Physiological & Psychological effects of Yoga

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What is Yoga

- Yoga is the Sanskrit word for union
- Yoga is an old discipline from India. It is both spiritual and physical.
- Yoga uses breathing techniques, exercise and meditation. It helps to improve health and happiness.
- Techniques of controlling the body and the mind
- Group of physical, mental, and spiritual practices or disciplines which originated in ancient India.

What is Yoga…

- Speculated to date back to pre-Vedic Indian traditions
- Developed around the sixth and fifth centuries BCE
- The Yoga Sutras of *Patanjali* date from the first half of the 1st millennium
- Gained prominence in the West in the 20th century.
- On 11 December 2014, the United Nations General Assembly approved a resolution establishing 21 June as "International Day of Yoga"

Yoga Practice

- Yoga practice can be divided into three subcategories of practice
  - Posture-holding exercise (*Asana*)
  - Breathing (*Pranayama, Kriya*)
  - Meditation (*Dhyana*)
- Emerging as an important health behavior-lifestyle modifying module to achieve holistic health
- Many studies have tried to determine the effectiveness of yoga as a complementary intervention for cancer

Significant physiologic changes after Yoga

- Reduction in the resting heart rate, systolic & diastolic BP and MAPt
- Increase in FVC, FEV_1 and PEFR
- Reduction in BMI.
- Reduction in FBS, serum total cholesterol, serum triglycerides, serum low-density lipoproein levels, and significant increase in HDL
- Model of the psycho-neuroimmunologic processes are affected
- Activation of the hypothalamic-pituitary-adrenal axis and inflammation
- Decreases in self-reported anxiety and depression as well as increases in mindfulness
- Raises Plasma levels of Brain Derived Neurotrophic Factors
- Increases level of the cortisol awakening response.

Psychologically beneficial effects

- Parasympathetic activity overrides the sympathetic activity
- Decreases in anger, depression and fatigue
- Beneficial effects on tension, anxiety and vigor.
- Mental health and cognitive benefits
- Significant decrease in Adrenocorticotropic hormone and cortisol values related to the participants' stress levels
- Self-reported emotional experience(Stress & Coping) is improved
- Significant improvement in reaction time

Sleep, Brain and humoral functions

- Brain Wave Coherence study showed significant increase in both Delta and Alpha wave coherence leading to improvement of coherent and integrated brain functioning
- Increased orderliness of brain functioning, leading to good academics
- Reduced the depression and improved quality of sleep in elderly.
- Reduced glutathione, vitamin C, and vitamin E; the ratio of reduced to oxidized glutathione; and total antioxidant status were increased significantly following yogic practice.
- Dopamine, Oxytocine, Endorphine & Serotonin levels incread=se

Yoga can be beneficial

- Stress & Anxiety
- Inflammation
- Cardiac & Respiratory function
- Depression & Quality of Life
- Sleep & Brain function
- Chronic pain
- Flexibility & Balance
- Chronic & acute Pain

Thanks for your attention

I bring Vijaya/Dussera greetings form India and my colleagues from my Institute

The Impact of Yoga and Pranayama Breathing on Serum Markers

An Evidence Based Intervention

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Kuala Lumpur, Malaysia
1—4 Oct 2018

Strengthen
Inspire
Deliver

uicc global cancer control WORLD CANCER CONGRESS

Track 4-107- Maximising quality of life and death. Empowering patients and care givers

Disclosure of interest: None declared

INTRODUCTION – YOGA

- Yoga is one of the best scientifically proven lifestyle modality and an ancient Vedic science thought to have originated in India in 5000 BC which has well-established multiple health benefits (Fishman and Saltonstall, 2008).

- Yoga's ultimate goal - quieting one's mind to achieve the union of mind, body and spirit which includes practice of specific posture (*asana*) and regulated breathing (*Pranayama*).

- Regardless of its spiritual origins, yoga has become a popular route to physical and mental well-being and has been adapted for use in complementary and alternative medicine in North America and Europe (De Michaelis, 2005).

- In Western societies, yoga is gaining increased popularity as a therapeutic method. About 20 million adult Americans reported that yoga had been recommended to them by a physician or therapist (Clarke et al., 2015).

- Worldwide, it is estimated that yoga is regularly practiced by about 30 million people (Dangerfield, 2009). However, this number might still underestimate the actual prevalence of yoga practice.

INTRODUCTION – PRANAYAMA

- The word *Pranayama* is comprised of two components: '*prana*' and '*ayama*'. *Prana* means 'vital energy' or 'life force'. *Ayama* is defined as 'extension' or 'expansion'.

- Thus, the word '*Pranayama*' means 'extension or expansion of the dimension of '*prana*'. (Saraswati, 2008)

- In the *Pranayama* practices, there are four important aspects of breathing such as

1. *Puraka* (inhalation)
2. *Recaka* (exhalation)
3. *Antah Kumbhaka* (internal breath retention)
4. *Bahih Kumbhaka* (external breath retention)

- An advanced stage of Pranayama which occurs during high states of meditation is called as *kevala kumbhaka* (spontaneous breath retention).

AN EVIDENCE-BASED INTERVENTION
YOGA AND PRANAMAYA

EFFECT OF YOGA ON OXIDATIVE STRESS WITH GRADE-I HYPERTENSION (Patil SG et al., 2014)

OBJECTIVE: To investigate the effect of yoga on oxidative stress in elderly with grade-I Hypertension

METHODS: An open parallel-arm randomized controlled study.

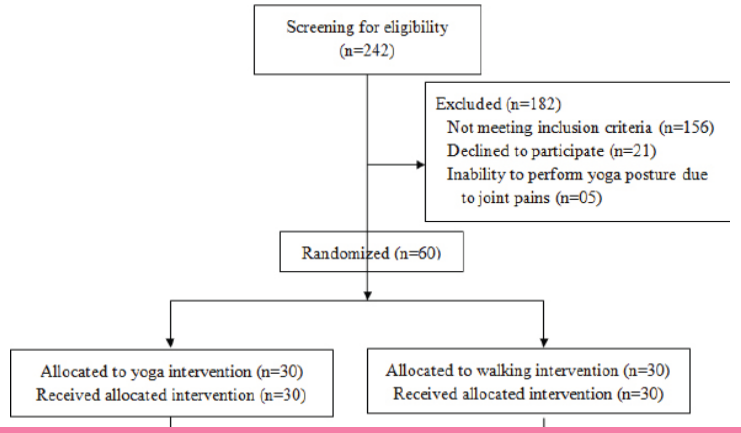
Study Protocol: Screening of elderly individuals attending geriatric clinic above 60 yrs. for grade I hypertension (SBP- 140-159mmHg /DBP-90-99mmHg) as per ESH and ESC.

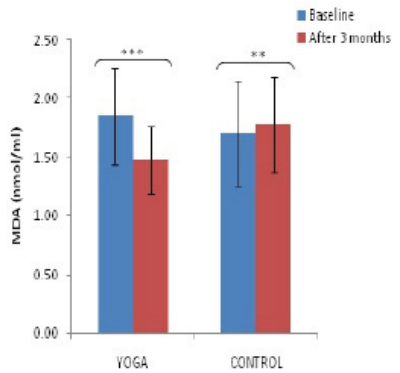
YOGA GROUP: Yoga six days in a week for one hour daily in the

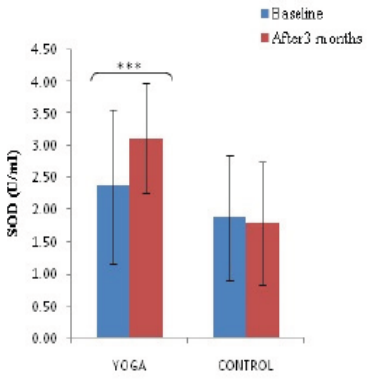
(5 min); Asanas or maintaining postures such as Padmasana, Ardhachakrasana, Shashankasana, Ardha Ustrasana, Bhujangasana, Ardha Salabasana and Trikonasana (15 min); Pranayama or breathing exercises such as Anuloma Viloma Pranayama and Brahmari Pranayama (5 min); Cyclic meditation, a yoga based guided relaxation technique; Devotional session (5min); and Closing prayer (1 min).

CONTROL GROUP: The protocol for control group includes flexibility or stretching practices for 15-20 min followed by walking for 35-40 min and rest for 5 min for six days in a week, for one hour in the morning between 06:00 to 7.00 hours for three months under the supervision of an authorised instructor.

RESULTS: Yoga practice for three months has significantly reduced serum MDA level (p<0.001), and enhanced antioxidants level such as SOD activity (p=0.007), serum GSH (p=0.002) and vitamin C (p=0.002). In the control group, we observed a significant increase in serum MDA level (p=0.04) and reduction in serum vitamin C level (p=0.015)



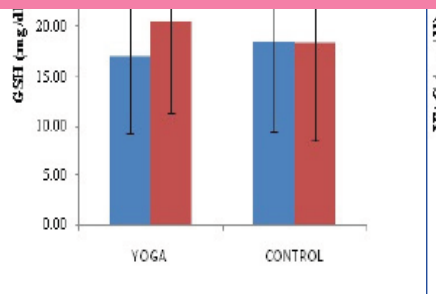


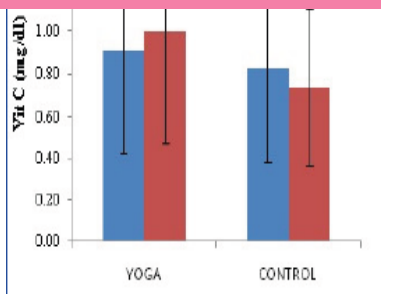


Yoga is an effective means to reduce oxidative stress and to improve antioxidants in elderly hypertensive individuals.

Final analysis (n=28) | Final analysis (n=29)

Variable	Yoga group (n=28)	Control group (n=29)	p-Value
Age (Years)	68.68 ± 4.97	69.17 ± 5.99	0.736
BMI (kg/m²)	24.65 ± 3.76	25.54 ± 3.41	0.355
Systolic BP (mmHg)	146.07 ± 5.18	145.72 ± 5.9	0.656
Diastolic BP (mmHg)	74.25 ± 4.68	75.52 ± 5.21	0.281
Fasting Blood Glucose (mg/dl)	93.50 ± 11.94	91.27 ± 11.89	0.484
Serum Triglyceride (mg/dl)	93.89 ± 26.35	98.90 ± 23.56	0.453
Total Cholesterol (mg/dl)	151.36 ± 24.72	153.34 ± 19.52	0.737
HDL Cholesterol (mg/dl)	46.75 ± 4.09	46.07 ± 4.34	0.545





Variable	Yoga Group (n=28)				Control group (n=29)			
	Before	After	Change at 3months	p-value	Before	After	Change at 3 months	p-value
SBP (mmHg)	146.07 ± 5.18	133.86 ± 7.37	-12.21 ± 2.19	<0.001***	145.72 ± 5.9	146.82 ± 6.03	1.1 ± 0.13	0.158
DBP (mmHg)	74.25 ± 4.68	73.10 ± 4.14	-1.15 ± 0.54	0.216	75.52 ± 5.21	74.79 ± 4.37	-0.73 ± 0.84	0.61
PP (mmHg)	71.82 ± 5.37	60.75 ± 7.12	-11.07 ± 1.75	<0.001***	70.20 ± 5.91	72.03 ± 6.95	1.78 ± 1.04	0.085
MAP (mmHg)	98.07 ± 4.20	93.32 ± 4.36	-4.75 ± 0.16	<0.001***	98.86 ± 4.77	98.34 ± 3.60	-0.52 ± 1.11	0.339

Values are expressed in Mean ± SD; *p<0.05, **p<0.01, ***p<0.001. Statistical analysis was done by students paired t-test and Wilcoxon signed rank test. p < 0.05 was considered statistically significant

Yoga Is as Effective as Standard Pulmonary Rehabilitation in Improving Dyspnea, Inflammatory Markers, and Quality of Life in Patients With Chronic Obstructive pulmonary disease (COPD) [Guleria et al., 2015]

PURPOSE: To investigate to see whether yoga was as effective as standard pulmonary rehabilitation on inflammatory markers, dyspnea and quality of life in patients with COPD.

METHODS: 60 patients with COPD were randomly divided into 2 groups. One group (group 1) taught yoga exercises including asanas, pranayama, meditation and relaxation technique. The second group (group 2) underwent pulmonary rehabilitation. Both groups underwent one hour of training twice a week for the first 4 weeks. For the remaining 8 weeks the supervised session was fortnightly and the remaining sessions were at home. Baseline evaluation for both group included lung functions, dyspnea assessment (Borg scale, VAS, six minute walk test), quality of life (QOL) and serum inflammatory markers (CRP and Il-6). Repeat assessment of all these parameters was done at the end of 12 weeks in both groups.

Yoga is a cost-effective form of rehabilitation and is as effective as a standard PMR. Yoga programs can be adopted as integral part of long term management of COPD.

12 week (Median)	0.70(0.10-10.0)	0.80 (0.3-6.6)	32.74 (0.50-206.00)	36.28 (6.88-198.03)

	6MWT (m; GP-I)	6MWT (m; GP-II)	Borg Scale (GP-I)	Borg Scale (GP-II)	VAS (mm; GP-I)	VAS (mm; GP-II)
Baseline (Mean)	419.0±128.12	391.88±113.10	1.50 (0.5-7.0)	3.00 (0.0-7.0)	55.17±8.55	49.67±17.6
12 week (Mean)	456.43±91.41	424.66±78.21	1.0 (0.0-4.0)	0.50 (0.0-7.0)	70.36±8.81	67.24±17.55

CONCLUSIONS: Yoga and PMR exercises done in a structured manner result in similar improvement in pulmonary functions, 6 minute walk distance, Borg scale, severity of dyspnea, quality of life and levels of C-reactive protein after 12 weeks of training.

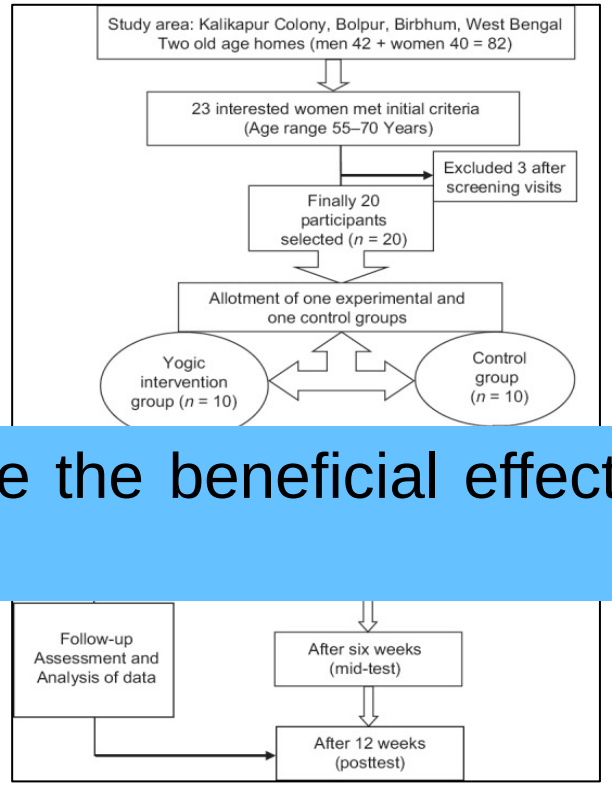
Yoga as therapeutic intervention for the management of type 2 Diabetes Mellitus

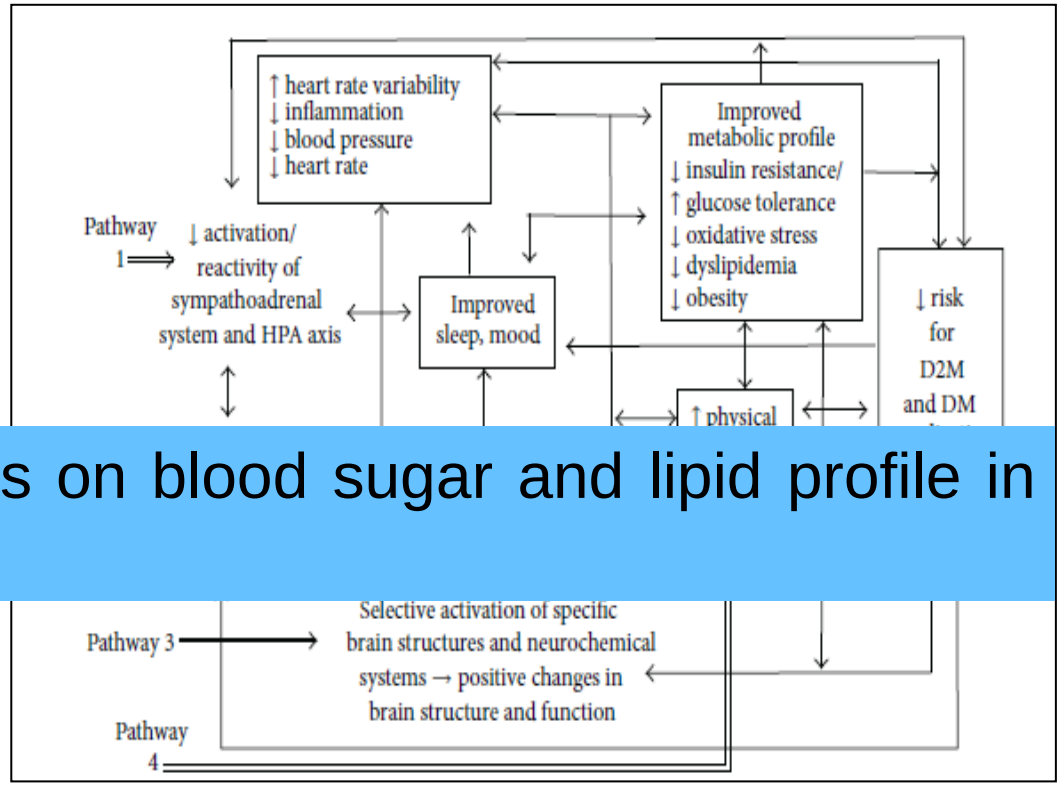
(Mondal et al., 2018)

OBJECTIVE: To investigate the effect of 12 weeks yogic intervention on blood sugar and lipid in elder women with type2 diabetes mellitus

METHODS: 21 elderly T2DM women were divided into two groups: Yogic (YIG; n=10/age 64.70± 4.04/BMI= 24.26 ± 3.40) and controls (CG; n=10/age 64.40 ± 4.79 /BMI= 24.28 ± 3.40). Yogic intervention was given for 12 weeks (3 sessions/week), while the CG continued their usual routine activities. Standing height, body weight, BMI, blood sugar, and lipid profile were measured before commencement and after 6 and 12 weeks of yogic intervention in both groups.

RESULTS: There was a significant ($P < 0.01$) decrease in fasting plasma glucose, postprandial blood sugar, total cholesterol, triglycerides, low-density lipoprotein, and very low density lipoprotein, with a significant ($P < 0.01$) increase in high-density lipoprotein level from its initial value in YIG, while showing insignificant result in CG.





Yogic intervention may have the beneficial effects on blood sugar and lipid profile in elderly women with T2DM.

Blood sugar and lipid profile	Yogic intervention group			Control group			F
	Pretest	Mid-test (pre vs. mid)	Posttest (pre vs. post)	Pretest	Mid-test (pre vs. mid)	Posttest (pre vs. post)	
FPG (mg/dl)	168.30±14.86	163.00±11.28	158.50±11.70	165.30±27.34	165.30±27.38	165.50±27.03	4.17*
		t=2.63*	t=2.39*		t=0.00	t=0.37	
PPBG (mg/dl)	236.80±42.60	232.40±42.20	228.70±42.70	235.60±25.97	235.80±26.26	236.20±26.67	7.56**
		t=5.28**	t=6.67**		t=0.80	t=1.50	
TC (mg/dl)	206.90±30.94	204.10±31.36	201.80±31.70	207.80±36.90	207.90±36.70	207.90±36.50	21.85**
		t=9.64**	t=8.70**		t=0.99	t=0.23	
TG (mg/dl)	166.90±28.62	164.00±28.20	161.90±27.87	166.60±23.64	167.30±23.92	167.20±23.67	16.17**
		t=6.33**	t=6.85**		t=1.12	t=1.08	
LDL (mg/dl)	127.50±15.11	125.30±15.17	123.70±14.89	125.10±17.21	125.10±17.60	125.00±17.62	18.22**
		t=8.82**	t=9.78**		t=0.00	t=0.43	
VLDL (mg/dl)	35.60±3.78	33.80±3.99	32.70±3.74	33.90±3.73	34.10±3.25	33.90±3.25	8.12**
		t=7.22**	t=7.66**		t=0.80	t=0.00	
HDL (mg/dl)	47.60±3.66	49.20±3.61	51.20±3.55	47.40±3.37	47.30±3.40	47.30±3.33	20.53**
		t=7.24**	t=9.00**		t=0.43	t=0.32	

*P<0.05, **P<0.01; two tailed, t-test for paired data comparing the values at 6 weeks (mid-test) versus baseline (pretest) and 12 weeks (posttest) versus baseline (pretest). FPG = Fasting plasma glucose, PPBG = Postprandial glucose, TC = Total cholesterol, TG = Triglyceride, LDL = Low-density lipoprotein, VLDL = Very low-density lipoprotein, HDL = High-density lipoprotein, YIG = Yogic intervention group, CG = Control group

Lipid profile	Adjusted posttest means		Mean differences	SE
	YIG	CG		
FPG (mg/dl)	156.98	166.66	−9.68**	±3.313
PPBG (mg/dl)	227.50	236.20	−8.70**	±1.605
TC (mg/dl)	200.86	206.06	−5.20**	±0.733
TG (mg/dl)	157.45	162.76	−5.31**	±0.727
LDL (mg/dl)	123.23	126.94	−3.71*	±0.512
VLDL (mg/dl)	32.48	34.56	−2.08*	±0.519
HDL (mg/dl)	51.35	47.64	3.71*	±0.570

*P<0.05, **P<0.01. FPG = Fasting plasma glucose, PPBG = Postprandial glucose, TC = Total cholesterol, TG = Triglyceride, LDL = Low-density lipoprotein, VLDL = Very low-density lipoprotein, HDL = High-density lipoprotein, YIG = Yogic intervention group, CG = Control group, SE = Standard error

Effect of exercise therapy on lipid profile and oxidative stress indicators in patients with type 2 diabetes (Gordon et al., 2008)

Objective: This study investigated the impact of Hatha yoga and conventional physical training (PT) exercise regimens on biochemical, oxidative stress indicators and oxidant status in patients with type 2 diabetes.

Methods: This prospective randomized study consisted of 77 type 2 diabetic patients in the Hatha yoga exercise group that were matched with a similar number of type 2 diabetic patients in the conventional PT exercise and control groups. Biochemical parameters such as fasting blood glucose (FBG), serum total cholesterol (TC), triglycerides, low-density lipoprotein (LDL), very low-density lipoproteins (VLDL) and high-density

The study demonstrate the efficacy of Hatha yoga exercise on fasting blood glucose, lipid profile, oxidative stress markers and antioxidant status in patients with type 2 diabetes and suggest that Hatha yoga exercise and conventional PT exercise may have therapeutic preventative and protective effects on diabetes mellitus by decreasing oxidative stress and improving antioxidant status.

activities of PLA2 and catalase after six months although the latter increased by 13.68% and 13.19% in the Hatha yoga and conventional PT exercise groups respectively (P = 0.144).

Table 3: Comparison of HDL, LDL and VLDL among conventional PT exercise, Hathayoga exercise and control type 2 diabetic patients over a 6-month period

Variable/Group	Baseline	3 Months	6 Months
HDL (mmol/L)			
Conventional PT	0.93 ± 0.04	0.94 ± 0.04	0.94 ± 0.04
Hatha yoga	0.94 ± 0.04	0.97 ± 0.04	0.97 ± 0.05
Control	0.93 ± 0.93	0.93 ± 0.04	0.91 ± 0.04
LDL (mmol/L)			
Conventional PT	3.02 ± 0.12	3.00 ± 0.12	3.00 ± 0.12
Hatha yoga	3.09 ± 0.14	3.01 ± 0.15	3.01 ± 0.14
Control	3.07 ± 0.12	3.17 ± 0.13	3.24 ± 0.12
VLDL (mmol/L)			
Conventional PT	0.83 ± 0.05	0.78 ± 0.05	0.77 ± 0.05*a
Hatha yoga	0.83 ± 0.07	0.79 ± 0.07	0.77 ± 0.07*a
Control	0.84 ± 0.06	0.84 ± 0.06	0.84 ± 0.06

Values represent Mean ± S.E. *p < 0.05; a: statistically significant different from baseline.

Table 4: Comparison of MDA, PLA2 and POX concentrations among conventional PTexercise, Hatha yoga exercise and control treated type 2 diabetic patients over a6-month period

Variable/Group	Baseline	3 Months	6 Months
MDA (nmol/L)			
Conventional PT	2.32 ± 0.12	2.23 ± 0.12	1.90 ± 0.10**a*b
Hatha yoga	2.36 ± 0.20	2.21 ± 0.15	1.89 ± 0.16**a*b
Control	2.35 ± 0.12	2.36 ± 0.12	2.37 ± 0.13
PLA2 (IU)			
Conventional PT	1.97 ± 0.08	2.19 ± 0.08	2.29 ± 0.09
Hatha yoga	2.10 ± 0.08	2.12 ± 0.07	2.25 ± 0.07
Control	2.06 ± 0.09	2.16 ± 0.09	2.15 ± 0.09
POX (nmol/mg)			
Conventional PT	2.25 ± 0.12	2.21 ± 0.14	2.34 ± 0.15
Hatha yoga	2.19 ± 0.13	2.20 ± 0.14	2.34 ± 0.13
Control	2.21 ± 0.13	2.23 ± 0.15	2.25 ± 0.16

Values represent Mean ± S.E. **p < 0.0001; *p < 0.05; a: significantly different from baseline; b: significantly different from control.

Table 5: Comparison of the activities of superoxide dismutase (SOD) and catalaseamong conventional PT exercise, Hatha yoga exercise and control type 2 diabetic patients over a 6-month period

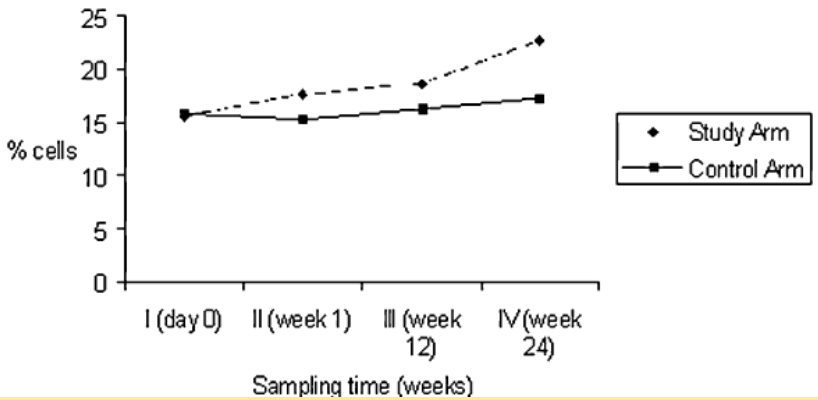
Variable/Group	Baseline	3 Months	6 Months
SOD (U/mL)			
Conventional PT	11.25 ± 0.86	11.66 ± 0.82	13.52 ± 0.96*a
Hatha yoga	11.17 ± 1.18	11.64 ± 1.15	13.86 ± 1.11*a
Control	11.01 ± 1.05	11.03 ± 0.98	10.42 ± 0.93
Catalase (U/mL)			
Conventional PT	80.28 ± 5.57	85.44 ± 5.54	90.87 ± 5.13
Hatha yoga	80.36 ± 7.02	85.53 ± 3.77	91.35 ± 5.21
Control	82.10 ± 5.89	81.44 ± 4.67	82.11 ± 5.34

Values represent Mean ± S.E. *p < 0.05; a: significantly different from baseline.

Effect of rhythmic breathing (Sudarshan Kriya and Pranayam) on immune functions and tobacco addiction (Kochupillai et al., 2005)

Background: Stress, a psychophysiological process, acts through the immune-neuroendocrine axis and affects cellular processes of body and immune functions, leading to disease states including cancer. Stress is also linked to the habit of tobacco consumption and substance abuse, which in turn also leads to diseases. Sudarshan Kriya (SK) and Pranayam (P), rhythmic breathing processes, are known to reduce stress and improve immune functions.

AIM: To investigate the rhythmic breathing (Sudershan Kriya and Pranayama) on immune functions and tobacco addiction



The inexpensive and easy to learn and practice breathing processes (SK and P) in this study demonstrated an increase in NK cells and a reduction in tobacco consumption. When confirmed in large and randomized studies, this result could mean that the regular practice Sudershan Kriya and Pranayama might reduce the incidence and progression of cancer

Role of sudarshan kriya and pranayam on lipid profile and blood cell parameters during exam stress: A randomized controlled trial (Subramanian et al., 2012)

AIM: To investigate the effect of sudarshan kriya (SK and P) program on lipid profile and blood cell parameters during exam stress.

METHODS: Blood samples of 43 engineering students were collected at four intervals namely baseline (BL), exam stress (ES), three and six weeks practice of SK and P during exam stress. Lipid profile (TC, TGL, VLDL) and hematological parameters (neutrophil, lymphocytes, platelet count, packed cell volume (PCV), mean cell volume (MCV) were measured at all four intervals.

Study design: The study included forty-three students and was randomized into two major groups. Group I (*n*=21) : Control group/ Group II (*n*=22) : Study group: The two groups were further subdivided as follows:

Group Ia : Baseline (no exam) [BL]

SK and P practice has the potential to overcome ES by improving lipid profile and hematological parameters.

Group Id : Six weeks + exam stress

Group IIa : Baseline (no exam) [BL]

Group IIb : Exam stress [ES]

Group IIc : SK and P practice (three weeks)+exam stress

Group IId : SK and P practice (six weeks)+exam stress

RESULTS: Exam stress elevated TC, TGL and VLDL levels. Hematological parameters affected by ES included neutrophil, lymphocytes, platelet count, PCV and MCV. Three and six weeks practice of SK and P reduced the elevated lipid profile, hematological parameters and improved lymphocyte levels.

Parameters	Control group (Group I)				Study group (Group II)			
	Group Ia	Group Ib	Group Ic	Group Id	Before SK and P practice		After SK and P practice	
					Group IIa	Group IIb	Group IIc	Group IId
Cholesterol (mg/dl)	143 ± 17.3	169.1 ± 16.6^{A1**}	170.4 ± 13.4	168.2 ± 18.2	147.1 ± 16.1	168.3 ± 14.4^{A2**}	152.9 ± 14.9^{A3*}, ^{B1**}	146.7 ± 23.6^{A4*}, ^{B2**}
HDL (mg/dl)	40.7 ± 6.8	44.9 ± 2.8	45.7 ± 2.3	45.4 ± 2.6	40.2 ± 7.9	43.3 ± 5.7	42.8 ± 5.4	42.5 ± 7.6
LDL (mg/dl)	97.4 ± 22.1	100.4 ± 28.3	98.2 ± 23.9	102.4 ± 12.4	96.5 ± 7.1	102.8 ± 15.6	95.1 ± 17.6	90.85 ± 27
TGL (mg/dl)	75.4 ± 22.5	106.1 ± 22.5^{A1***}	103.7 ± 16.1	102.4 ± 15.1	72 ± 7.1	101.3 ± 13.3^{A2***}	84.4 ± 14.4^{A3**}, ^{B1**}	71.0 ± 11.4^{A4***}, ^{B2**}
VLDL (mg/dl)	15.0 ± 4.2	21.1 ± 5.9^{A1***}	19.3 ± 4.96	21.2 ± 2.8	14.1 ± 1.2	22.6 ± 4.7^{A2***}	16.5 ± 4.2^{A3*}, ^{B1**}	14.3 ± 4.2^{A4**}, ^{B2**}

Group I - Control group, Group I - Study group, Group Ia - Baseline, Group IIa – Baseline, Group Ib - Exam stress, Group IIb - Exam stress, Group Ic - Three weeks +ES, Group IIc - SK and P practice (three weeks) +ES, Group Id - Six weeks +ES, Group IId - SK and P practice (six weeks) +ES, SK and P - *Sudarshan kriya and pranayam*, HDL - High density lipoproteins, LDL - Low density lipoproteins, VLDL - Very low density lipoproteins, TGL – Triglycerides, A - comparison within the group, A1 - Comparison between group Ia and Ib, A2 - Comparison between group IIa and group IIb, A3 - Comparison between group IIb and group IIc, A4 - Comparison between group IIb and IId, B - Comparison between groups, B1 - Comparison between group Ic and group IIc, B2 - Comparison between group Id and group IId, ***P<0.001, **P<0.01, *P<0.05

Parameters	Group Ia	Group Ib	Group Ic	Group Id
Hb (g%)				
Female	4.42 ± 0.83	4.44 ± 0.63	4.32 ± 0.93	4.44 ± 0.65
Platelet count (lakhs/cumm)	2.12 ± 0.17	2.42 ± 0.39^{A1**}	2.44 ± 0.52	2.33 ± 0.14
PCV (%)	34.3 ± 2.2	43.3 ± 4.95^{A1*}	41 ± 10.2	40.3 ± 6.1
MCV (Femto litre)	78.3 ± 4.6	86.86 ± 3.3^{A1*}	85.8 ± 3.8	84.3 ± 4.1
MCH (pg/cell)	25 ± 4	31.3 ± 3.5	30.2 ± 2.77	29.5 ± 3.44
MCHC (%)	33.4 ± 2.8	35.4 ± 3.04	34.0 ± 2.35	32.5 ± 2.2

A - Comparison within the group, A1 - Comparison between group Ia and Ib, ***P<0.001, **P<0.01, *P<0.05, Hb - Hemoglobin, T.WBC - Total white blood cells, T.RBC - Total red blood cells, PCV - Packed cell volume, MCV - Mean corpuscular volume, MCH - Mean corpuscular hemoglobin, MCHC - Mean corpuscular hemoglobin concentration

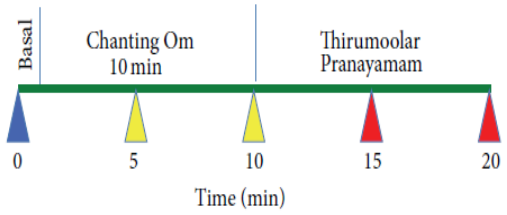
Parameters	Before SK and P practice		After SK and P practice	
	Group II a	Group IIb	Group IIc	Group IId
Hb (g%)				
Male	13.9 ± 1.6	14.2 ± 1.35	14.0 ± 1.52	14.1 ± 1.21
Female	12.8 ± 2.1	13.1 ± 1.43	12.9 ± 1.6	12.9 ± 1.3
T.WBC (m/cumm)	7700 ± 15.5	7800.5 ± 14.4	7600.9 ± 10.7	8000.1 ± 13.3
Neutrophils (%)	52.6 ± 5.7	71.3 ± 8.51^{A2***}	57.8 ± 7.5^{A_2**B_1*}	51.5 ± 5.6$^{A4*** B_2*}$
Eosinophils %	4.4 ± 1.6	3.5 ± 2.1	4.2 ± 1.1	3.5 ± 1.01
Lymphocytes %	37.9 ± 9.1	29.4 ± 3.8^{A2**}	36.9 ± 7.3$^{A3** B_1**}$	39.0 ± 7.4$^{A4** B_2**}$
T.RBC milli/cumm				
Male	5.36 ± 0.92	5.5 ± 0.58	5.44 ± 0.63	5.42 ± 0.68
Female	4.42 ± 0.83	4.4 ± 0.86	4.35 ± 0.75	4.57 ± 0.74
Platelet count lakhs/cu mm	2.06 ± 0.51	2.39 ± 0.45^{A2**}	1.96 ± 0.42$^{A3* B_1*}$	1.94 ± 0.46$^{A4** B_2*}$
PCV (%)	33.3 ± 5.1	40.4 ± 6.1^{A2*}	38.4 ± 3.5	39.6 ± 4.8
MCV (femtoliter)	83.9 ± 6.4	88.9 ± 4.8^{A2*}	84.7 ± 10.5	84.5 ± 7.2
MCH (pg/cell)	28.7 ± 4.3	32.1 ± 5.9	28.4 ± 5.7	24.5 ± 3.2^{A4*}
MCHC (%)	33.1 ± 5.6	32.6 ± 6.0	32.1 ± 4.7	30.3 ± 4.3

A - Comparison within the group, A2 - Comparison between group IIa and group IIb, A3 - Comparison between group IIb and group IIc, A4 - Comparison between group IIb and IId, B - Comparison between groups, B1 - Comparison between group Ic and group IIc, B2 - Comparison between group Id and group IId, ***P<0.001, **P<0.01, *P<0.05, SK and P - *Sudarshan kriya and Pranayam*, Hb - Hemoglobin, T.WBC - Total white blood cells, T.RBC - Total red blood cells, PCV - Packed cell volume, MCV - Mean corpuscular volume, MCH - Mean corpuscular hemoglobin, MCHC - Mean corpuscular hemoglobin concentration

Alterations in Salivary Proteome following Single Twenty-Minute Session of Yogic Breathing (Balasubramanian et al., 2015)

Background and Aim: Yogic breathing (YB) has been suggested to reduce stress and blood pressure and increase cognitive processes. However, alterations after YB at the molecular level are not well established.

Yogic Breathing intervention. Yogic breathing exercise contains two phases, namely Chanting Om and Thirumoolar Pranayama, each for 10 minutes. Saliva samples collected starting from 0 min and every five minutes as shown.

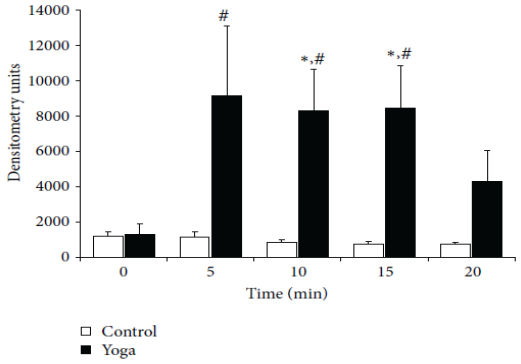


Protein identification	Uniprot #	MW	$\log_2$FC	*P* value
Ig lambda-2 chain C regions	P0CG05	11 kDa	1.1	0.000
Mucin-7	Q8TAX7	39 kDa	0.8	0.002
Alpha-2-macroglobulin-like protein 1	A8K2U0	161 kDa	−1.4	0.006
Deleted in malignant brain tumors 1 protein	Q9UGM3	261 kDa	1.1	0.010
Immunoglobulin J chain	P01591	18 kDa	1.8	0.010
Ig alpha-1 chain C region	P01876	38 kDa	1.5	0.012
Ig mu chain C region	P01871	49 kDa	3.8	0.015
Ig heavy chain V-III region BRO	P01766	13 kDa	3.1	0.016
Cystatin-S	P01036	16 kDa	0.5	0.016
Keratin, type I cytoskeletal 10	P13645	59 kDa	−1.7	0.017
Prolactin-inducible protein	P12273	17 kDa	0.7	0.018
Ig alpha-2 chain C region	P01877	37 kDa	1.3	0.018
Keratin, type II cytoskeletal 5	P13647	62 kDa	−1.8	0.022
Glyceraldehyde-3-phosphate dehydrogenase	P04406	36 kDa	−1.1	0.020
Kallikrein-1	P06870	29 kDa	2.9	0.026
UPF0762 protein C6orf58	Q6P5S2	38 kDa	1.5	0.028

These data are the first to demonstrate the feasibility of stimulating and detecting salivary protein biomarkers in response to an acute Yoga exercise.

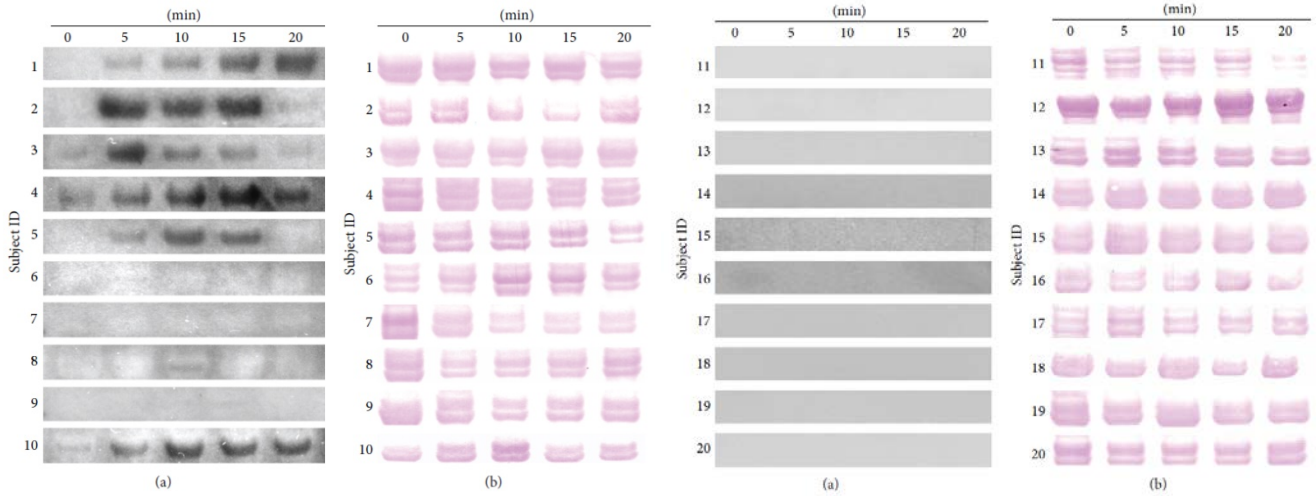
AC group read a text of their choice for 20 minutes. Saliva was collected at baseline and at 5, 10, 15, and 20 minutes. Mass Spectrometry (MS) revealed 22 proteins differentially expressed and deleted in malignant brain tumor-1 (DMBT1) and Ig lambda-2 chain C region (IGLC2) validated using Western Blotting.

Results: DMBT1 was elevated in 7 of YB group by 10-fold and 11-fold at 10 and 15 minutes, respectively, whereas it was undetectable in the time-matched AC group ($P < 0.05$). There was a significant interaction between groups and time assessed by two-way ANOVA ($P < 0.001$). IGLC2 also showed a significant increase in YB group as measured by Western Blotting.



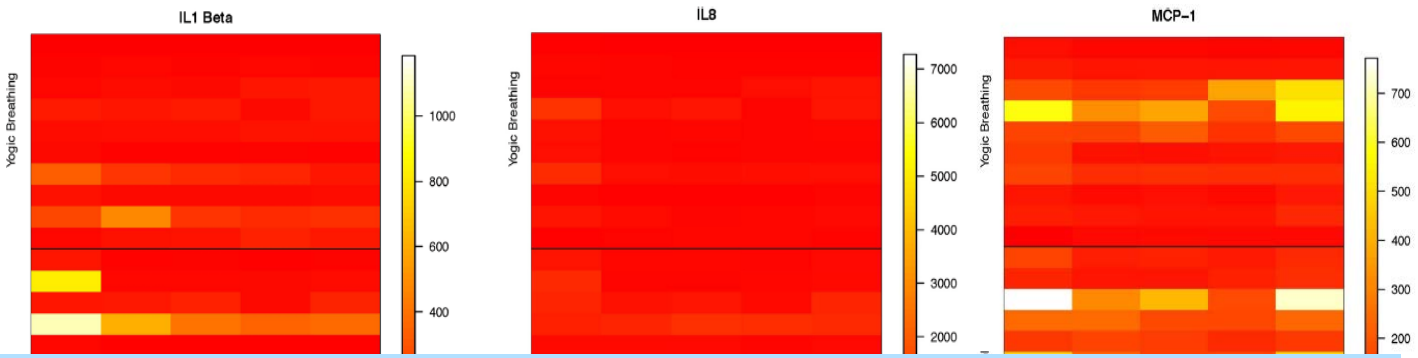
Increased salivary DMBT1 abundance in Yogic breathing participants

Undetectable salivary DMBT1 level in Attention Control participants



Yogic breathing when compared to attention control reduces the levels of pro-inflammatory biomarkers in saliva:a pilot randomized controlled trial (Twal et al., 2016)

AIM: As Yoga practice stimulates salivary secretion, and saliva is considered a source of biomarkers, changes in salivary cytokines before and after Yogic breathing exercise as specified in an ancient Tamil script, Thirumanthiram, were examined using a Cytokine Multiplex to compare to Attention Control (AC) group.



These data are the first to demonstrate the feasibility of detecting salivary cytokines using multiplex assay in response to a Yoga practice.

a text of their choice for 20 min. Saliva was collected immediately after YB training at 0, 5, 10, 15 and 20 min and analyzed by Multiplex ELISA.

Results: The levels of interleukin (IL)-1β, IL-8, and monocyte chemotactic protein−1 (MCP-1) were significantly reduced in YB group when compared to AC group. The level of reduction of IL-8 was significant at all time points tested, whereas IL-1β showed reduction at 15 and 20 min time points ($p < 0.05$), and MCP-1 level was marginally different at 5–20 min. There were no significant differences between YB and AC groups in the salivary levels of IL-1RA, IL-6, IL-10, IL-17, IP-10, MIP-1b, and TNF-α.

Table 2 Changes in salivary IL-1β, IL-8 and MCP-1 levels in Yogic Breathing (YB) group when compared with Attention Control (AC) group

	0 min		5 min		10 min		15 min		20 min	
	AC	YB	AC	YB	AC	YB	AC	YB	AC	YB
IL-1β (pg/mL)	432.40 (440.99)	87.04 (110.64)	231.69 (248.58)	95.43 (142.79)	184.96 (200.35)	62.96 (60.07)	149.98 (172.63)	66.12 (52.34)	215.10 (211.72)	66.18 (49.24)
IL-8 (pg/mL)	1812.13 (2304.86)	364.68 (375.22)	539.79 (336.52)	150.72 (101.32)	476.28 (275.59)	159.05 (142.59)	426.33 (283.75)	145.47 (100.20)	845.10 (915.08)	196.05 (149.71)
MCP1 (pg/mL)	329.38 (232.63)	143.03 (167.12)	201.90 (95.70)	91.21 (94.37)	186.81 (111.70)	103.95 (113.81)	149.20 (67.97)	97.47 (110.70)	275.95 (211.78)	162.32 (199.17)

Saliva samples from both groups were collected at 0, 5, 10, 15 and 20 min were analyzed multiplex assay as explained under Methods. Pooled data (with standard deviation in parentheses) expressing levels of IL-1β, IL-8 and MCP-1 levels (pg/mL) from all the individuals from YB and AC groups at each time point were used for statistical analysis using linear mixed models with Auto Regressive order 1 correlation structure

THANKS FOR YOUR KIND ATTENTION

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The Role of Yoga in the Adjuvant Treatment of Breast Cancer: Results from a Large Randomized Controlled Trial

Quality of life results

Nita S. Nair, Nishu Singh Goel, Rohini W Hawaldar, Shabina Siddique, Vani Parmar, Aarti Pandey, Jaya Ghosh, Joyita Deodhar, Anuradha Daptardar, Rajendra A. Badwe

Tata Memorial Centre, Mumbai

World Cancer Congress
Kuala Lumpur, Malaysia
1—4 Oct 2018

Strengthen
Inspire
Deliver

uicc global cancer control WORLD CANCER CONGRESS

Track <INSERT>

Disclosure of interest: None declared

Background

- Yoga appears to enhance emotional well-being and mood and may serve to buffer deterioration in both overall and specific domains of QOL

- May provide beneficial changes in circulating levels of nonspecific markers of chronic low-grade inflammation.

- Fatigue is one of the most prevalent QOL concerns, affecting 30% to 70% of breast cancer survivors and Yoga may impact the same

- In breast cancer survivors with sleep disturbance, Yoga significantly improved QOL and this improvement in QOL may be mediated by concurrent improvements in sleep disturbance and fatigue

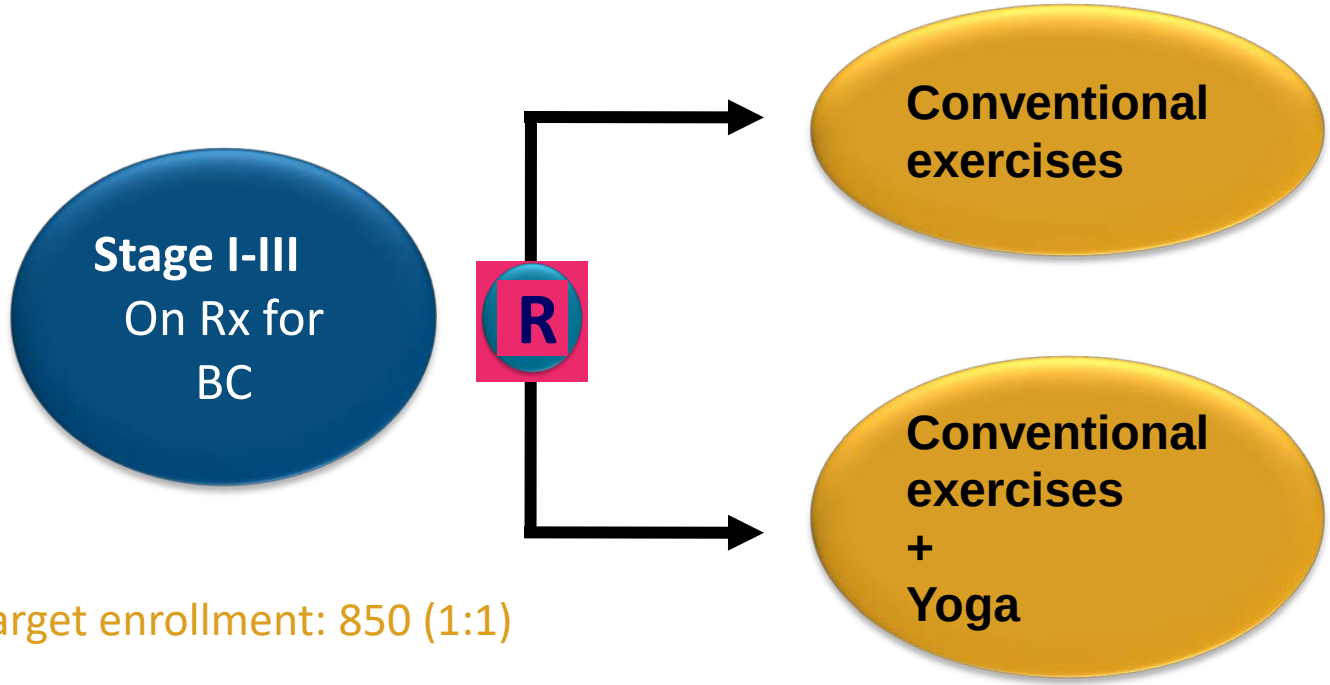
JCO 2008 , JCO 2016
Springerplus. 2015

Review of yoga therapy during cancer treatment

- Findings most consistently support improvement in psychological outcomes (e.g., depression, distress, anxiety).
- Several studies also found that yoga enhanced quality of life, though further investigation is needed to clarify domain-specific efficacy (e.g., physical, social, cancer-specific).
- Evidence increasingly suggests that yoga ameliorates sleep and fatigue
- Suggested for strengthening yoga research methodology to inform clinical guidelines.
- Cochrane review : Included 24 studies with a total of 2166 participants,
- Provided moderate-quality evidence showing that yoga
- improved health-related quality of life
- reduced fatigue and reduced sleep disturbances in the short term
- Yoga did not appear to reduce depression or anxiety

Supportive care in cancer 2017

Yoga Vs Conventional Exercises in BC: A randomized controlled trial (CTRI no: REF/2014/03/006566)



Phase I: 1-14 days
Phase II: 15-completion of adjuvant
Phase III: If compliant to phase 2, next 5 years

Target enrollment: 850 (1:1)

Primary endpoint: DFS

Evaluations

- EORTC QLQ-C30 & BR-23
- Brief Fatigue Inventory
- VAS (Pain score)
- Spirituality Questionnaire
- PFT

Stratification:

Menopausal status
Clinical Stage
Treatment

Inv:, Nair, Badwe et al.

- This is the first randomized controlled trial of this magnitude (850 women), which in addition to testing the impact of yoga on QOL is also powered to evaluate the impact of yoga on survival

- This is a longitudinal study measuring various phases of yogduring treatment and survivorship, with a comparative analysis of different time points and the response to yoga , which will help integrating yoga as a complementary modality

- Also this study will help identify the long term and short term effects of this therapy in breast cancer patients and survivors

Objectives

Primary :

Disease free survival

Secondary :

Quality of life

Overall Survival

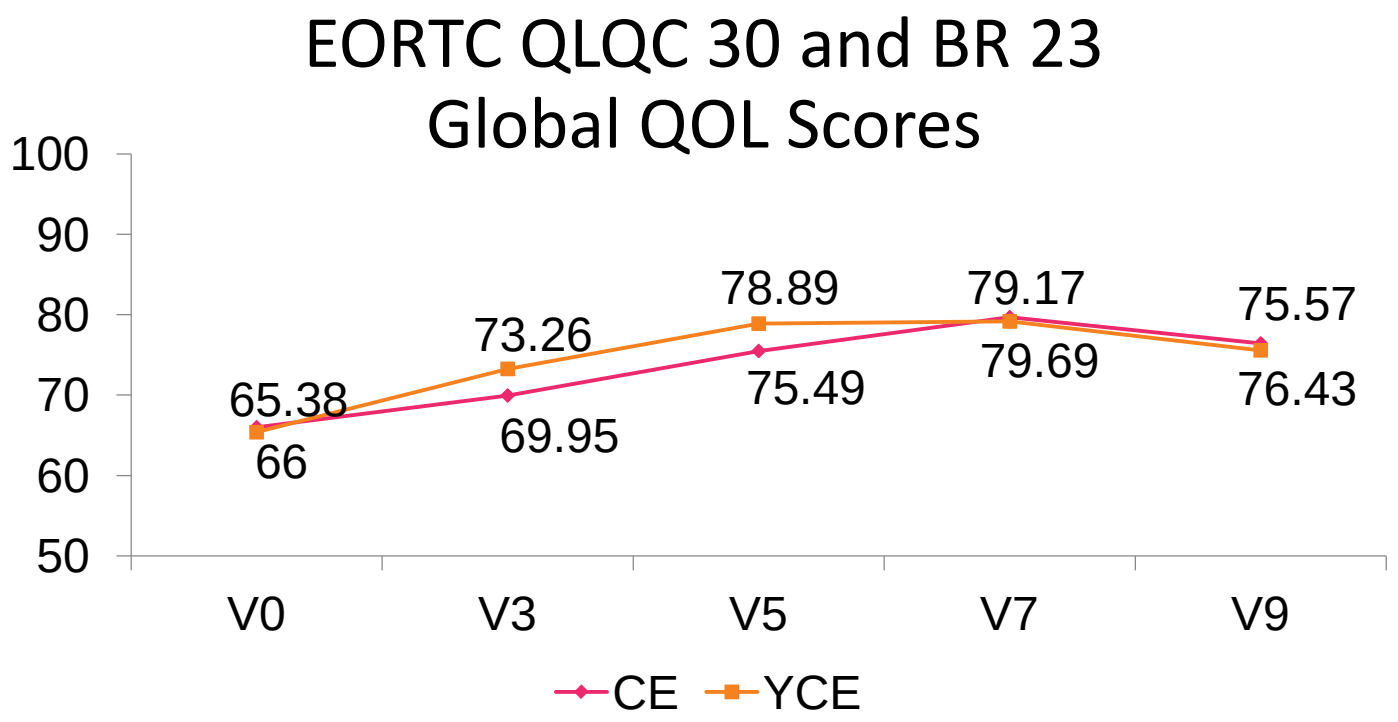
Circulating levels of markers of inflammation

Results

At present 746 women have been accrued on the study and 605 have a minimum one year follow up

Assessment of compliance to performing the exercise is 76.7% in phase 2 and 82.41% in phase 3

	CE	Yoga + CE
Age (Median)	48	47
Stage (%) OBC LABC	 80.5 19.5	 84.2 15.8
BCT (%) MRM (%)	66.1 33.9	65.9 34.1
BMI(Median) kg/m2	25.77	24.65



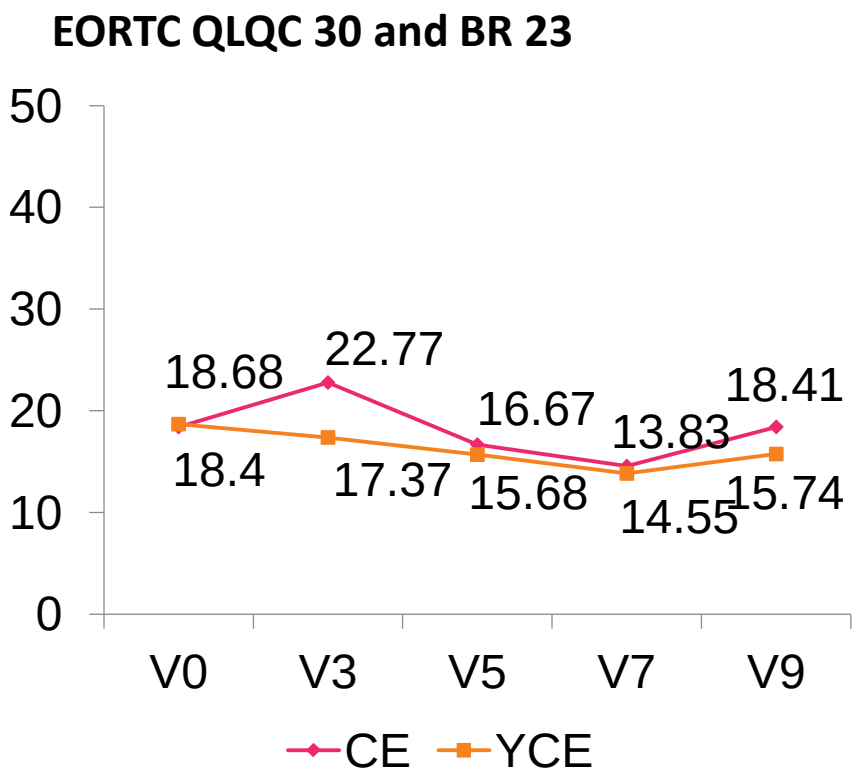
- At 6-9 months **(V3)** there was no significant difference in global QOL scores (p = 0.08).

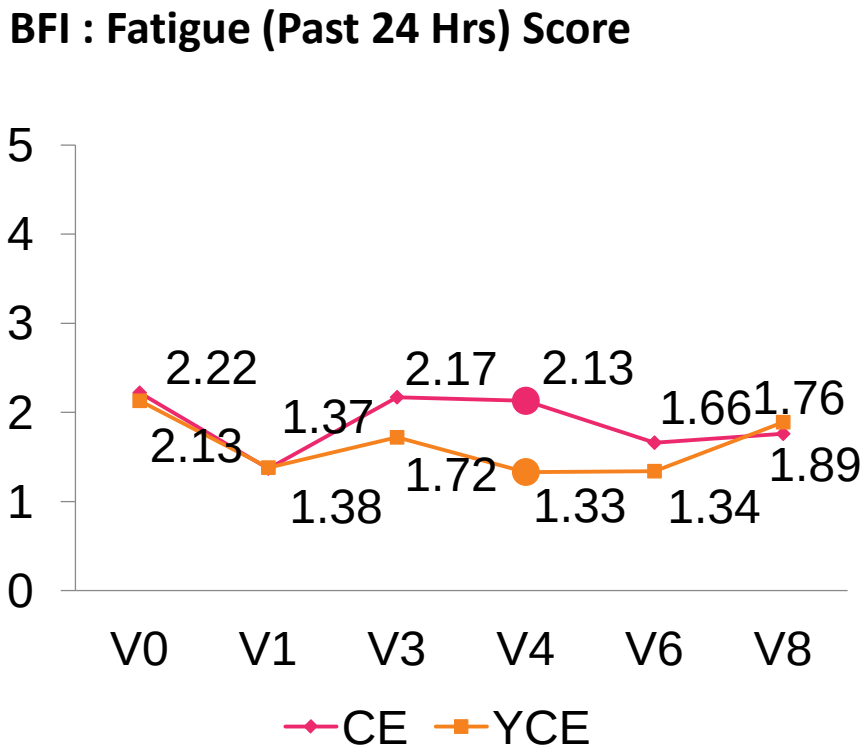
  52% women on YCE showed an improvement

- No difference in median scores but **(V5)**: Less number of women reported systemic side effects in YCE (56% vs 44%, p = NS)
- At 18-21 months (V5): median scores of emotional function were better in YCE compared to CE (78.68 vs 82.57, p = 0.002)

JCO 2017

Fatigue Scores





- At 6-9 months **(V3)**: Median score of fatigue after adjuvant therapy was lower in YCE vs CE (median score 17.37 vs 22.77, p = 0.003)

- At 12-15 months **(V3)**: Median scores of fatigue were lower in YCE compared to CE , (2.17 vs 1.72, p = 0.04)

Summary

In women undergoing treatment for breast cancer Yoga appears to

- Lower Fatigue
- Improve Emotional function
- Lower Systemic therapy side effects
- Prevent Mood detriment
- Improve General activity

Conclusions

- Yoga showed numerically better scores in all aspects of QOL, which reached statistical significance in domains related to fatigue, emotional score and pain score.
- Customisation of yoga exercises is desired for better patient involvement and compliance to practise .
- Yoga is a low-risk, low-cost, complementary therapy that may improve compliance to therapy by improving parameters that can affect day-to-day activity in women with breast cancer

Thank You

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Yoga and Cancer Control: Research, Evidence and practice

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World Cancer Congress
Kuala Lumpur, Malaysia
1—4 Oct 2018

Strengthen
Inspire
Deliver

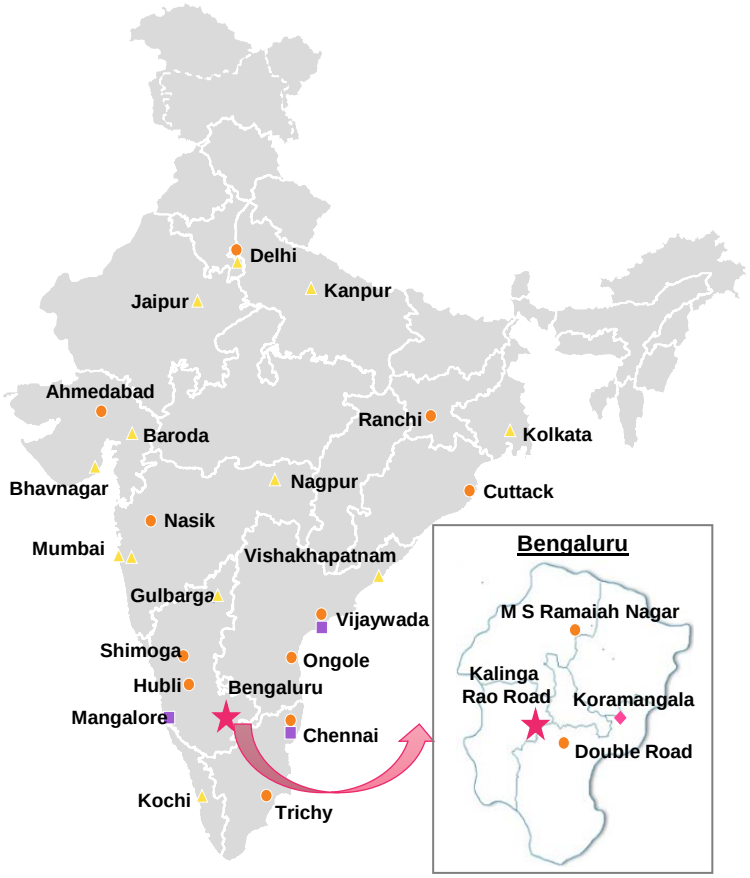
uicc
global cancer control
WORLD CANCER CONGRESS

Disclosure of interest: None declared

HCG's Cancer Care Network in India

adding life to years

Pan-India Presence Across 13 Cities and Towns in 8 States…



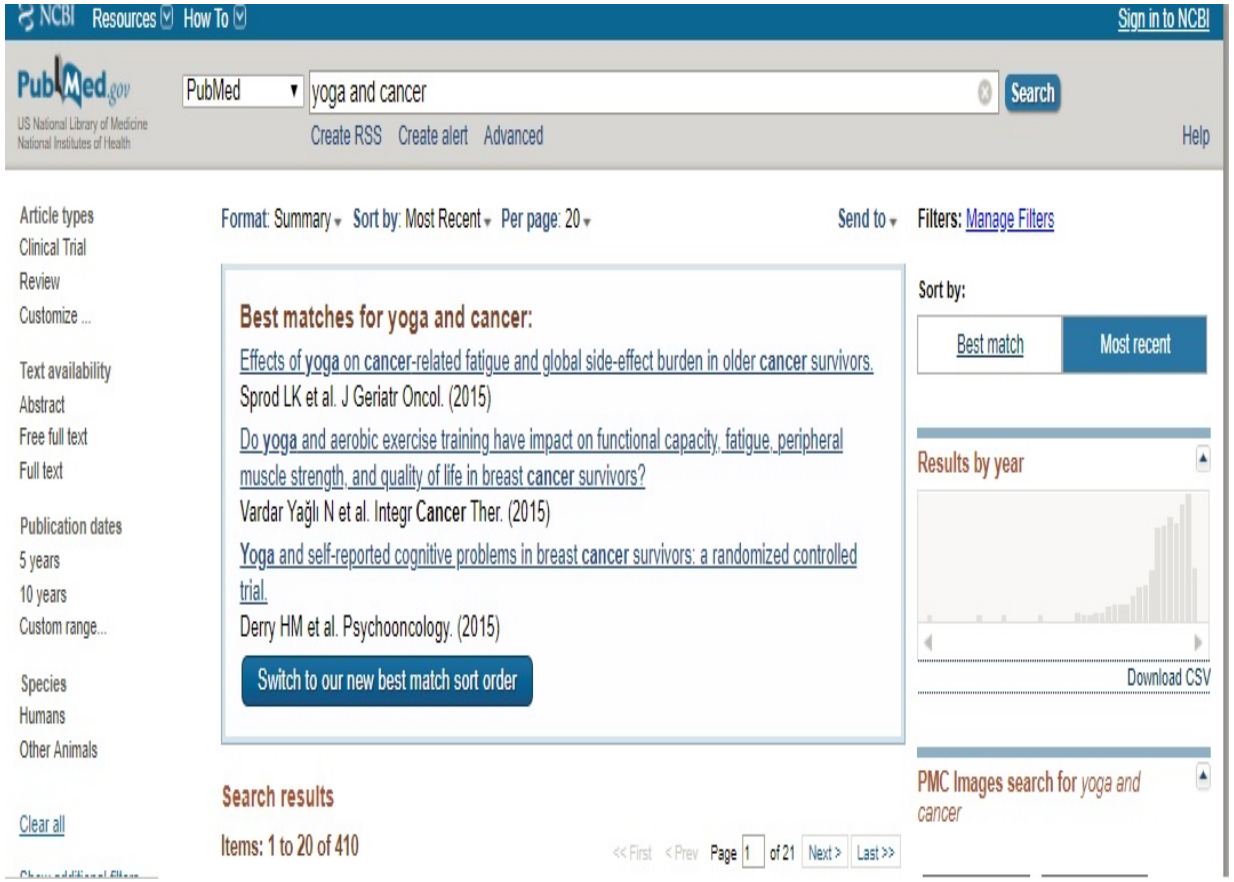
- ★ Centre of Excellence (CoE) (1)
- ● Comprehensive Cancer Centre (14)[1]
- ■ Freestanding Diagnostic Centre (3)
- ◆ Day Care Chemotherapy Centre (1)
- ▲ Cancer Centres Under Development (12)

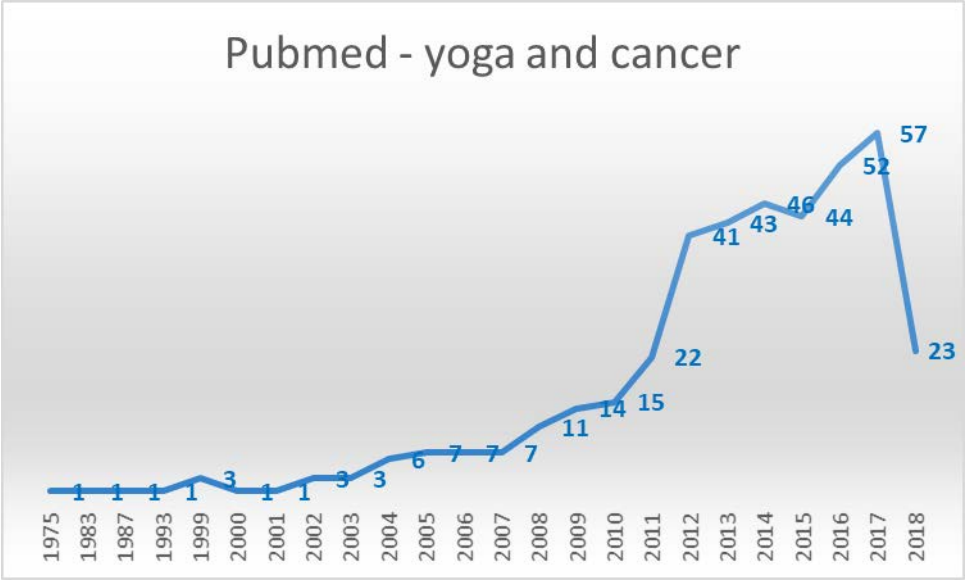
Infrastructure Expansion Across The Network[2]

- **14** to **26** Comprehensive Cancer Centres[3]
- **902** to **1,817** Operational Beds[4]
- **17** to **31** LINACS[5]
- **31** to **63** Operation Theatres
- **7** to **16** PET CT Scanners[6]

Note: As of 31-Dec-2015
[1] Including Bengaluru CoE; [2] Includes expansion of Ahmedabad and Cuttack Centres; [3] Expect to commence operations by Fiscal Years 2016,2017 and 2018
[4] Number of available operational beds includes ICU beds and day-care beds (as applicable) but excludes self-care beds ; [5] Includes a WBRRS system
[6] PET-CT procedures are performed at the SMH DCA Imaging Centre, which is part of our comprehensive cancer centre in Delhi

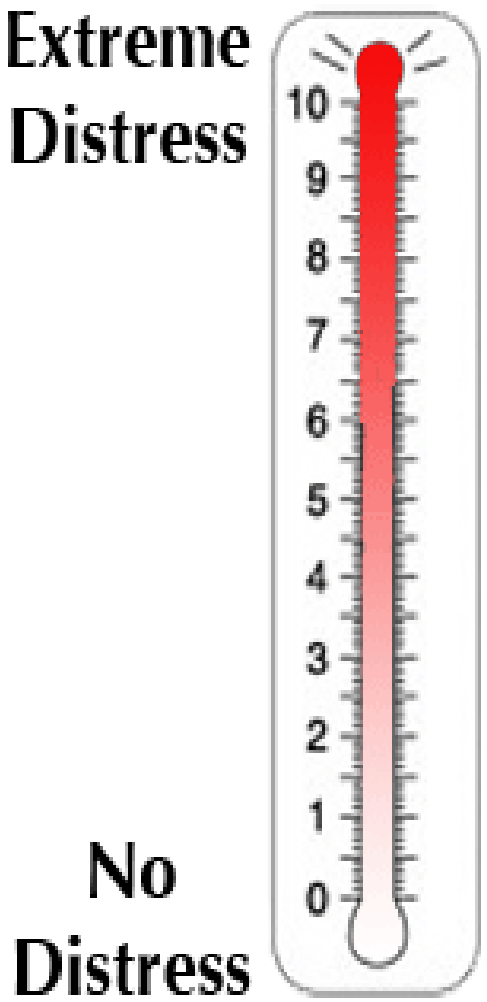
EVIDENCE FOR YOGA & CANCER

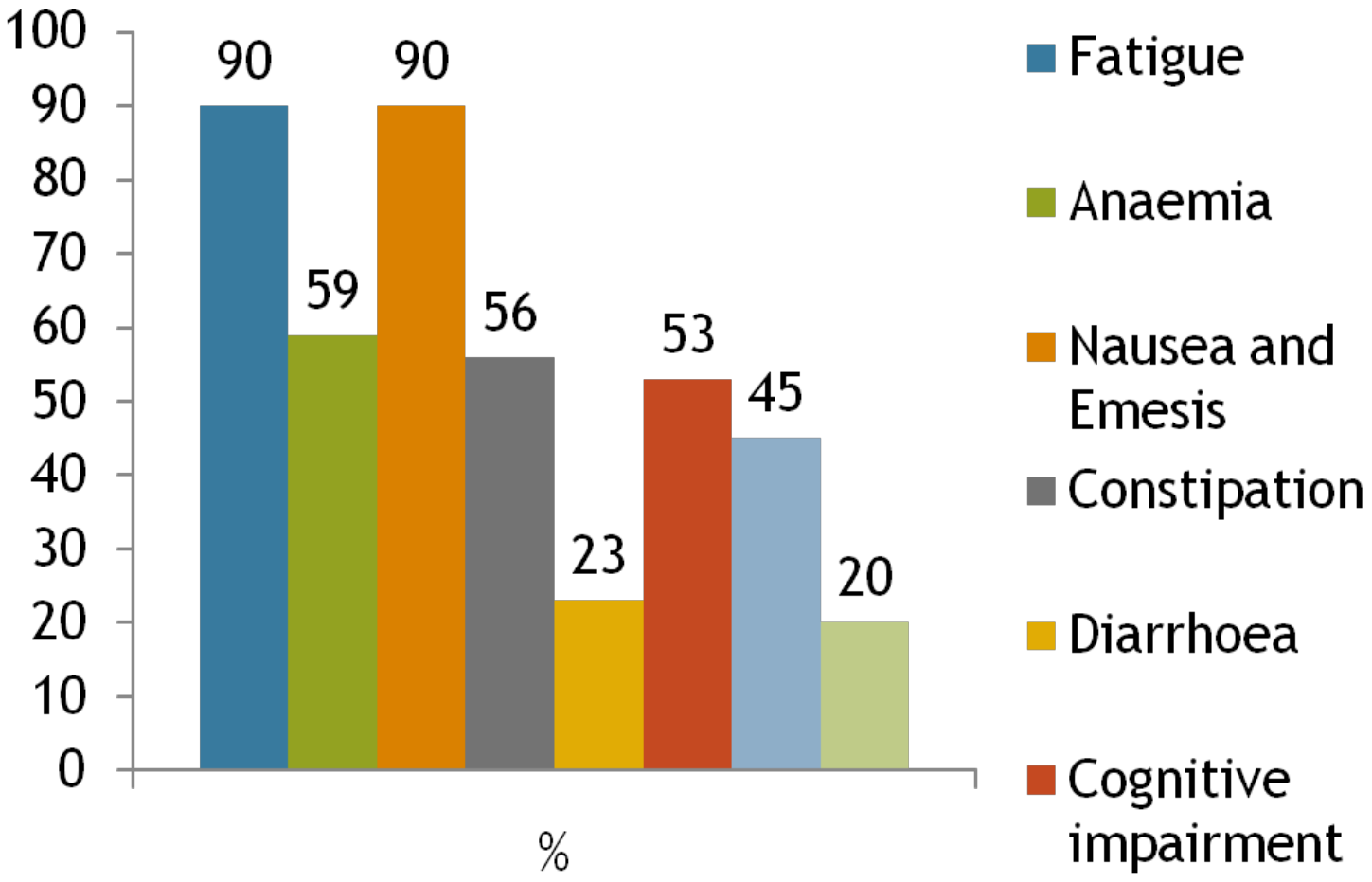




~50% focus on QoL & Symptom Management

Prevalence of Symptom Burden and Distress in Cancer Patients



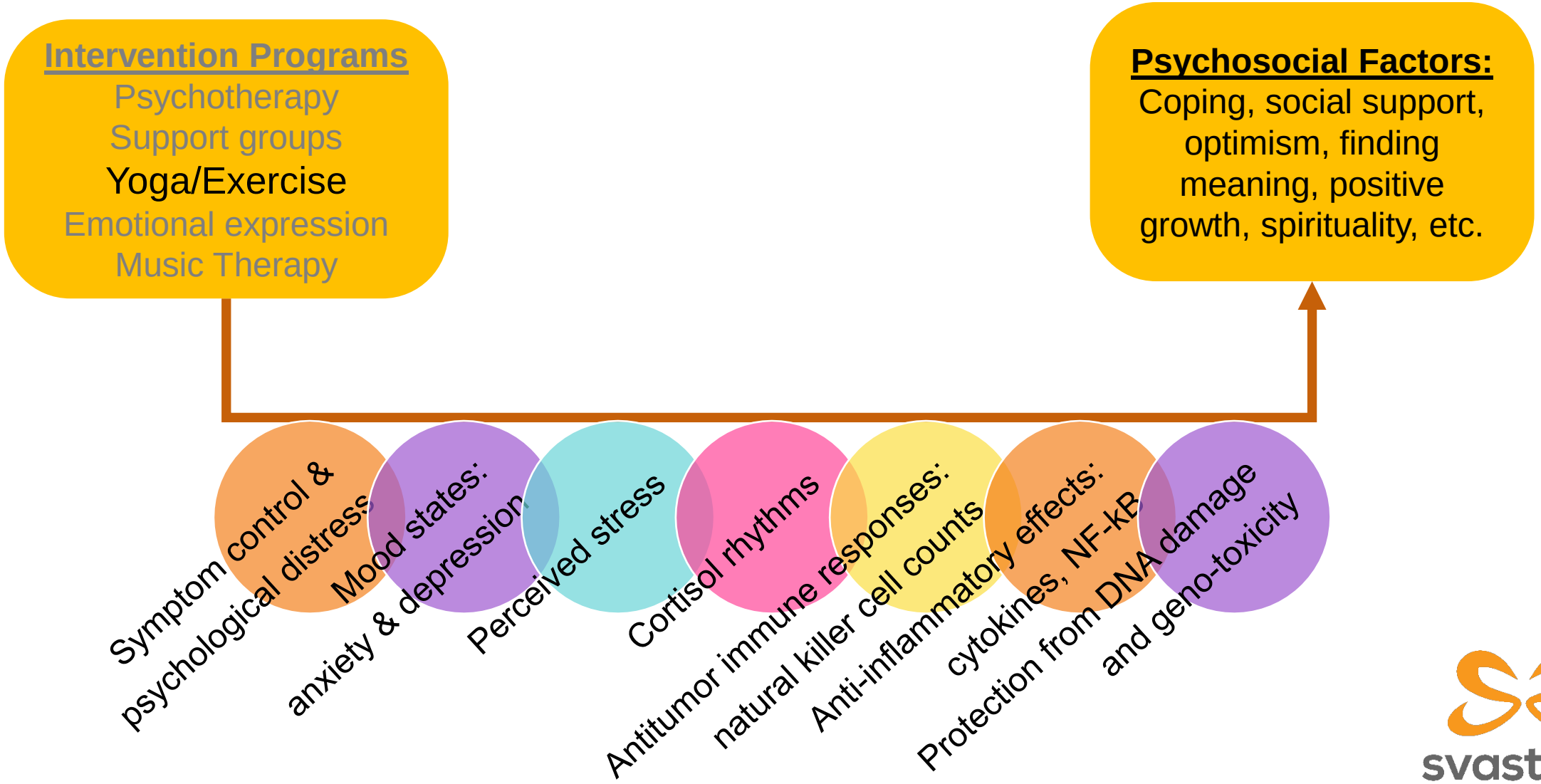


svasthya

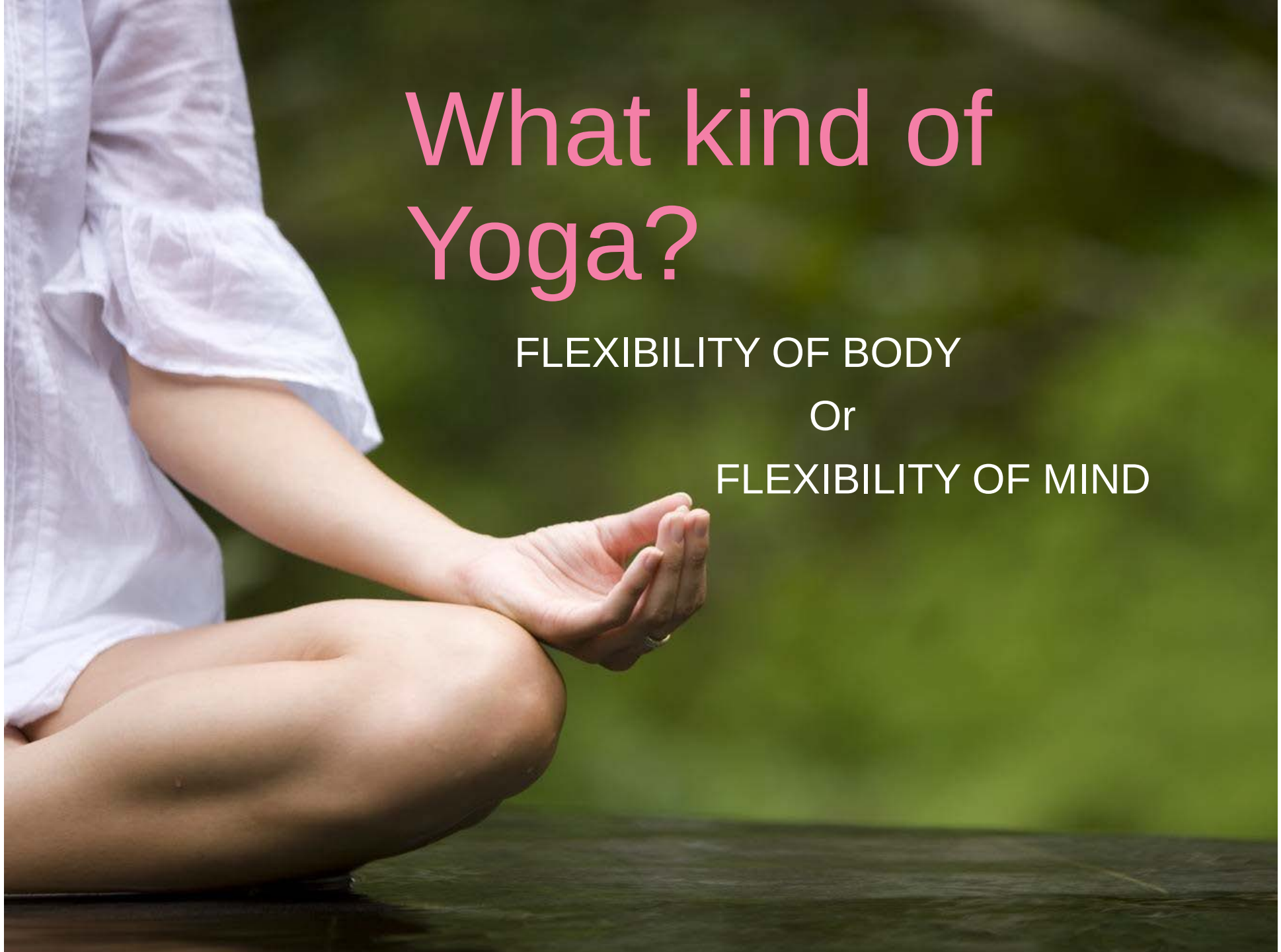
Yoga as a “Therapy”

International Day of Yoga
21 June
Yoga for Harmony & Peace

Psycho-Oncology - Mechanisms



svasthya



What kind of Yoga?

FLEXIBILITY OF BODY

Or

FLEXIBILITY OF MIND

Defining Yoga

Manah Prasamanah Upayah||

- Yoga Vasishta

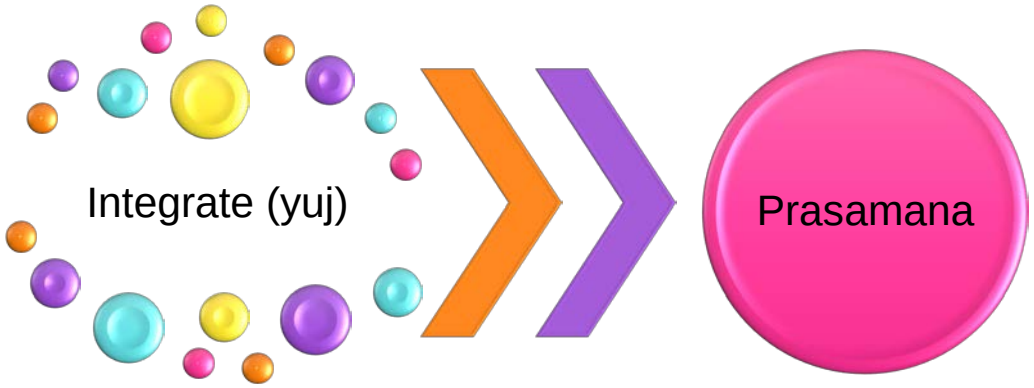
Yogah Chitta Vritti Nirodhah||

- Patanjali Yoga Sutra

Samatvam Yoga Uchyate||

Yoga Karmasukousalam||

- Bhagavat Gita



Various Practices

To Control the mind

Concept of Personality

Anna

Prana

Manas

Vijnana

Ananda

Concept of Disease

Patanjali	Krishna-Gita	Vasistha
Klesha (5)	Dhyayato Vishayan	Adhi
Dukha	Pranashyati	Vyadhi

Yoga in Oncology

Surgery	Wound Healing, Immunity, Inflammatory cytokines, Anxiety
Chemotherapy	Mood, Nausea and Emesis, Fatigue, Stress
Radiotherapy	Speech Articulation, Fatigue, Myofascial Pain
Supportive Care	Pain management, Immunity, QoL, Constipation, Fatigue

21 International Peer Reviewed Publications

RESEARCH EVIDENCE

Beneficial effects of Yoga

Psychologic outcomes & Distress

Symptom Management

Neuroendocrine Modulation

Immune modulation

Original Article

Effect of Long-term Yoga Practice on Psychological outcomes in Breast Cancer Survivors

Ram R Amritanshu, Rao M Raghavendra, Raghuram Nagaratna[1], Vidya Harini Veldore, MR Usha Rani, Kodaganur S Gopinath[2], BS Ajaikumar

Department of CAM, Healthcare Global Enterprises Ltd., [1]Department of life sciences SVYASA Yoga University, [2]Department of Surgical Oncology, HCG Bangalore Institute of Oncology Specialty Center, Bengaluru, Karnataka, India

Abstract

Aim: Breast cancer has become a pandemic with an ever-increasing incidence. Although better diagnostics and treatment modalities have educed mortality, a large number of survivors face cancer and treatment-related long-term symptoms. Many survivors are taking up yoga for mproving the quality of life (QoL). The present study attempts to evaluate predictors of psychological states in breast cancer survivors with ong-term yoga experience. **Materials and Methods:** A case–control study recruited early breast cancer survivors, 30–65 years, completing reatment > 6 months before recruitment, and grouped them based on prior yoga experience (BCY, $n = 27$) or naïve (BCN, $n = 25$). Demography, ancer history, diet, exercise habits, and yoga schedule were collected and tools to assess stress, anxiety, depression, general health, and QoL vere administered. Multivariate linear regression was done to identify predictors of psychological variables. **Results:** BCY had significantly ower stress, anxiety, depression, better general health, and QoL ($P < 0.001$). Global QoL and trait anxiety were significantly predicted by Yoga practice; depression was predicted by yoga practice, annual income, and sleep quality; state anxiety was predicted by Yoga practice and ncome; and stress was predicted by Yoga practice and sleep quality. **Conclusion:** Results indicate that breast cancer survivors, doing yoga, ave better psychological profiles and are able to deal with demanding situations better. The psycho-oncogenic model of cancer etiology uggests that a better psychological state in survival has the potential to improve prognosis and survival outcomes and Yoga may be a suitable ractice for staying cancer-free for a longer time.

Keywords: Anxiety and depression, breast cancer survivors, perceived stress, quality of life, Yoga

NOT JUST DURING Rx IN SURVIVORSHIP AS WELL

Improved Mood
Reduced Fatigue
Improved Sleep
Improved QoI

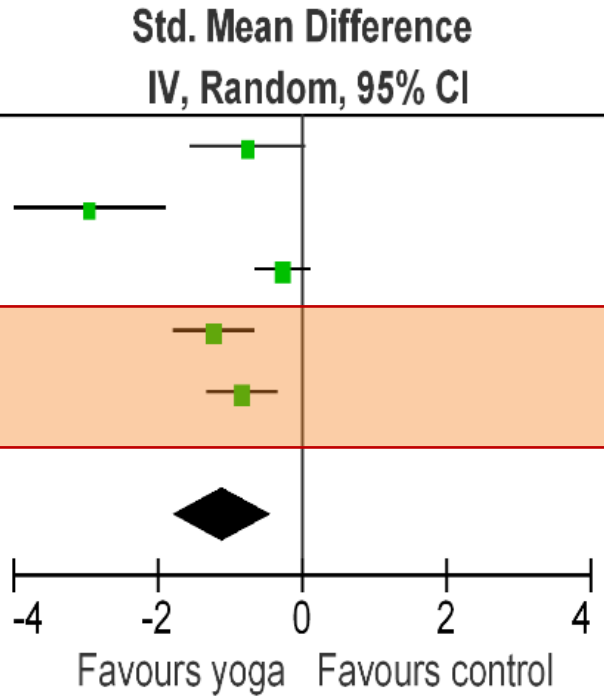
svasthya

Decrease in Psychological Distress - Meta-analysis

Study or Subgroup	Yoga Mean	Yoga SD	Yoga Total	Control Mean	Control SD	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Danhauer 2009	14	3.9	13	19.9	9.8	14	18.4%	-0.76 [-1.54, 0.03]
Kovacic 2010	7.06	2.35	16	16.69	3.84	16	15.5%	-2.95 [-3.99, -1.91]
Moadel 2010	17.16	16.57	84	21.88	18.85	44	23.0%	-0.27 [-0.64, 0.10]
Raghavendra 2007	16.6	10.1	28	29.9	11.2	34	21.2%	-1.23 [-1.77, -0.68]
Vadiraja 2009	12.91	10.39	42	21.85	10.86	33	21.9%	-0.83 [-1.31, -0.36]
Total (95% CI)			**183**			**141**	**100.0%**	**-1.10 [-1.77, -0.43]**

Heterogeneity: Tau² = 0.47; Chi² = 26.84, df = 4 (P < 0.0001); I² = 85%

Test for overall effect: Z = 3.23 (P = 0.001)



BMC Cancer

Cramer H et al, 2012, April, JSCC

Effects of a Yoga Program on Mood States, Quality of Life, and Toxicity in Breast Cancer Patients Receiving Conventional Treatment: A Randomized Controlled Trial

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Abstract

Aims: The aim of this study is to compare the effects of yoga program with supportive therapy counseling on mood states, treatment-related symptoms, toxicity, and quality of life in Stage II and III breast cancer patients on conventional treatment. **Methods:** Ninety-eight Stage II and III breast cancer patients underwent surgery followed by adjuvant radiotherapy (RT) or chemotherapy (CT) or both at a cancer center were randomly assigned to receive yoga ($n = 45$) and supportive therapy counseling ($n = 53$) over a 24-week period. Intervention consisted of 60-min yoga sessions, daily while the control group was imparted supportive therapy during their hospital visits. Assessments included state-trait anxiety inventory, Beck's depression inventory, symptom checklist, common toxicity criteria, and functional living index-cancer. Assessments were done at baseline, after surgery, before, during, and after RT and six cycles of CT. **Results:** Both groups had similar baseline scores. There were 29 dropouts 12 (yoga) and 17 (controls) following surgery. Sixty-nine participants contributed data to the current analysis (33 in yoga, and 36 in controls). An ANCOVA, adjusting for baseline differences, showed a significant decrease for the yoga intervention as compared to the control group during RT (first result) and CT (second result), in (i) anxiety state by 4.72 and 7.7 points, (ii) depression by 5.74 and 7.25 points, (iii) treatment-related symptoms by 2.34 and 2.97 points, (iv) severity of symptoms by 6.43 and 8.83 points, (v) distress by 7.19 and 13.11 points, and (vi) and improved overall quality of life by 23.9 and 31.2 points as compared to controls. Toxicity was significantly less in the yoga group ($P = 0.01$) during CT. **Conclusion:** The results suggest a possible use for yoga as a psychotherapeutic intervention in breast cancer patients undergoing conventional treatment.

Keywords: Cancer, depression, meditation, quality of life, yoga

Rao RM et.al. Indian J Palliat Care. 2015 May-Aug;21(2):174-81

Rao RM et.al. Indian J Palliat Care. 2017 Jul-Sep;23(3):237-246.

Rao RM et.al. Complementary therapies in medicine 17.1 (2009): 1-8

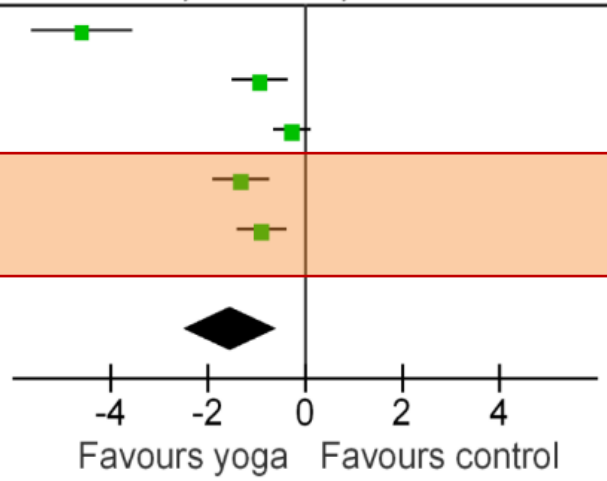
svasthya

Anxiety

Study or Subgroup	Yoga Mean	Yoga SD	Yoga Total	Control Mean	Control SD	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Banerjee 2007	4.1	1	35	10.5	1.8	23	17.5%	-4.60 [-5.62, -3.59]
Chandwani 2010	28	2.2	27	30.2	2.4	31	20.4%	-0.94 [-1.49, -0.39]
Moadel 2010	8.1	7.64	84	10.26	8.08	44	21.1%	-0.28 [-0.64, 0.09]
Raghavendra 2007	29.2	3.8	28	37.5	7.6	34	20.3%	-1.32 [-1.88, -0.77]
Vadiraja 2009	4.88	3.34	42	8.12	3.8	33	20.7%	-0.90 [-1.38, -0.42]
Total (95% CI)			**216**			**165**	**100.0%**	**-1.51 [-2.47, -0.55]**

Heterogeneity: Tau² = 1.10; Chi² = 64.57, df = 4 (P < 0.00001); I² = 94%

Test for overall effect: Z = 3.09 (P = 0.002)

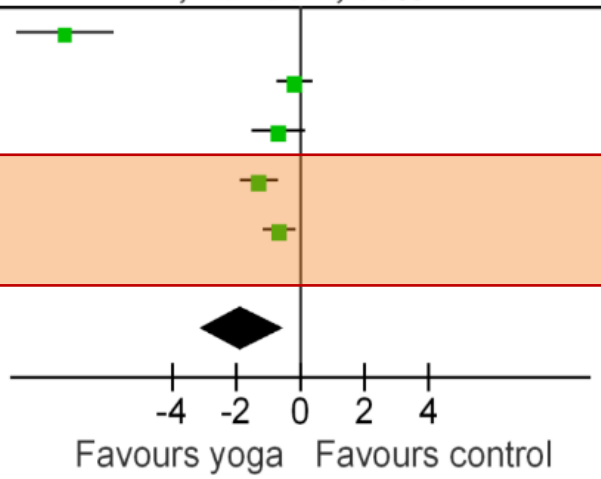


Depression

Study or Subgroup	Yoga Mean	Yoga SD	Yoga Total	Control Mean	Control SD	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Banerjee 2007	3.4	0.5	35	9.7	1.2	23	16.9%	-7.34 [-8.82, -5.86]
Chandwani 2010	6.6	2.1	27	7	2.2	31	21.0%	-0.18 [-0.70, 0.33]
Danhauer 2009	8.1	8.9	13	17.8	16.9	14	20.1%	-0.69 [-1.47, 0.09]
Raghavendra 2007	6.6	4.6	28	14.2	6.6	34	20.9%	-1.30 [-1.85, -0.74]
Vadiraja 2009	4.14	3.45	42	6.53	3.78	33	21.1%	-0.66 [-1.13, -0.19]
Total (95% CI)			**145**			**135**	**100.0%**	**-1.83 [-3.13, -0.53]**

Heterogeneity: Tau² = 2.04; Chi² = 83.37, df = 4 (P < 0.00001); I² = 95%

Test for overall effect: Z = 2.75 (P = 0.006)



BMC Cancer

Cramer H et al, 2012, April, JSCC

What type of YOGA

ANXIETY

Slow breathing practices

Emphasis on “exhalation”

“Internal awareness”

Relaxation techniques – QRT, CM etc

DEPRESSION

HYPERVENTILLATON BREATHING- Bhastrika, kapalabhati, Ujjayi can be used

Caution in patients with lung mets

Relaxation techniques- Cyclic Meditation

Breathing exercises

Asanas if bone mets not present

Yoga for CINV

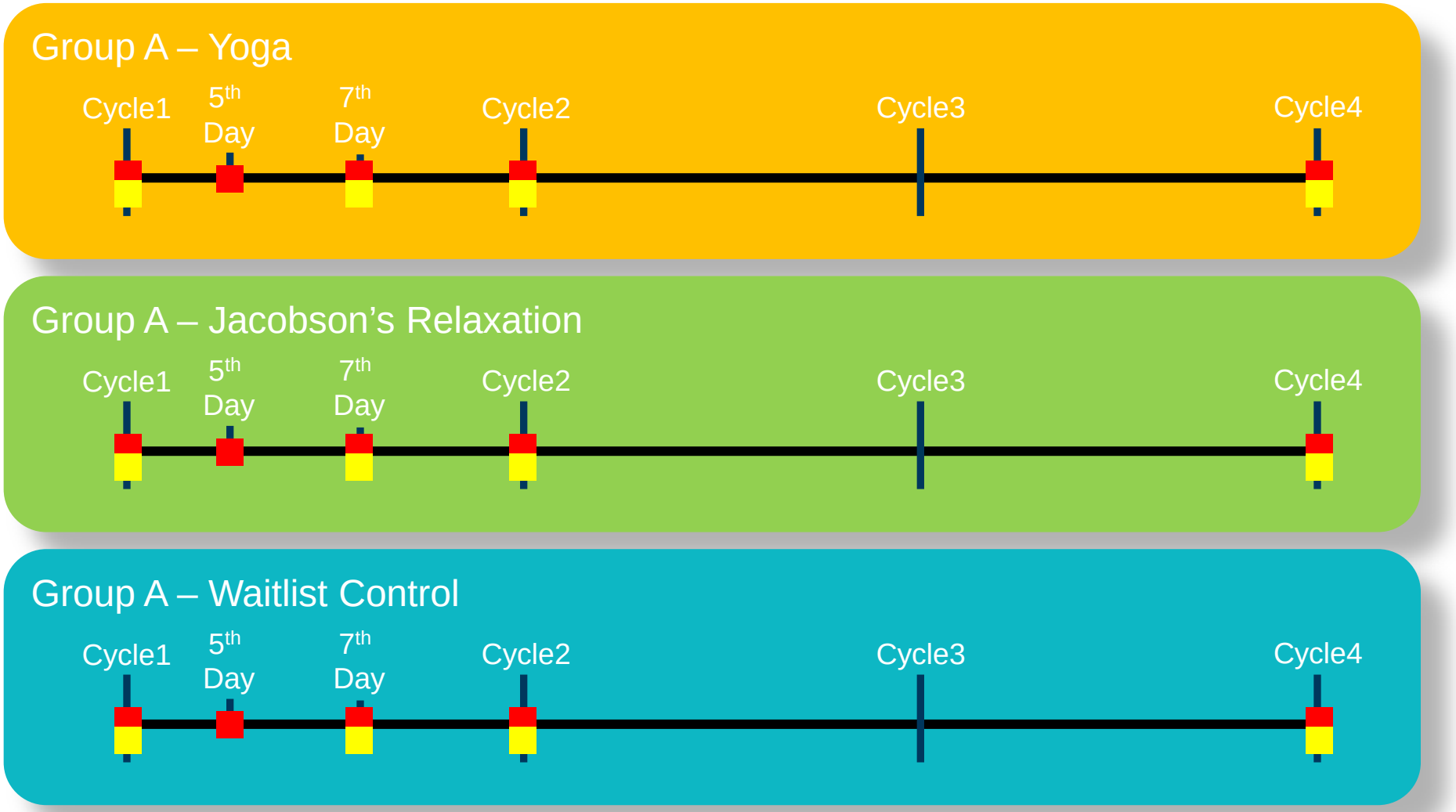
OBJECTIVES

- To evaluate effects of Yoga on progressive muscle relaxations on
  - **Chemotherapy induced nausea and emesis**
  - **Quality of life and Anxiety states**

- To understand underlying neural mechanisms
  - Gastric motility changes (Electrogastrogram)
  - Sympathovagal changes (HRV)

svasthya

Yoga for CINV



svasthya

ASCO 2013 MERIT AWARD

Yoga Group

- ↓ Nausea and Emesis Frequency and Severity
- ↓ anxiety and depression
- ↓ sympathetic Arousal (LF/HF Ratio)
- Normalization of Gastric motility on EGG by 3rd Cycle

Relaxation Group

- ↓ Nausea and Emesis Frequency and Severity
- ↓ anxiety and depression
- ↓ sympathetic Arousal (LF/HF Ratio)
- Gastric motility on EGG stayed abnormal

CHEMOTHERAPY
+ ANTIEMETICS
ONLY

Control Group

- No ↓ Nausea and Emesis Frequency and Severity
- ↑ sympathetic Arousal (LF/HF Ratio)
- Gastric motility on EGG stayed abnormal

Role of Yoga in Fatigue

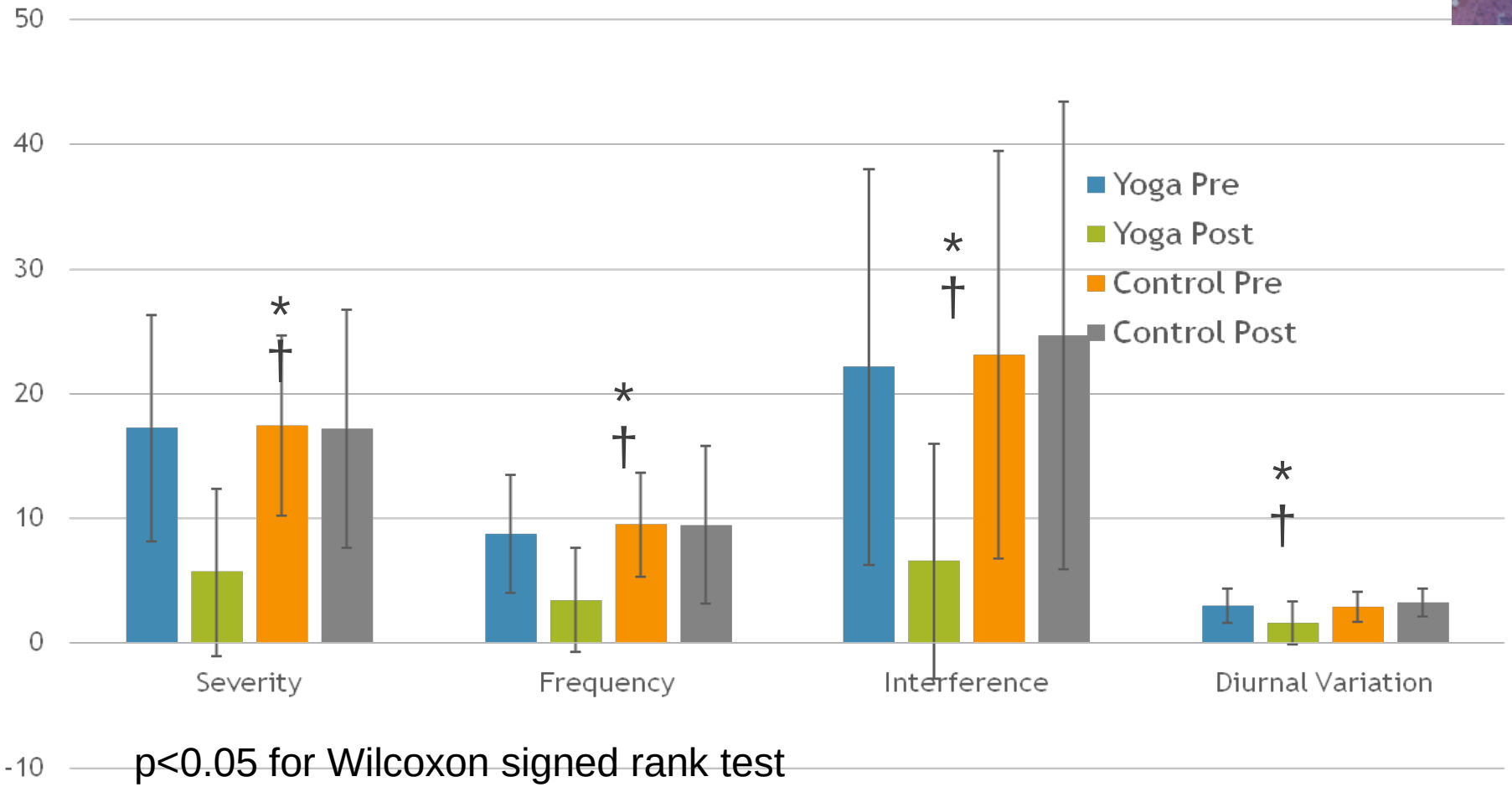
Mental and physical fatigue can be lessened by asana practice, which rests the brain and rejuvenates the body and the mind.

- Back Bends enables deeper breathing
- Twists keeps spine supple and removes laziness
- Better Energy Conservation than exercise

Type of Study	Number of articles in Pubmed in 5 yrs
Meta analysis	4
Systematic review	3
RCTs	19
CCTs	4
Cohort / Observational	3
Review	8
Total	41

Study 2: Stage II/III Breast cancer patients undergoing Radiotherapy a RCT

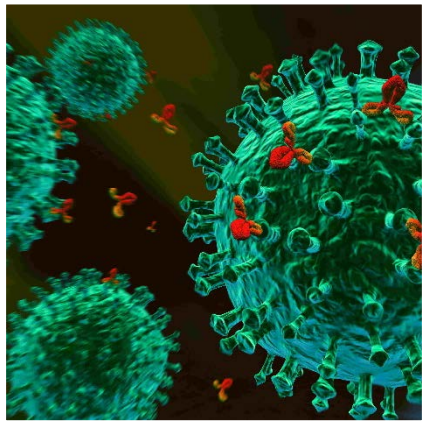
Fatigue Scale Inventory Scale

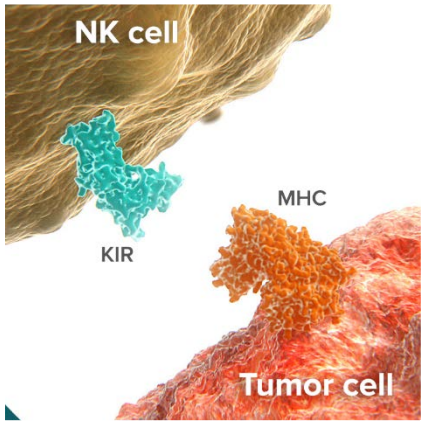


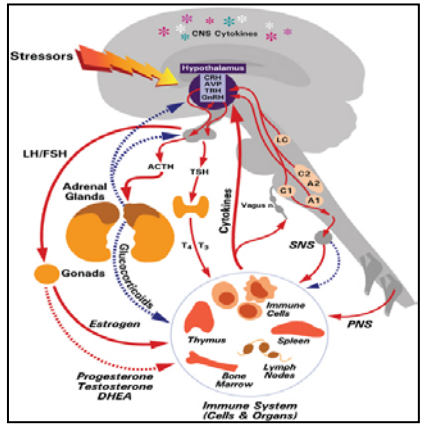
* p<0.05 for Wilcoxon signed rank test

† p<0.05 for Mann Whitney U test

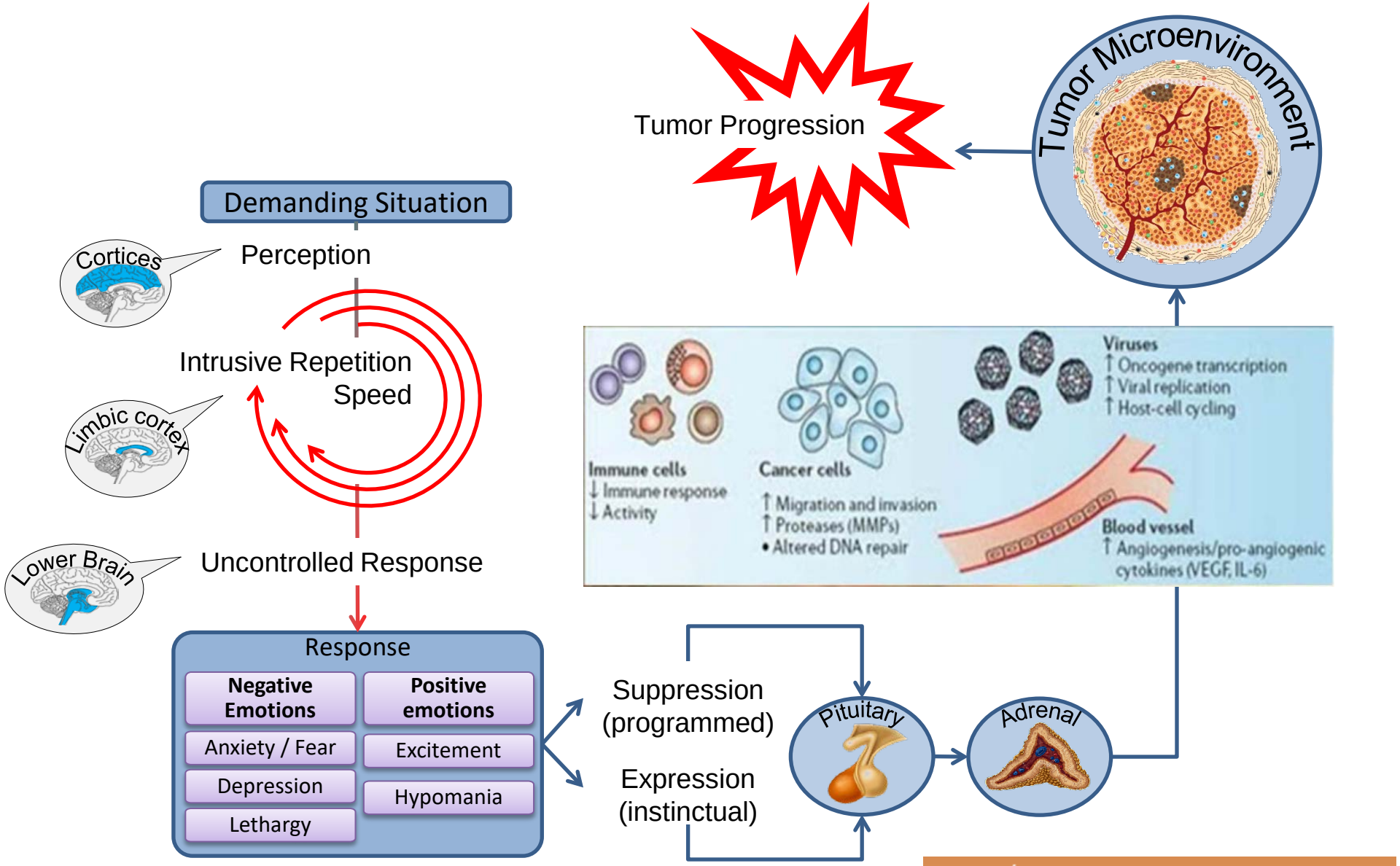
Yoga- Psycho-Neuro Immunology Mechanisms







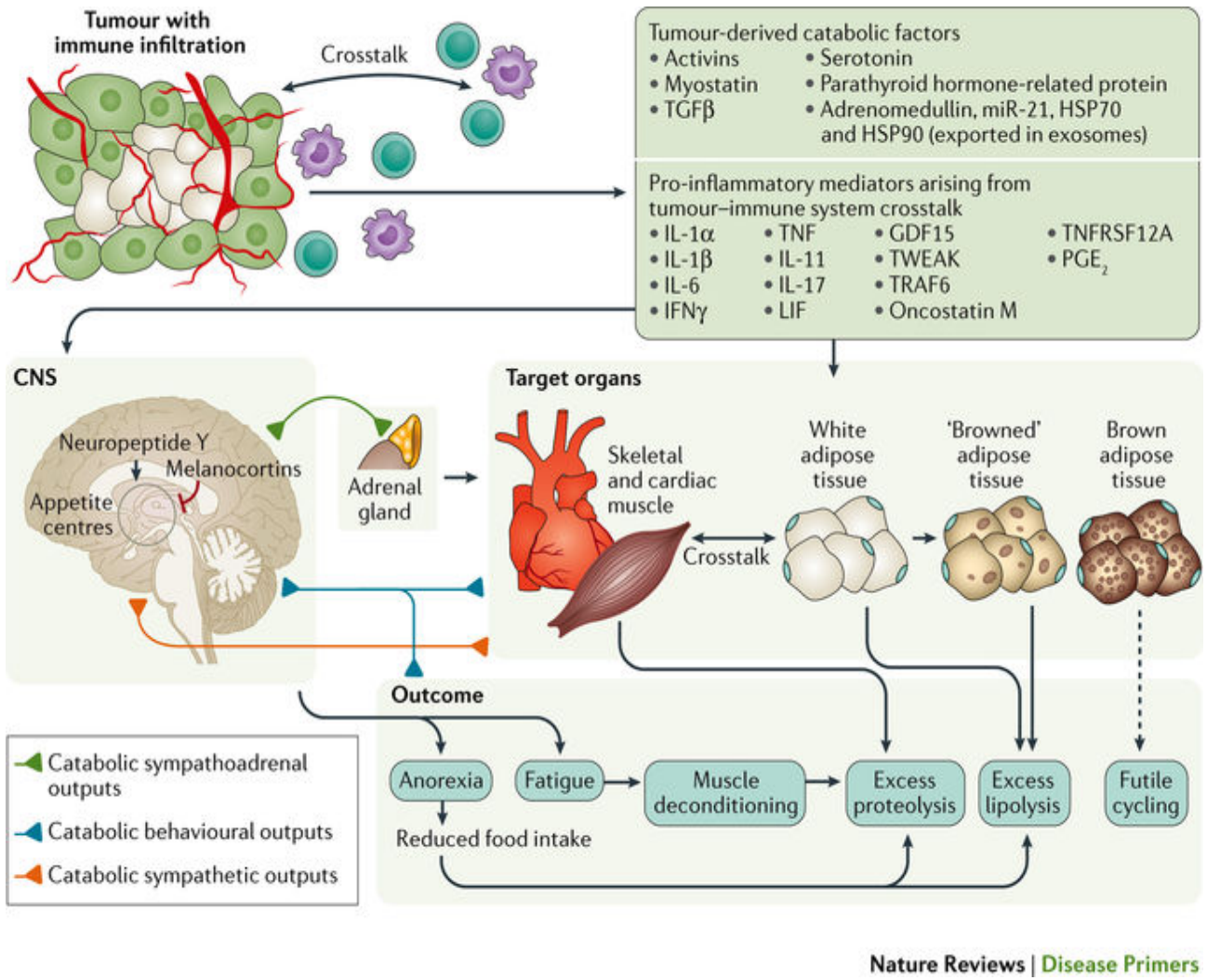
The HPA mechanism

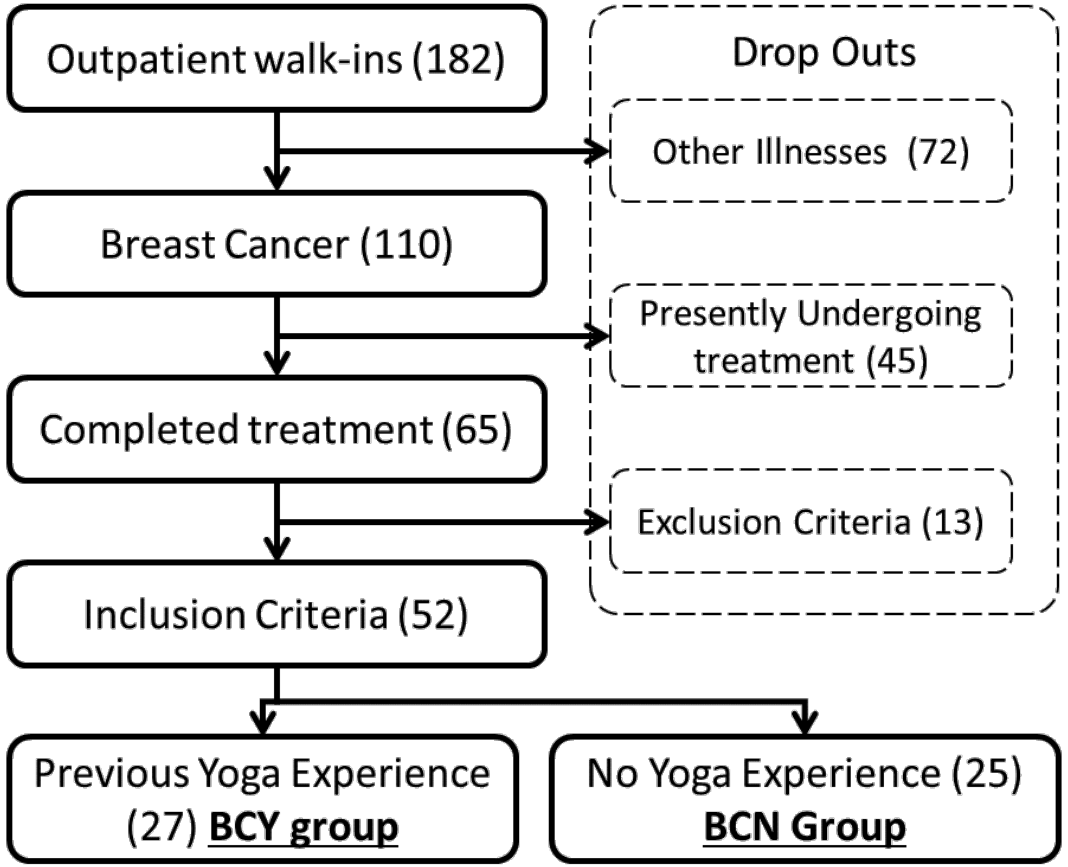


nature REVIEWS CANCER

Antoni M K, et. al., 2006

ANOREXIA & FATIGUE





Battery of 12 cytokines TH1/TH2/ Inflammation & NFkB

Health Spectrum – a DNA Paradigm

Breast cancer

Stage 2 and 3

Just prior to radiation

Normal

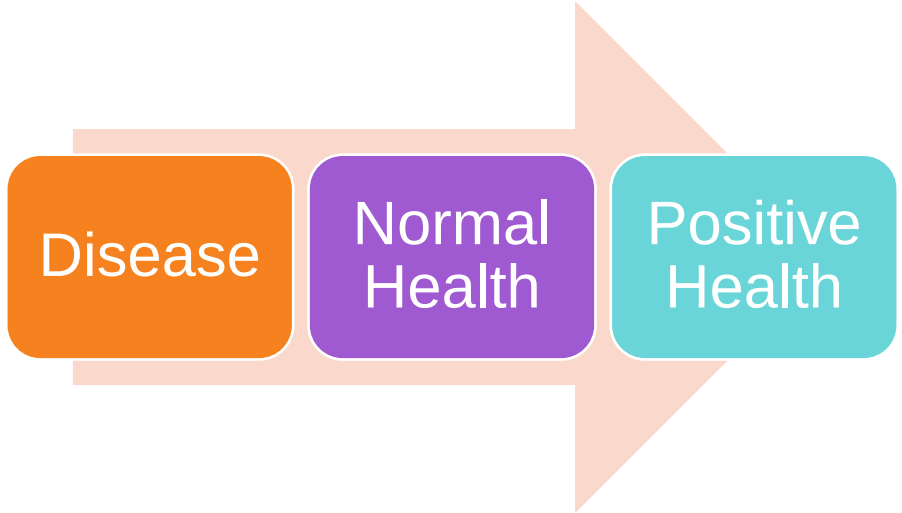
Disease free (Acute / Chronic)

No prior exposure to yoga

Yoga

Disease free (Acute / Chronic)

Regular practice of yoga for 10yrs



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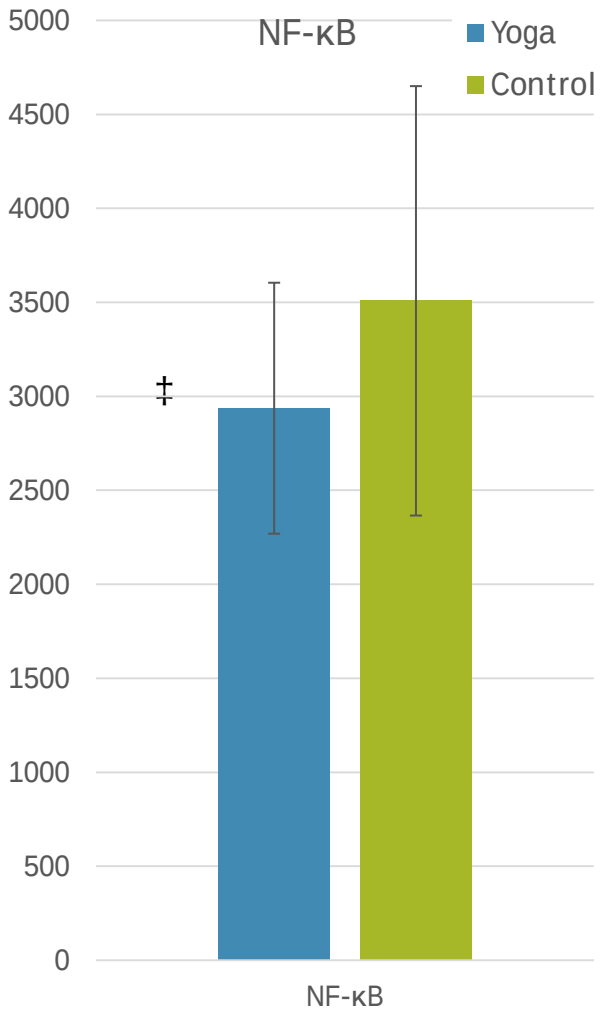
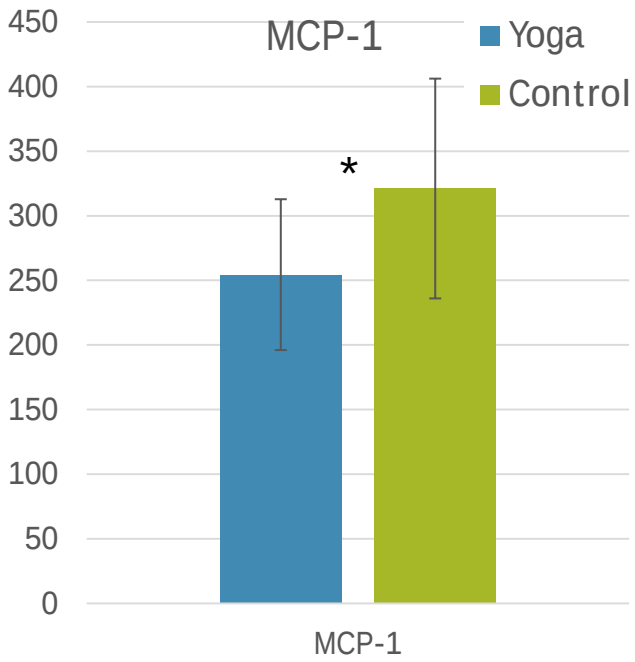
Immune Outcomes





Lower levels of Inflammatory cytokines

Other trends in immune markers			
Variable	**BCY**	**BCN**	**Sig.**
IL1 – β	0.54 ± 1.43	1.18 ± 1.92	***0.079****
IL6	2.85±1.56	4.68 ± 4.03	***0.070****
IL8	35.16 ± 43.62	100.89 ± 131.94	***0.057****

‡: p-value of Independent Samples t-Test; *: p-value of Mann-Whitney U

Between group comparisons of apoptotic index and % comets by one way ANOVA (n=9 in each group)				
	% Apoptosis *ANOVA, p=0.016*		*% comet* *ANOVA, P= 0.045*	
Group	*%*	*Post-hoc* Sig.*	*%*	*Post-hoc* Sig.*
Breast Cancer	10.05 ± 3.24	BC:SY 0.687	3.13 ± 1.74	BC:SY **0.047**
Yoga Practitioners	8.79 ± 3.08	SY:NV **0.019**	1.53 ± 1.00	SY:NV 0.313
Normal Volunteers	13.17 ± 2.77	NV:BC *0.113*	2.47 ± 0.93	NV:BC *0.564*
* Post hoc analysis by Scheffe test.				

Disease – high DNA damage & low Apoptosis

Body is vulnerable to DNA damage but is incapable of restorative activity

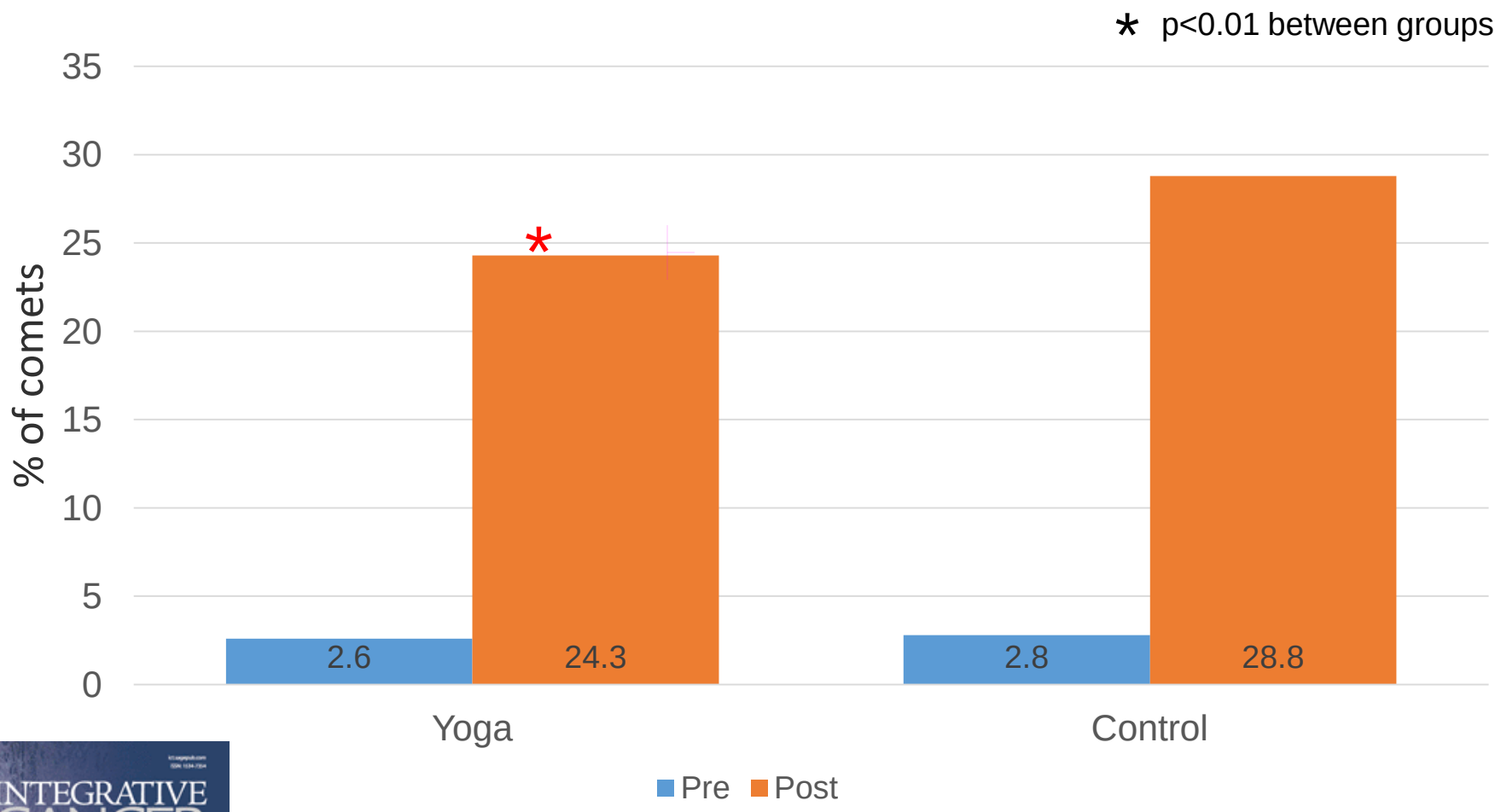
Normal – Moderate DNA damage & High Apoptosis

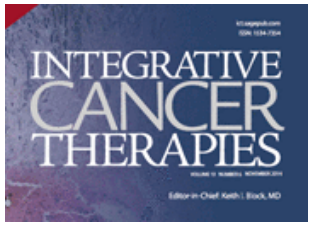
Heightened restorative activity in response to Normal DNA damage

Yoga - Low DNA Damage & Low Apoptosis

Body is maintained with lower damage and requiring lower repair activity

DNA Damage in Immune effector cells following adjuvant Radiotherapy

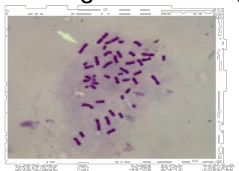


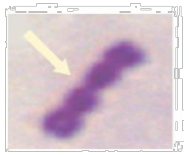


2007
6(3):242-50

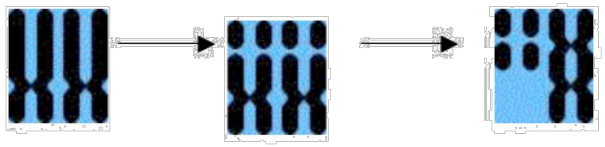
Assessing DNA Damage – Comet Assay

a)

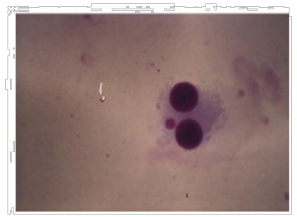




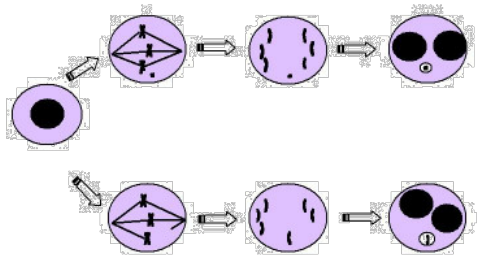
Metaphase with dicentric chromosome



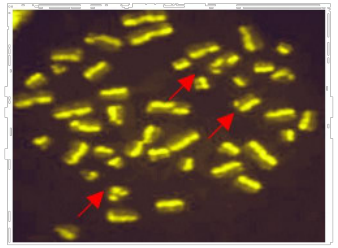
b)



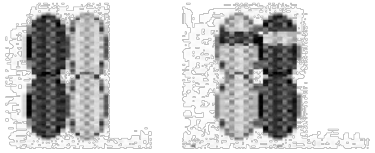
Binucleated cells with MN



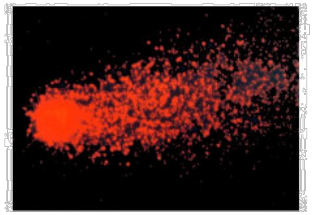
c)



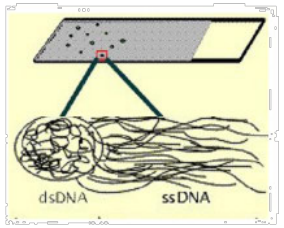
Metaphase with SCEs

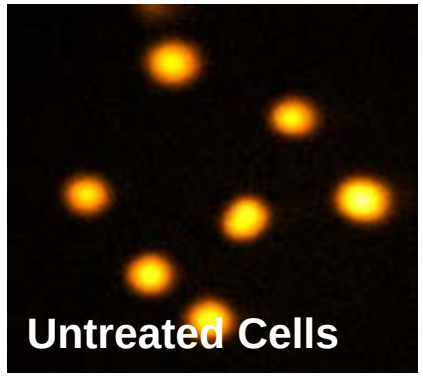


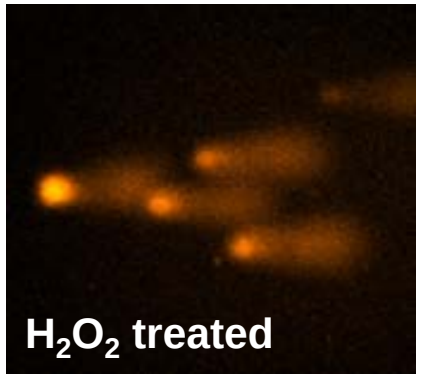
d)

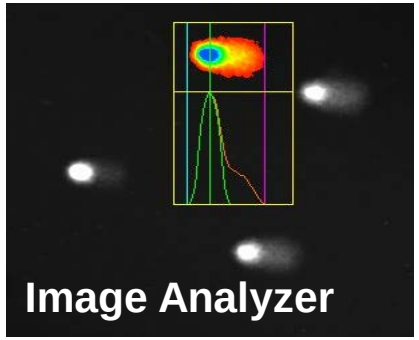


Lymphocyte with comet









Effect of Yoga on Sleep Quality and Neuroendocrine Immune Response in Metastatic Breast Cancer Patients

M Raghavendra Rao, HS Vadiraja[1], R Nagaratna[1], K S Gopinath[2], Shekhar Patil[3], Ravi B Diwakar[3], HP Shahsidhara[3], BS Ajaikumar[4], HR Nagendra[5]

Department of Complementary and Alternative Medicine, Healthcare Global, [1]Department of Life Sciences and [5]Department of Research and Development, Swami Vivekananda Yoga Anusandhana Samsthana, [2]Department of Surgical Oncology, [3]Department of Medical Oncology, [4]Department of Radiation Oncology, HCG Bangalore Institute of Oncology Specialty Center, Bengaluru, Karnataka, India

Abstract

Background: Studies have shown that distress and accompanying neuroendocrine stress responses as important predictor of survival in advanced breast cancer patients. Some psychotherapeutic intervention studies have shown have modulation of neuroendocrine-immune responses in advanced breast cancer patients. In this study, we evaluate the effects of yoga on perceived stress, sleep, diurnal cortisol, and natural killer (NK) cell counts in patients with metastatic cancer. **Methods:** In this study, 91 patients with metastatic breast cancer who satisfied selection criteria and consented to participate were recruited and randomized to receive "integrated yoga based stress reduction program" ($n = 45$) or standard "education and supportive therapy sessions" ($n = 46$) over a 3 month period. Psychometric assessments for sleep quality were done before and after intervention. Blood draws for NK cell counts were collected before and after the intervention. Saliva samples were collected for three consecutive days before and after intervention. Data were analyzed using the analysis of covariance on postmeasures using respective baseline measure as a covariate. **Results:** There was a significant decrease in scales of symptom distress ($P < 0.001$), sleep parameters ($P = 0.02$), and improvement in quality of sleep ($P = 0.001$) and Insomnia Rating Scale sleep score ($P = 0.001$) following intervention. There was a decrease in morning waking cortisol in yoga group ($P = 0.003$) alone following intervention. There was a significant improvement in NK cell percent ($P = 0.03$) following intervention in yoga group compared to control group. **Conclusion:** The results suggest modulation of neuroendocrine responses and improvement in sleep in patients with advanced breast cancer following yoga intervention.

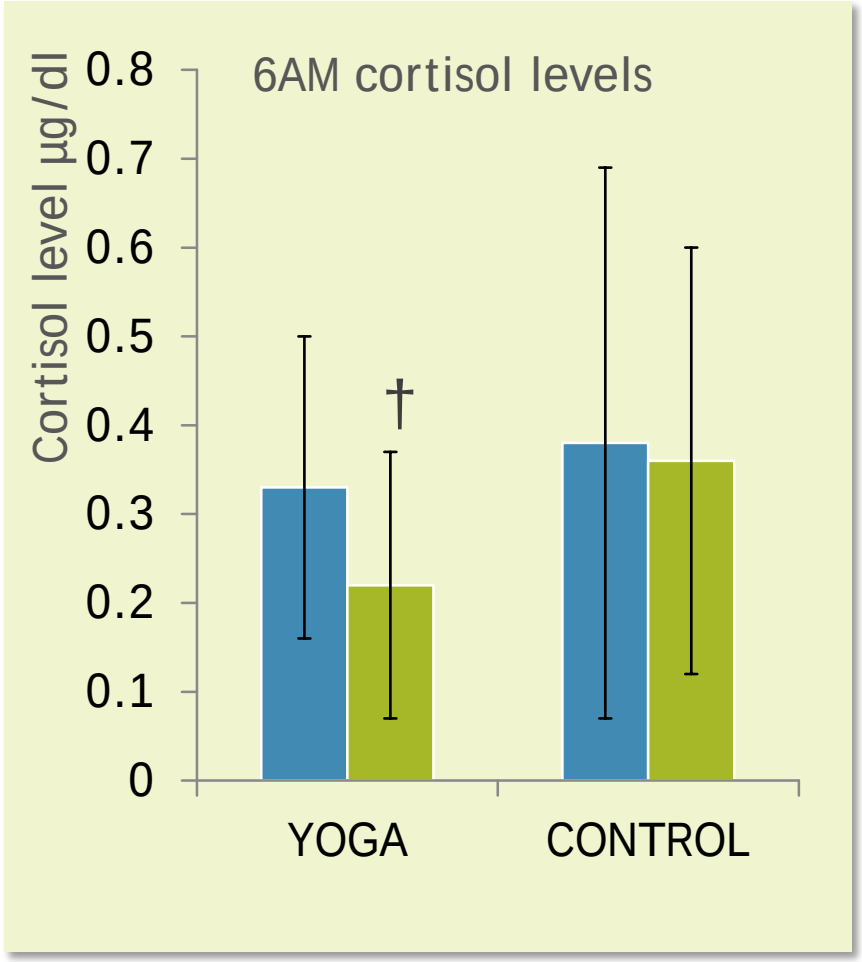
Keywords: Cortisol, immune, natural killer cell, sleep, yoga

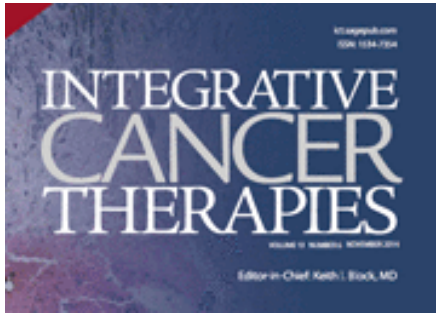
PRINCIPLE OF MANAGEMENT

STRESS REDUCTION

RELAXATION RESPONSE

LOWER LEVELS OF STRESS HORMONES ACTH, CORTISOL





svasthya

Post Operative Outcomes

Drain retention

↓

Duration of hospital stay

↓

Interval for suture removal

↓

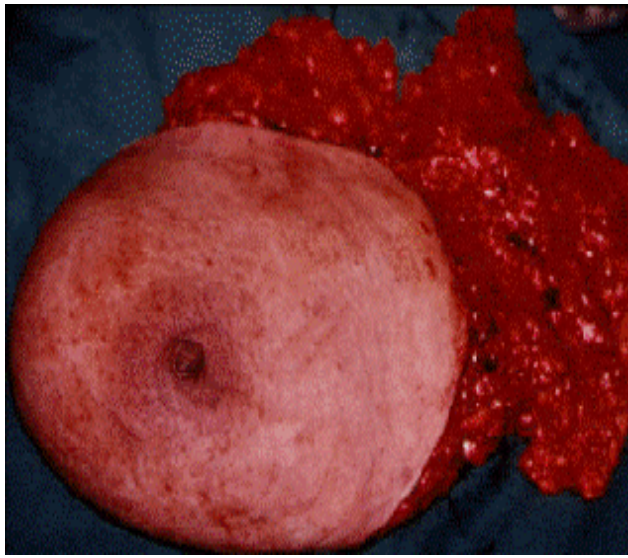
Post operative complications

↓

Post operative duration

↓

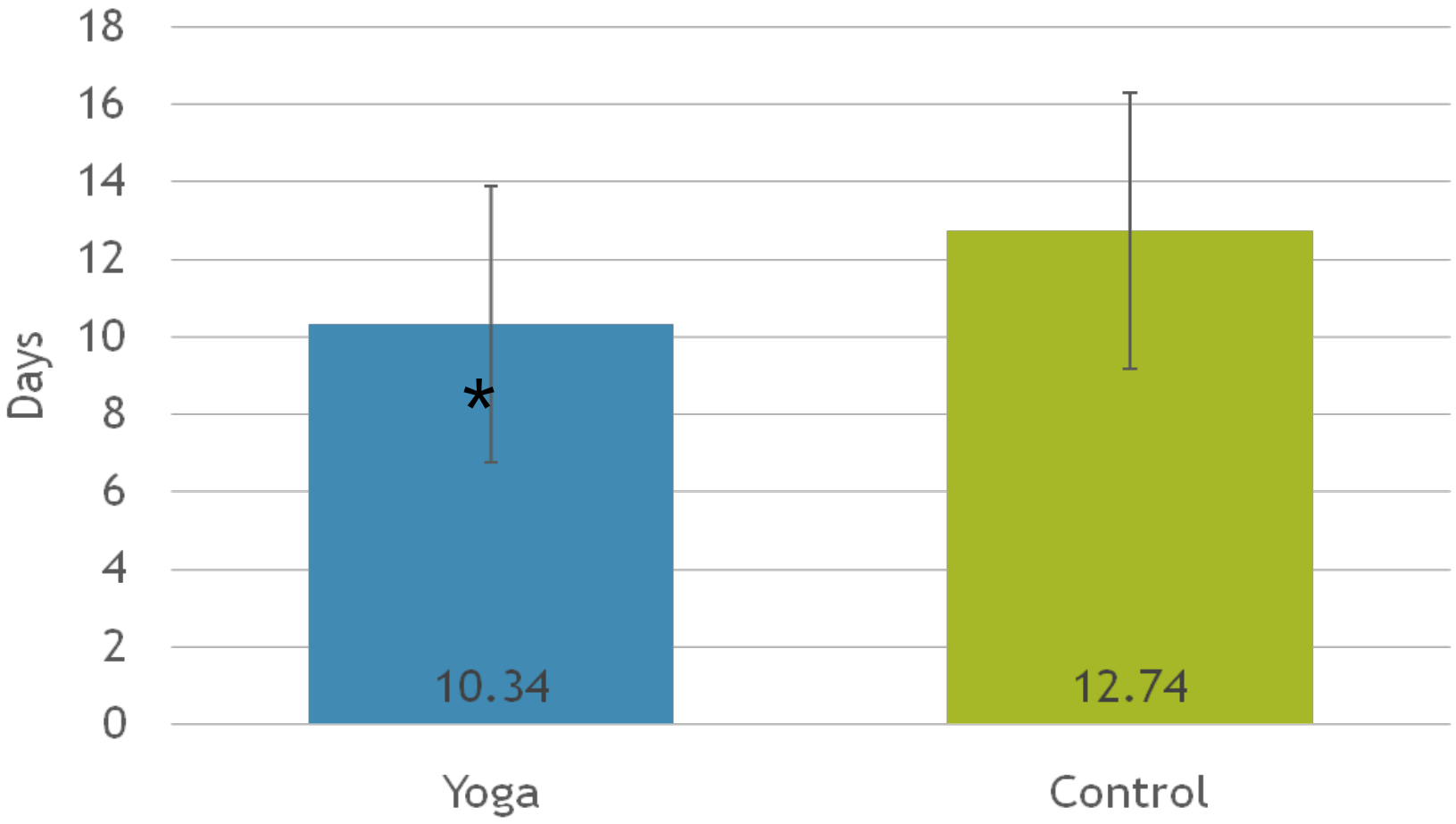
Improved Wound Healing



IJOY International Journal of Yoga

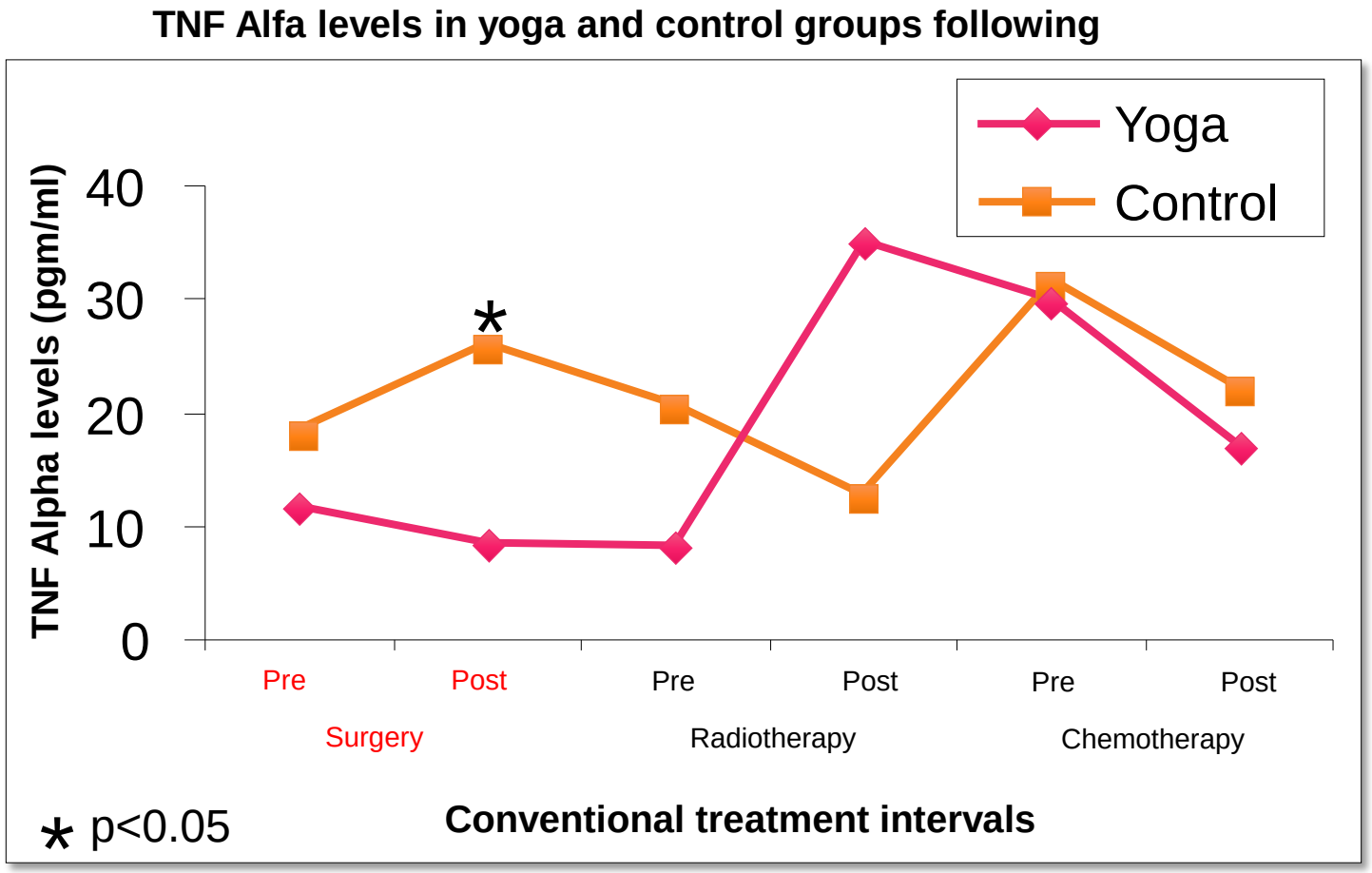
•**Raghavendra M.**, et al. I*nternational journal of yoga* 1.1 (2008): 33.

Wound healing :Duration for Suture Removal



* $p<0.05$

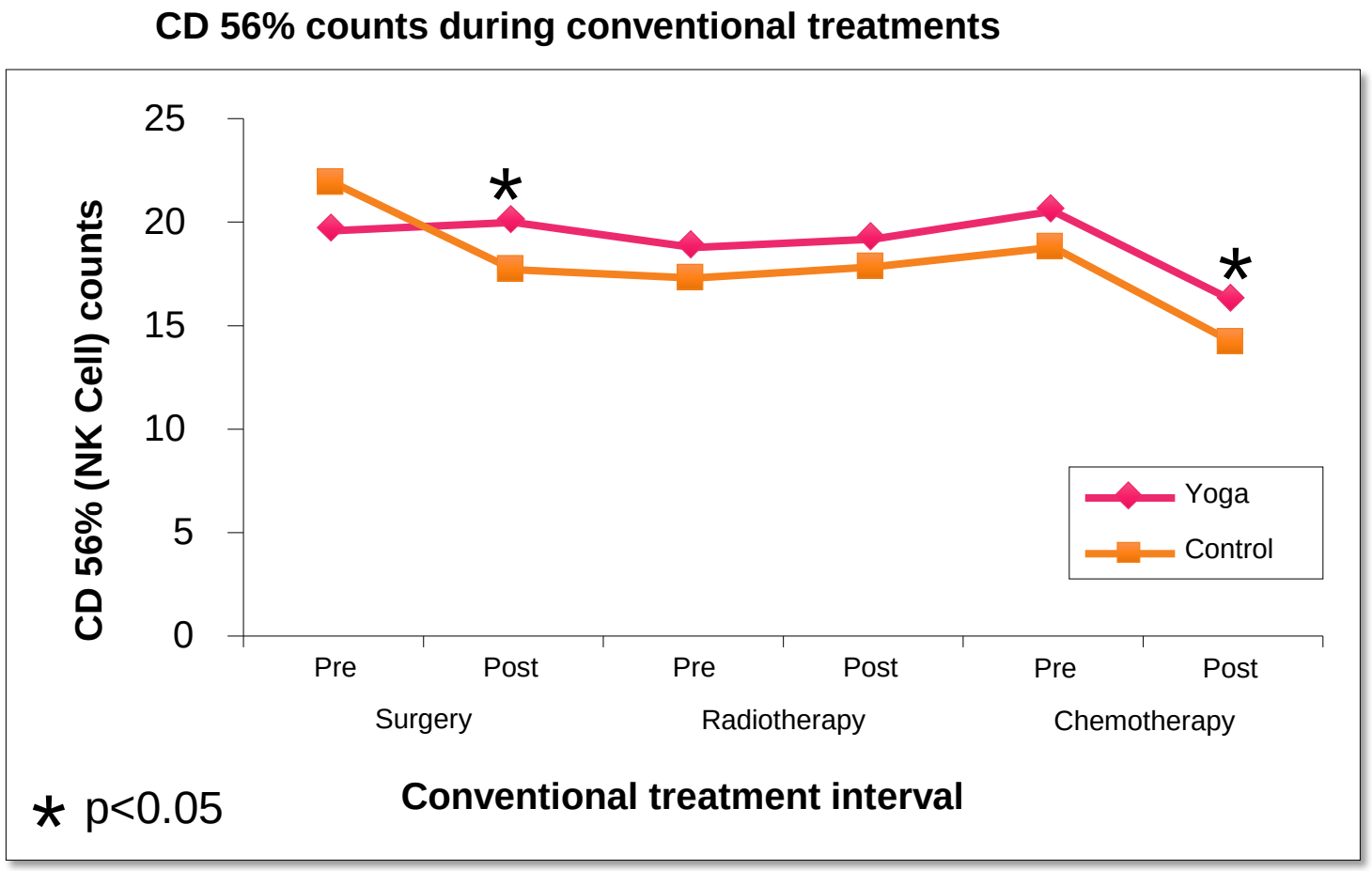
Immune Outcomes



IJOY International Journal of Yoga

Raghavendra RM et.al. International journal of yoga 1.1 (2008): 11.

Immune Outcomes



MEDICAL SCIENCE MONITOR

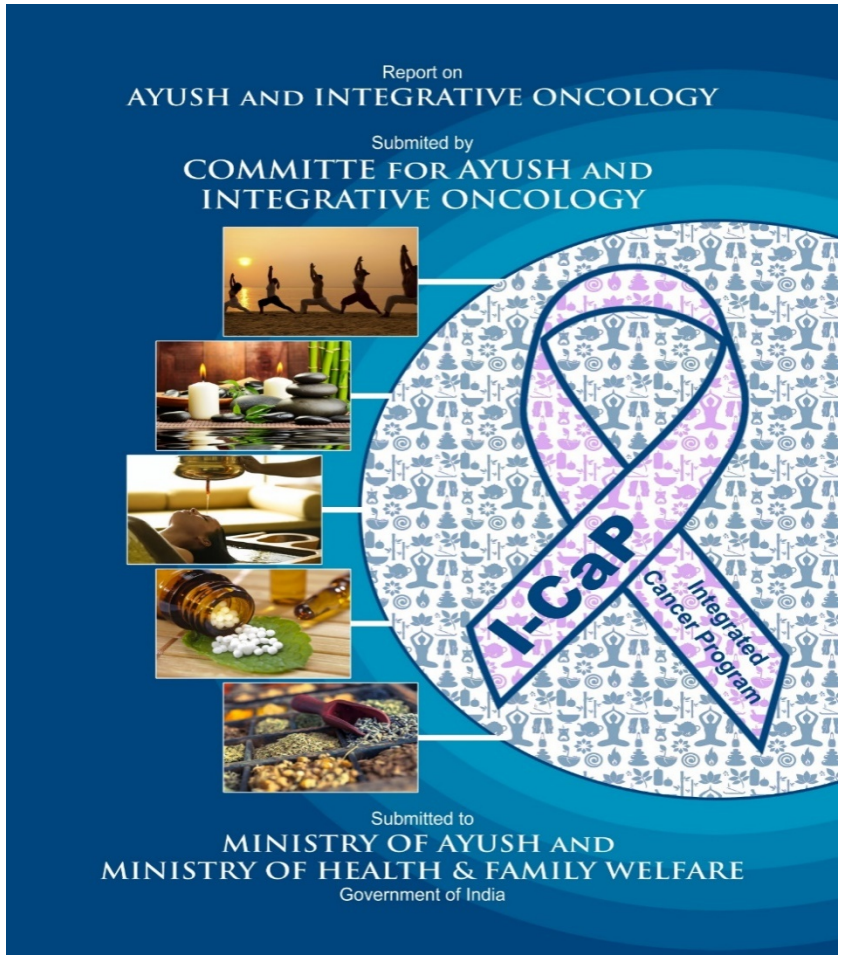
YOGA BENEFITS

Improvement in Psychological outcomes

Reduction in Symptom Clusters

Improved Immune Response

Improved QoL.



South Asia's Largest Cancer Care Network

HCG

adding life to years

ACKNOWLEDGEMENTS

- Supported with grants from
- CCRYN , Ministry of AYUSH, Govt of India
- DST, Govt of India.
- Oncologists and supporting staff at Bangalore Institute of Oncology and Svyasa
- Cancer Patients

?