

**EFFECTS OF YOGA ON
CANCER CHEMOTHERAPY INDUCED NAUSEA AND
VOMITING, AND ITS CORRELATION TO THE
CONCEPT OF AGNI IN ĀYURVEDA**

Thesis submitted by
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Towards the partial fulfilment of
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To

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CERTIFICATE

This is to certify that, **Dr P. K. Lalitha Nandini**, who was given. Registration for PhD. bearing Registration No.**PhD./06/NR/SEP03** with Swami Vivekanada Yoga Anusandhana Samsthana, Deemed University under the Division of Yoga and Life Sciences, has successfully completed the required 'training' in acquiring the relevant background knowledge and has completed the required 'course of research' for not less than two years to submit this thesis entitled **“EFFECTS OF YOGA ON CANCER CHEMOTHERAPY INDUCED NAUSEA AND VOMITING, AND ITS CORRELATION TO THE CONCEPT OF AGNI IN ĀYURVEDA”** as per the regulations of the University. We also declare that the subject matter of the thesis has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

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DECLARATION

I, **Dr P.K. Lalitha Nandini.**, hereby declare that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bengaluru, under the guidance of **Dr. Nagarathna Raghuram** Medical Director, Arogyadhama VYASA, **Dr. Radheshyam Naik** Head Medical Oncology Bone Marrow Transplantation Specialist Health Care Global And **Dr. Shubha V Hegde** Professor, Sri Kalabaireshwara Ayurveda Medical College and Hospital.

Also I declare that the subject matter of my thesis entitled **“EFFECTS OF YOGA ON CANCER CHEMOTHERAPY INDUCED NAUSEA AND VOMITING, AND ITS CORRELATION TO THE CONCEPT OF AGNI IN ĀYURVEDA”** has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.

Date: 24-12-2014

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STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO

TRANSLITERATE SANSKRIT WORDS

Standard International Transliteration Code
(used to transliterate Sanskrit words in the text)

अ	=	a	ड	=	ḍa
आ	=	ā	ढ	=	ḍha
इ	=	i	ण	=	ṇa
ई	=	ī	त	=	ta
उ	=	u	थ	=	tha
ऊ	=	ū	द	=	da
ऋ	=	ṛ	ध	=	dha
ए	=	e	न	=	na
ऐ	=	ai	प	=	pa
ओ	=	o	फ	=	pha
औ	=	au, ou	ब	=	ba
अं	=	m	भ	=	bha
अः	=	ḥ	म	=	ma
क	=	ka	य	=	ya
ख	=	kha	र	=	ra
ग	=	ga	ल	=	la
घ	=	gha	व	=	va
ङ	=	ṅa	श	=	śa
च	=	ca	ष	=	ṣa
छ	=	cha	स	=	sa
ज	=	ja	ह	=	ha
झ	=	jha	क्ष	=	kṣa
ञ	=	ña	त्र	=	tra
ट	=	ṭa	ज्ञ	=	jña
ठ	=	ṭha			

ABSTRACT

Background

Chemotherapy results in severe nausea and vomiting (CCINV) along with accompanying symptoms and can cause severe distress amongst cancer patients. These clusters of symptoms are not given importance due to their subtle and subjective nature of presentation. CCINV needs to be addressed through a holistic understanding, as there is a disparity in the treating and the practicing guidelines for efficient management and complete control of nausea and vomiting. Traditional systems of healing like Yoga and Āyurveda, are holistic in their approach and prescribe specific practices for GI disturbances based on the concept of Jāṭarāgni (Jathara-gastric, Agni-fire), defined as, ‘the collective subtle energy that encompasses the entire digestion process.’ According to Āyurveda, CCINV is a manifestation of Impaired Jāṭarāgni.

The aim of the present study is to evaluate the effects of an integrated yoga program on Jāṭarāgni, autonomic, psychological and psychosocial factors in cancer patients with solid malignancies and lymphomas, receiving highly or moderately emetogenic chemotherapy.

The objectives of the study were: (i) to develop and standardize a checklist to assess cancer chemotherapy induced Jāṭarāgni Impairment that relies on gastrointestinal (GI) symptoms described by Āyurveda, (ii) to conduct a controlled study to assess the effect of yoga therapy for CCINV in patients undergoing chemotherapy on Jāṭarāgni impairment, (iii) to look at the effect of integrated yoga on autonomic variables (HRV and gastric autonomic function) and (iv) to study the effect of integrated yoga on

psychological distress (appetite reduction, cardiac and, stress, anxiety, depression, and quality of life). This was a three arm randomized control trial on patients undergoing conventional treatment for cancer.

Methods

Study 1: Development of Jāṭarāgni Impairment Checklist for CCINV

The development of Jāṭarāgni Impairment Checklist (JIC) was done by following the standard procedures used for any scale development that included three steps. The first step involved the pooling of all items relevant to Jāṭarāgni, followed by item reduction, construction of the scale, and consensual validity. The first step involved three rounds of focus group discussion with experts in the field of Āyurveda, Cancer and Yoga. The second step consisted of a pilot study to assess the feasibility and comprehensibility of checklist and the third step attempted to examine the measurability of the checklist and to establish the norms for final interpretation. The 13 item checklist was then standardized and subjected to divergent validation with the Functional Life Index of Emesis, which is a standard scale. Also, the reliability of the JIC was established by Chronbach's Alpha that reached a value of 0.79.

Study 2: Effect of yoga on Jāṭarāgni, Autonomic and Psychosocial Factors

A three arm randomized control trial was conducted on 109 patients diagnosed with solid malignancies or lymphomas who were scheduled for receiving highly or moderately emetogenic chemotherapy. Subjects who satisfied the selection criteria and gave written consent to participate were randomized to receive Yoga (n=38) or

Jacobson's relaxation (n=39) or serve as waitlist controls (n=32) for first 3 cycles of chemotherapy.

Jātarāgni impairment inventory for CCINV, Functional Living Index of Emesis, Emesis & nausea diary, State and trait anxiety, Hospital anxiety and depression, perceived stress, Heart rate variability (HRV) and gastric motility were measured during course of three chemotherapy cycles. Autonomic assessments measured at three time points [before the first cycle (C₀), six days after the 1st cycle (C₁), 2nd(C₂), and 3rd(C₃) cycles of chemotherapy]. Psychological and psychosocial assessments were carried out at baseline and after the 3rd cycle of chemotherapy.

All groups received conventional antiemetic therapy as per the treatment protocol along with chemotherapy. The wait list control group had no additional activity whereas the yoga group included a 25 minute module of an integrated yoga program consisting of āsanas, praṇāyāma, relaxation and meditation and the relaxation group practiced 25 minutes of the Jacobson's Progressive Muscle Relaxation Technique which includes alternative tightening and loosening of different muscle groups. Both interventions were imparted by the same trainer. Subjects were also required to practice at home twice daily after the initial training phase. The follow up was done using a video compact disc (VCD).

Data were analysed using repeated measures ANOVA with post hoc Bonferroni tests.

Results

The mean age of study sample was 49.3 ± 11.3 years and the distribution of gender, religious class, cancer type, grade, prior surgery and co-morbid illness was not significantly different between groups.

Jātarāgni

Between subject effects were not significant for total Agni score following 3 consecutive chemotherapy cycles ($F_{(2, 97)} = 1.19, p=0.31$). However within subjects effects was significant for time ($F_{(3, 97)} = 23.2, P<0.001$) only. There was no significant group by time interaction effects observed. Within yoga group there was a significant increase in Agni impairment score between C0 and C1 reading ($p<0.001$) and decrease between C1 and C2 reading ($p=0.001$). Though there was a decrease in Agni impairment scores in yoga group between C0 and C3 it was not significant and was not different between groups. In Jacobson's group there was a significant increase between C0 and C1 reading ($p=0.001$) and C3 reading ($p=0.004$). There was a significant increase in Agni scores between baseline and D5-6 of first cycle ($p<0.001$) in waitlist control group.

Quantity of meal

The quantity of meal showed no significant change for all the three groups between C0, C1 and C2 time points but there was a significant improvement in quantity of meal taken at C3 in yoga group compared to Jacobson's group and controls ($r=0.23, p=0.02$).

Nausea severity

Acute and delayed nausea severity decreased significantly more in the Yoga group as compared to the control group ($p=0.001$) and Jacobson's group ($p=0.004$) after the 1st cycle of chemotherapy.

Psychological tests

There was a significantly better decrease in anxiety and depression scores as measured with the Hospital anxiety and Depression Inventory, following the intervention in the

yoga and Jacobson's groups as compared to controls. There was a significant decrease in self-reported anxiety and depression in Yoga ($p=0.03$) and Jacobson's relaxation ($p=0.004$) compared to control group at the C3 time point.

Autonomic tests-HRV

The power in the low frequency (LF) and high frequency (HF) bands of spectral analysis of HRV showed better decrease in LF/HF ratio ($p=0.06$, between groups) in Yoga group compared to control group after C3 time point.

Autonomic tests-EGG

The electro-gastro-gram (EGG) showed a significant decrease in bradygastria ($p=0.002$) and tachygastria percentage ($p=0.03$) in Yoga group compared to Jacobson's and control group that became more evident after the third cycle (C3 time point).

Conclusion

In subjects undergoing chemotherapy for cancer, yoga helps in the restoration of gastric activity and reduces impairment in the subtle digestive energies as seen by reduction in scores of Jāṭarāgni Impairment Checklist. Yoga practice not only increases the parasympathetic autonomic activity in general but also improves the local gastric autonomic function. Yoga also improves the psychological and psychosocial variables in both Yoga and Jacobson's intervention. Thus, this study provides the evidence for the beneficial effects of yoga in reducing chemotherapy induced nausea and vomiting in cancer patients. .

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