(29.17%)	
Total	18(100)	24(100)	
Age(years)	50.95 ± 10.03	51.37 ± 9.35	0.88NS
Age range(years)	28-65	33-64	------
BMI(kg/m2)	27.66 ± 4.29	29.10 ± 4.86	0.316NS
Underweight (< 18.5)	------	------	0.91^{NS}
normal weight(18.5-24.9)	3(16.67%)	5(20.83%)	
Over weight(25-29.9)	8(44.45%)	11(45.83%)	
Obese(≥ 30)	7(38.88%)	8(33.34%)	
Family history			0.515^{NS}
Positive	3(16.67%)	6(25%)	
Negative	15(83.33%)	18(75%)	
Comorbid disease			0.612^{NS}
Positive	14(77.8%)	17(70.8%)	
Negative	4(22.2%)	7(29.2%)	
Concomitant drug			0.89^{NS}
<5 Drugs	2(11.11%)	3(12.5%)	
>5 Drugs	16(88.89%)	21(87.5%)	
Surgical intervention			0.70^{NS}
Positive	5(27.78%)	8(33.33%)	
Negative	13(72.22%)	16(66.67%)	
Smoking			0.65^{NS}
Smoker	7(38.89%)	11(45.83%)	
Non Smoker	11(61.11%)	13(54.17%	
Drinking Alcohol			0.40^{NS}
Drinker	2(11.11%)	5(20.80%)	
Non-Drinker	16(88.89%)	19(79.20%	
Duration of stay in the hospital/per Days	7.55 ± 2.68	8.62 ± 4.74	0.36^{NS}

Note: Data presented as Mean ± SD, (n) is number of patients and (%) is percentage. Chi-square test for numerical values to compare between group 1 and group 2.Two-sample t-test is used to statistically analyse BMI where, NS: Not significant (p>0.05).

Table 2. Effect Study intervention on muscle power scale after three months.

Variable	Study groups	Estimated baseline	Estimated Endline		p-value	% of difference
			Mean	± SD		
(MRC)	Group1(n=18)	2.51	3.54	0.82	0.009**	41.10
	Group2(n=24)		4.30	0.96		71.30
nifi	nifi	nifi	nifi	nifi	nifi	nifi

Note: Data presented as mean ± SE, Analysis of covariance were used, **(P-value<0.01) is considered Highly Significant differences.

Table3. Effect of study intervention on ACTIVLIM-Stroke Questionnaire after three months.

Variable	Group 1 (n=18)	P-value	% of difference	Group 2 (n=24)	P-value	% of difference	a
Pair 1	E. baseline	1.72 ± 0.66	0.001**	54.7%	1.75 ± 0.53	0.001**	57.1%
	Endline	2.66 ± 0.48			2.75 ± 0.44		
Pair 2	E. baseline	1.83 ± 0.61	0.001**	57.4%	1.79 ± 0.58	0.001**	58.1%
	Endline	2.88 ± 0.32			2.83 ± 0.38		
Pair 3	E. baseline	1.72 ± 0.75	0.001**	54.7%	1.45 ± 0.65	0.001**	80.7%
	Endline	2.66 ± 0.48			2.62 ± 0.49		
Pair 4	E. baseline	1.72 ± 0.66	0.001**	58.1%	1.75 ± 0.53	0.001**	61.7%
	Endline	2.72 ± 0.46			2.83 ± 0.38		
Pair 5	E. baseline	1.66 ± 0.68	0.001**	60.2%	1.45 ± 0.66	0.001**	92.4%
	Endline	2.66 ± 0.48			2.79 ± 0.41		
Pair 6	E. baseline	1.61 ± 0.50	0.06NS	16.77%	1.66 ± 0.70	0.001**	62.7%
	Endline	1.88 ± 0.32			2.70 ± 0.46		
Pair 7	E. baseline	2.38 ± 0.69	0.001**	23.53%	2.25 ± 0.67	0.001**	31.1%
	Endline	2.94 ± 0.23			2.95 ± 0.20		
Pair 8	E. baseline	1.66 ± 0.68	0.001**	60.2%	1.45 ± 0.66	0.001**	89.7%
	Endline	2.66 ± 0.48			2.75 ± 0.44		
Pair 9	E. baseline	1.72 ± 0.66	0.06NS	22.67%	1.75 ± 0.53	0.001**	57.1%
	Endline	2.11 ± 0.58			2.75 ± 0.44		
Pair 10	E. baseline	1.66 ± 0.68	0.001**	57.2%	1.50 ± 0.65	0.001**	83.3%
	Endline	2.61 ± 0.50			2.75 ± 0.44		
Pair 11	E. baseline	1.66 ± 0.68	0.11NS	16.87%	1.45 ± 0.65	0.001**	89.7%
	Endline	1.94 ± 0.23			2.75 ± 0.44		
Pair 12	E. baseline	1.66 ± 0.68	0.001**	57.2%	1.54 ± 0.65	0.001**	78.6%
	Endline	2.61 ± 0.50			2.75 ± 0.44		
Pair 13	E. baseline	1.66 ± 0.68	0.09NS	20.5%	1.45 ± 0.65	0.001**	92.4%
	Endline	2.00 ± 0.48			2.79 ± 0.58		
Pair 14	E. baseline	1.66 ± 0.68	0.08NS	23.5%	1.54 ± 0.65	0.001**	78.6%
	Endline	2.05 ± 0.63			2.75 ± 0.44		
Pair 15	E. baseline	1.50 ± 0.51	0.001**	70%	1.41 ± 0.50	0.001**	77.3%
	Endline	2.55 ± 0.51			2.50 ± 0.51		
Pair 16	E. baseline	1.44 ± 0.51	0.19NS	15.28%	1.29 ± 0.46	0.08^{NS}	25.6%
	Endline	1.66 ± 0.48			1.62 ± 0.76		
Pair 17	E. baseline	1.61 ± 0.50	0.14NS	20.5%	1.37 ± 0.49	0.10^{NS}	21.17%
	Endline	1.94 ± 0.80			1.66 ± 0.70		
Pair 18	E. baseline	1.50 ± 0.51	0.43NS	10.67%	1.29 ± 0.46	0.12^{NS}	22.5%
	Endline	1..66 ± 0.68			1.58 ± 0.77		
Pair 19	E. baseline	1.72 ± 0.75	0.48NS	9.3%	1.40 ± 0.50	0.10^{NS}	21.43%
	Endline	1.88 ± 0.83			1.70 ± 0.73		
Pair 20	E. baseline	1.11±0.32	0.38NS	9.91%	1.29 ± 0.46	0.17^{NS}	16.28%
	Endline	1.22±0.42			1.50 ± 0.58		

Table 4. Effect study intervention on Stroke Specific Quality of Life Scale after three months.

SS-QOL Domains	Estimated Baseline	Groups	Estimated Endline	Cronbach's α	No.of items	p-value
Energy	2.65	Group1	3.89 ± 0.82	0.88	3	0.014*
		Group2	4.57 ± 0.87			
Family Roles	3.12	Group1	3.68 ± 0.72	0.91	3	0.408^{NS}
		Group2	3.87 ± 0.74			

Language	2.77	Group1	3.25 ± 0.63	0.97	5	0.399^{NS}
		Group2	3.42 ± 0.65			
Mobility	2.86	Group1	3.17 ± 0.41	0.89	6	0.001**
		Group2	3.83 ± 0.49			
Mood	3.21	Group1	3.64 ± 0.38	0.96	5	0.220^{NS}
		Group2	3.78 ± 0.33			
Personality	3.29	Group1	4.01 ± 0.82	0.98	3	0.567^{NS}
		Group2	4.16 ± 0.85			
Self-Care	3.83	Group1	4.03 ± 0.66	0.97	5	0.656^{NS}
		Group2	4.12 ± 0.62			
Social Roles	3.75	Group1	3.82 ± 0.58	0.98	5	0.399NS
		Group2	3.98 ± 0.63			
Thinking	3.32	Group1	3.67 ± 0.71	0.86	3	0.009**
		Group2	4.29 ± 0.75			
Extremity Function	3.12	Group1	3.62 ± 0.82	0.85	5	0.004**
		Group2	4.41 ± 0.86			
Vision	3.66	Group1	4.20 ± 0.91	0.94	3	0.206^{NS}
		Group2	4.57 ± 0.94			
Work/ Productivity	2.29	Group1	3.13 ± 0.65	0.87	3	0.001**
		Group2	3.89 ± 0.73			
SS-QOL Total	3.15	Group1	3.67 ± 0.91	0.92	49	0.086^{NS}
		Group2	4.07 ± 0.96			

Note: Data presented as mean ± SE, Analysis of covariance were used,(*) Significant difference (P<0.05) (**) Highly Significant difference (P<0.01),NS=Non significant differences (p value >0.05).All domains was calculated as total measured ,cronbach's alpha measured normal range (0.70-0.99).

Table 5. Effect study intervention on blood pressure after three months.

Variable	**Study groups**	**E.baseline**	**Endline**		**p-value**	**% of difference**
BP (SBP)		**172.47**	**Mean**	**± SD**		
After 1 month	Group1(n=18)		160.34	25.34	0.558NS	-7.03
	Group2(n=24)		155.76	24.08		-9.69
After 2 months	Group1(n=18)		154.52	24.11	0.409NS	-10.40
	Group2(n=24)		148.28	23.77		-14.03
After 3 months	Group1(n=18)		155.67	21.18	0.045*	-9.74
	Group2(n=24)		142.07	20.73		
Variable	Study groups	E. baseline	Endline		p-value	% of difference
BP (DBP)		115.21	Mean	± SD		
After 1 month	Group1(n=18)		110.94	26.10	0.802NS	-3.89
	Group2(n=24)		108.91	25.35		-5.65
After 2 months	Group1(n=18)		107.31	25.69	0.516NS	-7.03
	Group2(n=24)		102.20	24.02		-11.46
After 3 months	Group1(n=18)		96.39	22.24	0.543NS	-16.5
	Group2(n=24)		92.27	20.54		

Discussion

In the current study both genders were assigned, a majority (62%) of the study participants was male and (38%) were female in both groups. The causes for this gender differences are unknown but have been associated with hormonal or immunological factors, hence, these results agreed with other studies [11,12]. Aging is the most non-modifiable risk factor for incident stroke, which doubles every 10 years after age 55 years, and as the number of people aged ≥ 65 years is projected to grow; the number of incident strokes in older adults is expected to rise, presenting major challenges for clinicians and policy makers in future [13]. In current study, majority of patients aged around and more than 50 y.o. Result were matched in study by Yousufuddin et al. In 2019, more than 25% of ischemic stroke occurs in patients under age 45, which doubles every 10 years after age 55 years.

Obesity is another modifiable risk factor for stroke, and the correlation between baseline body mass index and the subsequent development of stroke was positive[14,15].This fact is applied to a larger percent among male than females

and this may be related to the degree of adiposity in man[16]. Most of patients in the present study are categorized as overweight or obese with body mass index ≥ 25 kg/m2.

There are many factors that involve increase risk of stroke mainly comorbid chronic diseases prevalent among stroke patients. hypertension, diabetes, arrhythmias, IHD and atherosclerosis were each found in >10% of patients hospitalized for stroke [17]. In current study more than 74% in both groups presented with positive comorbid, with more than 5 concomitant medications. Moreover, family history of stroke can provide an opportunity for earlier detection and management of modifiable risk factors [18].

The assessment of muscle power is a key part of a neurological examination of the upper or lower limbs, the results in the present study revealed improvement up to (71.30%) in muscle power scale in patients with who received Curcumin adjuvant treatment when compared to control patients ($p<0.01$). In a recent study by Fernández-Lázaro, D et al. Curcumin reduces the subjective perception of the intensity of muscle pain; reduces muscle damage, increase muscle power scale through the decrease of Creatine Kinase (CK); increases muscle performance; at a dose between 150–1500 mg/day [19]. Experimentally, administration of curcumin after focal cerebral ischemia in rats significantly diminished infarct volume, improved neurological deficit, improvement rat movement, decreased mortality and reduced the water content of the brain in a dose-dependent manner [20].

For clinical practice, the ACTIVLIM Stroke scale questionnaire presents good psychometrics qualities and provided accurate questionnaires for all activity limitations of functioning, disability and health in patients with stroke, hence, attenuating muscle damage may improve performance and recovery, allowing for improved training quality and adaptations [8]. In the present study improvement activity of patients' daily activities after curcumin adjuvant treatment, particularly items from (3 to 14) scaling to the most difficult (carrying a heavy bag). In previous study, Ralf Jäger et al. Compared (1000-mg dose delivering 200 mg of curcuminoids) with a lower dose of Curcumin (250-mg dose delivering 50 mg of curcuminoids) in patients with disability of walking, there was significant improvement in knee flexion in patients who received high dose of curcumin compared to low dose [21].

The SSQOL questionnaire of stroke specific quality of life showed acceptability and reliability properties comparable in many studies [22,23]. This study was mostly the first trial to apply the SSQOL questionnaire among Iraqi post stroke survivors, specific domains like (energy, mobility, thinking, extremity function and work productivity) were notable improved in group 2 patients on curcumin adjuvant treatment. Curcumin could significantly improve cognitive dysfunction, according to epidemiological studies; Indian population is at the lower risk of Alzheimer disease because it consumes a substantial amount of curcumin in their food [24]. In the double-blind placebo-controlled study 40 adults (between 50 and 90 years of age) were selected who complained of memory issues, compared to control group, curcumin-treated group experienced improvement in memory, This group showed less brain amyloid and tau deposits in the brain areas that control memory and emotion compared to control group[25]. As mentioned earlier, curcumin possesses potent antioxidant, anti-inflammatory, antiapoptotic, and antiamyloid properties; which are responsible for improving learning and memory, thereby it has the potential to produce more effect than current treatments. It can effectively penetrate the blood brain barrier and neuronal Membranes [26].

The most items of the SS-QOL questionnaire measure by Cronbach's αwas used for the analysis of internal consistency However, the items demonstrated adequate internal consistency and were capable of differentiating individuals with and without restriction to participation which facilitates comparisons and discussion on functional health and social participation after stroke [22,23].

In a recent systemic review by Hadi et al. reported that curcumin may improve SBP when administered in long durations [27].This finding was revealed in the current study patients reviewing curcumin adjuvant produced significant decrease in SBP after 3 months of treatment($p<0.05$), though the effect on DBP was also slightly reduced. Other previous study showed that curcumin treatment for 3 months or more has positive effect on SBP. Several possible mechanisms involved in BP reduction are suggested; include antioxidant, anti-inflammation, Ca2+ concentration interference, alpha 2-adrenergic receptor stimulation, and renin-angiotensin system inhibition [28,29].

Conclusion

From the present study, promising therapeutic strategies emerged from the available results among patients with post ischemic stroke received curcumin adjuvant treatment through improvement in patients' daily activities and subsequent quality of life. Therefore, more clinical research can provide new insight into the treatment of stroke with curcumin. Patients with TIA and AF, prevention of recurrent ischemic stroke of cardiac origin should begin oral anticoagulation (rivaroxaban, dabigatran, warfarin, or apixaban) immediately after brain imaging has excluded intracranial hemorrhage. For patients presenting with AF and acute ischemic stroke, the immediate use of heparinoid/heparin anticoagulation is not recommended. The optimal timing of oral anticoagulation following acute stroke for patients in AF is unclear; it is normal practice to wait 2–14 days and repeat brain imaging (MRI or CT) to exit asymptomatic intracranial hemorrhage.

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Ethical Consideration

• The study protocol was approved by Scientific and Ethics Committee in the College of Pharmacy/University of AL-Mustansiriayah, and was conducted in accordance with the 2013 declaration of Helsinki.

• The agreement of Baghdad teaching hospital was achieved according to the ministry of health ethical comets/Baghdad Medical city.

• Patients were informed about the research by the researcher and asked if they were ready participate in the current study, then verbal and written formally documented for all patients in this study.

Conflict of Interest

The authors declare non.

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