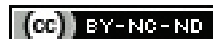


Effectiveness of Yoga on Quality of Life among Patients with Depression: A Randomised Controlled Trial

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ABSTRACT

Introduction: Depression is the over-riding reason for disability and its global prevalence has been increasing in recent decades. Depression is a substantial contributor to the global disease burden and a crucial determinant of quality of life and survival.

Aim: To determine the quality of life of patients with depression who received yoga intervention and compare it to patients who received conventional antidepressant medication (without yoga intervention) in terms of various domains.

Materials and Methods: This randomised controlled trial was conducted in Department of Physiology with the collaboration of the Department of Psychiatry at Sawai Man Singh Medical College, Jaipur, Rajasthan, India, from November 2018 to February 2020. The study involved clinically diagnosed 60 patients with mild to moderate depression between the age groups of 18 to 45 years. The participants were split into two groups. The participants were split into two groups: interventional and control. The interventional group received a set of yoga exercises for three months in addition to conventional antidepressant treatment, while the control group received only conventional antidepressant treatment for the same duration. The World Health Organisation Quality of Life-BREF (WHOQOL-BREF) scale was used to assess the quality of life in both study groups at baseline, and after one

month and three months. The unpaired Student's t-test and repeated measures Analysis of Variance (ANOVA) were applied for two and more groups, respectively. A p-value <0.05 was considered as statistically significant.

Results: The present study included 60 patients with depression; out of them 39 were male and 21 were females. A statistically significant difference was observed in WHOQOL-BREF scores between the interventional and control group in the physical (p-value <0.001) and psychological health (p-value <0.001) domain after three months of follow-up, but it was more improved among the interventional group. A significant difference was observed after one month in the interventional group in overall quality of life (p-value=0.004), physical (p-value <0.001), and psychological health domain (p-value=0.009) of quality of life. While in the control group, physical (p-value <0.001) and psychological health domain (p-value <0.001), as well as social relationships domain (p-value=0.015) significantly improved after three months of antidepressant treatment.

Conclusion: Three month of yoga practice improved the overall quality of life and all domains of quality of life. Whereas, three months of conventional antidepressant treatment improved only physical, psychological health and social relationship.

Keywords: Antidepressant, Environment, Physical health, Psychological health, Social relationships, Yoga intervention

INTRODUCTION

Depression is the over-riding reason for disability and a major contributor to the disease burden across the world. In recent decades, the global prevalence of depression has risen [1]. According to the World Health Organisation (WHO), around 280 million people worldwide suffer with depression, with over 7,00,000 people dying each year as a result of it [2]. Depression is a significant contributing factor to the quality of life and survival, accounting for about 50% of psychiatric consultations and 12% of all hospital admissions [1]. It has been associated with an elevated risk of mortality, poorer outcome of treatment of physical disorders, and may negatively influence the Quality Of Life (QOL) [3]. The pharmacological treatment prescribed for patients with depression indirectly affects the quality of life as medicinal treatment focuses on their symptoms [4]. In recent clinical trials, measuring QOL has been recognised as an important add-on to objectify clinical effectiveness [5,6].

The quality of life is defined by WHO as 'individuals' perception of their position in life in the perspective of the culture and value systems in which they live and with their goals, expectations, principles, and concerns' [7]. High levels of emotional stress can cause neurological and behavioural changes and negative life style practices, which has a negative effect on quality of life [8]. Antidepressants improve only clinician-rated depression symptoms and did not exhibit improvement in overall well-being and QOL of

patients [9]. Numerous physical and mental practices and yoga relieve stress and improve QOL in patients with chronic disease [10,11]. Studies non specific improvement in quality of life after intervention of yoga or Iyengar yoga in the breast cancer survivor, menopausal women and nonspecific chronic back pain [12-14].

Yoga practice emphasises the harmony of the mind and body to encourage a state of calmness and presence [15]. The yoga intervention has been shown to improve physical health, mental health and psychological well-being, behavioural regulation, and interpersonal behaviour, and thereby, it may concurrently reduce a variety of psycho-pathological symptoms [16]. However, studies on the effects of yoga have not primarily focussed on the depressed people's quality of life. Many researchers have looked at the link between depression and QOL in elderly and middle-aged people around the world [17,18], but there is a paucity of literature on QOL in depressed patients in India. Thus, the present study aimed to determine the quality of life in patients with depression who received yoga intervention and compared it to patients who had conventional antidepressant treatment (without yoga intervention) in terms of various domains after three months of follow-up.

MATERIALS AND METHODS

This randomised controlled trial was conducted in Department of Physiology with the collaboration of the Department of Psychiatry

at Sawai Man Singh Medical College, Jaipur, Rajasthan, India, from November 2018 to February 2020. The study was undertaken after obtaining permission from the Departmental Research Committee (DRC), Institutional Clinical Trial Screening Committee (CTSC), Ethics Committee (EC), and written consent from the participants. University approval number (No. F7 Research/RUHS/ 2018/16480) and Institutional Ethics Committee approval number (No. 3951 MC/EC/2018). Clinically diagnosed patients of depression who were on stable medical treatment (for atleast one month), recruited from the Psychiatry Outpatient Department after taking written informed consent from patients.

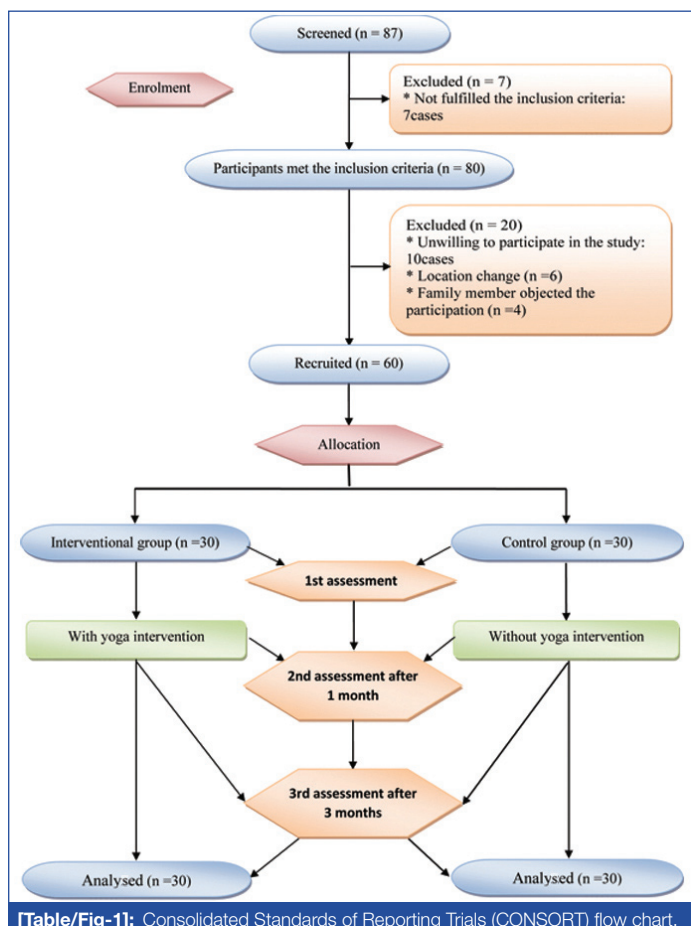
Sample size calculation: Sample size was calculated at 95% confidence level, 0.05 α error and at 80% study power 30 for each group.

Inclusion criteria: Patients with mild to moderate levels of depression were recruited in the study that was diagnosed by using the Hamilton Depression Rating Scale (HDRS) [19]. A total 60 patients of depression between the ages of 18-45 years of both genders were included in the present study.

Exclusion criteria: Patients with severe mental and medical comorbidities, those who were already practicing yoga or were receiving any cognitive behavioural therapy or psychotherapy, who had a history of alcohol consumption or smoking, or who used any other addictive substance, and those who were non cooperative during the study, all were excluded from the study.

A total of 87 participants were screened and out of them seven participants were excluded from the study, only 80 participants who met the inclusion criteria were included in the study after obtaining written informed consent. But only 60 participants were recruited and others were excluded. Randomisation was done by using chit box method [Table/Fig-1]. The participants were randomly assigned into:

- Interventional group (n=30): For 3 months, patients received yoga intervention while continuing to get the same medical treatment.
- Control group (n=30): Patients received same conventional antidepressant treatment for the same time frame.



Study Procedure

The study included 60 patients with depression using Hamilton Depression Rating Scale (HDRS) [19]:

- Mild depression (8-13)
- Moderate depression (14-18)

The test procedure had been explained to all of the participants, and it was recommended that they maintain their lifestyle during the intervention program. The group that underwent yoga intervention was asked to practice a set of yogic exercises (Asana), Pranayama, and Dhyana one hour daily, for atleast five days per week under the supervision of a trained yoga instructor. In both study groups, QOL was measured at baseline, after one month and three months.

The following yoga practices were advised to perform during the study period:

- Specific postures (Asanas): Suryanamaskara, Shashankasan (for 15 min)
- Breathing exercises (Pranayamas): Kapalbhati, Deerg-Swas-Preksha, Anulom-vilom, Bhramari, Omkar Chanting (for 20 min)
- Meditation (Dhyana): (for 20 min)

World Health Organisation Quality of Life-BREF (WHOQOL-BREF)

Quality of life was measured with the World Health Organisation Quality of Life-BREF (WHOQOL-BREF) [7], a short version of the WHOQOL-100 questionnaire. The WHOQOL-BREF questionnaire is a validated self-assessment questionnaire designed for use in clinical trials and consists of 26 items assessing the Quality Of Life (QOL) of the subjects in four domains:

- Domain 1: Physical health (seven items),
- Domain 2: Psychological health (six items),
- Domain 3: Social relationships (three items)
- Domain 4: Environment (eight items)
- General evaluative aspect (overall Quality of Life and General Health: two items).

Each questionnaire item was answered on a five-point Likert scale. The total scores were calculated; a higher score indicated a good quality of life and vice-versa. The calculated raw scores in each domain transformed into the score of 0-100 scale comparable with WHOQOL-100.

STATISTICAL ANALYSIS

The data was entered into a spreadsheet (Microsoft Excel 2007). Quantitative data were expressed in mean and standard deviation, while qualitative data was expressed in percentage and proportion. Quantitative data was further analysed by unpaired Student's t-test and for multiple variables repeated-measure Analysis of Variance (ANOVA) was applied. The tests were conducted in Statistical Package for the Social Sciences (SPSS) version 20.0 with a confidence interval of 95% and an α error of 0.05. A p-value <0.05 was considered statistically significant.

RESULTS

The baseline mean \pm SD of HDRS score for interventional and control groups were 14.97 \pm 1.65 and 14.43 \pm 2.46 (p-value=0.328), respectively and compatible at the baseline level. The socio-demographic characteristics of research participants are shown in [Table/Fig-2].

The present study found that overall quality of life and general health in the patients with depression improved among the interventional group (p-value <0.001), while in the control group, no significant improvement was observed. A statistically significant difference was observed in WHOQOL-BREF scores between the interventional and control group in the physical and psychological health domain after three months of follow-up. But the statistically significant improvement in WHOQOL-BREF scores was more among the interventional group than the control group after three months.

Variables	Interventional group (n, %)	Control group (n, %)	Total (N=60) (N, %)	p-value (Chi-square test)
Gender				
Male	18 (60)	21 (70)	39 (65)	0.417
Female	12 (40)	9 (30)	21 (35)	
Age group				
18-25 years	11 (36.67)	11 (36.67)	22 (36.67)	0.048*
26-30 years	12 (40)	3 (10)	15 (25)	
31-35 years	4 (13.33)	6 (20)	10 (16.67)	
36-40 years	2 (6.67)	6 (20)	8 (13.33)	
41-45 years	1 (3.33)	4 (13.33)	5 (8.33)	
Religion				
Hindu	26 (86.67)	27 (90)	53 (83.33)	0.688
Muslim	4 (13.33)	3 (10)	7 (11.67)	
Residential area				
Rural	6 (20)	11 (36.67)	17 (28.33)	0.152
Urban	24 (80)	19 (63.33)	43 (71.67)	
Education				
Illiterate	1 (3.33)	3 (10)	4 (6.67)	0.532
Primary and Middle school	4 (13.33)	5 (16.67)	9 (15)	
Secondary and Senior secondary school	9 (30)	9 (30)	18(30)	
Graduate	10 (33.33)	11 (36.67)	21 (35)	
Postgraduate	6 (20)	2 (6.67)	8 (13.33)	
Occupation				
Government sector	3 (10)	5 (16.67)	8 (13.33)	0.193
Private sector	9 (30)	3 (10)	12 (20)	
Self-employed	3 (10)	8 (26.67)	11 (18.33)	
Housewife	5 (16.67)	6 (20)	11 (18.33)	
Student	10 (33.33)	8 (26.67)	18 (30)	
Family type				
Joint	8 (26.67)	10 (33.33)	18 (30)	0.580
Nuclear	17 (56.67)	13 (43.33)	30 (50)	
Three generation	5 (16.67)	7 (23.33)	12 (20)	
Socio-economic status				
Upper class	2 (6.67)	5 (16.67)	7 (11.67)	0.026*
Upper middle class	24 (80)	12 (40)	36 (60)	
Middle class	3 (10)	10 (33.33)	13 (21.67)	
Lower middle class	1 (3.33)	1 (3.33)	2 (3.33)	
Lower class	0	2 (6.67)	2 (3.33)	
Depression				
Mild	5 (16.67)	12 (40)	17 (28.33)	0.045*
Moderate	25 (83.33)	18 (60)	43 (71.67)	

[Table/Fig-2]: Socio-demographic profile of study participants.
p-value <0.05 was considered as statistically significant

Whereas, the social relationships and environment domain were only statistically improved among the interventional group [Table/Fig-3].

The present study found that overall quality of life in the patients with depression improved even after one month among the interventional group (p-value <0.05). A significant difference was observed only after one month in the interventional group as all duration showed a significant change in the physical and psychological health domain of quality of life. Whereas, a statistically significant improvement in the social relationships and environment domain was observed after three months (0 to 3 months and 1 to 3 months), as shown in [Table/Fig-4].

The physical and psychological health domains, as well as social relationships domain in the control group, improved after three months (0 to 3 months and 1 to 3 months) of antidepressant treatment with a significant difference, whereas statistically no improvement was observed in the environment domain of quality of life [Table/Fig-5].

A statistically high significant (p-value=0.001) improvement was observed in all domains of quality of life in terms of mean change (0 to 3 months) among the interventional group than the control group, which showed that quality of life improves more with yoga intervention [Table/Fig-6].

The percentage distribution of all domains shows a similar pattern in both study groups. There was a significant improvement in all the four domains of QOL followed by the yoga intervention in terms of mean change percentage as depicted in [Table/Fig-7].

DISCUSSION

The present study was conducted on 60 patients of depression with a mild and moderate level of severity. In the present study, it was discovered that overall quality of life in patients with depression improved only after one month of yoga intervention (p-value <0.05), but there was no significant improvement in the control group. Yoga practice improved all domains (physical, psychological, social relationships, and environment) of quality of life, while conventional antidepressant treatment improved only physical, psychological and social relationship after three months. Yoga improved physical and physiological health earlier than social relationships and environment domain. After three months mean change in all domains significantly risen among the interventional group than the control group subjects, but the percentage distribution of all domains remained same in both study groups.

The physical health domain deals with features such as mobility, fatigue, pain, sleep, and work capacity while the psychological health domain deals with questions relating to feelings, self-esteem, spirituality, thinking, learning, memory, etc. The social relationships domain has questions relating to problems with interpersonal relationships, social support, etc and the environment domain deals with problems relating to financial resources, physical safety, and adaptability to the physical environment such as pollution, noise, and climate [20,21].

Previous study conducted by Tekur P et al., reported the usefulness of one week intensive residential integrated yoga in improving QOL with all four domains in patients with chronic low back pain [22]. Since,

Domains of QOL	Study groups	Baseline (Mean±SD)	1 month (Mean±SD)	3 months (Mean±SD)	F-value	p-value (Repeated measure ANOVA)
Domain 1 (Physical health)	Interventional	31.33±7.95	37.60±6.92	58.10±6.11	533.216	<0.001**
	Control	34.50±14.16	36.73±12.72	42.00±10.25	19.082	<0.001**
	p-value [†]	0.290	0.744	<0.001**		
Domain 2 (Psychological health)	Interventional	32.50±11.25	34.13±10.23	50.07±9.53	338.562	<0.001**
	Control	34.30±11.76	34.73±11.77	38.40±10.04	10.060	<0.001**
	p-value [†]	0.547	0.834	<0.001**		
Domain 3 (Social relationship)	Interventional	52.50±15.18	53.10±15.02	61.30±12.98	38.044	<0.001**
	Control	53.17±15.70	53.80±15.15	55.87±13.72	7.192	0.004*
	p-value [†]	0.868	0.858	0.121		

Domain 4 (Environment)	Interventional	45.80±9.70	46.00±9.72	51.00±9.72	115.116	<0.001**
	Control	44.70±13.76	44.67±13.98	45.73±12.70	3.417	0.053*
	p-value [‡]	0.722	0.670	0.076		
Ques. 1 (Overall QOL)	Interventional	1.80±0.664	2.10±0.548	2.60±0.563	29.811	<0.001**
	Control	2.33±0.661	2.27±0.640	2.40±0.621	1.526	0.229
	p-value [‡]	0.003*	0.283	0.197		
Ques. 2 (General health)	Interventional	1.80±0.610	2.00±0.525	3.03±0.556	151.132	<0.001**
	Control	1.93±0.640	2.00±0.643	2.13±0.434	2.689	0.100
	p-value [‡]	0.412	1	<0.001**		

[Table/Fig-3]: Comparison of mean WHOQOL-BREF scores among the interventional and control group.

*p-value <0.05 was considered as significant; **p-value <0.001 was considered as highly significant; ‡Unpaired student's t-test

Domains of QOL	Duration		Mean difference	95% Confidence interval for difference		p-value (Repeated measure ANOVA)
				Lower bound	Upper bound	
Domain 1 (Physical health)	Baseline	1 month	6.267	-8.094	-4.440	<0.001**
	Baseline	3 months	26.767	-29.415	-24.118	<0.001**
	1 month	3 months	20.50	-22.471	-18.529	<0.001**
Domain 2 (Psychological health)	Baseline	1 month	1.633	-2.914	-0.353	0.009*
	Baseline	3 months	17.567	-20.098	-15.035	<0.001**
	1 month	3 months	15.933	-17.586	-14.281	<0.001**
Domain 3 (Social relationship)	Baseline	1 month	0.600	-1.449	0.249	0.249
	Baseline	3 months	8.800	-12.311	-5.289	<0.001**
	1 month	3 months	8.200	-11.601	-4.799	<0.001**
Domain (Environment)	Baseline	1 month	0.200	-0.708	0.308	0.977
	Baseline	3 months	5.200	-6.313	-4.087	<0.001**
	1 month	3 months	5.000	-6.194	-3.806	<0.001**
Ques. 1 (Overall QOL)	Baseline	1 month	0.300	-0.516	-0.084	0.004*
	Baseline	3 months	0.800	-1.108	-0.492	<0.001**
	1 month	3 months	0.500	-0.766	-0.234	<0.001**
Ques. 2 (General health)	Baseline	1 month	0.200	-0.389	-0.011	0.035
	Baseline	3 months	1.233	-1.467	-1.000	<0.001**
	1 month	3 months	1.033	-1.182	-0.885	<0.001**

[Table/Fig-4]: Pair-wise comparison of WHOQOL-BREF scores among the interventional group.

Level of significance: *p-value <0.05 (Significant), **p-value <0.001 (Highly significant)

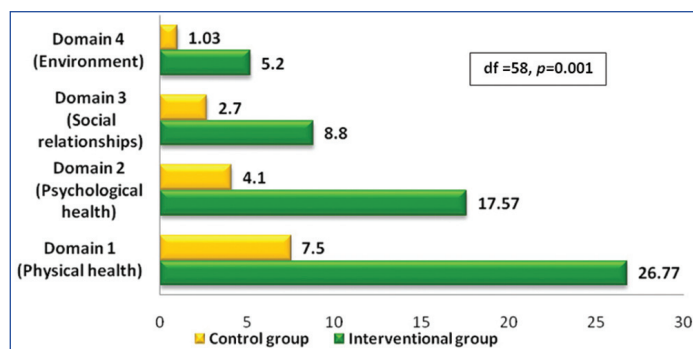
Domains of QOL	Duration		Mean difference	95% Confidence interval for difference		p-value (Repeated measure ANOVA)
				Lower bound	Upper bound	
Domain 1 (Physical health)	Baseline	1 month	2.233	-5.027	0.560	0.154
	Baseline	3 months	7.500	-10.969	-4.031	<0.001**
	1 month	3 months	5.267	-8.471	-2.062	<0.001**
Domain 2 (Psychological health)	Baseline	1 month	0.433	-2.869	2.002	1.000
	Baseline	3 months	4.100	-6.601	-1.599	<0.001**
	1 month	3 months	3.667	-6.378	-0.955	0.005*
Domain 3 (Social relationships)	Baseline	1 month	0.633	-2.036	0.769	0.782
	Baseline	3 months	2.700	-4.953	-0.447	0.015*
	1 month	3 months	2.067	-3.989	-0.145	0.032*
Domain 4 (Environment)	Baseline	1 month	0.033	-0.761	0.827	1.000
	Baseline	3 months	1.033	-2.348	0.282	0.166
	1 month	3 months	1.067	-2.412	0.279	0.160
Ques. 1 (Overall QOL)	Baseline	1 month	0.067	-0.051	0.184	0.482
	Baseline	3 months	0.067	-0.275	0.142	1.000
	1 month	3 months	0.133	-0.369	0.102	0.482
Ques. 2 (General health)	Baseline	1 month	0.067	-0.184	0.051	0.482
	Baseline	3 months	0.200	-0.456	0.056	0.169
	1 month	3 months	0.133	-0.398	0.132	0.634

[Table/Fig-5]: Pair-wise comparison of WHOQOL-BREF scores among the control group.

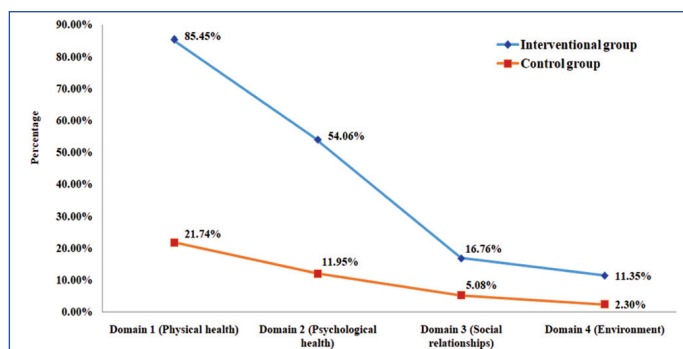
Level of significance: *p-value <0.05 (Significant), **p-value <0.001 (Highly significant)

it was a highly controlled setting, where patients stayed away from their normal duties, a significant difference in QOL was observed

after one week [22]. Hariprasad VR et al., in the elderly showed improvement in all domains of QOL with six months of yoga [23]. QOL



[Table/Fig-6]: Mean difference of WHOQOL-BREF scores between baseline and after three months among the interventional and control group. $df = 58, p = 0.001$



[Table/Fig-7]: Percentage distribution of mean change in various domains of WHOQOL-BREF scale between baseline and after three months.

Author's Name and year	Place of study	Number of subjects	Age and disease considered	Intervention given	Conclusion
Kang H and Jang S, (2021) [18]	Korea	50	40-60 years, depression	Mindfulness yoga program	An increase in the QOL with mindfulness yoga program in middle-aged men showed a significant improvement in psychological, social, and overall quality of life among the sub-dimensions of quality of life.
Saxena R et al., (2017) [26]	New Delhi, India	60 females	18-45 years, chronic pelvic pain	Deep breathing, OM chanting, asana, pranayama and relaxation	After 8 weeks, the practice of yoga causes a reduction in pain intensity and improves the quality of life in patients with chronic pelvic pain.
Ramanathan M et al., (2017) [17]	Puducherry, India	40	Elderly females	Yoga	Yoga practice causes a reduction in depression and anxiety scores and improvement in self-esteem scores in elderly women subjects.
Pandey RK et al., (2017) [27]	Baltimore, United States of America	54	20-80 years, chronic kidney disease	Asanas, Pranayama and relaxation techniques	A significant improvement was found in the physical and psychological domain of the QOL in the yoga group as compared to the control group after 6 months.
Dhawan A et al., (2015) [20]	Bangalore, Karnataka, India	84	More than 18 years, Opioid dependent users	Sudarshan Kriya Yoga	All four QOL domain scores were significantly higher at 6 months.
Sharma NK et al., (2015)[28]	Kansas City, KS, United States of America	13	Parkinson's disease	Yoga	Improvements were noted in depression scores, QOL, and physiological functions in stages PD, and participants reported more positive symptom changes including immediate tremor reduction.
Lakkireddy D et al., (2013)[29]	Kansas Medical Center, Kansas, United States of America	52	18-80 years, paroxysmal atrial fibrillation	Yoga intervention	Yoga training causes improvement in depression and anxiety scores and also improved the QoL parameters of physical functioning, general health, vitality, social functioning, and mental health domains in paroxysmal.
Ebnazar J et al., (2011)[30]	Karnataka, Bengaluru, India	250	35-80 years, osteoarthritis	Yoga therapy	Yoga therapy is better than therapeutic exercises as an adjunct to transcutaneous electrical stimulation and ultrasound treatment in improving knee disability and quality of life in patients with osteoarthritis knees.
Present study, 2022	Jaipur, Rajasthan, India	60	18-45 years, depression	Yoga intervention	Quality of Life (QOL) shows a statistically significant difference between the interventional and control group in the physical and psychological health domain after three months. A high significant difference was observed after one month in the physical and psychological health domain of QOL in the interventional group. Whereas, significant improvement in the social relationships and environment domain was observed after three months.

[Table/Fig-8]: Previous studies related to yoga intervention [17,18,20, 26-30].

in Dental Professionals improved with six weeks of integrated yoga and breathing techniques sessions [24]. Patil NJ et al., conducted a randomised trial on the nursing population with chronic low back pain and observed a significant improvement in physical, psychological, and social domains of WHOQOL-BREF, whereas the environmental domain did not show significant improvement [25]. The present study supports the findings as shown below [Table/Fig-8] [17,18,20,26-30].

Regular practice of yoga improves depression and can lead to a significant increase in serotonin levels and a decrease in the levels of monoamine oxidase, an enzyme that breaks down neurotransmitters and cortisol [31]. Exercise induces neurogenesis which modulates synaptic plasticity. It increases several growth factors relevant for maintaining optimal functioning of the brain and also has been associated with changes in regional brain volume and integrity. The effects induced by these exercises have been simulated in healthy humans and clinical populations and they show increased brain volume in grey and white matter regions, increased white matter integrity in frontal and temporal lobes, increase in Brain-Derived Neurotrophic Factor (BDNF), reduction in symptoms of depression,

and improvement in cognitive functioning in young and old [32]. The present study was a randomised control design, with an economical approach and active supervision for the control group as well as the interventional group for three months were the strengths of the present study.

Limitation(s)

The limitation of the study was its small sample size.

CONCLUSION(S)

Yoga improves one's overall quality of life. Interventional group had much better physical and psychological health after three months of yoga than the control group. Yoga intervention promoted physical and psychological well-being faster (just after one month of yoga intervention), but it took a little longer (three months) to enhance social interaction and the environmental domain. When comparing the interventional group to the control group after three months, the mean change in all areas of quality of life was considerably greater in the interventional group subjects. Yoga improved mostly

all domains of quality of life of a depressed person in a short span of time. So, yoga must be promoted as an alternative therapy with medication for good, quick results; as yoga heals the body and mind naturally. The present research highlights the importance to create awareness and encourage the practice of yoga among depressed persons. However, future studies are required on a larger population to fortify current understanding about the beneficial effect of yoga intervention on quality of life in patients of depression.

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