

## **YOGA THERAPY and THE MANAGEMENT OF TYPE 2 DIABETES**

The latest scientific evidence suggests the potential of Yoga Therapy in the management of Type 2 Diabetes. This paper sifts through several bodies of research on this subject and looks at three large research studies and shows the outcomes with a sample of the design from each research study. The article concludes by outlining the writer's own experience of managing Type 2 Diabetes with Yoga Therapy.

The outcome in all the studies shows a significant decrease in the levels of blood glucose, stress, and BMI. There were also significant improvements in lipid indices, immunomodulation (changes in gene expression, cellular immunity, inflammatory response),<sup>1</sup> significant decreases in blood pressure, diabetes secondary co-occurring symptoms such as sleep and mood disorders, and regulation of the nervous system and, importantly, reductions in medication use after the yoga programme (*Jeter & McCall*).

### **Type 2 Diabetes Mellitus (T2DM):**

T2DM is a complex group of metabolic disorders, in which persistent high levels of blood glucose ultimately leads to heart disease, stroke, kidney failure, foot ulcers and damage to the eyes. Hyperglycaemia with insulin resistance is when the pancreas is no longer able to make insulin or when the body cannot make good use of the insulin it produces.<sup>2</sup> Cardiovascular disease is the leading cause of death among those with T2DM.<sup>3</sup> There are currently 425 million people with this disease worldwide. It is a serious, expensive disease and in the UK it accounts for about 10% of the NHS budget. An interaction between genetic background, poor nutrition and sedentary life style may accelerate the growth of T2DM.<sup>4</sup> In addition to all this, the study INTERPRET-DD finds that 'people with diabetes are at an increased risk of developing depression and other psychological disorders.'<sup>5</sup> Together with oral medication and insulin, the cornerstone of T2DM care is lifestyle management (increased

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<sup>1</sup> Raveendran, Arkiath Veettil et al. "Therapeutic Role of Yoga in Type 2 Diabetes." *Endocrinology and metabolism (Seoul, Korea)* vol. 33,3 (2018): 307-317. doi:10.3803/EnM.2018.33.3.307 [accessed various dates till 30<sup>th</sup> May 2020] Hereafter abbreviated: *Raveendran et al*

<sup>2</sup> IAYT, 'Research Summary for Yoga Therapists: Yoga Therapy for Type 2 Diabetes Mellitus, Pam Jeter and Timothy McCall, [https://cdn.ymaws.com/iayt\\_site-ym.com/resource/resmgr/docs\\_Research\\_Summaries/4.Summaries\\_Diabetes\\_v2.pdf](https://cdn.ymaws.com/iayt_site-ym.com/resource/resmgr/docs_Research_Summaries/4.Summaries_Diabetes_v2.pdf) [accessed various dates till 30<sup>th</sup> May 2020] Hereafter abbreviated: *Jeter & McCall*

<sup>3</sup> International Diabetes Federation, [https://www.diabetesatlas.org/en/resources/?gclid=Cj0KCQjwhT1BRciARIsAGIY51Kvq\\_19vxuJVmL2eb6xVObsV427wKIGvsY9RQ0vhYmWQOv98fp-ZXcaAvMGEALw\\_wcB](https://www.diabetesatlas.org/en/resources/?gclid=Cj0KCQjwhT1BRciARIsAGIY51Kvq_19vxuJVmL2eb6xVObsV427wKIGvsY9RQ0vhYmWQOv98fp-ZXcaAvMGEALw_wcB) [accessed various dates till 30<sup>th</sup> May 2020]

<sup>4</sup> World Health Organization: <https://www.who.int/news-room/fact-sheets/detail/diabetes> [accessed various dates till 30<sup>th</sup> May 2020]

<sup>5</sup> Lloyd CE, Sartorius N, Cimino LC, et al. The INTERPRET-DD study of diabetes and depression: a protocol. *Diabet Med.* 2015;32(7):925-934. doi:10.1111/dme.12719

physical activity, healthy diet, and reduction of stress levels) is considered critical to the prevention of acute complications and the reduction of risk for long-term complications.

### **Research findings, aetiology and rationale for yoga therapy for T2DM:**

From the enormous and extensive bodies of research available on this subject, I have narrowed my search to the following:

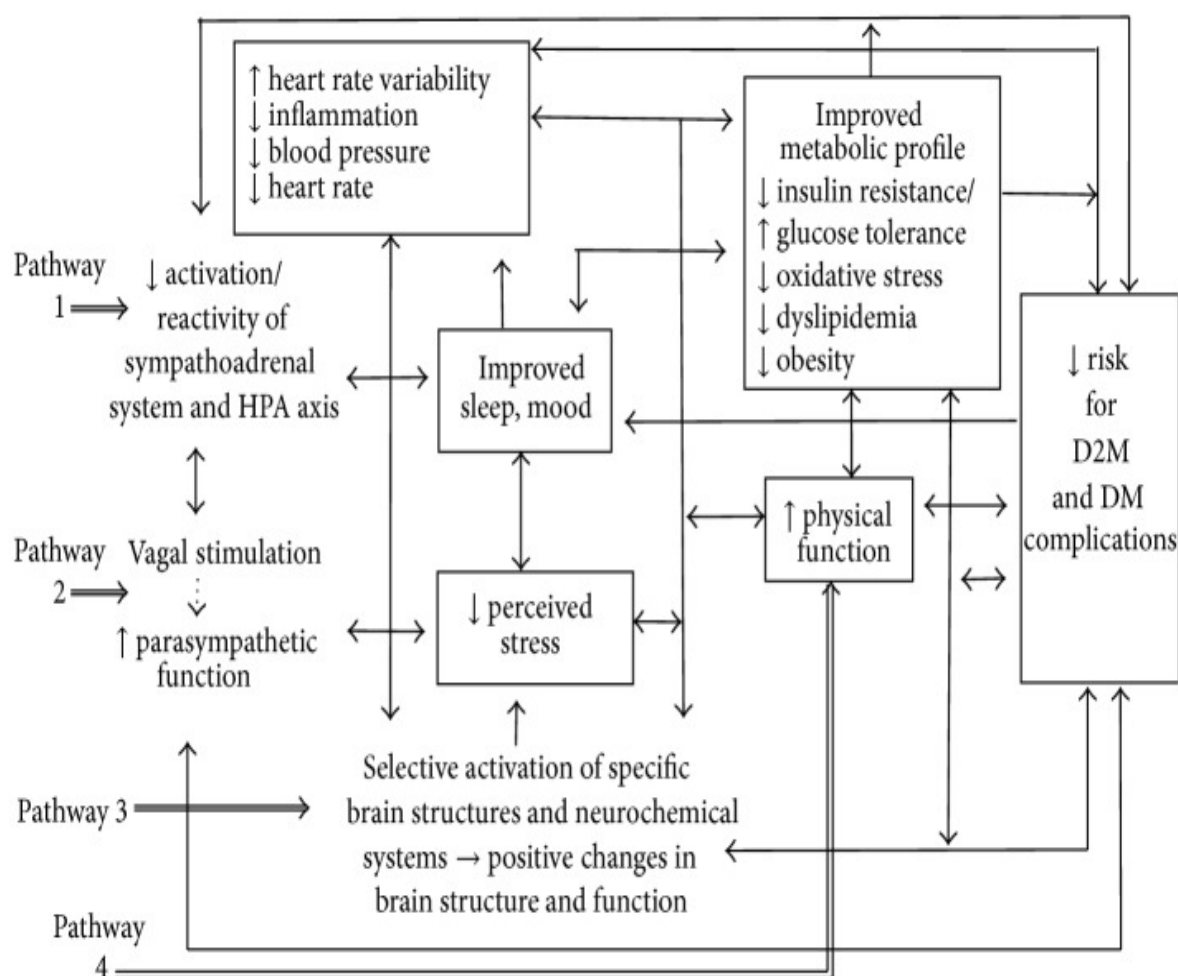
The '*Research Summary for Yoga Therapists: Yoga Therapy for Type 2 Diabetes Mellitus (Jeter & McCall)*', is a comprehensive IYAT summary of twenty-three of the best available research (randomized controlled trials and non-randomized controlled trials), which, compellingly, finds at least three possible pathways that might support T2DM management with YT whilst *Ughreja & Ughreja*<sup>6</sup> have found others:

- Yoga may reduce the downstream effects of stress, such as those on metabolic function, neuroendocrine status and inflammatory responses.  
Yoga may help modulate the autonomic nervous system (ANS) by stimulating the vagal system.
- Yoga may selectively activate areas of the brain associated with cognition and mood, indirectly improving attitudes related to health and lifestyle providing a source of social support.
- The stretching of abdomen during yogic asana is thought to regenerate  $\beta$  pancreatic cells, improving their sensitivity to glucose and improving secretion of insulin.
- Yoga leads to changes in level of hormones and neurotransmitters such as  $\beta$  endorphin, serotonin, dopamine etc., which result in feelings of joy, euphoria, calm and bliss (accessing the anandamaya and vignanamaya koshas).

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<sup>6</sup> Ughreja, Reepa, & Reena A. Ughreja. "Type 2 diabetes mellitus, physical activity, yoga and telomere length: A literature review." *Journal of Insulin Resistance* [Online], 4.1 (2019): 9 pages. Web. 8 Jun. 2020. Hereafter abbreviated: Ughreja & Ughreja

The figure below highlights some of these pathways:<sup>7</sup>



The following 3 research studies show the beneficial effects of yoga therapy on a range of diabetes markers:

1. 'Yoga as a complementary therapy for patients with type 2 diabetes: Design and rationale of the HA1C study'.<sup>8</sup> (Thind et al)
2. 'Yoga as a Therapeutic Intervention for the Management of Type 2 Diabetes Mellitus'.<sup>9</sup> (Mondal et al)
3. 'Therapeutic Role of Yoga in Type 2 Diabetes', (Raveendran et al)

<sup>7</sup> With permission: Innes KE, Selfe TK. Yoga for Adults with Type 2 Diabetes: A Systematic Review of Controlled Trials. *J Diabetes Res.* 2016;2016:6979370. doi:10.1155/2016/6979370

<sup>8</sup> Thind, Herpreet et al. "Yoga as a Complementary Therapy for Adults with Type 2 Diabetes: Design and Rationale of the Healthy, Active, and in Control (HA1C) Study." *International journal of yoga therapy* vol. 28,1 (2018): 123-132. doi:10.17761/2018-00026 [accessed from 3/3/20 till date] Hereafter referred to as: *Thind et al*

<sup>9</sup> Mondal S, Kundu B, Saha S. Yoga as a Therapeutic Intervention for the Management of Type 2 Diabetes Mellitus. *Int J Yoga.* 2018 May-Aug;11(2):129-138. doi: 10.4103/ijoy.IJOY\_74\_16. PMID: 29755222; PMCID: PMC5934948. Hereafter referred to as: *Mondal et al*

### Protocols used in the three studies:

1. 'Yoga as a complementary therapy for patients with type 2 diabetes: Design and rationale of the HA1C study', is a vast randomized controlled trial that shows yoga positively impact stress, and other self-care tasks that will contribute to improved glycaemic control. This was followed up with the results a year later: *Feasibility of Yoga as a complementary therapy for patients with type 2 diabetes: The Healthy Active and in Control (HA1C) study*<sup>10</sup>:

Intervention: 175 adults with Type 2 diabetes – in randomized 12-week programme of twice weekly Iyengar Yoga and twice-weekly standard exercise.

Results/conclusions: The yoga intervention was highly feasible and acceptable and produced improvements in blood glucose and psychosocial measures of diabetes management. Yoga produces significant reductions in HbA1c levels.

Sample of intervention used: (with permission *Bock & Thind et al*)

Session	Practice
Week 1	1. Upward extended arms and bound knuckle pose 2. Sideways angle pose 3. Half wall stretch 4. Chair twist 5. Relaxation Poses: Legs up the wall and/or Corpse pose with breath awareness and Body Scan.
Week 2	1. Sideways angle pose 2. Flank stretch on wall 3. Standing chair twist at wall 4. Downward facing dog 5. Relaxation Poses: Legs up the wall and/or Corpse pose with breath awareness and Body scan.
Week 3	1. Bound knuckle, Cow face pose 2. Extended leg stretch 3. Hero pose 4. Four footed pose 5. Relaxation Poses: Legs up the wall and/or Corpse pose with breath awareness and Body Scan
Week 4	1. Reclining bound angle pose 2. Child's pose to Downward facing dog (back and forth- 3 poses) 3. Wall hang 4. Marichyasana 1 twist 5. Relaxation Poses: Supported corpse Pose. Practice Body Scan and breath awareness

2. 'Yoga as a Therapeutic Intervention for the Management of Type 2 Diabetes Mellitus', a 12-week study, which investigates the effects of 12 weeks yoga

<sup>10</sup> Bock, B.C., Thind, Harpreet et al, Feasibility of yoga as a complementary therapy for patients with type 2 diabetes: The Healthy Active and in Control (HA1C) study, *Complementary Therapies in Medicine*, Volume 42, February 2019, Pages 125-131, doi: 10.1016/j.ctim.2018.09.019. Epub 2018 Sep 26. PMID: 30670230; PMCID: PMC6598709. <https://pubmed.ncbi.nlm.nih.gov/30670230/> [accessed on 3rd November 2023]. Hereafter referred to: *Bock & Thind et al*

intervention on blood sugar and lipid profile in older women with type 2 diabetes.

Results/conclusions: The study confirmed the useful role of yoga in the control of Type 2 diabetes, and lipid profile.

**Sample of yoga intervention – Week 1 to week4: (with permission *Mondal et al*)**

Yogic interventions	1 session/day and 3 days/week			Recovery time/density	Total volume
	Intensity				
	Execution time	Repetition/frequency	Total time		
Surya namaskar (12 counts)	2 min	1 repetition	2×1=2 min	2 min Shavasana × 1 rep=2 min	2+2 = 4 min
(1) Namaskarasana					
(2) Ardha-Chandrasana					
(3) Padahasthasana					
(4) Ashwa Sanchalanasana					
(5) Parvatasana					
(6) Ashtanga Pranamasana					
(7) Bhujangasana					
(8) Parvatasana					
(9) Ashwa Sanchalanasana					
(10) Padahasthasana					
(11) Ardha-Chandrasana					
(12) Namaskarasana					
Asanas (holding time: 5 s)	1.5 min	1 repetition	1.5 min × 8 asanas=12 min	45 s Shavasana between each asana × 8 asanas=6 min	12+6=18 min
Yogamudra					
Janu sirsasana					
Ardha Matsyendrasana					
Bhadrasana					
Dhanurasana					
Shalabhasana					
Naukasana					
Setu Bandhasana					
Shavasana					
Kriyas					
Kapalbhati	30 strokes at 1 stroke/s	3 repetitions	30 s × 3=1.5 min	30 s rest in between each repetition × 3=1.5 min	1.5+1.5=3 min
Agnisara	5 snaps at 1 snap/10 s	2 repetitions	5×2×10 s=100 s	10 s rest in between each repetition × 2=20 s	100 s + 20 s=2 min
Pranayamas					
Ujjayi (1:1:1)	1 min	2 repetitions	1 min × 2=2 min	0.5 min rest after 2 repetition	2+0.5=2.5 min
Anuloma-Viloma (1:1:1)	1 min	2 repetitions	1 min × 2=2 min	0.5 min rest after 2 repetition	2+0.5=2.5 min
Meditation: A-U-M or complete "AUM" chanting	-	-	-	3 min	3 min
<b>Total</b>	<b>6 min 50 s</b>	<b>10 repetitions</b>	<b>20 min 40 s</b>	<b>14 min 20 s</b>	<b>35 min</b>

3. 'Therapeutic Role of Yoga in Type 2 Diabetes', (Raveendran et al), this study concludes that: 'cleansing processes, asanas, pranayama, mudras, bandha, meditation...reduces blood glucose levels to help in the management of comorbid disease conditions associated with type 2 diabetes resulting in significant positive clinical outcomes

**Sample of Yoga practices used: (with permission Raveendran et al**

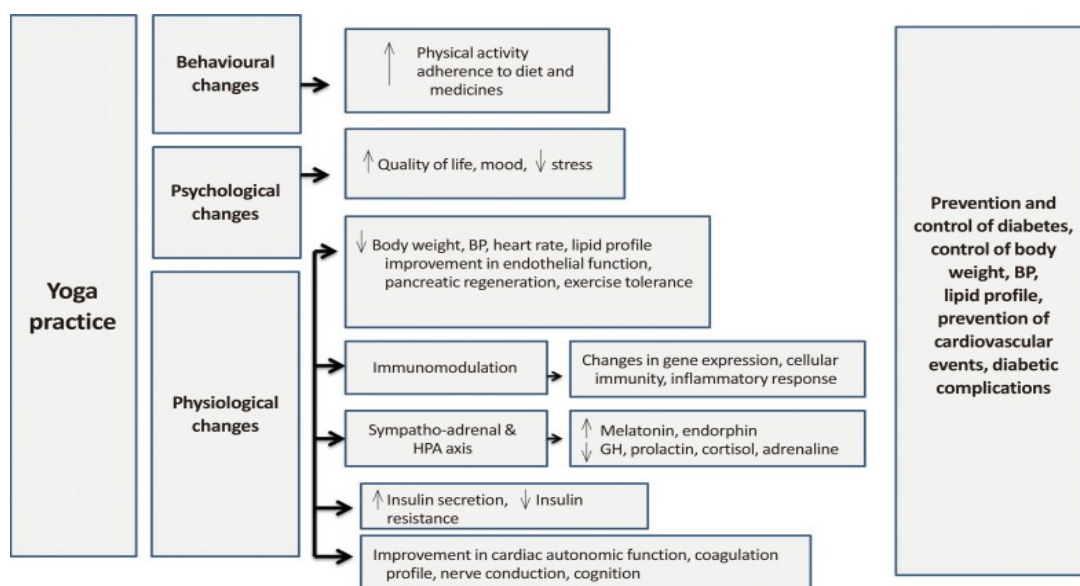
<b>Yoga technique</b>	<b>Approximate duration and remarks</b>
Cleansing practices: <i>shuddhi kriya</i>	
<i>Kapalbhati</i> (frontal brain purification)	5 rounds, 120 strokes
<i>Agnisar kriya</i> (stimulating the digestive fire)	5 rounds
<i>Vaman dhauti</i> (stomach cleansing)	Once a week
<i>Full shankhprakashalana</i> (intestine cleansing)	Once a year
<i>Laghu shankhprakashalana</i> (short cleansing)	Every 40 days
Preparatory practices/warming up	5–10 minutes
<i>Surya namaskar</i>	Slow speed, 3–7 rounds according to an individual's capacity
Yoga postures: <i>asanas</i>	
Standing postures	
<i>Trikonasan</i> (triangle pose)	Recommended to hold the final pose for 15 seconds, gradually increasing the duration up to 1 minute
<i>Tadasan</i> (palm tree pose)	
<i>Tiryak tadasan</i> (bent palm tree pose)	
<i>Veerasan</i> (warrior pose)	
Seated poses	
<i>Vakrasan</i> (spinal twist)	Recommended to hold the final pose for 15 seconds, gradually increasing the duration up to 1 minute
<i>Ardhamatsyendrasan</i> (seated spinal twist)	
<i>Mandukasan</i> (frog pose)	
<i>Ushtrasan</i> (camel pose)	
<i>Paschimottanasan</i> (seated forward bend)	
<i>Yoga mudra</i> (forward bend)	

Yoga technique	Approximate duration and remarks
Prone poses	
<i>Bhujangasan</i> (cobra pose)	Recommended to hold the final pose for 15 seconds, gradually increasing the duration up to 1 minute
<i>Dhanurasan</i> (bow pose)	
<i>Naukasan</i> (boat pose)	
<i>Makarasan</i> (crocodile pose)	Relaxation pose: 2–5 minutes as needed
Supine poses	
<i>Pavanmuktasan</i> (wind releasing pose)	Recommended to hold the final pose for 15 seconds, gradually increasing the duration up to 1 minute
<i>Supta vajrasana</i> (supine thunderbolt pose)	
<i>Setubandhasan</i> (bridge pose)	
<i>Matsyasan</i> (fish pose)	
<i>Shavasana</i> (corpse pose)	Relaxation pose: 2–5 minutes as needed
Inversions	
<i>Sarvangasan</i> (shoulder stand)	Hold the final pose for 15 seconds, gradually increasing the duration up to 1 minute
<i>Halasan</i> (plough pose)	
Regulated breathing practices: <i>pranayama</i>	
<i>Anulom vilom</i> (alternate nostril breathing)	5–10 minutes
<i>Chandra bhedan</i> (left nostril breathing)	5 minutes
<i>Surya bhedan</i> (right nostril breathing)	5 minutes
<i>Bhastrika</i> (bellows breath)	3–5 minutes
<i>Bhramari</i> (humming bee breath)	5 rounds
<i>Sheetali/Sitkari</i> (cooling breath)	3–5 minutes
Lock: <i>bandha</i>	
<i>Uddiyan bandha</i> (abdominal lock)	5 rounds
Hand gestures: <i>mudras</i>	
<i>Linga mudra, surya mudra, prana mudra, apan mudra, gyan mudra</i>	15–45 minutes
Meditation	
Meditation on <i>manipur chakra</i> (solar plexus)	10 minutes or more
Meditation on <i>manipur chakra</i> (solar plexus)	10 minutes
“Aum” chanting	5 minutes
Yogic relaxation: <i>yoga nidra</i>	30 minutes

## Outcomes:

In all the studies above, the yoga groups showed significant decrease in the levels of blood glucose, stress, and BMI. There were also significant improvements in lipid indices, immunomodulation (changes in gene expression, cellular immunity, inflammatory response),<sup>11</sup> significant decreases in blood pressure, diabetes secondary co-occurring symptoms such as sleep and mood disorders, and regulation of the nervous system and, importantly, reductions in medication use after the yoga programme (*Jeter & McCall*). The diagram below shows the mechanisms of benefits of yoga in type 2 diabetes, blood pressure, hypothalamic-pituitary-adrenal; GH, growth hormone.

(*Raveendran et al*)



## Writer's own experience:

I have been a diabetic since 2000. Up until 2015, I was on four different drugs plus two shots of insulin a day to control my extremely high blood sugars. As a result of the combination of being a diabetic and the side effects of medication and stress, I suffered from several of the resulting co-occurring symptoms including hyperlipidaemia, hypothyroidism, effects of inflammation, low mood etc. However, over the last eight years or so, I have managed to come off all medication including insulin, following a specific diet, intermittent fasting, keeping up to date with research studies, doing yoga everyday and practising the yoga models of yoga therapy.

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<sup>11</sup> Raveendran, Arkiath Veetil et al. "Therapeutic Role of Yoga in Type 2 Diabetes." *Endocrinology and metabolism (Seoul, Korea)* vol. 33,3 (2018): 307-317. doi:10.3803/EnM.2018.33.3.307[accessed various dates till 30<sup>th</sup> May 2020] Hereafter abbreviated: *Raveendran et al*



## Bibliography:

- Desikachar, T.K.V., *The Heart of Yoga*, Inner Traditions International, 1995, Vermont.
- Frawly, David, *Yoga & Ayurveda: Self-Healing and Self-Realization*, Lotus Press 1999, Wisconsin
- Hirschi, Gertrud, *Mudras: Yoga in your hands*, Hodder & Stoughton Ltd., London, 2000
- Kabel, Olga, *Most Effective Yoga Adaptations of 20 Superposes*, SWiz Library
- Kraftsow, Gary, *Yoga for Wellness*, Penguin Compass, 1999
- Lasater, J Hanson, *Yoga Body: Anatomy, Kinesiology, and Asana*, Shambhala Publications, Inc., 2009, China
- Satyananda Saraswathi, Swami, *Asana Pranayama Mudra Bandha*, Thomson Press, 2008, New Delhi
- Satyananda Saraswathi, Swami, *Yoga Nidra*, Thomson Press, 2012, India
- Stiles, Mukunda, *Structural Yoga Therapy*, Goodwill Publishing House, New Delhi
- Sovik, Rolf, *Moving Inwards: the Journey to Meditation*, The Himalayan Institute, 2013
- Teaslay, Rebecca, *Vagus Nerve and Polyvagal Theory: Heal Yourself*, Amazon , 2019

## Web-ography:

- Bock, B.C., Thind, Harpreet et al, Feasibility of yoga as a complementary therapy for patients with type 2 diabetes: The Healthy Active and in Control (HA1C) study, *Complementary Therapies in Medicine*, Volume 42, February 2019, Pages 125-131, doi: 10.1016/j.ctim.2018.09.019. Epub 2018 Sep 26. PMID: 30670230; PMCID: PMC6598709. <https://pubmed.ncbi.nlm.nih.gov/30670230/> [accessed on 3rd November 2023].
- Innes KE, Selfe TK. Yoga for Adults with Type 2 Diabetes: A Systematic Review of Controlled Trials. *J Diabetes Res*. 2016;2016:6979370. doi:10.1155/2016/6979370
- International Diabetes Federation, [https://www.diabetesatlas.org/en/resources/?gclid=Cj0KCQjwhfTIBRCiARIsAGIY51Kvq\\_l9vxuJVmL2eb6xVObsV427wKlGvsY9RQ0vhYmWQOv98fp-ZXcaAvMGEALw\\_wcB](https://www.diabetesatlas.org/en/resources/?gclid=Cj0KCQjwhfTIBRCiARIsAGIY51Kvq_l9vxuJVmL2eb6xVObsV427wKlGvsY9RQ0vhYmWQOv98fp-ZXcaAvMGEALw_wcB) [accessed various dates till 30<sup>th</sup> May 2020]
- Jeter, Pam and McCall, Timothy, IAYT, 'Research Summary for Yoga Therapists: Yoga Therapy for Type 2 Diabetes Mellitus, , [https://cdn.ymaws.com/iayt.site-ym.com/resource/resmgr/docs\\_Research\\_Summaries/4.Summaries\\_Diabetes\\_v2.pdf](https://cdn.ymaws.com/iayt.site-ym.com/resource/resmgr/docs_Research_Summaries/4.Summaries_Diabetes_v2.pdf) [accessed various dates till 30<sup>th</sup> May 2020]
- Lloyd CE, Sartorius N, Cimino LC, et al. The INTERPRET-DD study of diabetes and depression: a protocol. *Diabet Med*. 2015;32(7):925-934doi:10.1111/dme.12719
- Raveendran, Arkiath Veettil et al. "Therapeutic Role of Yoga in Type 2 Diabetes." *Endocrinology and metabolism (Seoul, Korea)* vol. 33,3 (2018): 307-317. doi:10.3803/EnM.2018.33.3.307 [accessed various dates till 30<sup>th</sup> May 2020]
- Schwartz, Dr. Arielle, 'Vagus Nerve Yoga: A Mind-Body Approach to Wellness', <https://drarielleschwartz.com/vagus-nerve-yoga-dr-arielle-schwartz/#.XuEKa2pKhz-> [accessed from 30/5/20 to date]
- Thind, Herpreet et al. "Yoga as a Complementary Therapy for Adults with Type 2 Diabetes: Design and Rationale of the Healthy, Active, and in Control (HA1C) Study." *International journal of yoga therapy* vol. 28,1 (2018): 123-132. doi:10.17761/2018-00026 [accessed from 3/3/20 till date]
- Ughreja, Reepa, & Reena A. Ughreja. "Type 2 diabetes mellitus, physical activity, yoga and telomere length: A literature review." *Journal of Insulin Resistance* [Online], 4.1 (2019): 9 pages. Web. 8 Jun. 2020
- Vaibhavi, Satyam et al, "Effect of Holistic Module of Yoga and Ayurvedic Panchakarma in Type 2 Diabetes Mellitus – A Pilot Study' *Open Journal of Metabolic Diseases*, Vol.3No.1, 2013, [https://www.researchgate.net/publication/276491977\\_Effect\\_of\\_Holistic\\_Module\\_of\\_Yoga\\_and\\_Ayurvedic\\_Panchakarma\\_in\\_Type\\_2\\_Diabetes\\_Mellitus-A\\_Pilot\\_Study](https://www.researchgate.net/publication/276491977_Effect_of_Holistic_Module_of_Yoga_and_Ayurvedic_Panchakarma_in_Type_2_Diabetes_Mellitus-A_Pilot_Study) [accessed from 30/5/20 till date].
- World Health Organization: <https://www.who.int/news-room/fact-sheets/detail/diabetes> [accessed various dates till 30<sup>th</sup> May 2020]