

CHAPTER-2

Aim and Objectives

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2.0 AIM AND OBJECTIVES OF THE STUDY

2.1 AIM:

- To evaluate the effect of different *pranayama* techniques & a *yogic kriya* on cerebrovascular hemodynamics and cardiovascular functions in healthy volunteers

2.2 OBJECTIVES:

1. To study and compare the differences in cerebrovascular hemodynamics in healthy *yoga* and non-*yoga* practitioners
2. To study and compare the differences in cardiovascular functions in healthy *yoga* and non-*yoga* practitioners
3. To study and compare the differences in breath holding time (BHT) in healthy *yoga* and non-*yoga* practitioners
4. To study the influence of different *pranayama* & *yogic kriya* on cerebrovascular hemodynamics in healthy volunteers
5. To study the influence of different *pranayama* & *yogic kriya* on cardiovascular functions in healthy volunteers

2.3 RATIONALE OF THE STUDY:

Different types of *pranayama*'s produce specific physiological responses (Madanmohanet al., 2005) for example in a study of slow *pranayama*, reduction in heart rate and blood pressure were reported (Sharma et al., 2013) whereas a study on *bhastrikapranayama*, the bellows type rapid and deep breathing, it was reported to significantly increase the heart rate, rate pressure product and double product unlike other *pranayama* (Madanmohanet al., 2005). One or the other cerebral hemodynamic variables such as CBF, cerebrovascular resistance, cerebral perfusion and auto-regulation were reported to impaired in various disease such as hypertension (Manolio et al., 2003), abdominal obesity, metabolic syndrome (Birdsill et al., 2013), stroke (Aaslid et al., 1989), epilepsy, Alzheimer's disease (Stanimirovic et al, 2012), memory (Birdsill et al., 2013) and cognitive functions (Pires et al., 2013 & Tarumi et al., 2015). Whereas, yogic practices including *pranayama* were reported to be effective for the management of hypertension (Tyagi et al., 2014 & Telles et al., 2013), obesity, metabolic syndrome (Schmid et al., 2014), stroke (Siu et al., 2015 & Mishra et al., 2012), epilepsy, Alzheimer's disease (Mishra et al., 2012), memory (Gothe et al., 2014) and cognitive functions (Kyizom et al., 2010 & Sharma et al., 2014).

Though yogic breathing techniques such as Bhramari, Bhastrika, and Kapalbhathi kriya are commonly practiced, there is a limited number of studies showing its physiologic effects. It is very much essential to understand the underlying physiological mechanisms before applying them as therapeutic agents in pathological conditions. Moreover, a précised scientific effect behind these practices need to be understood. So, we intended to evaluate the impact of different *pranayamas* (one of the *yoga* techniques) such as kumbhaka (breath retention), Bhastrika (bellows breath), Bhramari (humming bee breath) and a yogic kriya -Kapalbhathi

(frontal brain cleansing breath) on cerebrovascular hemodynamic changes and cardiovascular functions during the practice in healthy volunteers.

2.4 RESEARCH QUESTIONS AND HYPOTHESIS

2.4.1 Research question: Do different voluntarily regulated breathing techniques influence cerebrovascular haemodynamics and cardiovascular functions specifically?

2.4.2 Hypothesis: Different voluntarily regulated breathing techniques influence cerebrovascular haemodynamics and cardiovascular functions specifically

2.4.3 Null hypothesis: Different voluntarily regulated breathing techniques may not influence the cerebrovascular haemodynamics and cardiovascular functions specifically

2.5 RELEVANCE AND BENEFITS OF THE STUDY:

Different voluntarily regulated breathing techniques may produce specific cerebrovascular hemodynamics and cardiovascular functions such as the slow *pranayama* might increase the cerebral blood flow and improve the cardiovascular functions while the fast *pranayamas* reduce. If we know the different effects of various *pranayamas* and a yogic kriya on cerebrovascular hemodynamics and cardiovascular functions, we can use the particular practices to produce a specific effect which is necessary for clinical practices. The findings of this study might play a potential role in designing the *Pranayama* techniques according to patients' requirements.