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Review Article

A selective review of *dharana* and *dhyana* in healthy participants

Shirley Telles*, Nilkamal Singh, Ram Kumar Gupta, Acharya Balkrishna

Patanjali Research Foundation, Haridwar, 249405, Uttarakhand, India

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ABSTRACT

Attention is an important part of the process of meditation. Traditional Yoga texts describe two stages of meditation which follow each other in sequence. These are meditative focusing (*dharana* in *Sanskrit*) and effortless meditation (*dhyana* in *Sanskrit*). This review evaluated eight experimental studies conducted on participants in normal health, who practiced *dharana* and *dhyana*. The studies included evaluation of autonomic and respiratory variables, eLORETA and sLORETA assessments of the EEG, evoked potentials, functional magnetic resonance imaging, cancellation task performance and emotional intelligence. The studies differed in their sample size, design and the method of practicing *dharana* and *dhyana*. These factors have been detailed. The results revealed differences between *dharana* and *dhyana*, which would have been missed if the two stages of meditation had not been studied separately.

1. Introduction

Meditation practiced over a period of time changes perception, attention, and cognition [1]. The practice of meditation helps attain a mental state characterized by deep relaxation along with attention directed inwards [2].

Several studies have reported the effects of practicing meditation in practitioners who were inexperienced as well as those who were experienced [3,4]. Across meditation techniques it was interesting to observe that even though there is a common perception of vagal dominance and reduced arousal during meditation [5]; in different meditation techniques, practitioners of the same technique showed opposite trends of results. This has been detailed below.

The study by Wallace, Benson and Wilson (1971) [3], on 36 volunteers with an average of 29.4 months of experience of Transcendental Meditation (TM), showed that meditation practice was associated with a decrease in oxygen consumption, reduced heart and breath rates, decreased blood lactate levels and an increase in slow alpha and occasional theta in the EEG. Another early study suggested that TM practice was associated with greater autonomic stability based on the rate of GSR habituation, and multiple responses of the GSR as well as spontaneous fluctuations in the GSR [6].

However, a different effect of TM practice was suggested by another early study which reported changes in plasma noradrenaline after TM in long-term meditators (with 2–3 years experience of TM) and advanced meditators (with 4.1 years average experience of TM) [7]. Advanced meditators had higher 24-h urinary catecholamines compared to long term meditators. This is a single study and cannot in isolation be worth considering when questioning whether meditation increases or reduces relaxation.

However, contradictory effects were also reported for the eyes open, Zazen meditation. One report described an increase in heart rate during meditation [8]; while another report on the effects of the same meditation showed a decrease in oxygen consumption [9].

Two contradictory reports were also seen for Ananda Marga meditation which involves concentration and attention directed to an inward or outward focus. In one report, the basal skin conductance level increased during meditation with a trend of increase in heart rate from a mean of 69.4 bpm to 72.8 bpm [10]. Based on this the authors challenged the 'relaxation model of meditation'. This was despite the fact that an earlier published report of the effects of Ananda Marga meditation showed an increase in GSR, a decrease in breath rate and a more stable EEG with increased alpha and theta activity [11].

* Corresponding author.
E-mail address: officeprfms@gmail.com (S. Telles).
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Table 1
Description of the studies on *dharana* and *dhyana*.

Sl No	Citation	Sample size	Design	Variables	Results	Cohen's d	Interpretation
1	Telles et al. (2013)	30	Random allocation of participants to four sessions	Heart rate variability, respiration, photo-plethysmogram and skin resistance	During *dhyana* 1. skin resistance level increased 2. photo-plethysmogram amplitude increased 3. heart rate decrease 4. breath rate decreased 5. low frequency power decreased 6. high frequency power increased 7. NN50 count increased 8. pNN50 increased	1. 0.472 2. 0.223 3. 0.502 4. 0.938 5. 0.745 6. −0.733 7. −0.307 8. −0.260	The changes were suggestive of reduced sympathetic activity and/or increased vagal modulation
2	Travis (2011)	26	Random allocation of participants to two groups	Coherence, amplitude and eLORETA, sLORETA EEG analysis	TM-Sidhi practice was characterized by higher frontal alpha1 and beta1 amplitudes, and eLORETA-identified sources of alpha1 EEG in right hemisphere object recognition areas including the right parahippocampus gyrus, right fusiformgyrus, lingual gyrus, and inferior and medial temporal cortices	Alpha 1 (0.937), Beta 1 (0.872)	The observed brain patterns support the descriptions of *sanyama* as including both specificity (sutras or verses), as suggested by higher frontal beta1 EEG amplitude and by eLORETA sources in right-hemisphere object recognition areas, and holistic experience (pure consciousness) as suggested by higher frontal alpha1 EEG amplitude.
3	Kumar et al. (2010)	30	Random allocation of participants to four sessions	Short latency auditory evoked potentials	The peak latency of a component called wave V was significantly increased during *dharana*, random thinking and focusing, but not during *dhyana*	*Dharana* wave V peak latency (−*0.368*), random thinking (−0.343) and focusing (−0.378)	Information transmission along the auditory pathway was delayed during *dharana*, random thinking and focusing but there was no change during *dhyana*
4	Telles et al. (2012)	60	Random allocation of participants to four sessions	Mid-latency auditory evoked potentials	During *dhyana* latencies of the Na and Pa waves were prolonged	Na wave (−0.311) and Pa wave (−0.377)	The auditory transmission at the level of the medial geniculate and primary auditory cortex was delayed during *dhyana*.
5	Telles et al. (2015)	60 (48 final)	Random allocation of participants to four sessions	Long latency auditory evoked potentials	1. Peak latency of the P2 component decreased during and after meditation 2. Peak amplitudes of the P1, P2 and N2 components decreased during random thinking and non meditation focused thinking	1. Dhyana: During (0.614), Post (0.702) 2. Amplitude: random thinking P1 (0.675), P2 (0.656), N2 (0.679); non meditative focused thinking: P1 (0.540), P2 (0.615), N2 (0.561)	*Dhyana* facilitates the processing of auditory information in the auditory association cortex, whereas the number of neurons recruited was less in random thinking and non meditative focused thinking at the level of the secondary auditory cortex, auditory association cortex and anterior cingulated cortex