

effect of 16-weeks of yoga on the quality of life of type-2 diabetes mellitus patients of mongoloid community

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Research Article

## **Effect of 16-weeks of Yoga on the Quality of Life of Type-2 Diabetes Mellitus patients of mongoloid community**

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### **Abstract**

Quality of life evaluation has become an important outcome measure for chronic disease management like diabetes. Therefore, the present study aimed to investigate the influence of yoga intervention on the quality of life of mongoloid patients with Type2 Diabetes Mellitus. This study was conducted at Jawaharlal Nehru Institute of Medical Sciences (JNIMS) Imphal, Manipur. 310 patients were randomly assigned 1:1 to the experimental and control groups. The experimental group was prescribed oral anti-glycaemic agents along with yoga for one and half hours daily for 6 days a week for four-month whereas the control group was under oral anti-glycaemic agents only. The Quality of Life Instrument for Indian Diabetes Patients (QOLID) was used to assess participants' quality of life before and after the four-month intervention. The findings showed a significant improvement in quality of life in both yoga and control groups. This study indicated yoga helps to minimize the complications of T2DM and increase physical and psychological well-being.

**Keywords:** Type2 Diabetes Mellitus, Quality of Life, Yoga

### **Introduction**

Type 2 diabetes mellitus (T2DM) is a metabolic condition characterized by elevated blood glucose levels resulting from insulin resistance and relative insulin insufficiency (Ginter & Simko, 2013). The prevalence of T2DM is increasing rapidly throughout the globe, including developed and underdeveloped countries. One in 11 adults suffers from diabetes mellitus, with 90% T2DM. Asia is becoming the epicentre, with China and India on the top two (Zheng, Ley, & Hu, 2018). Diabetes affects roughly 61.3 million people in India, and the figure is expected to climb to 101.2 million by

2030 (Guariguata, Whiting, Weil, & Unwin, 2011). With regard to the North East States of India, where more than 80 % of the population is mongoloid, the prevalence of Type 2 Diabetes Mellitus differs from State to State. The prevalence of T2DM in the Manipur State was 15.17 % of the total population in 2013, which has been increased to 26.05% in 2015, an elevation of 10.88 % in two years (Beliya, Devi, Singh, & S, 2019).

T2DM increases the risk of microvascular complications (e.g., neuropathy, retinopathy, and nephropathy) and macrovascular complications like cardiovascular conditions (DeFronzo et al., 2015). T2DM is also associated with mental health problems. A cohort study conducted on 63365 patients with T2DM showed mental health comorbidity in 19% of patients. According to this study, depression is most common among diabetic patients (Guerrero Fernández de Alba et al., 2020). In addition, T2DM impaired daily functioning and increased cardiovascular and locomotory morbidity (de Grauw, 1999). It also significantly reduces the quality of life, which plays a role in increasing comorbidity (Bosic-Zivanovic, Medic-Stojanoska, & Kovacev-Zavasic, 2012).

Complications like hypertension, long duration of diabetes, a diet with red meat, and depression are positively associated with poor quality of life in diabetic patients (Jing et al., 2018). A study conducted in a rural medical college in India found that diabetic patients' health-related quality of life is significantly impacted by poor physical and psychological health, deteriorating social relationships, and poor environmental conditions (Jain, Shivkumar, & Gupta, 2014).

The physical and psychological health difficulties of T2DM patients can be reduced by improving their quality of life. Prior research has indicated the requirement of effective intervention to enhance the quality of life in T2DM patients (Alshayban & Joseph, 2020). Integrated yoga, a lifestyle intervention, can be an effective intervention in enhancing the quality of life in T2DM patients. It is a holistic approach that strives to harmonize and balance all levels of human existence, including physical, psychological, and spiritual (Liu et al., 2014; McDermott et al., 2014). Numerous studies conducted in the past have reported the effectiveness of yoga in glycaemic control, lipid profile, blood pressure, body mass index, and cortisol level (Jayawardena, Ranasinghe, Chathuranga, Atapattu, & Misra, 2018; Thind et al., 2017).

However, studies to assess the effect of integrated yoga on quality of life in T2DM patients are rare. A systematic review has pointed out the requirement of more studies to assess the effect of yoga on quality of life in patients with diabetes with large sample size and robust study design (Cai, Li, Zhang, Xu, & Chen, 2017). In addition, the literature search did not show a study in the northeast states of India, including Manipur. Therefore, the present randomized control trial was conducted to assess the effect of 16 weeks of integrated yoga on the quality of life among mongoloid patients diagnosed with T2DM.

## **Methodology**

The design of the study is a randomized control trial. The study was conducted at Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, Manipur, from June 2017 to January 2019 after obtaining the ethical clearance from the Institutional ethical committee (Office No Ac/02/IEC/JNIMS/2016/R). Written informed consent was obtained from participants before enrolling in the study.

## Participants

The participants who have been diagnosed with T2DM by the physicians of the Endocrinology Department of JNIMS, based on clinical test results of metabolic parameters and having fasting blood glucose > 120 mg%, T2DM patients of age ranging from 25 to 80 years old and suffering from T2DM for more than one year up to a maximum of 15 years, and not attending to any physical exercise and yoga practice were inclusion criteria of the current study. In addition, participants with a history of amputation of limbs, severe neuropsychiatric problems, and associated with significant complications of diabetes such as renal failure, history of coronary or cardiovascular complications, proliferative retinopathy were excluded. In addition, pregnant woman patients with T2DM and severe obesity (BMI > 40) were excluded.

The responsibility for selecting participants for the study for both intervention and control group was given to the medical staff members of the Endocrinology Department of JNIMS Hospital who were not involved in the study in any way. Nevertheless, entirely made the whole randomization procedure understood, the staff members screened out 450 patients.

Out of them, 310 patients randomized in to experimental (N = 155) and control (N = 155) groups. Randomization was done using the lottery method. Each patient was asked to pick up a folded opaque paper. Participants who picked a paper with 'C' were assigned to the control group, while patients who picked a paper with 'I' were allotted into the intervention group.

Blinding is not conceivable in a yoga interventional trial. However, during the randomization of patients' selection, the Senior Doctor of JNIMS Hospital's Endocrinology Department, the Senior Yoga Therapist/Yoga teachers, and the research supervisor and researcher were blinded.

## Intervention

The experimental group was prescribed oral anti-glycaemic agents and yoga for one and half hours daily for six days a week for 16 weeks. The yoga intervention sessions were performed from June 2017 onwards for a batch of 30 patients in the morning hours for one and half hours a day for six days a week for four months. The module includes *asanas* (postures) *pranayama* (breathing control), counselling on diet, health, mind, emotional control through chanting *Bhajan*, *sloka* (devotional songs). The detail of the yoga module followed in the present study is shown in Table-1. For every batch of yoga groups, 30 patients of the control group were maintained, giving conventional treatment for four-month. The control group was prescribed oral anti- glycaemic agents only and did not perform any exercise during the period.

**Table-1: Common protocol for yoga intervention to Type2 Diabetes mellitus patient**

A. BREATHING PRACTICES	Repeat	Time	Mon, Tue, Wed, Fri
i. Hand Stretching	3x5	3 min	
ii. Hands in and out	5	1 min	
iii. Ankle raise breathing	5	1 min	
iv. Tiger breathing	5	1 min	
v. Alternate leg rising	5x2	1 min	

<b>B. LOOSENING EXERCISES</b>			<b>Mon, Tue, Wed, Fri</b>
<i>i.</i>	<i>Bhastika stimulation</i>	20	1 min
<i>ii.</i>	<b>Wrist and Elbow Twisting</b>	10	1 min
<i>iii.</i>	<b>Shoulder rotation</b>	10	1 min
<i>iv.</i>	<b>Neck movement</b>	5x2	1 min
<i>v.</i>	<b>Trunk twisting, forward &amp; backward</b>	5x2	1 min
<i>vi.</i>	<b>Side bending</b>	10	1 min
<i>vii.</i>	<b>Hip rotation</b>	10	1 min
<i>viii.</i>	<b>Knee extension</b>	10	1 min
<i>ix.</i>	<b>Ankle rotation</b>	10x2	1 min
<i>x.</i>	<b>Backstretch</b>	5x2	1 min
<b>C. SURYANAMASKARA (sun salutation)</b>		<b>12</b>	<b>10 min</b>
<b>D. QRT</b>			<b>3 min</b>
<b>E. YOGASANAS (in sequence)</b>			<b>30 min</b>
<b>Mon, Thu, Fri</b>			
<b>STANDING</b>			
<i>i.</i>	<i>Ardhakatikasana (each side) (side semicircle)</i>		2 min
<i>ii.</i>	<i>Padahasthasana (head bending)</i>		1.5 min
<i>iii.</i>	<i>Ardhacakraasana (semicircle)</i>		1.5 min
<i>iv.</i>	<i>Parivratatrikonasana (alternate toe touching)</i>		2 min
<b>SITTING</b>			
<i>i.</i>	<i>Pachimotanasana (sitting head bending)</i>		1.5 min
<i>ii.</i>	<i>Ustrasana (camel posture)</i>		1.5 min
<i>iii.</i>	<i>Sasankasana (rabbit posture)</i>		1.5 min
<i>iv.</i>	<i>Vakrasana or Ardha-Masyendrasana (Spine twist)</i>		1.5 min
<b>PRONE</b>			
<i>i.</i>	<i>Bhujangasana (Cobra posture)</i>		1.5 min
<i>ii.</i>	<i>Salabhasana (locust posture)</i>		1.5 min
<i>iii.</i>	<i>Naukasana or Dhanurasana (Boat or Bow posture)</i>		2 min
<b>SUPINE</b>			
<i>i.</i>	<i>Sarvangasana with Halasana (whole-body posture)</i>		2 min
<i>ii.</i>	<i>Matsyasana (fish posture)</i>		1.5 min
<i>iii.</i>	<i>Pawanmuktasana/</i>		1.5 min

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<i>SuptaBhadrasana</i> (air cleansing tech)			
<b>F. DRT</b>		<b>7 min</b>	
<b>G. KRIYAS</b>		<b>30 min</b>	<b>Wed, Sat</b>
<b>i. Kapalabhati</b> (blasting breath)		6 min	
<b>ii. UddhyanaBandha</b> (diaphragm locks)		5min	
<b>iii. Agnisar</b> (abdominal flap)			
<b>iv. Nauli (I, II, III)</b> (abdominal movement)	3x5		
<b>v. Neti</b> (nasal wash)			
<b>vi. Dhauti</b> (yogic vomiting)			
<b>vi. SankhaPrakshalana</b> (yogic bowel cleansing)			
<b>H. DRT</b> (Deep relaxation technique)		<b>5 min</b>	
<b>I. PRANAYAMA</b> (Yogic breathing)		<b>30 min</b>	<b>Tue, Thu, Fri</b>
<b>i. Sectional Breathing</b> (preparation for <i>pranayama</i> )			
<b>a. Abdominal breathing</b>	5	3 min	
<b>b. Thoracic breathing</b>	5	3 min	
<b>c. Clavicular breathing</b>	5	3 min	
<b>d. Full yogic breathing</b>	5	3 min	
<b>ii. Nadisudhi</b> (alternate nose breathing)	9	3 min	
<b>iii. Sitali, Sitkari, Sadanta</b> (cooling breath)	9	3 min	
<b>iv. Bhramhari pranayama</b> (bee breathing)	9	3 min	
<b>v. Nadanusandhana</b> (sound resonance merger)	5	3 min	
<b>J. DHARANA AND DHYANA</b> (Meditation)		<b>3 min</b>	
<b>k. CYCLIC MEDITATION</b> (stimulation & relaxation tech)		<b>30 min</b>	<b>Tue, Wed, Sat</b>
<b>L. Educational theory to patients using Charts, Picture Diagrams</b>		<b>30 min</b>	<b>Mon, Thu, Fri</b>
<b>i. Education on Yoga Breathing theory</b>			
<b>ii. Education on Diet, health, and disease</b>			
<b>iii. Education on body and mind medicine</b>			

iv.	Education on yoga and spirituality
v.	Education on a diabetes diet.
vi.	Education on non-objective Happiness
M. BHAJAN (Devotional Songs)	Sun

### Data collection instrument

The Quality of Life Instrument for Indian Diabetes Patients (QOLID) was used to assess participants' quality of life before and after the four-month intervention. QOLID is a self-reported measure of diabetes patients' quality of life that consists of eight domains and 34 questions. QOLID has high internal consistency, with an overall Cronbach's alpha of 0.894 and 0.55 to 0.85 for subscales (Nagpal, Kumar, Kakar, & Bhartia, 2010).

### Statistical analysis

The sample size of 147 for each group was obtained by using G power 3.1 soft with alpha 0.05 and powered at 0.80 for an effect size of 0.3 of PPBS based on the previous study of (McDermott et al., 2014).

Inferential statistical analysis was computed using JASP, Jeffrey's Amazing Statistics Program (official webpage: <https://jasp-stats.org/>), version 0.12.2. JASP is an open-source, free statistical software package. Two-way mixed analysis of variance (ANOVAs) was used to compare differences between pre and post-intervention, with (experiment or control) as a between-subject factor and time (pre or post-intervention) as a within-subject factor. In addition, the group-by-time difference on each outcome measure was assessed.

### Findings

In the end, 151 people were in the experimental group and 153 in the control group. Four patients in the intervention group and two in the control group were eliminated from the trial on personal grounds.

**Table 2: Pre and Post changes in Quality of Life Instrument for Diabetes questionnaire in Yoga intervention and control group**

Variable	Yoga Group (n=151)			Control Group (n=153)			Group X Time	
	PRE	POST	ES	PRE	POST	ES	F (1,302)	$\eta^2$
PH	57.17±6.4	73.84±2.90**	2.7	57.58±1.4	68.30±2.39**	3.8	119.03**	.28
	1	*	1	9	*	9	*	3
PE	68.43±5.7	76.56±0.60**	1.4	66.54±2.6	73.36±0.90**	2.3	6.37*	.02
	1	*	3	2	*	6		1
GH	61.02±7.7	70.07±4.61**	1.2	56.64±4.6	61.22±4.80**	0.6	29.9***	.09
	7	*	2	6	*	6		0
TS	33.08±7.6	81.16±6.26**	5.6	31.73±5.4	58.24±3.46**	4.1	621.29**	.67
	6	*	0	8	*	7	*	3

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<b>SB</b>	52.01±4.0 0	72.36±4.10** *	3.5 4	58.08±3.0 3	72.98±1.49** *	4.2 8	100.23** *	.24 9
<b>FW</b>	48.25±7.9 2	54.40±6.30** *	0.5 8	41.57±5.6 0	47.32±3.54** *	0.8 7	0.16	.00 1
<b>EMH</b>	63.18±4.0 1	84.77±3.05** *	5.0 1	60.26±3.8 6	79.27±4.17** *	3.2 4	19.11***	.06 0
<b>DS</b>	60.93±5.2 2	77.22±3.30** *	2.7 6	61.61±4.4 6	76.30±4.39** *	2.2 0	4.90*	.01 6

**Legend:** \*  $p > 0.05$ , \*\*\*  $p < 0.001$  shows significant improvement on the respective parameter/variable within group comparisons.

**Cohen's D = ES; PH= Limitation due to Physical Health; PE= Physical Endurance; GH= General Health; TS= Treatment Satisfaction; SB= Symptom Botherness; FW= Financial Worries; EMH= Emotional/ Mental Health; DS= Diet Satisfaction**

The results in Table-2 demonstrate that both the yoga and control groups had significant changes in scores across all QOLID domains ( $p < 0.001$ ). Statistical analysis also showed a significant interaction (group x time) for Limitation due to Physical Health [ $F(1,302) = 119.03, p < 0.001, \eta^2 = 0.283$ ], Physical Endurance [ $F(1,302) = 6.37, p < 0.001, \eta^2 = 0.021$ ] and General Health [ $F(1,302) = 29.9, p < 0.001, \eta^2 = 0.090$ ], Treatment Satisfaction [ $F(1,302) = 621.29, p < 0.001, \eta^2 = 0.673$ ] and, Symptom Botherless [ $F(1,302) = 100.23, p < 0.001, \eta^2 = 0.249$ ], Financial Worries [ $F(1,302) = 0.16, p > 0.05, \eta^2 = 0.001$ ], Emotional Health [ $F(1,302) = 19.11, p < 0.001, \eta^2 = 0.060$ ] and, Diet Satisfaction [ $F(1,302) = 4.90, p < 0.001, \eta^2 = 0.016$ ]. But higher scores in all parameters were indicated in the yoga intervention group over the control group.

### Discussion and Conclusion

The present randomized control trial was conducted to assess the effect of integrated yoga on quality of life in T2DM patients. The current study's findings showed a significant improvement in both groups' quality of life domains. However, as compared to merely standard care, integrated yoga with treatment, as usual, was found to be superior.

The current study's findings are consistent with earlier studies (Jyotsna et al., 2012; Shiju et al., 2019; Schmid et al., 2018; Sreedevi, Unnikrishnan, Karimassery, & Deepak, 2017). However, these studies differ from the present study regarding sample size, research design, and population. Jyotsna et al. (2012), Schmid et al. (2018), and Shiju et al. (2019). Studies had a small sample size. Similarly, Sreedevi et al.'s (2017) study participants were only women. Shiju et al.'s (2019) study was a pilot study without a control group. Jyotsna et al. (2012) and Shiju et al. (2019) intervention was *Surdashan Kriya Yoga*, while Schmid et al. (2018) and Sreedevi et al.'s (2017) intervention included postures, *pranayama*, and meditational aspects of yoga, but not *kriyas* (yogic cleansing practices), and yoga education.

The study was the first to investigate the role of integrated yoga intervention on quality of life in T2DM patients of mongoloid race of Manipur State of India. The yoga module was ideally designed after an extensive literature review to perfectly integrate eight limbs of Seer Patanjali's *Astanga* yoga (eight-limbs of yoga philosophy) to suit the targeted disease under study. The experimental yoga

group and the non-yoga control group fully complied with the guidelines framed for the respective group during the investigation period. An experienced yoga therapist strictly conducted the yoga sessions, assisted by two other yoga Instructors. The experimental and the control groups were under constant supervision of a senior endocrinology doctor of JNIMS, Hospital.

The findings of the present study are highly significant. It is well-known that uncontrolled glucose, comorbidity, and insulin dependence deteriorate the quality of life in diabetic patients (Das et al., 2013; Patel, Oza, Patel, Malhotra, & Patel, 2014). It is evident that yoga intervention significantly improves physical and psychological indices compared to the non-yoga control group under conventional treatment on anti-hyperglycemic agents. The present study infers that integrated yoga could enhance the physical and mental health of T2DM patients improving the quality of life. Therefore, based on the present study, T2DM patients' can be prescribed integrated yoga, including *yoga asana, pranayama, kriya*, dietary class, *cyclic meditation*, counseling, *Bhajan*, spiritual discussion, and relaxation addition to standard treatment to improve their quality of life.

The present study's findings suggest that integrated yoga significantly improves the quality of life in T2DM patients. Furthermore, this finding indicated that yoga helps minimize the complications of T2DM and increase physical and psychological well-being.

### Suggestions

In this research, clinical and anthropometric markers for T2DM were not examined. Likewise, a previous study found that diabetes family history, comorbidity, morbidity, educational status, marital status, treatment kinds, and complications are linked to the quality of life in Indian diabetic patients (John, Pise, Chaudhari, & Deshpande, 2019). However, the current study did not address these factors. Therefore, future research evaluating the efficacy of yoga intervention in T2DM patients might include the variables mentioned above.

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