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## Effect of yogic interventions on cerebral palsy: A systematic review

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### Abstract

Cerebral Palsy (CP) is related to motor dysfunction during the childhood days. Various intervention programmes are beneficial for the improvement CP. The present study is a systematic review aim at to find out the effectiveness of yogic interventions on CP patients. The electronic databases searched included: PubMed, CINAHL (the Cumulative Index to Nursing and Allied Health Science), Cochrane Library, PEDro (the Physiotherapy Evidence Database), Medline, Medscape, Proquest, Ovid, Ebsco, Hooked on Evidence, Institute for Scientific Information (ISI) Web of Knowledge and Google Scholar. 09 studies found relevant to the present study. After meta-analysis of all the selected studies the present researchers are of the opinion that yogic interventions are not only develops the physiological performance but also mental performance of the CP children.

**Keywords:** Cerebral palsy, interventions, meta-analysis, systematic review

### Introduction

According to CDC (2013), Cerebral palsy (CP) is a combination of various disorders which have an effect on the entire system of an individual. CP commonly related to motor dysfunction during the childhood days. 'Cerebral' is related to the brain and 'Palsy' is related to the difficulty in muscular functioning. CP is actually caused by abnormal growth or damage of the growing brain which in turn affects the control over a person's muscles function.

CP generally occurs during prenatal, perinatal, and postnatal time period due to the brain injury characterized by lack of control over the motor functions and impairs the independency of the child (Jones *et al.*, 2007) [15], affects the psycho-physiological functioning like feeling, insight, cognition, communication etc. (Rosenbaum *et al.*, 2007) [29] and the control over the internal organs and systems like respiration, excretion, digestion, speech etc. (Shrader & Salzbrenner, 2018) [34]. Due to the brain abnormalities various neurological problems are common in CP children (Staffs of Mayo Clinic, 2019) [39]. It is very much common in young children (Paneth, Hong, & Korzeniewski, 2006) [26].

Application of regular conventional physiotherapy programme is useful in recovering muscle strength, muscular endurance, and overall joint range of motion in CP children (Singhi, 2004; Mayston, 2004; Taggart & Aguilar, 1999) [37, 20, 42] and also provides self assistance and active participation up to a certain extent (Taggart & Aguilar, 1999; Stanger & Oresic, 2003) [42, 40]. Various previous researches have suggested that conventional occupational therapy is beneficial in the treatment of children with CP (Palisano, Snider & Orlin, 2004; Steultjens *et al.*, 2004) [25, 41] progressive resistive exercises are very much useful for them in the improvement muscle strength (Mathews & Wilson, 1999; Dodd, Taylor & Damiano, 2002) [19, 10]. Yoga is a type of exercise which originates since primeval Indian philosophy. Yoga is intended for the body, spirit and spirit of happiness and is as an intervention intended for a variety of diseases. Yoga has been revealed to improve executive functions, attention, intellect, memory and attentiveness to people since it is as an intervention using bodily postures, breathing exercises and meditation techniques (Verma, Jayashankarappa & Palani, 1982; Rani & Rao, 1996; Sridevi, Sitamma & Krishna, 1998; Manjunath & Telles, 2001; Sharma *et al.*, 2006) [45, 28, 38, 21, 33]. According to Hathapradipika, a reputable Yoga book, Yoga is a safe and trustworthy practice for all aged people, provided those are practiced and performed following the correct rules and regulations (Bhatt, Sinh & Vasu, 2004) [3].

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Bhavanani (2014) [4] stated that yoga can also be performed to cure any kind of acute or chronic and painful disorders. Hatha yoga is beneficial for the development of all kinds of fitness, health, posture, functioning of internal and external systems and organs; which in turn develops the overall well-being of a person (Bhavanani, 2008 & 2013) [6, 5]. Various previous studies have suggested that if the yoga is been practice by the children with special needs regularly following proper instructions, they can improve various basic motor, communicative and cognitive skills, as it recreate, refine and redefine a child (Meena, 2007; Galantino, Galbavy & Quinn 2008) [22, 11]. After going through various review studies and literatures, the researchers was of opinion to go through various yogic interventions studies on CP and systematically analyze each and every study to find out the conclusive evidence that how yogic interventions are effective in the improvement of functional ability of an individual with CP.

Therefore, the objective of this study was to a meta-analysis of published primary studies to find the impact of yogic interventions on functional ability of individuals with CP.

## Methods

### Study search and selection

A bibliographic searching was conducted to identify the studies carried out on CP patients ( $\leq 20$  years), written in English in which yogic interventions in order to assess intra-group change and those that reported differences between groups in various outcome measures. Different international and national bibliographic databases were consulted. The electronic databases searched included: PubMed, CINAHL (the Cumulative Index to Nursing and Allied Health Science), Cochrane Library, PEDro (the Physiotherapy Evidence Database), Medline,

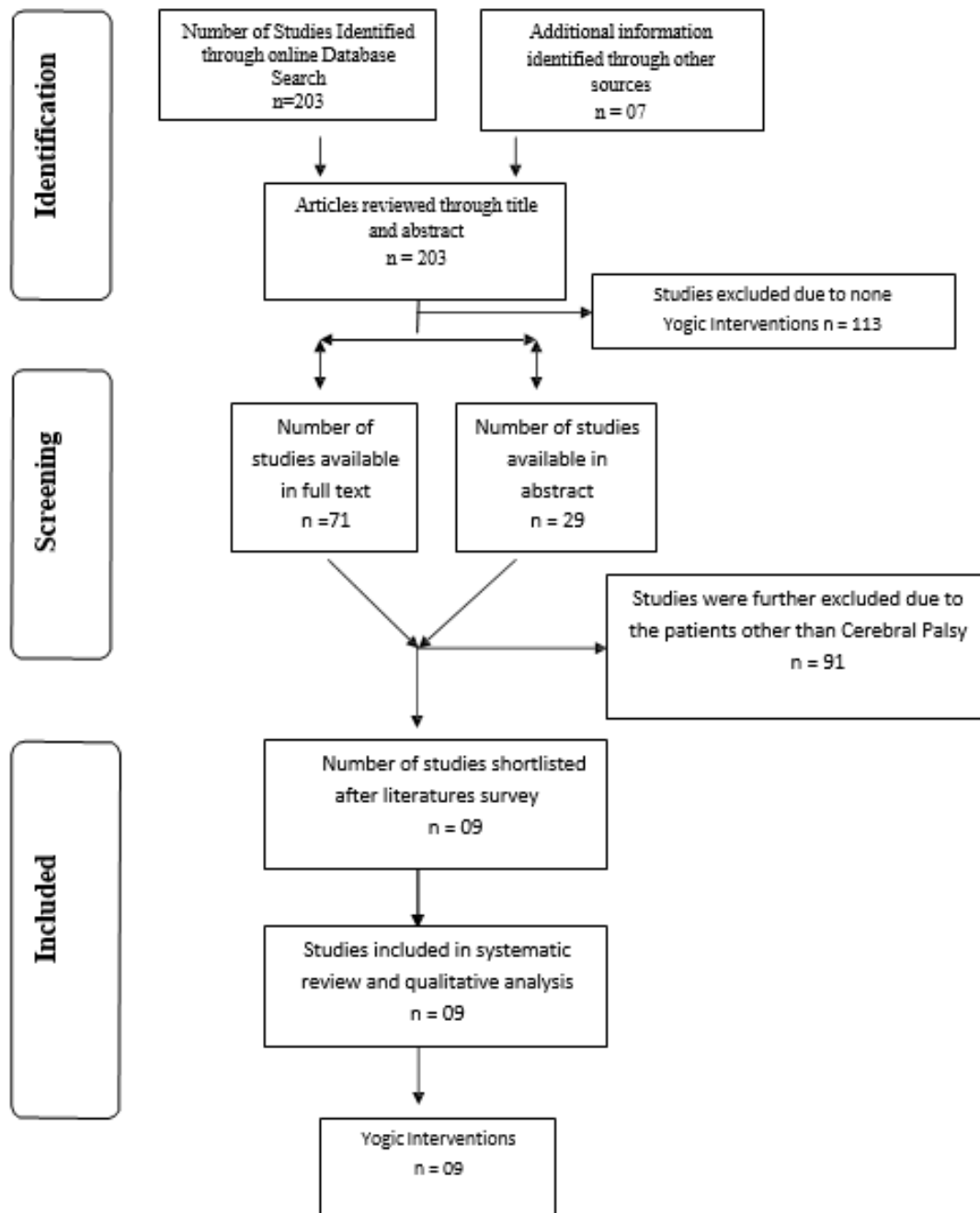
Medscape, Proquest, Ovid, Ebsco, Hooked on Evidence, Institute for Scientific Information (ISI) Web of Knowledge and Google Scholar. To avoid excluding potentialities relevant to articles at the search stage, a comparatively extensive search strategy was used, so all the studies on the effect of various yogic interventions on various physical and mental components on cerebral palsy were identified. All relevant primary studies (published) until June 2020 were identified, using the following keywords: “Yoga”, “Yogic asana”, “Yogic therapy”, “Yogic Interventions”, “Yoga therapy “Yogic exercise”, and “cerebral palsy”, using free text and without applying any limitation in the search strategy. Researchers also performed a manual search within the bibliographic references of the retrieved studies.

### Eligibility criteria

Eligibility of articles was assessed on the basis of eligibility criterion first at the level of the title, abstract, and source, and then the full text articles. Original studies of all designs investigating the effect of yogic interventions on various physical and mental components of cerebral palsy was undertaken for the research review study. After collecting articles, the researcher confirmed literature surveys within four highlighted areas i.e. Yogic Intervention, Yoga Therapy, Yoga and cerebral palsy. Whereas studies which were not of direct match with the concept of analysis or did not include Yoga as an intervention were excluded from the systematic review. Full text reading of articles that were potentially eligible was undertaken. The inclusion and exclusion criterion of the studies is shown in Table 1. The schematic representation of the literature survey is shown in Figure 1.

**Table 1:** Inclusion and exclusion criteria.

<b>Inclusion Criteria</b>
Patients diagnosed with Cerebral Palsy ( $\leq 20$ years).
Design: both controlled (randomized or quasi-randomized) and non-controlled clinical trials. Intervention based on Yoga.
Language: only written in English.
Information on effect of at least one intervention of yoga, both pre and post intervention, or differences between groups in these outcome measures in the case of controlled studies
<b>Exclusion Criteria</b>
Patients diagnosed with Cerebral Palsy ( $\geq 20$ years).
Effect of yogic intervention on the disability of the patients other than cerebral palsy.



**Fig 1:** Detail procedures of literature survey

## Results

After the exhaustive search and selecting the studies on the basis of inclusion criteria, 09 articles were shortlisted for the meta-analysis. All the selected studies were only experimental with yogic interventions.

The researchers of these selected studies have seen the effect of yogic interventions on various physical, physiological, psychological and social dimensions of cerebral palsy like flexibility, strength, motor skills and performance, health-related quality of life, well being, sleeping behavior, attention, intellectual ability, quality of life etc. So the present researcher has done the data synthesis by categorizing the study findings into two categories:

- Effect of yogic interventions on physical and physiological components of CP patients.
- Effect of yogic interventions on psycho-social components of CP patients.

The data extractions included the interpretation performed and findings of the research outcomes.

## Effect of Yogic Interventions on Physical Components of Cerebral Palsy Patients

Lee (2011) [15] conducted a single subject AB design study to evaluate the effectiveness of yoga therapy on the motor skills, well-being, and attention for two 11 years old children with cerebral palsy where he found significant improvements in active range of motion for both participants and postural stability for one participant; however non-significant improvements were found in motor skills, well-being, and attention. In a case study it has been reported that six week yoga program in conjunction with physical therapy improved strength, flexibility, and balance, as well as functional mobility of the CP child (Vendrey *et al.*, 2013). An open labeled randomized, controlled clinical trial study result indicated that Mustadi *Rajayapana Basti* along with oral administration of *Baladi Yoga* has a significant positive effect in gross motor functions, fine motor function and language and performance skill of cerebral palsy patients (Shailaja *et al.*, 2014) [35]. Chinnasamy (2015) [9] administered selected yogasanas on six 7 – 11 years children (both boys and girls)

with intellectual disability having cerebral palsy for 20 sessions (each session of 1 hour per day) from Monday to Friday for 20 days and found a significant effect in the improvement of flexibility in hip and knee joints. So the range of motion also improved and maintained for the selected sample. 10 sessions (45minutes/day) of yoga therapy which includes breathing techniques, warm-up exercises [warming up in standing position], Surya Namaskar, Asanas has significantly improved postural control, functional mobility and balance among 40 CP children aged 5 – 17 years (Gokcek *et al.*, 2017) <sup>[13]</sup>. Significant improvement was found in the selected cerebro muscular variables like Visual perception and proprioception among children with cerebral palsy due to the practice of Vinyasa yoga with and without mantra chanting for the period of 22 weeks. Further it has been proved that the Vinyasa yoga with mantra chanting had better significant improvement than Vinyasa yoga without mantra chanting (Selvalakshmi & Subbulakshmi, 2018) <sup>[31]</sup>. Shafei & Ghasemi (2020) <sup>[36]</sup> reported that eight weeks moderated Hatha yoga exercises have a significant effect on the strength of the extensor muscles of the trunk of CP children.

### Effect of Yogic Interventions on Psycho-Social Components of Cerebral Palsy Patients

No significant improvement was found in attention among both the participants suffering from cerebral palsy as a result of 10 weeks yoga therapy in the study of Lee (2011) <sup>[15]</sup>. The result of Shailaja *et al.* (2014) <sup>[35]</sup> study indicated that the *Rajayapana Basti* along with oral administration of *Baladi Yoga* improves the understanding ability along with other physical skills of CP patients which can be helpful in the development of self-sustainability for them. The study result of Chinnasamy (2015) <sup>[9]</sup> also indicated that there is an enhancement in Quality of life by improving and maintaining a good range of motion in the joints for the selected sample. Beside various physical components as a result of 10 days yoga therapy depression and sleeping quality of the CP children improved (Gokcek *et al.*, 2017) <sup>[13]</sup>. MiYoga programme consisting of hatha yoga and mindfulness meditations, as well as informal mindfulness activities such as explorations and games such as mindful eating for 8 weeks have significantly improved attention in children with CP and parents of the experimental group have demonstrated significantly decreased mindfulness (Mak *et al.*, 2018) <sup>[17]</sup>. The implication for rehabilitation 6-month follow-up evidence for retention of effects of MiYoga on children's attention was inconsistent (Mak *et al.*, 2020) <sup>[18]</sup>.

### Discussion

The objective of this study was to a systematic analysis of published primary studies to find the impact of yogic interventions on functional ability of individuals with CP. For that purpose the researchers have gone through various published researches available in the web. After the detailed search by following the inclusion criteria the researchers have found total 09 studies related to the topic.

Out of total studies 07 studies were related to the effect of yogic interventions on various physical and physiological dimensions of CP children. The physical and physiological dimensions which have significantly improved due to yogic interventions were range of motion, postural stability (Lee, 2011; Gokcek *et al.*, 2017) <sup>[15, 13]</sup>, strength, flexibility, balance, functional mobility (Vendrey *et al.*, 2013; Gokcek *et al.*, 2017) <sup>[13]</sup>, motor functions, fine motor function, language and performance skill (Shailaja *et al.*, 2014) <sup>[35]</sup>, flexibility in hip

and knee joints (Chinnasamy, 2015) <sup>[9]</sup>, Visual perception and proprioception (Selvalakshmi & Subbulakshmi, 2018) <sup>[31]</sup>, strength of the extensor muscles of the trunk (Shafei & Ghasemi, 2020) <sup>[36]</sup>.

On the other hand 05 studies have shown the impact of yogic intervention on psycho-social components of CP children. The psycho-social components which have improved due to the yogic interventions were attention (Lee, 2011; Mak *et al.*, 2018) <sup>[15, 17]</sup>, the understanding ability and self-sustainability (Shailaja *et al.*, 2014) <sup>[35]</sup>, Quality of life (Chinnasamy, 2015) <sup>[9]</sup>, depression and sleeping quality (Gokcek *et al.*, 2017) <sup>[13]</sup>.

So the present researchers is of opinion that yoga therapy could be used as an alternative therapeutic module along with other therapies as it is evident that Yoga is very useful for the disabled as they can get relief from physical ailments (Ijbarathi, 2012) <sup>[14]</sup> and certain yoga techniques may improve physical and mental health of people both with and without disabilities (Ross & Thomas, 2010) <sup>[30]</sup>.

Various articles and the findings of previous researches on the effect of yoga on people with disability has supported the opinion of the present researchers as the author of a web article (Yoga for the Special Child, 2011) <sup>[46]</sup> stated that high muscle tone which is very common in CP children can be reduced by means of yoga. Holding a pose during yoga practice provides the muscles and tendons a relaxing stretch, releases stress and tightness of the muscles and joints, develops coordination and greater range of motion. Furthermore the findings of the staffs at Mind Body Solutions have also supports the thought of the present researchers where they have seen due to the implication of Iyengar yoga on different types of disabled people have improved balance, coordination, control over the muscular activities, management of pain, control over psychological functions, body awareness etc. (Mind Body Solutions, 2011) <sup>[23]</sup>. Various fewer studies (Seiler & Renshaw, 1978; Telles *et al.*, 1993; Peck *et al.*, 2005) <sup>[32, 43, 27]</sup> also found the significant positive effect of on children.

So after the detailed analysis of the reviewed literatures on the effect of yogic interventions on the functional ability of the CP children and along with other supportive evidence related to the effect of yoga programme on different types of disability, the present researcher is of the opinion that yogic intervention is an effective module for the development of various physical, physiological and psycho-social components of cerebral palsy children.

### Practical Applications

After the meta-analysis of the available studies on the effect of yogic interventions on cerebral palsy children the present researcher is of the opinion that the yogic intervention have a significant effect in the improvement of various physical, physiological and psycho-social aspects of cerebral palsy children and this can be used along with other therapeutic module so that much more development of the CP children can takes place and the CP children can come out from the monotony of doing same type of traditional therapeutic programme.

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