Conference Proceedings

BCIPCON -2K23

"Head and Neck Cancers: Road to Rehabilitation"

Editor- Ms. Nidhi Kalra

BCIPCON-2K23

"*Head and Neck Cancers: Road to Rehabilitation*"

BANARSIDAS CHANDIWALA INSTITUTE OF PHYSIOTHERAPY

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BCIPCON-2K23
"*Head and Neck Cancers: Road to Rehabilitation*"

EDITORIAL TEAM

PREFACE

Dear Readers,

It is a feeling of contentment, when I again connect myself with the scholars and researchers of my field through the release the BCIPCON 2K23 national level conference proceedings. I must thank my editorial team for bringing together two important aspects of physiotherapy namely "change' and "practice". While we are still in process of evolving standards of best practices; I am sure, our proceedings provide a medium for researchers to put forth new ideas and facts for emerging technologies in the field of physiotherapy. Valid evidence is all that is required to reinforce scientific basis of physiotherapy and combat challenges faced by our profession. A local resource with data, information and guidelines is being consolidated by every intellectual work published in journals or other resources. I am happy that many researchers and professionals are contributing to its development story. The research ideas and initiatives happening around and coming across are quite encouraging. I congratulate all authors for their valuable inputs and contributions. Our unsung editorial team remains the powerhouse behind our modest attempts and initiatives and I realize it at every stage of this publication. I stand behind my editorial team to keep it erect against all odds.

On behalf of this my colleagues & contributors of this publication, Welcome!

Organizing Team

CHIEF GUEST

Dear Readers,

Banarsidas Chandiwala Institute of Physiotherapy, New Delhi, is a premium institute which has come out as an institute of excellence, beliefs, for imparting the exceptional knowledge to their students and significantly contributing towards the society by organizing various international conferences to create awareness among the health professionals.

I have noticed that BCIP always picks up best of the topics and this time they have organized a 2-day conference BCIPCON 2K23 on Head and Neck Cancer: Road to Rehabilitation. In today's time Cancer is the leading cause of death worldwide. I feel extremely happy as BCIP has taken the initiative to conduct a conference on such topic because it is the need of the hour and it is going to create awareness among the budding physios and the other health professionals.

BCIP has consistently impressed me with their vision of creating an impact on society whether it be a simple plantation drive or conducting "Anti-tobacco Campaign". Such efforts if joined by all may lead to change all across the globe and make it a happy place to live!

I would like to appreciate the Director, Faculty members for their consistent efforts, hardwork, and compassion in organizing such initiatives and giving momentum to gain knowledge in diverse fields.

As a president of the Council, I would like to wish you best of luck and hope we will keep raising the standard of our practices.

Wishing you Best of luck with everything that lies ahead.

Dr Arun Aggarwal

President, DCPTOT

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SECTION -I: SPEAKERS ABSTRACTS

PRE-OPERATIVE AND POST RADIO THERAPEUTIC NECK AND SHOULDER REHABILITATION

Dr.M.S.Satish MPT,MSc,PhD
Chief Physiotherapist, Cancer Institute (WIA), Chennai.

Head and neck cancers (HNC) include cancer that arises in the nasal cavity, sinuses, oral cavity (lips, mouth, tongue, hard palate, gums) salivary glands, pharynx (nasopharynx, oropharynx including base of tongue, tonsils, soft palate and hypopharynx) or larynx. Secondary or associated conditions and complications like pain, lymphedema of the neck, and face, or mucositis, trismus, dysphagia, facial nerve palsy, other cranial nerve palsy, musculoskeletal neck and shoulder impairments, including cervical dystonia, dropped head/neck extensor weakness, shoulder dysfunction and pain, scapular winging, neuromuscular impairments including myopathy, radiculopathy, plexopathy and neuropathy. Cancer related fatigue and radiation fibrosis. The aim of treatment for HNC is to maximize locoregional control and survival while minimizing functional and cosmetic alteration. Surgery and radiation therapy aim to provide curative control while chemotherapy is used as a combined modality treatment. Prehabilitation plays a vital role in optimizing the functional outcome.

PHYSIOTHERAPY MANAGEMENT OF PULMONARY COMPLICATIONS FOLLOWING HEAD AND NECK SURGERY

Vincent Singh Paramanandam PhD., MSc in Cancer Care, MPT, BPT
Faculty of Medicine and Health, The University of Sydney, Australia

Postoperative pulmonary complications are common following head and neck cancer surgeries. Physiotherapy plays a key role along with the multidisciplinary team in preventing postoperative pulmonary complications following head and neck cancer surgery. The primary objectives of physiotherapy in this context are to assist patients in preparing them for surgical procedures, aid in recovery following surgery, maintain their overall health and optimise their well-being during survivorship. Prehabilitation and early postoperative physiotherapy management are crucial in improving airway clearance, respiration and mitigating short-term and long-term complications. Exercise training and physical activity are integral aspects of physiotherapy intervention, and emerging evidence underscores the benefits of exercise for individuals with head and neck cancers. This review provides an overview of head and neck cancer patients' pre and postoperative physiotherapy management. Although head and neck cancers can affect individuals of all age groups, this review focuses on adult patients.

FACIAL EDEMA MANAGEMENT IN ACUTE CARE WITH HEAD AND NECK CANCERS

Dr. Ankita Chitre (PT)
B.P.Th., M.P.Th., Certified Lymphedema & Manual Therapist, Physiotherapy Department, MPMMCC/HBCH, Varanasi

Under this topic the lymphatic system was discussed in brief along with its functions. Definition of lymphedema and its types were explained. Emphasis was on secondary lymphedema which is common in cancer patients. Following this the signs and symptoms of lymphedema were told. Information regarding the red flags was given. Types of head and neck lymphedema are external and internal lymphedema. Assessment protocol for the same was elaborated- in which the demographic details, information about the previous and current treatment, pain assessment, physical and functional examination, psychological assessment has to be done. Details regarding the circumferential measurement were explained. Foldi 's scale for assessment was elaborated. Under treatment strategies the sub topics included were skin care, Complete decongestive therapy, Manual lymphatic drainage, compression garment/face mask, Neck and facial muscles exercises and requirement of psychological support. All the above-mentioned topics were covered in detail. Participants had quite a few queries which were answered at the end of the session.

PAIN AND PALLIATIVE CARE IN HEAD AND NECK CANCERS

Dr. Anuradha Abhijeet Daptardar(PT)
Office in Charge Physiotherapy Department, Tata Memorial Hospital.

The International Association for the Study of Pain's widely used definition defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". In medical diagnosis pain is a symptom. It may be acute or chronic, nociceptive or neuropathic. The prevalence of pain in Head and Neck cancers ranges from 9% to 98%. Pain may be mainly due to the spread of the primary tumor, consequences of surgery, oral mucositis, dysphagia, trismus or neuropathy as toxic side effects of radiotherapy, chemotherapy or both. Pain is assessed using Numerical Rating Scale or Visual Analog scale.

Surgical pain can be treated with analgesics, positioning, TENS, exercises and ambulation. Different chemotherapy drugs have different side effects but the commonest are bone pain, joint pain, myalgia, peripheral neuropathy, oral mucositis, Myelosuppression and fatigue. The treatment is mainly pharmacological. The non-pharmacological treatment includes TENS, low level laser therapy, hot and cold packs, exercises for mobility and strength, assistive devices, mobility aids. Alternative treatment like massage, acupressure, acupuncture, yoga, thai chi and others. Pain following Radiation Therapy is due to xerostomia, radiation fibrosis, Trismus, radiation neuropathies, plexopathies. Treatment includes TENS, myofascial release, stretching exercises, devices like jaw stretcher key, therabite, and orthosis and splints.

National Cancer Institute defines Palliative care as care meant to improve the quality of life of patients who have a serious or life-threatening disease, such as cancer. It can be given with or without curative care. Palliative care is an approach to care that addresses the person as a whole, not just their disease. Patients may receive palliative care in the hospital, an outpatient clinic, a

long-term care facility, or at home under the direction of a health care provider.
Palliative care Team includes physician, nurses, care givers, physiotherapists, occupational therapists, psychologists, nutritionists, counsellors, social workers and volunteers. The cluster of symptoms in Head and Neck cancers requiring palliative care are Pain, Oral mucositis, Neuropathies, Trismus, Head and Neck Lymphedema, Cancer Related Fatigue, Metastasis- Bone, Lung, Brain and Respiratory Problems.

INTRODUCTION & CLASSIFICATION OF HEAD & NECK CANCERS

Dr. Divye Malhotra
Professor & Head, Dept. of Oral & Maxillofacial Surgery
Himanchal Dental College, Sundernagar

Every patient with oral cancer presents the treating clinician with a unique set of challanging, complex and multidisciplinary clinical problems, the solution to which impact both theory survival and quality of life. The management of all oral cancers should occur in a multidisciplinary head and neck oncology team. There are many different clinicians that form a part of the head and neck multidisciplinary team (H&N MDT), and these include (but are not limited to): oral and maxillofacial, ear , nose and throat and plastic and reconstructive surgeons , radiologist, anatomical pathologists, anaesthetists, speech and language therapists, dieticians head and neck nurses, physiotherapists, oral medicine specialists , prosthodontists, special needs dentists, facial prosthetists and social workers.
The management of cancer of the oral cavity is complex, due to the functional and aesthetic implications of treatment of tumor in this region. Breathing, speech, deglutition, sight, smell, taste, mastication and jaw function are Just several of critical functions of head and neck that can be impaired, either temporarily or permanently by the tumor or its treatment. In addition our facial dental aesthetics are important in how we are perceived by others; self esteem and self confidence may be severely affected by the tumor itself and or its treatment.
Dentists play a critical role in the management of oral cancer, from the detection of premalignant lesions, early detection of oral cancer , management of oral cancer patient's dentition both prior to and post definitive treatment, surveillance or recurrent or new primary tumors in conjunction with the treating specialist, and rehabilitation of missing teeth in conjunction with the treating maxillofacial surgeon and prosthodontists

MANAGING TRISMUS: PHYSIOTHERAPEUTIC MANAGEMENT

Dr Nipa Shah
MPT,CLT(Certified Lymphedema Therapist)
Lecturer in SBB College of Physiotherapy

Incidence rate of head and neck cancer is rising day by day worldwide, but due to advance technology in cancer treatments i.e., surgery, chemotherapy, radiotherapy, survival rate is also increasing. Now Thrust in cancer care is not simply on survival, but on QOL of survivors, for that Physiotherapy has very important role. Various residual deformities and dysfunctions are related with patients with HNC. Following any treatment for HNC, Physical therapy may play an essential role in preventing and managing various complications. Trismus is restriction or limitation of opening the mouth, a common complication of head and neck cancer and its treatments. According to recent studies, it develops in 38% to 42% of head and neck cancer patients.

The temporo-mandibular joint or the mastication muscles can experience fibrosis because of radiotherapy, leading to trismus. The risk of trismus goes up when muscles of mastication are in radiation zone, multiple surgical procedures or high doses of radiotherapy. Cutoff point for defining trismus quantitatively is, a $\leq$35 mm maximum inter-incisal distance (MID)

Physiotherapeutic Management of trismus include mouth opening exercises and use of multiple mobility devises like Therabite, TMJ exerciser, Heister's device etc. Many advanced evidence-based techniques are also very effective like TMJ mobilization, Soft tissue release or Manual Lymphatic drainage.

No one can convey a clear consensus as to optimal intervention for trismus in HNC patients. Also, low-level laser therapy and low-intensity ultrasound coupled with exercise may be beneficial for patients with trismus. Efforts focused on increasing adherence to a particular intervention protocol and that should be based on detailed examination and focus on impairments of HNC patients.

SWALLOWING AND SPEECH DIFFICULTIES IN ORAL CANCER AND THEIR MANAGMENT

Dr. Gayathri Krishnan
Speech Language Pathologist, All India Institute of Speech and Hearing
Manasagangtori, Mysore

Oral Carcinoma and its management is a common cause of speech and swallowing impairments. Any treatment that changes the structure, function and efficiency of participation of oral components in speech such as jaw, lips, tongue, soft palate, hard palate, and/or pharyngo-laryngeal structures have an adverse effect on speech and swallowing function. The extent of impairment depends on the site, extent of lesion, post operative reconstruction characteristics and the additional treatment modalities given. This session focuses on the characteristics of speech and swallowing impairments in persons with oral cancer in particular. Oral carcinoma can affect oral preparatory stages, oral phase as well as pharyngeal phases of swallow. The impairments under each of these stages are discussed in detail. The speech subsystems that are affected in oral cancer include the articulatory subsystem, phonatory subsystem, and the resonatory subsystem that ultimately leads to poor speech intelligibility in oral cancer survivors. Common assessment procedures followed, the process of clinical decision making and an overview of treatment approaches that aim at improving the quality of life of oral cancer survivors is the main focus of this session. The role of multidisciplinary allied health care and rehabilitation experts is emphasized throughout.

SECTION II RESEARCH ARTICLES

CORRELATION BETWEEN COGNITION, BALANCE, AND HAND DEXTERITY IN ELDERLY: CROSS SECTIONAL STUDYR

Rimi Tiwari[1], Hammad Ahmed Siddiqui[2], Charu Chabra[3]

1. Postgraduate Student, Jamia Hamdard, Delhi
2. Assistant Professor, Jamia Hamdard, Delhi
3. Assistant Professor, School of Physiotherapy and Rehabilitation Sciences, KR manglam University, Haryana

ABSTRACT

Background: The maturation process results in a general reduction in sensory abilities, which affects coordinated conduct and suggests a deterioration in the competence of afferent information coming from the extremities. These motions & complicated actions involving regulation of balance take additional mental effort to regulate. The purpose of this study was to determine if balance and hand dexterity were related to cognitive deterioration in elderly individuals. Methods: Using convenience selection, a total of 30 healthy volunteers were chosen based on the study's inclusion criteria. Prior to the study, the ethics committee of the university granted ethical permission, and written informed consent was acquired. At the Rehabilitation Centre, Jamia Hamdard in Delhi, all the individuals had assessments for balance, manual dexterity, and cognition using the Humac balance, peg board test, and Mini mental state examination, respectively. Statistical analysis for correlation was done through Statistical software IBM SPSS statistics 21.0 and Pearson correlation test was used with a significance level set at 0.01. Results: In this study they were 22 males (73.3%) and 8 females (26.6%). The mean age and BMI was 70.53±3.20 years and 24.21±1.64 kg/cm^2 respectively. The results showed a significant correlation between hand dexterity and balance and Positive correlation found between cognition and hand dexterity ($p \leq 0.05$). Conclusion: It was concluded from the existing work that there exists a noteworthy relation amongst balance and hand dexterity, but there was a moderate relation between cognition and hand dexterity in the elderly.

Keywords: Hand dexterity, Cognitive function, Balance, Elderly

Introduction

The population is aging at a rate that has never been seen before. According to estimates from the Technical Group on Population Projections for India and States 2011–2036, there will be over 138 million senior people in India by 2021, made up of 67 million men and 71 million women[1]. A person's ability, intellect, neuromuscular systems, and several other systems significantly deteriorate as they age due to physiological changes in all bodily systems.

The prefrontal cortex's grey matter begins to recede more noticeably with age owing to neuronal loss, which has an impact on cognition[2].

Among the most prevalent and expensive age-related issues that might result in total loss of independence in daily living activities are fall injuries and cognitive impairment. Over one-fourth of persons 65 and older will fall each year, according to the Centres for Disease Control and Prevention [3], making falling the main cause of fatal and non-fatal injuries among older adults.

In older persons, timing is a crucial component of movement efficiency. Alterations in balance and coordination are discernible because of the deterioration of central or peripheral systems[4].

Sensory inputs like the visual, vestibular, proprioceptive, and mechanoreceptive systems, CNS functions with feedback and

feed forward loops able to withstand external and internal stimulus, and musculoskeletal factors like adequate muscle strength and range of motion in the joints for coordinated movement patterns are crucial contributors to an adequate static and dynamic balance—confidence and control, promote mobility, and improve balance[4,5].
While sensory-motor systems are linked with a hierarchy of neurological processes in the ageing population, cognition also plays a significant role in maintaining a dynamic equilibrium in this group. As people age, their cognitive function gradually deteriorates, making it harder for them to manage their dynamic balance and do coordinated tasks like ADLs[6].
The most efficient and necessary instruments for doing daily tasks are the hands, and in particular the fingers. Deterioration of hand and finger function brought on by disease or ageing restricts independence in ADLs and lowers quality of life, which makes it harder for people to do ADLs as they age. In order to comprehend the risk factors for cognitive decline and the prevalence of dementia, several behavioural investigations have been carried out [7,8,9], and it has been discovered that motor function impairment is directly associated to these changes. Cross-sectional research has shown that either hand dexterity or handgrip strength [10,11] are related to overall cognitive function. Additionally, clinical investigations have shown a substantial difference between older persons with moderate cognitive impairment and cognitively normal older adults in terms of motor impairment (loss of muscle control or movement). [8,13]

There is dearth in current literature on associations between hand dexterity, balance and cognitive function. Thus, the aim of the current study was to find association between balance and hand dexterity with increased cognitive decline in elderly population.

Materials and Methods

Ethical approval:

The study proposal was ethically approved by the Jamia Hamdard Institutional Ethics Committee via online meeting dated 07/04/2022.

Study participants:

A total of 30 subjects were selected to participate in this study by convenience sampling, from Rehabilitation centre, Jamia Hamdard university. Participants between age group of 65-75 years were recruited for the study if they were able to walk without any assistive device upto distance of 10 meters and able to do sit to stand prior to enrolment, both genders, having normal BMI (18.5 to 24.9) and having MMSE (Mini mental state examination) score of 24 and above.

Participants with Auditory and/or visual impairment, history of vestibular disorders, vertigo, neuromuscular disorder, recent fall, chronic ankle instability and those dependent on walking aids for ambulation, any history of trauma, fracture, or surgery like TKR etc. in past 1 year, deformities of spine and lower limbs, such as flat foot, pescavus, genu varum, etc, any neurological disorder like Stroke, Parkinson's, TBI, Dementia etc, any orthopedic disorder involving lumbar spine, pelvis and lower extremities, those on Psychotropic medication affecting cognitive abilities were excluded from the study. A written informed consent was taken prior to the study after explaining the study procedure, risks, and benefits in local language

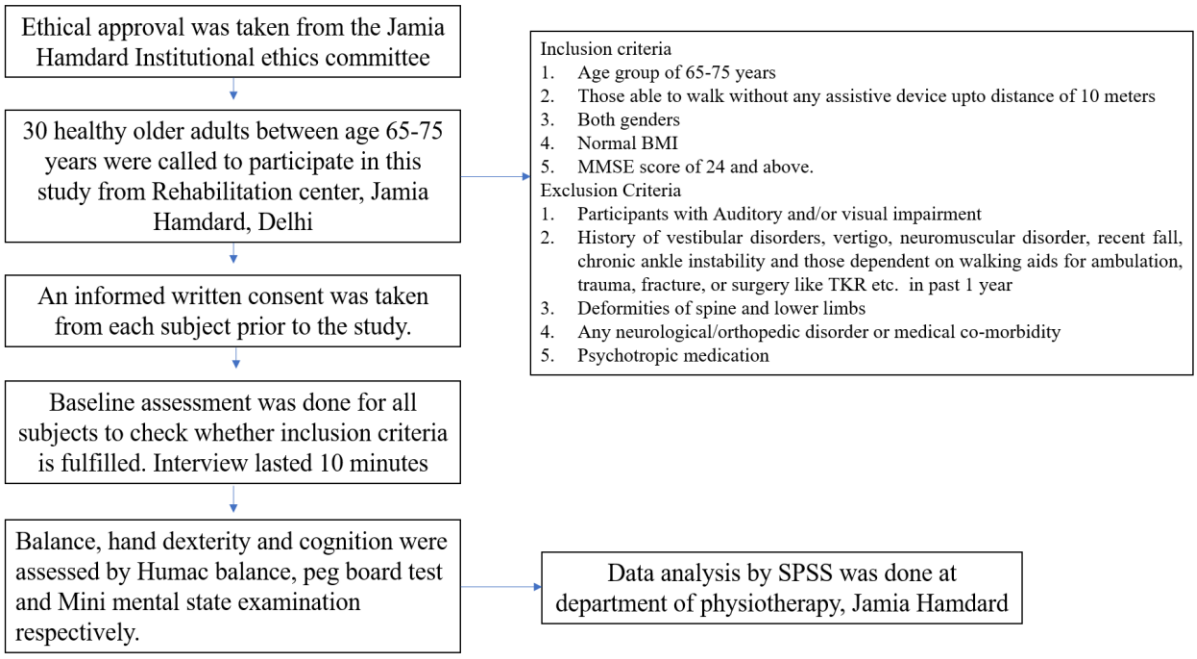
Outcome Measures:

The outcome measures in the study - Balance, hand dexterity and cognition were assessed by Humac balance, 9 hole

pegboard test[14] and Mini mental state examination[15] respectively.

Procedure: Data collection was done at the Rehabilitation centre, Jamia Hamdard, Delhi. Base-line anthropometric traits as well as history for the participants was obtained by personal interview. Questions of the interview were closed-ended. Base-line anthropometric traits and history included; age, gender, occupation, past ailment history, drug history, typical personal manners, and motor or sensory abnormalities. Subjects(N=30) fulfilling the inclusion and exclusion criteria were asked to give their consent for participation after they were explained about the procedure of the study. Static and dynamic balance were assessed by computerized dynamic posturography performed on the Humac Balance board which utilizes transducers located in a force platform which measures vertical and horizontal forces that are produced by the body's movement around a fixed base of support. The score includes scores for Eyes Open Firm Surface (EOSS), Eyes Closed Firm Surface (ECSS), Eyes Open Foam Surface (EOFS) and Eyes Closed Foam

Surface (ECFS). Subjects were tested on two different surfaces (firm surface and foam with eye close and open on both surfaces) which were recorded in graphical form in software connected to standing surface with monitor through USB cable. The Mini-Mental State Examination [15] (MMSE) scoring was sone to assess cognition. The 9-hole peg board test was used to measures fine motor skills and hand-eye coordination. The test was administered by asking the subject to take the pegs from a container, one by one, and place them into the holes on the board as quickly as possible. After completing the task, participants must then remove the pegs from the holes, one by one, and replace them back into the container. The scores are based on the time taken to complete one cycle of the test activity, recorded in seconds.



Flowchart 1: Procedure of the study

Data analysis: The Statistical software IBM SPSS statistics 21.0 (IBM Corporation, Armonk, NY, USA) was used for the analyses of the data and managed on the Microsoft Excel. The significance value was less than or equal to 0.05. Values for measures of central tendency and dispersion to assess the sample were noted and Pearson's test for correlation was performed to find any relationship between dexterity, balance, and cognition.

Results: A total of 30 subjects (22 Males and 8 females) were recruited for this study. Table I shows the demographic characteristics of the study population. The humac balance apparatus gives score for Eyes Open Firm Surface (EOSS), Eyes Closed Firm Surface (ECSS), Eyes Open Foam Surface (EOFS) and Eyes Closed Foam Surface (ECFS). Table II shows the mean scores for hand dexterity (9-hole peg board test) and Balance (Humac balance).

The statistical analysis of the data showed significant correlation between Hand dexterity and EOSS (p=0.02), EOFS(p=0.03) and ECSS(p=0.00). ECFS score was not found to have significant correlation with hand dexterity (p=0.2). Table III shows the Pearson correlation coefficient and p value of balance and hand dexterity. Image 1 shows the scatterplot for correlation between balance scores (humac balance) on Y-axis and hand dexterity (9-hole peg board) on X-axis.

Mean Age	**70.53±3.20 years**
Mean Height	**162.5±4.36 cm**
Mean Weight	**60.6±7.68 kg**
Mean BMI	**24.21±1.64 kg/cm^2**

Table I: Demographic characteristics of group

Variables	**Mean±SD**
Hand-dexterity	**42.9±8.9**
Balance	**79.53±7.2**

Table II: Mean and SD for scores of hand dexterity and balance

Balance	**Hand Dexterity**	**P value**
EOSS	**-0.4148**	**0.02**
EOFS	**-0.3804**	**0.03**
ECSS	**-0.482**	**0.00**
ECFS	**-0.2248**	**0.23**
Abbreviations: Eyes-Open-Firm-Surface (EOSS), Eyes-Closed-Firm-Surface (ECSS), Eyes-Open-Foam Surface (EOFS) and Eyes-Closed-Foam-Surface (ECFS)		

Table III: Pearson correlation co-efficient and p-value of balance and hand-dexterity

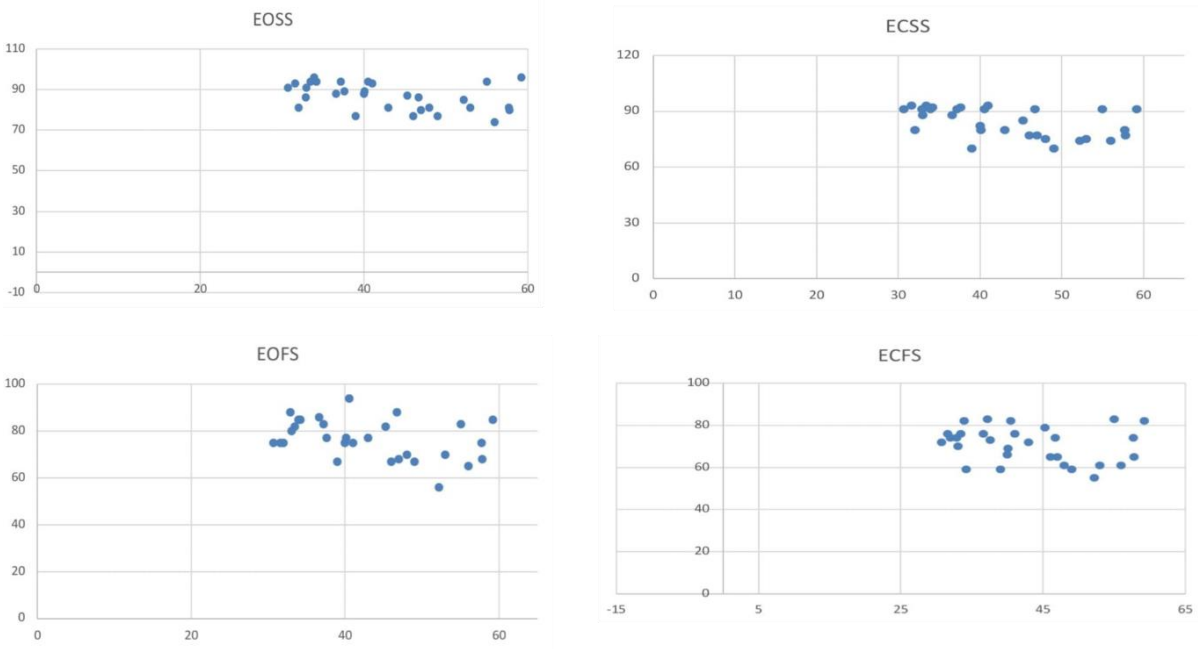


Image 1: Scatter Plot for correlation between balance scores (Humac balance) on the Y-axis and hand dexterity (9-hole peg board) on X-axis

Discussion:

This study was undertaken to investigate whether there exists any correlation between hand dexterity, balance and cognition in geriatric population. Results have shown significant correlation between Hand dexterity and EOSS (p=0.02), EOFS(p=0.03) and ECSS(p=0.00). ECFS score was not found to have significant correlation with hand dexterity (p=0.2)

Age-related reductions in cognitive control and the processing of afferent information for coordinated behavior are demonstrated to result from deteriorating inhibitory mechanisms and decreased optimum (attentional) monitoring of sensory feedback information, according to studies. It is hypothesized that a decline in the quality of afferent information from the periphery and/or an increase in the threshold for its detection will alter the available contextually related input for coordinated behavior because ageing causes an overall deterioration of sensory functions [16,17,18,19].

Our findings are interestingly validated by earlier research showing that ageing may increase the likelihood of cognitive impairment, poor coordination, and balance issues. Rattanawan P. revealed in his study showed in older persons with MCI, dominant hand dexterity had a significant impact on domestic and complicated ADL. There were lateral asymmetrical motor decrease age-related alterations, particularly in cognitive activities. However, complicated cognitive activities may call for bimanual, non-dominant, and dominant hand dexterity.[20] Kang et al concluded that while controlling isometric pressures bilaterally with visual feedback, elderly individuals exhibit lower bi - lateral motor synergies than younger adults. The ability to synergistically coordinate and choose the

best pairings of bilateral force productivities over numerous trials may deteriorate with age.[21] These findings suggested that all these factors are responsible for reducing the overall QOL of the individual.

Another key finding is that, despite claims that cognitive decline does not become obvious until around the age of 60, findings reveal that alterations in cognition can emerge considerably sooner. [22].

There are a few limitations to this study. First, the results might have been affected by various biases, such as recall bias (fall history relied on participant recall) and selection bias (participants might have been particularly likely to live healthy lives). Second, our study had a smaller sample size. Third, some of the participants were asked to repeat failed trials that may have caused training effects. In future studies, can be taken up on larger sample sizes and age-based subgroups can be created, longitudinal studies could determine how postural control is related to the independent finger control.

Conclusion: The study concluded that there was a statistically significant correlation between balance and hand dexterity in the geriatric population with MMSE score over 24.

Acknowledgements: The completion of this study was possible even in the hazardous pandemic era of Covid-19 due to continuous support from Department of Rehabilitation sciences, Jamia Hamdard University (New Delhi, India),

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THE PREVALENCE OF MEDIAN NERVE COMPRESSION AMONG COLLEGE GOING STUDENTS DUE TO SMARTPHONE USAGE: AN OBSERVATIONAL STUDY

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ABSTRACT

Introduction: The smartphone has become an integral part of our daily life. Smartphones give us full control, directly at our fingertips. This addiction to mobile phones has increased during the recent epidemic of Covid 19 especially in college students. It has been seen that with the increase in Mobile Phone usage, there is a more chance of having wrist pain which results in pain and disability of the wrist joint. A study has been conducted to see the effect of excessive use of smartphones on carpal tunnel and median nerve. The study concludes that increased smartphone usage can cause or trigger carpal tunnel syndrome (CTS), the reason behind developing CTS can be because of excessive pressure on the carpal tunnel. Aim: To assess the prevalence of median nerve compression among the college-going students due to smartphone usage. Methodology: This was an observational study. A total of 394 college students of Delhi in the age group 18-25 years were taken. The average screen time per day was monitored through inbuilt android application. The smartphone addiction was analysed by SAS-SV scale and median nerve compression was analysed through Boston Carpal Tunnel Questionnaire (BCTQ) that has two subscales i.e., SSS and FSS for analysis of symptoms and functions respectively at wrist joint. The participants who were addicted to smartphone and also have score of SSS $\geq$ 1.72 and FSS $\geq$ 1.32 have undergone special nerve provocation test to confirm the median nerve involvement. Results: In a study with 394 participants, it was found that 89 of them were addicted to smartphones while 305 were not. Among the addicted participants, 47 were females, and 42 were males, suggesting that females had a higher addiction rate than males. The study also revealed that 22.6% of all participants were in the smartphone addiction group, while the majority (77.9%) were not. Dominant hands were more affected and males are more prevalent towards MNC. Prevalence rate of signs of MNC was determined to be 13.5%. Conclusion: This shows that overuse of smartphones for long hours and its addiction can play a role in the causation of median nerve compression at the wrist joint. So, college students are at minor risk of developing CTS, especially males and dominant hands are more likely to be affected. Therefore, we should prevent and minimize smartphone addiction so that this prevalence can be avoided. Also, investigatory tests such as nerve conduction tests, diagnostic ultrasonography, grip strength tests can be conducted for a clearer picture.

Key Words: *Smartphone addiction, Median nerve compression, Boston Carpal Tunnel Questionnaire, Smartphone Addiction Scale- Short Version*

Introduction

The smartphones have become an essential part of our daily lives, providing us with various functionalities such as calendars, reminders, email, and instant access to information. The COVID-19 pandemic has led to an increase in smartphone usage, with a 39 percent rise in the number of hours spent on them in 2020.[1]

A study has been conducted that examined the impact of excessive smartphone usage on the development of carpal tunnel syndrome (CTS) and wrist pain. The study found that increased smartphone usage can cause or trigger CTS due to excessive pressure on the carpal tunnel. Furthermore, another study suggests that there is a strong association between smartphone usage and wrist pain. [2] Carpal tunnel syndrome (CTS), a mononeuropathy that results from the compression of the median nerve at the carpal tunnel. The clinical features of CTS, including pain, tingling, and weakness in the hand, which worsen at night and result in clumsiness during the day. two common clinical tests used to diagnose CTS, the Phalen test and the Tinel test, which both involve provocation of the median nerve. [3]

High prevalence rates and relative risks associated with certain occupations that involve repetitive and forceful gripping, as well as highly repetitive or forceful movements of the hands. These activities are believed to increase the risk of developing carpal tunnel syndrome (CTS), a condition in which the median nerve in the wrist is compressed, causing pain, tingling, and weakness in the hand and wrist. There is strong evidence to support the idea that prolonged and highly repetitive flexion or extension of the wrist significantly increases the risk of developing CTS. [4]

The objective of a study is to investigate the potential correlation between smartphone use and median nerve function in college students. The study aims to determine which gender and hand may be more susceptible to the effects of smartphone usage on the median nerve. This study is likely conducted to identify the potential risks associated with smartphone usage and raise awareness about the importance of responsible device usage to prevent any adverse effects on nerve function. [5]

Objectives

- To evaluate total numbers of hours of smartphone usage.
- To identify the effect of mobile phone usage on the median nerve.
- To evaluate which gender group and hand is more prone to median nerve compression (MNC).

Methodology*

An observational study that was conducted among 394 college students of Chandiwala Estate campus in Delhi. participants were selected through convenient sampling.The study aimed to investigate the potential relationship between smartphone usage and median nerve compression. In this study utilized an inbuilt android application to monitor the average screen time per day of the participants. The participants were also evaluated for smartphone addiction using the SAS-SV scale and for median nerve compression using the Boston Carpal Tunnel Questionnaire (BCTQ), which has two subscales - SSS and FSS - for analyzing symptoms and functions at the wrist joint.

The study further identified participants who were addicted to their smartphones, they were subjected to a special nerve provocation test to confirm the involvement of the median nerve. The study aimed to establish a possible correlation between smartphone addiction, median nerve compression, and associated symptoms and functional impairment. By conducting a nerve provocation test.

Results

The results of a study that examined the relationship between smartphone addiction and median nerve compression in 394 college students aged 18-25 years in Delhi. The study found that 89 participants were addicted to smartphones, while 305 were not. Among the addicted participants, 47 were females, and 42 were males, indicating that females were more addicted than males. Additionally, 22.6% of the participants were in the smartphone addiction group, while 77.4% were not.

Moreover, the study found that dominant hands were more affected than non-dominant hands, and males were more affected than females in both the SSS and FSS scales of BCTQ.

Furthermore, out of the 22 participants who underwent a specialized nerve provocative test, 12 of them were diagnosed with median nerve compression. Among those diagnosed, there were 8 males and 4 females. The prevalence rate of this condition was determined to be 13.5%. These findings indicate that smartphone addiction can have a significant impact on median nerve compression, leading to functional impairments and symptomatic presentations.

Discussion

This study aims to assess the prevalence of the relationship between smartphone addiction and its effect on median nerve in college students. A total of 405 research forms have been received from college students, aged 18-25, out of which 394 have been selected. The average screen time per day used by participants is in the range of 3-6 hours, with 283 participants having screen time of more than 3 hours. Similar results have been found in other studies.

22.6 percent participants have been found smartphone addicted with the help of SAS-SV scale whereas 77.4 percent were non-addicted to smartphones. 24.2 percent of females and 21 percent of males are found to be addicted to smartphones. Although the difference is not major, we can say females are more prone to overuse smartphones. Similar findings have been reported in previous studies done in various countries (e.g.; López-Fernández et al., Tateno M et al., Luk et al.) [6–8]. However, this is in contrast with the study done by Chen B et al.[9]

Dominant hands are more affected as compared to non dominant hands in the participants and males are more affected as compared to females in both SSS and FSS scales of BCTQ. Similar findings were found in a study done by Sharan D. et al.[10] where male participants were most affected due to extensive use of handheld devices.

22 participants have undergone special nerve provocation tests for the median nerve. 8 were female and 14 were males The results of these tests can be seen. 12 of them were diagnosed with median nerve compression (MNC) in which 8 were males and 4 were females. 1 female participant confirmed our findings of the CTS through the gold standard test of diagnosis which is NCV testing. The prevalence rate of MNC due to over usage of smartphones among college students comes out to be 13.5 percent. Similar results can be seen in the study done by Brean Behee and Judy R. Wilson[11] where 6 male and 1 female individuals (16%) showed signs of MNC. Also the same prevalence of CTS can be seen in the general population, a study done by Atroshi I et al.[12]

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Association between the Power Grip Strength and Sleep on performance in Athletes: A Review

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ABSTRACT

Background: Handgrip strength has been shown an indispensable biomarker for athlete and sleep is an important aspect in athletic performance and mental health. However, the association between sleep and grip strength on performance has been less studied in athlete. **Objective:** The objective of this review is to determine how power grip strength and sleep relate to performance in order to better inform coaches, trainers, physiotherapists, and players about the importance of these factors and how they have an effect on performance.

Methodology: Comprehensive literature in the English language were identified by searching through databases and search engines like Research Gate, Pubmed, Google Scholar, and Science Direct.

Conclusion: Additional high-quality trials are necessary to provide a more reliable basis for thinking about the association.

1. Introduction

According to scientific concepts, a team's psychological preparation is just as important in today's competitive atmosphere as teaching the different game mechanics because sports are psycho-social activities. There is a greater emphasis these days on the use of psychological principles to improve sports performance. Sports psychology is the study of how psychological factors influence an athlete's performance, as well as how exercise and sports affect athletes' psychological health. Players were classified as effective or unsuccessful based on their psychological profiles and abilities to perceive higher performance [(1)].

Both self-assurance and psychological state anxiety were important in distinguishing between successful and unsuccessful competitors [(2)]. It helps to create sports-specific knowledge, confidence, awareness, and motivation, which may be used to track performance and strengthen connections between coaches and athletes [(1)]. Athletes work hard to improve their sporting performance and overcome hurdles [(3)].

Although psychological variables have always been important in sports, they did not become particularly important until about 20 years ago. To get the most out of practise and competition, it is now unimaginable for a sports team not to engage with a psychologist [(4)].

Sports participation has been related to a number of psychological and physical benefits, including improved heart health, increased levels of self-esteem and body satisfaction, and improved emotional well-being [(5)]. The importance of fitness in any sport cannot be overstated. Physical fitness will help you play better. Cricket, as a team sport, necessitates a high level of fitness for a professional player to perform successfully, and all players must be active for up to five days during a match [(6)].

1.1 Sleep and its importance for athletes

Sleep is one of the most fundamental biological processes of a person. It is a process in which the

body's tissues recover from the metabolic activities of the day and prepare for the next day's efficient physiological functioning [7]. Athletes' ability to obtain enough sleep can be influenced by a range of circumstances, including their training and competition schedules, travel, stress, and academic duties [8]. Athletes may place less emphasis on sleep than on other training requirements. Our modern culture holds that the ability to function on little sleep is a sign of strength and is worn as a badge of honour [9].

Insufficient sleep duration can have an impact on metabolism, the endocrine system, athletic and cognitive outcomes, as well as the perceived effort required for exercise [10]. It is widely acknowledged that proper sleep is required for elite athletes to recover and perform at their peak. Despite ample evidence of sleep impairment in professional athletes, particularly during competition, sleep is usually given lower attention by athletes. Young, healthy people (18-25 years old) should receive 7-9 hours of sleep every night on average; however, athletes should get 8-10 hours to compensate for the added demands of training and competition [11]. Running's repetitive eccentric muscle contractions cause a specific form of tiredness that necessitates a lengthy recovery period [12].

Furthermore, it was shown that changing the regular sleeping environment had a negative impact on sleep quality [13]. Previous research on the use of electronic devices, sleep, and sports performance has found negative repercussions due to late-night light exposure altering the circadian cycle of sleep [14]. Training session and competition scheduling, as well as poor sleep initiation as a result of increased arousal prior to competition or the use of electronic devices before night, are common sleep-affecting factors [15].

Given the growing body of data on sleep and sports performance and recovery, athletes can use a variety of management approaches to treat sleep issues. It is vital to educate players about the value of sleep and how getting more sleep can improve their performance on the pitch as well as their personal health. Because this demographic may be unfamiliar with these concepts, addressing appropriate sleep habits and sleep hygiene may be beneficial. Furthermore, various elements in athletes' schedules put them at risk of disturbing their sleeping habits [16].

1.2 Sleep and various system effects in athletes

Insufficient sleep duration can have an impact on metabolism, endocrine function, athletic and cognitive performance, and increase perceived effort during exercise. Athletes tend to sleep less and less efficiently than nonathletes. Athletes commonly experience little or inadequate sleep, which can be attributed to time constraints, physical demands, or developmental needs. Sleep deprivation affects athletes' physical and mental performance, risk of injury and recovery, physical and mental health, and medical and mental wellness [10].

Sleep deprivation has a substantial impact on several physiological systems, including the cardiovascular, neurological, and endocrine systems. Regardless of the sport, sleeping longer provides benefits for performance. The quality and intensity of athletes' sleep must be considered when coaching them before, during, and after events. Coaches, psychologists, and team management must get sleep education training in order to change habits and increase team performance [7].

Neuromotor system

Those with optimal neuromotor performance have been demonstrated to excel in sports. Energy transfer and integration of the neuro-musculoskeletal system is a primary requirement for efficient sports performance, which is dependent on recovery from continuous exhausting physical performance, and thus sleep plays an important role in the recovery of neuro-musculoskeletal overload and energy replenishment for future performance. Sleep deprivation has a wide range of effects on human performance and brain functioning that manifest at various levels of description. Sleep deprivation mostly impacts executive operations on a macro level, particularly when executing novel tasks. One of the macroscopic and mesoscopic effects of sleep deprivation on brain activity is a reduced

cortical reaction to incoming stimuli, implying impaired attention. Lack of sleep is associated with greater amounts of adenosine, a neuromodulator having a broad-based inhibitory influence on brain function. While a decrease in cortical acetylcholine tends to underpin the effects of sleep loss on macroscopic brain activity, suppression of cholinergic nuclei appears to be particularly relevant [7, 17].

1.2.2 Cardiovascular system

Good quality sleep is linked to lower cardiovascular morbidity, while adequate sleep is linked to greater cardiovascular endurance. The neurobiology underpinning the association of poor sleep with an increase in angina pectoris and cardiac arrhythmias is shown by reports linking brainstem cardiovascular control, vasospasm, and wakefulness to dopamine lateralized to the right hemisphere. The fact that unilateral naris closure lowers dopamine levels and that paying close attention to breathing pauses generated by dopamine has a major impact on angina pectoris supports this theory. Because of these findings, behavioural interventions that alter the respiratory cycles of persons with sleep disorders and cardiac arrhythmias may be adjusted to reduce the likelihood of clinical occurrences. This strategy is strengthened by stress adaption, as evidenced by slower, deeper breathing, and contributes to a 6.5-fold reduction in mortality [18].

Sleep length and quality are associated to contractility, heart rate recovery, and myocardial oxygen consumption. Poor sleep quality has a deleterious impact on autonomic nervous system (ANS) activity, notably that of the cardiovascular (CV) system [19].

1.2.3 Respiratory system

Good sleep improves autonomic system and hormonal regulation, and it has been linked to the longevity of respiratory control and regulation during exercise. Sleep loss changes stress processes, perhaps increasing susceptibility to stress-related disorders. According to epidemiological research, sleep disruptions and sleep deprivation may be substantial risk factors for a number of illnesses, including cardiovascular disease and mental problems that are usually associated to stress. Good sleep has been shown to enhance maximum oxygen consumption, efficient gaseous exchange, anaerobic and ventilator thresholds [20, 21].

1.2.4 Metabolic system

The replacement of expended resources during exercise is essential to the energy cycle continuum. The energy cycle is hampered and the energy continuum comes to a halt if replenishment is insufficient. Sleeping well improves energy turnover by assisting in the replacement of expended energy sources during activity. Sleep is required for cerebral glycolysis modulation as well as the reduction of lactic acid-induced central tiredness. Sleep deprivation has been shown to reduce insulin sensitivity and glucose homeostasis [22]. Sleep deprivation causes energy transfer to occur primarily via peripheral glucose metabolism, resulting in a lower lactate threshold and early tiredness, limiting genuine athletic ability. Sleep deprivation can have a significant impact on athletic performance, especially during extended, submaximal training. Sleep disruption may also affect inflammation, immunity, pain perception, learning, memory, and cognition. Furthermore, chronic partial sleep deprivation may disrupt glucose metabolism and neuroendocrine function, affecting appetite, food intake, and protein synthesis. These factors can eventually have a negative impact on an athlete's nutritional, metabolic, and endocrine status, potentially lowering athletic performance [23].

1.2.5 Immune system

The energy allocation (EA) model describes behavioural strategies that improve reproductive success by optimising energy use over time. All animal species, according to this theory, share a common sleep function that redirects waking energy use towards sleep-dependent biological investment. Endotherms' REM sleep evolved to improve energy allocation for somatic and CNS-related operations by lowering skeletal muscle tone and thermoregulatory defences. Sleep replenishes energy reserves, allowing for stronger immune responses to dormant illness during the night [24].

During sleep, adaptive immunity is at its peak. Sleep problems are frequently linked to dysregulated inflammatory processes. During sleep deprivation, increased levels of inflammatory markers such as interleukins (IL—1), cytokines, C reactive protein, leukotrienes, growth hormone, and tumour necrosis factor (TNF) reduce immune systems and increase the likelihood of infection in athletes. According to research, sleep deprivation is associated with a decrease in T cell count and an increase in inflammatory markers [25].

1.2.6 Endocrine system

Athletes frequently experience hormonal imbalances. Sleep deprivation can contribute to hormonal imbalances in athletes. Sleep deprivation affects many hormones in athletes, including growth hormone, thyroid, adrenaline, and serum cortisol. Sleep slightly suppresses the basal activity of the major autonomic neuroendocrine stress systems. In response to disturbance or sleep deprivation, the activity of these stress systems will increase in the direction of the levels found during typical wakefulness. Sleep deprivation may increase the activity of the stress systems further depending on the type of wakefulness itself, that is, depending on both the mental load (sensory input, thoughts, emotions) and physical activities (voluntary or forced). The activity of stress systems frequently returns to baseline during the subsequent recovery sleep. However, a lack of recovery sleep can cause stress systems to partially reactivate the following day [20].

These chemicals have an effect on sleep, particularly cortisol and growth hormones. Adrenal insufficiency has been linked to overtraining. Stress and pain tolerance failure have been linked to epinephrine and nor epinephrine. This problem has been addressed in sleep-deprived, overtrained athletes. Overtraining can be a beneficial component of healthy training if done for a short period of time. Chronic overtraining is the root cause of major health problems such as adrenal insufficiency [26].

1.3 Sleep and athletic performance

Sleep is an important aspect in athletic performance and athlete mental health. Sleep deprivation is a significant predictor of injuries, particularly concussion. Cardiorespiratory and psychomotor effects, which necessitate continuous and steady performance throughout time, are just two of the long-documented deleterious effects of sleep deprivation on sports performance [10]. Both sleep deprivation and time of day have an effect on performance. A growing body of research has focused on the impact of sleep and circadian rhythms on athletic performance. The most intriguing fact is that athletic performance appears to be best in the evening, when core body temperature is generally at its peak. Sleep deprivation has been shown to reduce performance, but sleep extension appears to improve performance. The effects of circadian rhythm desynchronization depend on the local time of performance [27].

Sleep therapy for athletes have been shown to improve their physical power and speed, cognitive function and reaction time, emotional wellness, and other areas. Sports organisations should establish programmes to promote sleep health at the individual, team, and system levels [10].

1.4 Hand Grip Strength and its measurement

The shoulder and elbow complexes must be strong in order for the hand to function properly in space and carry out the task. These structures are required for the hand to function. The muscles in the hands and arms have a significant impact on grip strength [28]. The hand is a complex anatomical mechanism with 27 bones, 15 joints, and approximately 30 degrees of rotational and translational mobility that is used to grasp and exert force on objects of various sizes and shapes, as well as perform a variety of complicated, highly coordinated activities [29].

Despite the fact that it is critical for injury prevention and strength progression, the strength of one's grasp is frequently overlooked or taken for granted [30]. The power grip is achieved by the patient flexing their fingers as tightly as they can under normal biokinetic conditions, using their maximum voluntary force [31]. As a result, hand grip strength can be used to predict a player's

overall physical strength [30].

The ability to generate force is defined as strength. It is an essential component of power generation, making it a possible predictor of athletic performance [32]. In the majority of sports, grip strength is assessed as part of hand function. Grip strength is one of the best measures of a limb's total strength because it is the combined performance of multiple muscles that can be created during a single muscular activation. Grip strength is widely regarded as an objective measure of upper extremity functional integrity [33]. Maximum power grip strength is a common metric for determining how well the upper extremities perform [34].

Muscular strength is an important aspect of fitness because it allows people to perform a wide range of daily tasks as well as participate in sports throughout their lives. HGS is a good indicator of overall health because it frequently reflects overall muscle strength. This clinically relevant indication is linked to physical function, health/morbidity, dietary status, muscle mass, and morbidity. HGS can predict future outcomes such as mortality and reduced functional capacity even in adolescence [33].

The most commonly used equipment for measuring grip strength is the hand-held dynamometer. Hand-held grip dynamometry measures the muscle force produced by the forearm and hand flexor mechanisms [30]. A pinchmeter is used to assess the strength of finger pinches, while the Jamar dynamometer has been shown to produce the most precise and reliable measurements of grip strength [35]. Grip strength increased significantly when the elbow was kept at 90 degrees flexion rather than fully extended [36].

1.5 Impact of Hand Grip Strength on Performance

The precision grip, power grip, or a variation of these grips are used in the majority of hand movements that are specific to sports. HGS is thought to be a crucial characteristic for sports involving throwing (such as baseball, softball, cricket, American football, European football, rugby, handball, and water polo), bowling (both overhand and underhand), punching, clinching, and grappling, paddling (such as rowing, canoeing, and kayaking), and swinging a racket, stick, bat, or club (e.g. cricket, baseball, golf, tennis, squash, lacrosse, field hockey and, ice hockey). Basketball, volleyball, rock climbing, swimming, sailing, riding/driving (e.g., horses, bulls, mountain bikes, motorcycles, and race cars), and strength athletes are some other sports that call for a sufficient to high level of HGS (e.g. weightlifting, powerlifting, and strongman) [29].

2. Objectives:

The objective of the study is to review the evidence for the association between the power grip strength and sleep on performance in athletes.

3. Methodology:

The purpose is to describe the research design and research setting of the present study, explain the sample selection, and describe the procedure of data collection by using the outcome measures and assessing predictor variables for the present study.

3.1 Search Methods

Comprehensive literature in the English language were identified by searching through databases and search engines like Research gate, Google scholar, Science Direct, pubmed.

3.2 Search, screening, and selection results

The initial results of the database search were 69 records altogether. 15 papers were fully analysed after duplicates were eliminated and the remaining 54 articles were reviewed (of which 39 were found to be invalid). Nine articles in total were picked as being acceptable for this review.

3.3 Description of included studies:

Five studies were done to assess the sleep as primary outcome and 4 studies were done to assess the hand grip strength as their primary outcome.

7 studies done on sports population and 2 study on healthy individuals.

It became clear that the primary outcome measures could be classified into 2 categories:

Sleep

(a) Sleep quality relates with the health related quality of life [37]

(b) Sleep quality relates with the sleepiness and stress [13]

(c) Sleep relates with performance [11]

(d) Sleep relates with heart rate, blood pressure [19]

(e) Daytime sleepiness relates with reaction time, mood and performance [38]

2. Hand Grip Strength

(a) HGS relates with height and weight [39]

(b) HGS relate with shoulder injury [28]

(c) HGS relate with shoulder power [31]

(d) HGS relate with Hand Grip Endurance [40]

Table 1: Studies included in the review

STUDIES INCLUDED IN THE REVIEW										
S.NO.	YEAR	AUTHOR	COUNTRY	SAMPLE SIZE AND AGE	POPULATION	OBJECTIVE	METHODOLOGY	PRIMARY OUTCOME	MEASUREMENT OF PRIMARY OUTCOME	CONCLUSION
1.	2023	R G Burgos, *et al*	Chile	71 Mean Age 16.9 years	Young athletes	Examined the link between sleep quality (SQ) and health-related quality of life (HRQOL) in young athletes in a sports competition	Cross-sectional, analytical study on 71 young athletes who participated in a competition.	Sleep Quality (SQ) Health Related Quality Of Life (HRQOL)	Pittsburgh Sleep Quality Index (PSQI) Short Form (SF36 v2) Health Survey	Poor sleep quality is associated with a worse perception of HRQOL in young athletes during a competition, especially in domains related to their mental health.
2.	2021	O Saidi, *et al*	France	32 Adolescents	N1- 16 Elite Rugby players N2- 16 age matched non athlete (control group)	Assessed week and weekend sleep and schedule of activities in elite adolescent rugby players	This study assessed week and weekend sleep and schedule of activities in elite adolescent rugby players during the in-season competitive phase compared with age-matched non-athlete controls.	Anthropometry and body composition Sleep Quality Sleepiness Stress	Body Mass Index (BMI) Pittsburgh Sleep Quality Index (PSQI) Epworth Sleepiness Scale (ESS) Perceived stress scale (PSS-10)	Both groups showed insufficient sleep duration during the week (<7 h). Only GC caught up on their sleep debt during the weekend.

3.	2020	K McEwan, *et al*	South Africa	26 B/W 28.6 +_ 4.0 years;	Elite South African cricket players	To investigate the sleep behaviours of South African cricketers	This study investigated the sleep behaviours of 26 elite South African cricket players during home and away competition. Players completed an altered version of the Core Consensus Sleep Diary every morning post-travel, pre-match and post-match.	Sleep Performance	Morningness-Eveningness Questionnaire Athlete Sleep Behaviour Questionnaire (ASBQ) Batting Strike Rate Bowling Economy	Postmatch total sleep time was significantly shorter compared to post-travel and pre-match. Post-travel sleep onset latency and sleep efficiency were significantly shorter and higher at home than away respectively. Longer sleep onset latencies and shorter total sleep times were significantly associated with poorer One-Day International and Test batting performances
4.	2018	A R Rukadikar, *et al*	India	30 B/W 15-25 years	Healthy cricket players	To determine correlation of hand grip strength with height and weight in cricket players.	Healthy cricket players who regularly practicing from last 3 years at university level	Hand Grip Strength Standing height Weight	Sahens hand grip digital dynamometer Scale mounted on a wall Standardized weighing scale	It was found that there was positive correlation observed between hand grip strength with height and weight in cricket players.
5.	2016	P Sathya, *et al*	India	80 B/W 17-19 years	N1- 40 cricketers without any soft tissue injury of shoulder N2- 40 cricketers	To evaluate the affection of grip strength in cricketers who are having	A cross sectional survey was carried out on 80 cricketers, divided into 2 groups and evaluate the	Grip Strength	Hydraulic Hand Dynamometer	A reduction in grip strength is found on the dominant hand and non-dominant hand, in

					who had soft tissue shoulder injury	soft tissue injury of shoulder.	grip strength.			cricket players who had soft tissue shoulder injury on the dominant side.
6.	2016	P Sathya, *et al*	India	75 Age group 17-19 years	inter-collegiatemale cricket players 17 subjects of 17 years; 35 subjects of 18 years 23 subjects of 19 years	To find the correlation between the hand grip strength and the shoulder power in the inter-collegiate male cricket players	All the participants were assessed for the height, weight, BMI, the hand grip strength of the dominant hand and the non-dominant hand	Shoulder Power Hand Grip Strength	Closed Kinetic Chain Upper Extremity Stability Test calibrated hand held dynamometer	There is a positive correlation between hand grip strength and shoulder power, while training cricket players both should be given due importance for better performance in the game.
7.	2016	A Molouki , *et al*	Iran	44 B/W 18-25 years	N1-22 Massage Group N2- 22 Passive Movement Group	To examine the immediate effects of a single massage session on hand grip strength and endurance after isometric exercise in healthy young men under controlled conditions	Subjects were randomized to receive either massage or passive movement intervention. Hand grip endurance and hand grip strength in both groups were recorded using a Jamar hand grip dynamometer and a digital chronometer before and after the intervention.	Hand Grip Strength and Hand Grip Endurance	JAMAR 5030 J1 hydraulic dynamometer and digital chronometer	Immediately after 1 session of massage to the forearm and hand, the grip endurance improved in a group of healthy young men.
8.	2014	M Yuksel, *et al*	Turkey	113	Healthy individuals N1- 65 Good Sleepers N2- 48 Poor	To compare the heart rate, blood pressure at rest and during	In this cross-sectional study, all individuals underwent a Treadmill Stress Test and	Sleep Quality Heart rate Blood pressure	Pittsurgh Sleep Quality Index (PSQI) Indirect arm–cuff oscillometric sphygmomano	The poor sleepers showed higher resting HR, higher diastolic BP, similar

					Sleepers	exercise and heart rate recovery in good sleepers and bad sleepers.	had normal baseline, exercise electrocardiograms and assessed for sleep quality.	Heart rate recovery	meter Heart rate recovery index	systolic BP, more frequent hypertensive response to exercise and less HR increase with exercise compared with individuals who reported good sleep quality
9.	2011	C D Mah, *et al*	California	11 Mean age 19.4 ± 1.4 years	Healthy Basketball Players	To investigate the effects of sleep extension over multiple weeks on specific measures of athletic performance as well as reaction time, mood, and daytime sleepiness.	Subjects maintained their habitual sleep-wake schedule for a 2-4 week baseline followed by a 5-7 week sleep extension period.	Basketball Performance Reaction time Levels of daytime sleepiness Mood	Record the timed sprint and shooting accuracy. Psychomotor Vigilance Task (PVT) Epworth Sleepiness Scale (ESS) Profile of Mood States (POMS)	Improvements in specific measures of basketball performance after sleep extension indicate that optimal sleep is likely beneficial in reaching peak athletic performance.

Result:

1. Power Grip Strength

The author discovered a link between power grip strength and performance, which is significant for athletes. Studies met the inclusion criteria and were reviewed regarding the effects of power grip strength on performance. More research is required as limited studies were conducted on few sports. The author suggests that programmes for developing hand grip strength be planned at various levels, including school, college, university, state and more such data should be documented for the conclusive results.

2. Sleep

In the current review, the author discovered a beneficial relationship between sleep and performance; getting enough sleep enhances an athlete's performance and gives their bodies enough time to recover. To give a more solid foundation for thinking about the association, additional high-quality trials are required. The relationship between sleep and performance needs to be studied more.

Discussion:

This review's main goal is to evaluate the association between the power grip strength and sleep on performance in athlete. Results didn't show a lot of dependable proof of noticeable improvement in performance. Some studies

conclude that power grip strength as an important factor for better performance [31], but more research must be done for the definitive results.

Studies in different countries were conducted on sleep of athlete and support that sleep plays a vital role in performance and affect the various systems of the body which directly or indirectly affect the performance [11, 19, 38] few reliable indicators of a performance improvement were found in the results but not much reliable evidences.

Limitations

The drawback in this review was publication bias. Reviews should ideally cover all studies, including unpublished research, regardless of language. Due to resource and linguistic constraints, only English language publications were included in the review; no attempt was made to locate unpublished trials. However, it is also acknowledged that unpublished data may be biassed. The methodological excellence of the included trials is typically assessed by two or more reviewers. Unfortunately, the methodological quality assessment was only performed by one reviewer. Also blinded was the evaluation. Blinding can be difficult to complete, takes time, and may not significantly affect the results of a review, even though there is some evidence that blinded evaluations of the quality of trials may be more reliable than unblinded evaluations.

Conclusion:

Additional high-quality trials are necessary to provide a more reliable basis for thinking about the association. More research must be done to determine the relationship between power grip strength and sleep and how it affects an athlete's performance in different sports. In trials, their impact on performance should be precisely documented, and when assessing outcomes, adjustments to the outcome parameters should be taken into consideration. More thought should be given to these areas as well, as randomization methods and establishing adequate statistical power were consistently subpar throughout the included studies. In order to better inform decisions about athlete training, trials should evaluate and record not only the variations in sports performance averages but also the distribution of outcomes. There aren't enough high-quality randomised controlled trials demonstrating the relationship between power grip strength and sleep on performance in athletes; more research is needed. This is partly due to the variety of relationships between power and sleep with other factors mentioned in the literature.

Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Authors' Contributions

All authors contributed to the research design, data collection, data analysis, and manuscript formatting, drafting, and critical revision; gave final approval of the version to be published; and agreed to be held responsible for all facets of the work.

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PREVALANCE OF FOOT AND ANKLE MUSCULOSKELETAL CONDITION AMONG DESK JOB WORKERS

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Abstract:
Background: Desk job workers are known to be at an increased risk of developing musculoskeletal disorders (MSDs) such as those affecting the lower back, upper limbs, neck and shoulders. However, there is limited research on the prevalence of MSDs affecting the foot and ankle in this population. To address this knowledge gap, a study was conducted to assess the prevalence of foot and ankle MSDs among desk job workers, as well as identify potential risk factors. Methods: A self-administered questionnaire incorporating the Foot and Ankle Outcome Score (FAOS) was distributed to eligible subjects working as desk job workers, out of which 120 questionnaires were found completely filled and 25 questionnaires were found partially filled and thus not included in the study. A convenient sampling method was used, subject information regarding age, gender, height, weight, work experience etc. were obtained through subject in take form. We analysed the data through MS Excel. Results: According to the study findings, a notable proportion of participants, specifically 18.33%, reported experiencing musculoskeletal issues affecting the foot and ankle. Furthermore, the prevalence of affected individuals differed between genders, from 48 females and 72 males, 25% of female participants and 13.88% of male participants reporting such issues respectively. FAOS were significantly correlated with working hours and age. Conclusion: This study concluded that few participants were affected with ankle and foot musculoskeletal problems. Desk job workers who were older female and having more experience displayed higher risks for these disorders and should be given special attention. We recommend ergonomic programs, self-management, psychological health training and treatment strategies for ankle and foot MSDs.

Key Words: *Desk job Workers, Musculoskeletal Disorders*

Introduction/ Background

Office employees, who play essential roles in diverse organizations, including higher education institutions, have been documented to be impacted by work-related musculoskeletal disorders (WMSDs) in multiple countries.[1]

Musculoskeletal disorders are prevalent worldwide and are the second most frequent reason for work-related disability. The consequences of WMSDs range from symptoms to significant impairment, leading to a decrease in quality of life.[2]

Office workers are exposed to risk factors associated with WMSDs. To prevent WMSDs in the workplace, it is necessary to identify significant individual and occupational risk factors connected with symptoms and remove the contributing factors from the work environment.

Mechanical LBP typically arises from damage to the muscles, bones, tendons, ligaments, intervertebral discs, joints, or nerves in the lower back [3,4,5].

Postural imbalance occurs due to changes in the positioning of the feet, as the foot and ankle can adjust to improper balance arising from overlying structures or adaptive slopes.[6]

The complex relationship between low back pain and foot conditions involves the interconnected biomechanics of the lower back and foot. By comprehending these relationships, healthcare professionals can develop comprehensive treatment plans that address both areas of the body. Therefore, this study aims at exploring the prevalence of foot and ankle musculoskeletal conditions among desk job workers.

Aim and Objective

To find out Prevalence of Ankle and Foot musculoskeletal problems among desk job workers.
To find out if long sitting hours affect Ankle and Foot in desk job workers.

Methodology

120 desk job participants working in companies and banks in Delhi were included on the basis of inclusion and exclusion criteria.
Study design was observational study design. Convenient sampling method was adopted.
The questionnaire was distributed to the participants through email/WhatsApp after explaining the nature and purpose of the study.
Questionnaire consisted of:
Foot and Ankle Outcome Score (FAOS)
Consent form
Sociodemographic data form

Results

According to the study findings, a notable proportion of participants, specifically 18.33%, reported experiencing musculoskeletal issues affecting the foot and ankle. Furthermore, the prevalence of affected individuals differed between genders, from 48 females and 72 males, 25% of female participants and 13.88% of male participants reporting such issues respectively. FAOS were significantly correlated with working hours and age.

Discussion

The objective of our investigation is to determine the occurrence of musculoskeletal problems in the foot and ankle regions among office job laborers. Our examination provides insights on the impact of prolonged working hours on the ankle and foot caused by desk job work. The survey was administered to 120 office job employees across different industries, aged between 30-40 years with a minimum of 3 years of work experience.
In our study it is revealed that 18.33% is the prevalence rate of ankle and foot musculoskeletal conditions in desk job workers, revealing low prevalence rate. There are studies which revealed higher prevalence rate of musculoskeletal conditions in Ankle and Foot. Like, an article stated that the prevalence of Ankle and Foot Musculoskeletal conditions are 20.7%.[1]. In another research on Prevalence of Musculoskeletal Disorder among Computer Bank Office Employees in Punjab (India) stated that the prevalence of Ankle and Foot Conditions is 28.2%.[7]
Additionally, in association with gender, this study indicates that females have a higher likelihood of developing musculoskeletal conditions compared to males. A previous on work-related musculoskeletal disorders and associated factors among bank also supported our results, revealing that female participants were three times more likely to develop musculoskeletal conditions than males.[8] More research is needed to understand how gender relates to ankle and foot conditions in desk job workers due to inconsistent study findings.
Association with age stated a progressive increase in musculoskeletal disorders from younger to older age.[1] This study was supported by other studies like the study on work-related musculoskeletal problems and associated factors among office workers, which also support our result. A study revealed no such association between age and the prevalence of musculoskeletal disorders.[9]
In association with working Experience our study revealed that the prevalence of Ankle and Foot MSD increases with increasing work experience. Similar observations were reported in various studies, where prevalence increases

with work experience.[1] Another on "Perceptions of occupational hazards amongst office workers also revealed the same result as ours.[10]

A study revealed that prevalence tends to be increased with increase in working experience, hence supporting our result.[11]

Therefore, our study found that ankle and foot conditions are not as common as other musculoskeletal issues, but they can still greatly affect the lives of office workers. Women, older individuals, and those with more experience are at the highest risk. Other factors like working hours, body composition, and posture also play a role. Regular assessments of ankle and foot can help prevent these conditions.

Conclusion

This study concluded that few participants were affected with ankle and foot musculoskeletal problems. Desk job workers who were older female and having more experience displayed higher risks for these disorders and should be given special attention. We recommend ergonomic programs, self-management, psychological health training and treatment strategies for ankle and foot MSDs. Additionally, Proper footwear with cushioning and support, footrests, stretching exercises, low-impact exercises, and regular check-ins can prevent ankle and foot problems.

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SCREENING OF ATTENTION DEFICIT/ HYPERACTIVITY DISORDER IN ADULTS

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Abstract

Background: Attention deficit hyperactivity disorder is a neurodevelopmental disorder. Till now it has been considered as a childhood condition presenting with persistent pattern of inattentiveness, hyperactivity, and impulsive in nature. Although, there has been evidence of its persistence in adulthood in western countries. But due to dearth of research work and lack of awareness in India, ADHD in adults is still at a questionable stage. Unaware of their problem, these adults face many difficulties in their day-to-day life that affect and interfere with their personal, professional, and social relationships. Thus, the present study aims to evaluate the prevalence of ADHD in young adult population and study the variability of symptoms and psychological disorders among them. Methodology: A Cross sectional study design were Students from various professional colleges were recruited for the study. On the basis of the criterias of the study, 121 students were selected to proceed for screening. They were administered the Adult ADHD Self Report Scale (ASRS) and Wander Utah Rating Scale (WURS) to screen out adult ADHD. Type Of Study: Cross sectional study design Result: A total of 7 subjects (5.79%) fulfilled the criteria for adult ADHD. Conclusion: ADHD is prevalent among adult populations of college students.

KEYWORDS: *ADHD, Neurodevelopmental disorders, Hyperactivity, Attention disorder, Young adult population.*

INTRODUCTION

According to the Centres for Disease Control (CDC), development disabilities are a group of conditions due to an impairment in physical, learning, language or behaviour areas. These conditions start developing during the development period of an individual and usually lasting throughout lifetime, thus affecting day to day functioning. ADHD stands for Attention Deficit Hyperactive Disorder. It is a childhood-onset neurodevelopmental condition that was considered to be present in childhood age only. Although there have been studies suggesting of prevalence of ADHD in about 3-9% of school aged children and approx. 4% of adults worldwide.[1] It is a condition presenting with persistent pattern of inattentiveness, hyperactivity and impulsivity in nature. The condition is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development age. It is characterized by decreased attention, hyperactivity and acting hastily without thinking or impulsive in nature. This affects the learning, behavior and functioning in day-to day activities in daily life. In long term, it may severely impact upon a child's ability to achieve their educational potential, cause difficulty in managing social and home environment, interfere with interpersonal relationships and cause problems in finding employment.[2] Marked by an ongoing pattern of inattention and/or hyperactivity – impulsivity interfering with functioning or development, people with ADHD have trouble staying focused

on task, difficulty staying orientated, unfocused motor activity, frigidity, difficulty with self-control, etc, that are more severe and occur more often than other people of same age.[3] Also, it is associated with high rate of comorbid psychiatric problems, such as oppositional defiant disorder (ODD), conduct disorder, mood and anxiety disorder, sleep disorder, emotional dysregulation and substance use disorder, etc[4] The condition has been classified into three broad types on the basis of the dominance of presenting symptoms. These are predominantly inattentive, predominantly hyperactive-impulsive, and combined type. The radiological studies suggested with abnormalities in the cortical thickness and the frontostriatal region that is responsible for the inhibitory and attention were seen with attenuated brain activity in genetic studies.[5]

According to a review study done by Spencer T and co-workers,[7] to evaluate the validity of this disorder, there were multiple reports describing highly reminiscent clinical features of childhood ADHD in adults. Such investigations provide support for the descriptive validity of adult ADHD. There had been studies suggestive of missed diagnosis of the disorder due to lack of awareness, leading to delay in treatment. This had been associated with increased comorbidities with ADHD in later stage of life. ADHD has been also seen with associated other psychological disorders. Also, there has been some factors or clinical presentations that overlap with other psychological conditions. Thus, to confirm a clinical diagnosis of ADHD in adults requires a thorough description of symptoms and everyday behaviors over a period of at least the preceding 6 months[7] and a history of such symptoms since childhood.[1] As the condition is a childhood-onset, the presence of symptoms in childhood is very essential to investigate, . Earlier it was believed that ADHD did not continue beyond adolescence but long-term controlled follow- up studies have shown that the disorder persists in a sizable number of adults who had been diagnosed as having ADHD in childhood.[1] Such investigations provide support for the descriptive validity of the condition in adults.[8]

Although, there has been evidence of its persistence in adulthood in western countries, but due to dearth of research work and lack of awareness in India, ADHD in adults is still at a questionable stage. Unaware of their problem, these adults face many difficulties in their day-to-day life that affect and interfere with their personal, professional, and social relationships. As there is widespread stigma related to mental disorders, knowledge of the condition and its prevalence in the Indian Population could help to gain an insight into the morbidity burden of the country. Thus, the aim of this study was to evaluate the prevalence of ADHD in young adult population

METHODOLOGY

Study Design & Setting: It is a Cross Sectional Study conducted in the span of 6 months from April 2022 to September 2022 in various Professional Colleges Of Dehradun, Uttarakhand. The online forms created for the study were distributed among the students of various professional colleges of Dehradun. On the basis of the criterias of the study, 121 students were selected to proceed for screening. They were administered the Adult ADHD Self Report Scale (ASRS) and Wander Utah Rating Scale (WURS) to screen out adult ADHD.

Criterias for selecting Subject: The Criterias were to have adults of all gender & age group between 18-29 years old students of professional colleges of Dehradun, without any specific history of systemic, neurological or known psychological conditions. Also, there should be no history of recent trauma, physical or emotional, or head injury.

Outcome Measures: The scales that were used include ASRS (Adhd Self Rating Scale) that has an internal consistency of .885 for the entire scale and two- week test-retest reliability being 0.878 ($P<0.001$)[9]. This scale evaluates the symptoms in an adult from the past 6 months. Another scale was Wender Utah Rating Scale having high internal consistency (>.87) and high test-retest

reliability (R=.68).[10] This is a retrospective scale that questions the symptoms of the individual in childhood, or school going age.

RESULT AND DATA ANALYSIS

TABLE 1: Demographic data showing age and gender distribution among total population and

VARIABLES	TOTAL PARTICIPANTS (N=121)	ADHD GROUP (N=7)	CONTROL GROUP (N=23)
AGE GROUPS (in yrs)			
18-24	105	6	21
25-29	16	1	2
Mean (SD)	22.17(±2.33)	21.86(±2.23)	21.7(±2.28)
GENDER			
Male	31	1	5
Female	90	6	18

PIE CHART 1: Showing graphical representation of ADHD type predominantly seen in the sample

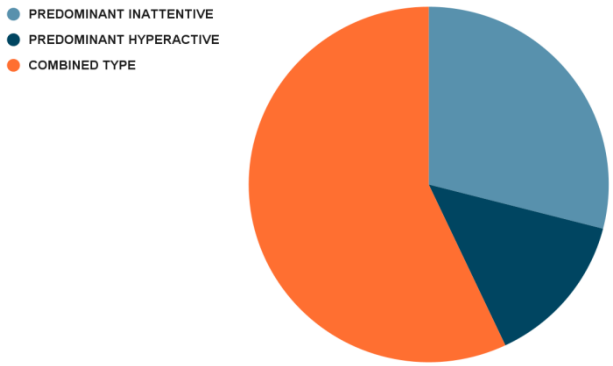
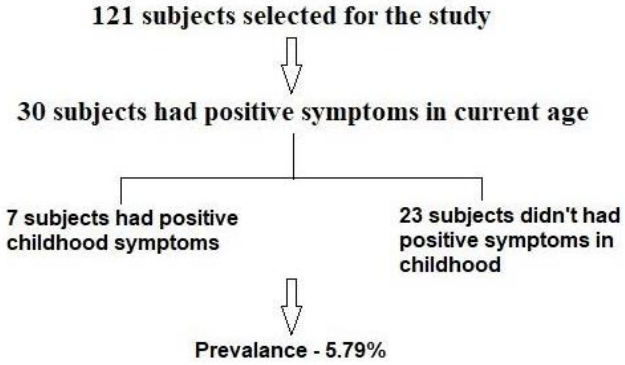


Fig 1: Representing the protocol of the study and its result



DISCUSSION

In our study, 7 subjects out of 121 were found with positive symptoms in both current age and childhood history. Thus, the prevalence of ADHD in the adult group was found to be 5.79%. Most of the studies held in population study had prevalence ranging in 4-5%. Also, in 2012 as part of WHO world mental health survey initiative in ten different countries, the pooled prevalence was 3.4% ranging between 1.2%- 7.3%.[8] The result obtained in our study was, thus, consistent with that of other studies[4,5,11,12].

In our study, 23 remaining subjects who did not have any childhood symptoms were concluded as false positive cases . As the symptoms were not present in childhood, these positive cases could be due to presence of other contributing factors, environment, society or peer pressure. Since the symptoms in this disorder are similar like that of other psychiatric disorders, overlapping of conditions can be possible. This causes challenges in proper diagnosis and treatment approach.[13,14]

There was higher prevalence seen in females (6.67%) in comparison to males (3.23%). This was in contradiction with the studies where gender difference seemed to be similar [4,15]. It has been also seen in many studies having male dominance more in childhood and comparative in adults,[5,12] This difference in gender dominance might be due to the study sample having more

female participants comparable to male. It might also be due to females being over concerned about their psychological health.

In this study, the combined type was seen to be the most common type (57%), with predominantly hyperactive/ impulsive type being the least common (14%). This result was in support of many previous studies that concluded the combined being the most common type.[15] Also, these studies suggested that internal restlessness replaces the hyperactive behavior in adolescents and adults and thus, there could be a decrease in symptoms of hyperactivity in advanced age, [7,17,18,19] leading to least prevalence of pure hyperactive disorder..

The question that was consistent during our study was that how these individuals were able to achieve these qualificational levels and able to continue through their education? To our answer we found that as the neuroimaging studies confirm abnormalities in frontal-subcortical-cerebellar systems that are involved in the regulation of attention, motor behaviour and inhibition, ADHD has been considered more of a neurobehavioral condition.[20] Many studies that suggested that these adults have tendency to develop coping mechanism as they grow up to deal with their symptoms. Wilmshurst L, et.al,[16] investigating the nature of self- concept and psychological well-being in college students with a diagnosis of ADHD, found that relative to peers, these students had positive family variables, emotional climate and time spent in extracurricular activities that may had served as a protective factor for positive quality of life and increased academic success for college students with ADHD. The self-concept in these individuals may consist of a different set of values and priorities based on life lessons learned. This makes their condition more difficult to diagnose and accept. As the condition has overlapping symptoms with other psychological disorders and also seen to be associated with comorbidities, thus, there is more need to understand the condition in adults and identify them.

The results were based on subjective data and depended on what the subjects had provided. Thus, for better understanding of the symptoms and thorough examination, individualized interviews with each participant can be done. Voluntary participation was less in our study as it was online based. Thus an offline based study with a large accessible population could be studied for understanding widespread conditions in future. Future research can be done to study the overlapping and difference in the symptoms of ADHD and other psychological impairments. correlation of other psychological impairments with adhd in adult population

CONCLUSION

Our study concluded that ADHD is prevalent in the adult population with a considerable rate of 5.79%, with the combined type of ADHD being the most common.

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TO FIND OUT THE EFFECT OF ABDOMINAL "DRAWING IN" MANEUVER EXERCISES ON YOUNG FEMALES WITH PRIMARY DYSMENORRHEA: AN EXPERIMENTAL STUDY

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ABSTRACT

Background: Dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin. The predisposing factors for dysmenorrhea are irregular periods, high and low BMI and heavy menses. Its management includes pharmacological and non – pharmacological management. Core strengthening exercises will allow small intrinsic muscles around the lumbar spine to be conditioned to increase performance making it more ready to deal with daily troops of natural biomechanics, even when the body is under the tension of the menstrual cycle. Aim: To Compare the Effect of Drawing In Maneuver Exercises versus Core Strengthening Exercises On Primary Dysmenorrhea. Method: 100 females with primary dysmenorrhea were included in the study through convenient sampling in a Group. They were given the abdominal drawing in maneuver exercises while for 8 weeks. The outcomes taken were pain intensity on NPRS, quality of life on Menstrual Distress Questionnaire and muscle strength. Result: The data was analyzed using SPSS 20. Paired t test was used for within group analysis Significant difference was observed in pain intensity and muscle strength in the subjects where significant reduction in pain and improved quality of life was seen with drawing in maneuver exercises.
Conclusion: Hence, we conclude that there is a significant reduction in pain intensity and increased muscle strength with drawing in maneuver exercises in females with primary dysmenorrhe

INTRODUCTION

Dysmenorrhea is referred to as the occurrence of the painful menstrual uterine cramps. 1 It is the most common gynecologic disorder affecting approximately 20-90% of women of the reproductive age. 2 Dysmenorrhea is classified into the two types: Primary and Secondary. Primary dysmenorrhea tends to occur within 12 months of menarche in absence of any pathology, that is, no identifiable pelvic disease. 3Whereas secondary dysmenorrhea occurs in the presence of any pathology such as endometriosis which most often happens after 25 years of age. 3 Dysmenorrhea is characterized as cramping pain in lower abdomen that is concentrated in the supra pubic area and sometimes radiate to the lower back and upper thighs. 4 Pain usually starts within hours of the onset of the menstruation and reaches peak when the menstrual flow is heaviest during the first two days of the cycle. It is accompanied with other symptoms like nausea, vomiting, headache, fatigue, diarrhea, nervousness, mood swings. Dysmenorrhea results in absenteeism in the college going and working young females. 4 Usually primary dysmenorrhea is idiopathic. One of the causes for primary dysmenorrhea is the rise in prostaglandins hormones. This hormone plays an important role in the uterine contractions during the menstruation and childbirth which leads to pain. Individuals with high and low BMI, heavy menses and irregular periods are at high risk of

dysmenorrhea. 5 There are pharmacological and non-pharmacological management for dysmenorrhea. Medical management includes the non-steroidal antiinflammatory drugs such as ibuprofen, mefenamic acid and naproxen. Oral contraceptive pills are used for relieving dysmenorrhea. But these medications have side effects like nausea, breast tenderness, intermenstrual bleeding, drowsiness, visual and hearing disturbance, peptic ulcers and dizziness. 3, 5 Acupuncture, TENS, heat packs, physical therapy and massage are the non-pharmacological management for primary dysmenorrhea. 5 The physical therapy of the abdominal and pelvic floor muscles helps them to stretch and strengthen. Taping techniques and aerobics exercises also effectively reduces the pain and discomfort in primary dysmenorrhea. 6 It was reported that isometric exercise reduced primary dysmenorrhea. Some studies concluded that yoga helped in controlling the stress and pain in dysmenorrhea with postures like cat pose, tiger pose, cobra pose, bow pose and fish pose. This helped to stretch and strengthen the back and pelvic floor muscle and gain positive effect in female with primary dysmenorrhea. 7 Injury and pain is caused by the instability, specifically during the stressful times of female body like menstruation. 8The lumbar region takes the force of the body. It also has origin and insertion of certain muscles and nerve innervations. If during menstruation, the lumbar spine is weak, it is not at the optimal level of handling functional stress, which can lead to pain throughout the abdomen, low back or thighs. 3, 8

Spinal misalignment results into changes in the lumbar pelvis in the sagittal plane, which induces locational change of the uterus. It was considered that the dysmenorrhea was increased by increasing tension of soft tissue including ligaments, tendons and muscles resulting from anterior and posterior locational change of the uterus. 9 Core strengthening exercises allows the small intrinsic muscles around the lumbar spine to be conditioned to increase performance; this training allows the isolation and strengthening of core muscle groups. When these muscles are strong, they are much more ready to deal with daily troops of natural biomechanics, even when the body is under the tension of the menstrual cycle. Bergmark classified the stability muscles into local muscle and global muscles systems. They reported that the main role of the local muscle system was to maintain stability of the body which includes the transverses abdominis and internal obliques. The differences between the thicknesses of these muscles were related to a weakened local muscle system, resulting in instability and dysmenorrhea. 9 The greater activity of internal obliques was observed in abdominal bracing even when compared to dynamic trunk movements' exercise. Also a significant increase in electromyographic levels of transverses abdominis caused when subjects were instructed to perform drawing in maneuver. 10

Study design: Experimental study
Sampling: Convenient Sampling
Study population: Females with primary dysmenorrhea. Study Duration: 6 months
Sample size: 50

Inclusion criteria: 14

- Females between 18 – 25 years of age.
- Regular menstrual cycle (30 – 35 days)
- Pain intensity ≥ 5
- Willing to participate in the study

Exclusion criteria: 16

- Irregular menstruation
- Abnormal vaginal bleeding
- Medications – analgesics and oral contraceptive pills

- History of gynecological disease

Materials required:

- Pen
- Lumbar pressure biofeedback unit
- Plinth

Procedure:

The trail was registered in Clinical Trials Registry (CTRI/2018/09/015617) and ethical clearance was taken from Ethics committee, School of Physiotherapy, RK University (ECR/259/Indt/GJ/2016). Females suffering from primary dysmenorrhea were included in the study. Their consent was taken prior the procedure. The demographic data, Numerical Pain Rating Scale, muscles strength was taken by pressure biofeedback unit and quality of life was taken by Menstrual Distress Questionnaire were recorded before the intervention. Group A included the participants underwent the drawing in maneuver exercises Numerical Pain Rating Scale, muscles strength and quality of life was taken were recorded after the 8 weeks intervention.

Intervention: The participants were taught the "drawing in" maneuver by asking to bring their navel towards the spine. The participants were instructed to perform the "drawing in" maneuver and maintain prior to the each following exercises protocol: Abdominal "drawing in" in quadruped position

 Bridging with single leg raise Quadruped with hip extension Alternate leg and arm raise in quadruped position10

Each exercise performed with 5 sec hold and 10 repetitions, and continued for 4 days/ week for 8 weeks.

Outcomes: The outcomes included in the study are Numerical pain rating scale, Menstrual Distress Questionnaire and lumbar pressure biofeedback.

The Numerical pain rating scale-- 11-point numeric scale range from '0' representing "no pain" to '10' representing "pain as bad as you can imagine" or "worst pain imaginable".

Lumbar Pressure Biofeedback is a device used for assessment of the strength deep abdominal muscles. Patient's position is prone lying. Place the pressure biofeedback unit horizontally under the abdomen with the lower edge just below the anterior superior iliac spines (navel at centre of unit).Inflate upto 70 mmHg and instruct the patient to perform the drawing-in maneuver. If patient performed properly, the pressure drops 6 to 10 mmHg, it is maintained upto 10 seconds.

Menstrual Distress Questionnaire consists of 47 symptoms under 8 different headings to assess the quality of life during the menstruation.

RESULT

The statistical analysis was done with the parametric tests as the data was normally distributed measured using normality curve and Q-Q plot. Paired t test was applied for intragroup comparison, while independent sample t test was applied for intergroup comparison with the help of SPSS (Version 20). Interpretation: The mean average for NPRS reduced from 7.76 (pre) to 3.32 (post), muscle strength improved from 66.68 (pre) to 61.76 (post). As per the Paired t test, data for NPRS, muscle strength and quality of life reflects that p value is less than 0.05 (except the water retention component of quality of life). Significant difference is seen in all three outcomes.

DISCUSSION

The statistical analysis reflects significant difference in pain intensity and muscle strength between both the groups where significant reduction was seen in drawing in maneuver exercise group. Significant difference was observed in quality of life in both the groups with significant difference was observed in behaviour, negative effects

and control between drawing in maneuver and core strengthening groups. Therefore, the null hypothesis is rejected. Previous studies have suggested reduction in pain intensity of primary dysmenorrhea due to expansion of capillaries and promoted blood circulation, producing various physiological effects, including metabolic stimulation, pain relief, and re-balancing of the autonomic nervous system with the help of different approaches which included Kinesio taping, hot packs, transcutaneous electrical nerve stimulation, interferential therapy and primrose oil. 19,23,25,26,28 Techniques like acupuncture and acupressure also significantly reduced the primary dysmenorrhea. Other physiotherapy interventions like manipulation, isometrics exercise, pelvic rocking exercises, stretching, aerobic exercises, Pilates, aquatic therapy, billings exercise, Swiss ball exercise and core strengthening exercises allowedsmall intrinsic muscles around the lumbar spine to be conditioned to increase performance and enhanced the quality of life and reduced the pain intensity in dysmenorrhea. 16,17,18, 20, 21,22,24,27, 29 Kirthika VS and colleagues observed that 12 weeks gym ball exercises have the potential to decrease the level of menstrual distress and related pain among females with primary dysmenorrhea19 . According to Fathey and Ashour, Core strengthening and stretching exercises were more effective in reducing pain intensity of dysmenorrhea as it led to increase in blood flow and metabolism, reduced sympathetic activity and relieve stress through release of endorphins, raising the pain threshold level. 11 Saleh HS concluded that core strengthening allows small intrinsic muscles around lumbar spine to be conditioned for greater performance. Kaur S and colleagues, observed no significant difference between active stretching and core strengthening in managing primary dysmenorrhea. Both can be safely used as an alternative therapy for pain relief in dysmenorrhea.8 Kim MJ and colleagues concluded that the differences between the muscle thickness of the groups in transverse abdominis and internal obliques muscles were related to a weakened local muscle system, resulting in instability and dysmenorrhea. 9An increased activity of the deep abdominal muscles in the EMG studies in the exercises included in group 1 while increased activity of superficial abdominal muscle in the electromyography studies in exercises included group 2 was observed by Bjerforks A. 10 Furthermore it was observed by Lim C. that by applying kinesio taping to the abdominal area in patients with dysmenorrhea provided a massage effect and improved the balance of abdominal muscles. 20 It was reported that isometric exercise reduced primary dysmenorrhea by reinforcing muscles surrounding the pelvis to provide stability with the potential mechanism of the effect of isometric exercises is strengthening pelvic muscles, facilitating bleeding, and excretion of wastes containing prostaglandin which causes contraction. 20

Drawing In Maneuver exercises which included bridging with single leg raise, single leg raise, abdominal drawing in and alternate arm and leg raise in quadruped position showed improved activation of transverse abdominis and internal obliques muscle, signified with improved outcomes from lumbar pressure biofeedback. 21 Drawing in maneuver activates the deep abdominal muscles which allow its strengthening and reducing the tension in the surrounding soft tissues and hence reducing the pain intensity. Improvement in pain intensity led to better quality of life in females with primary dysmenorrhea. Improvement in pain, concentration, behaviour, autonomic reactions, water retention, negative effects, arousal and control was observed in both the groups with the increased significant difference in behaviour, autonomic reactions, negative effects and control.

Hence, there was a significant reduction in pain intensity in drawing in maneuver exercises group as compared to core strengthening group in females with primary dysmenorrhea.

Limitations: The study took considerations of only the abdominal muscles and not the other core muscles. The daily habits and lifestyle of the subjects were not taken into consideration.

Further Recommendations: The further studies can be done in different population of nulliparous and multiparous females. The intervention can be compared in age groups above 25 years and adolescent females. Electromyographic biofeedback can be studied for correct activation of deep abdominal muscles and diminish the errors in performing the exercise. The further studies can be done for longer duration, comparing multiple menstrual cycles and in larger sample size.

CONCLUSION

Significant improvement was seen in the pain intensity, muscle strength and quality of life in in females with primary dysmenorrhea with a significant reduction in pain intensity and increased muscle strength with drawing in maneuver exercises in females with primary dysmenorrhea.

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"DRAWING IN" MANEUVER EXERCISES

Figure 3.10.1.: Abdominal "Drawing In"

Figure 3.10.2.: Bridging with single leg Raise

Figure 3.10.3.: Quadruped with hip extension

Figure 3.10.4.: Alternate Leg and Arm Raise

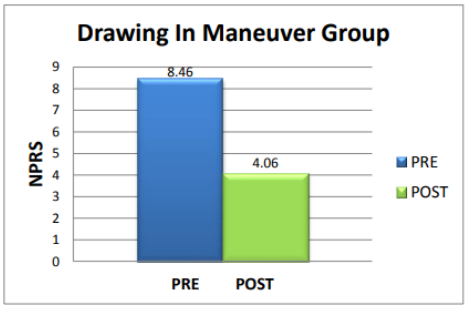
TABLE 4.1.: DEMOGRAPHIC DATA

	Group 1	
	Mean	Std. Deviation
Age	21.24	2.209
Age at Menarche	13.02	1.097
Length of Menstrual Cycle	29.66	1.117
Duration of menses	4.74	1.04

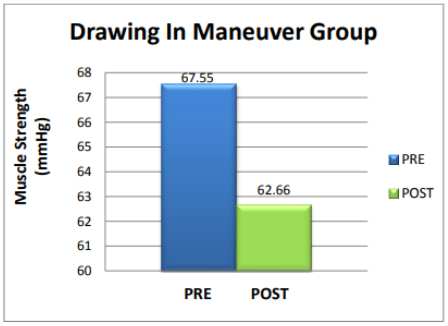
TABLE 4.2.: INTRAGROUP COMPARISON OF GROUP 1

Outcomes		Pre		Post		p value
		Mean	SD	Mean	SD	
NPRS		7.76	1.333	3.32	1.236	**0.000**
Muscle strength		66.68	1.486	61.76	1.492	**0.000**
Menstrual Distress Questionnaire	Pain	14.2	4.35	7.74	3.075	**0.000**
	Concentration	11.46	5.754	5.48	2.742	**0.000**
	Behavior	10.08	3.533	5.52	2.688	**0.000**
	Autonomic Reactions	3.88	2.568	1.56	1.567	**0.000**
	Water retention	1.62	1.988	0.94	2.151	**0.66**
	Negative Effect	18.46	7.42	9.64	4.507	**0.000**
	Arousal	3.3	3.34	1.66	2.31	**0.000**
	Control	4.5	3.441	2.24	1.964	**0.000**

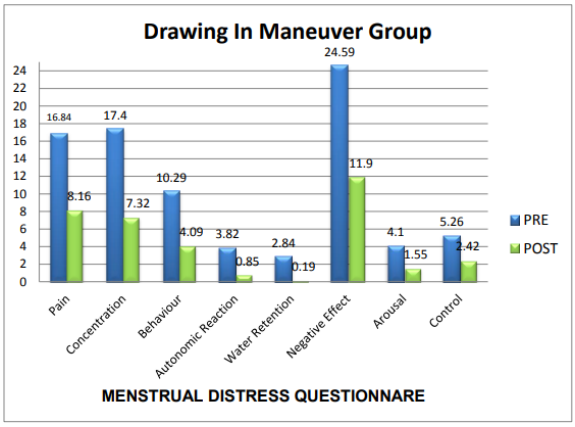
GRAPH 4.1.: INTRAGROUP COMPARISON FOR NPRS OF GROUP 1



GRAPH 4.2.: INTRAGROUP COMPARISON FOR MUSCLE STRENGTH OF GROUP 1



GRAPH 4.3.: INTRAGROUP COMPARISON FOR QUALITY OF LIFE OF GROUP 1



NEED OF PREHABILITATION IN ORAL CANCER PATIENTS – AN EXPERIENCE FROM A CASE REPORT

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ABSTRACT

BACKGROUND: Oral cancer is quite common and India ranks third in the world with 30% of all cancers. Surgical resection and reconstruction with or without adjuvant Chemotherapy/Radiotherapy has residual functional impairments. The variable post-surgical clinical disability is related to complex and unpredicted nerve injuries following the lifesaving surgical manipulations in axilla. Prehabilitation is an emerging approach towards enhanced patient recovery. **Case description:** A 65year male having buccal mucosa Carcinoma underwent right composite resection with pectoralis major, myocutaneous flap reconstruction with tracheostomy on 30.03.2023. The initial assessment showed reduced shoulder mobility and Muscle power. Physiotherapy included bronchial hygiene, guarded mobilisation, graded strength, endurance and flexibility training. On 04.04.2023, patient required a re-expolaration due to bleeding in flap, following which there was gross setback in the neuromotor status. Graded and tailor-made physiotherapy was continued till discharge. **Discussion:** Initially, patient had insignificant neuromotor deficits after composite resection. Initial Exercise training gave a significant improvement and possibly served as a prehabilitation for the unanticipated second surgical intervention. Patient level of cooperation/ understanding of exercise training was commendable which may be attributed to practice done in the initial days. Patient regained the neuromotor abilities and ambulant to get discharge with 10 days. Previous studies reported of such marginal improvement with structured exercise training along with psychosocial interventions. **Conclusion:** Thus, postoperative period has the potential risk of unpredictable complications like muscle weakness and restricted mobility. This case study experience reaffirms exploring the emerging trend of "Prehabilitation" in facilitating enhanced recovery in this unpredicted terrain of patient care with Randomised Controlled Trials in this population.

Key Words: *Buccal mucosa carcinoma, Prehabilitation, preoperative physiotherapy, exercise training, neuromotor deficit.*

INTRODUCTION:

Oral cancer is quite common and India ranks third in the world with 30% of all cancers(1)(2). A number of factors affecting QOL were identified, including age, overall stage, the use of free flaps, neck dissections, and the use of adjuvant radiotherapy.(3)Surgical resection and reconstruction with or without adjuvant Chemotherapy/Radiotherapy has residual functional impairments. (4) The variable post-surgical clinical disability is related to complex and unpredicted nerve injuries following the lifesaving surgical manipulations in axilla.(5) Group of interventions such as exercise, nutrition

and anxiety reduction in the preoperative period can complement the enhanced recovery program and facilitate the return to baseline activities of daily living.(6) Evaluation of prehab interventions in high-quality trials is essential and should include. (7) Prehabilitation including preoperative physical exercise, psychological support and nutritional support is an important adjunctive measure in major digestive surgery. (8) Prehabilitation is an emerging approach towards enhanced patient recovery.

EXPERIMENTAL SECTION

A 65year male having buccal mucosa Carcinoma underwent right composite resection with pectoralis major, myocutaneous flap reconstruction with tracheostomy on 30.03.2023. The initial assessment was done on 31.03.2023 showed on auscultation the air entry was equal in both lungs with crepitus in lower zones. Right Shoulder mobility (assisted flexion: 0 to 90 degrees, Abduction: 0 to 70degrees) shoulder elevation and depression movements were fairly present. Right Shoulder, Elbow, and wrist muscles Strength was grade 3+/4, with fair hand grip. Neurological examination showed reflexes present in both upper limbs and sensation preserved in all dermatomes. Additionally with mouth opening (<5mm), jaw mobility, neck mobility restricted markedly due to pain. Left shoulder mobility was good with muscles strength above grade4. Physiotherapy session started on the same day with breathing exercises and left costal expansion exercises for bronchial hygiene. Active assisted exercises to right shoulder in lying and sitting posture, minimal neck and jaw mobility exercises along with gentle mouth opening included for flexibility training. Followed with minimal resistance training to right upper limb within pain limits of the patient.

On 04.04.2023, patient was taken for re-exploration due to bleeding in flap following which there was gross setback in the neuromotor status. The next day referred for continuation of physiotherapy, neurological testing revealed diminished biceps reflex and decreased sensation in C4 and C5 dermatome, along with only minimal initiation in shoulder movements.

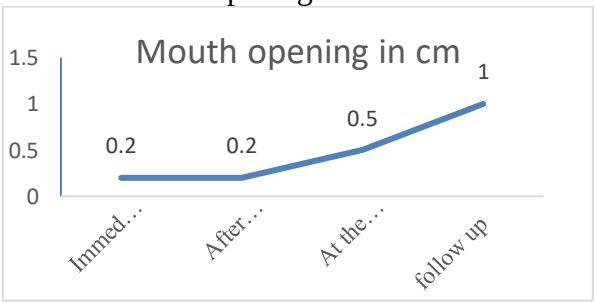
Graded and tailor-made exercises started: Active assisted exercises for shoulder in sagittal and frontal planes (shrugging, Bracing, flexion, extension, abduction and rotation) trained twice a day by physiotherapist. Education given to care taker for continuing exercises for every 2 hours in day time. Patient exhibited a noticeable improvement after receiving therapy sessions for 30 sessions.

RESULT AND DISCUSSION:

Figure:1, Shows Shoulder mobility

From the above figure, Shoulder mobility improved throughout course of physiotherapy assessment and management of the patient. Initially shoulder flexion was 90 degrees at immediate post op assessment, after re-exploration it was reduced to 10 degrees, at the time of discharge it was about 80 degrees and at first follow up it improved up to 95 degrees. Similarly, shoulder abduction initial assessment was 70 degrees, after re-exploration it reduced to zero degrees and at the time of discharge it was about 70 degrees and finally at first follow up improved by 90 degrees.

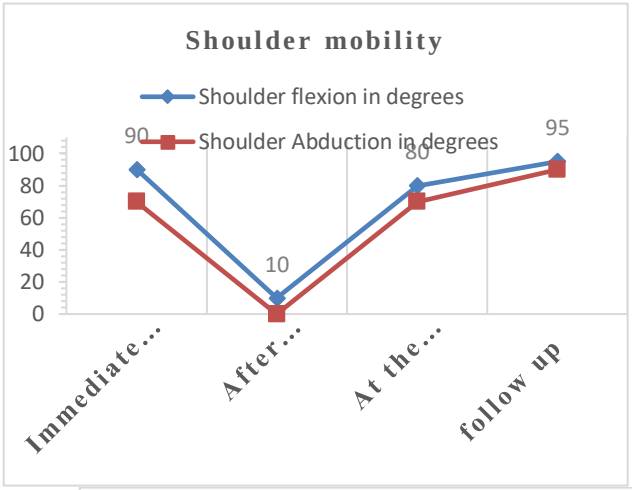
Figure:2 Shows Mouth opening

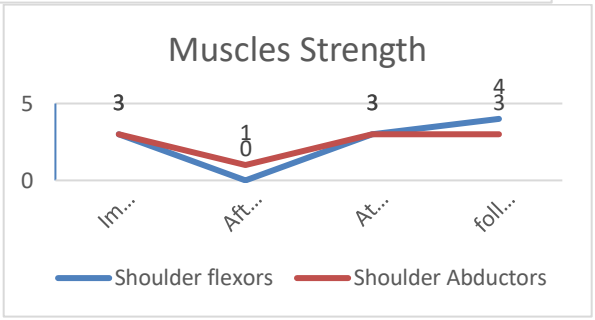


Mouth opening remained same at the immediate

post op and after re- exploration about >2mm, at the time of discharge increased to >5mm and at first follow up 1cm.

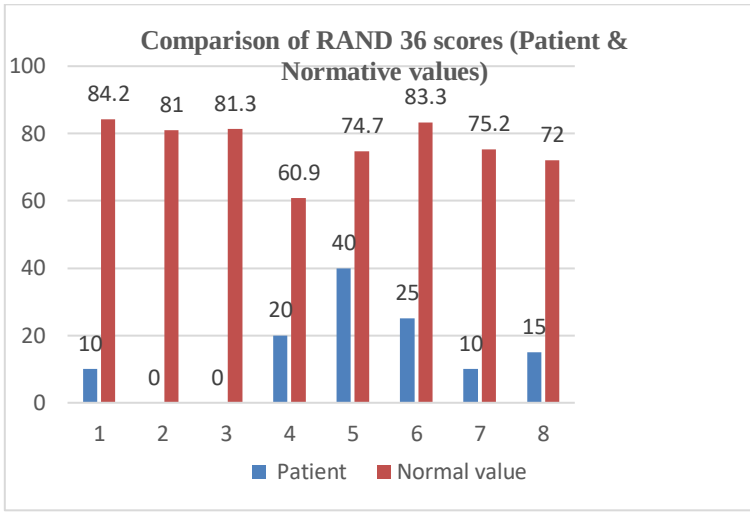
Figure:3 Shows Muscles Strength





Shoulder muscles strength throughout the course of physiotherapy assessment and management of the patient. Initially shoulder flexors were grade 3 at immediate post op assessment, after re-exploration it was reduced to very minimal contraction, at the time of discharge it was about grade 3 and at first follow up it improved up to muscle grade 4. Similarly, shoulder abductors initial assessment was grade 3, after re-exploration it reduced to visible flicker of contraction and at the time of discharge and first follow up improved by muscle grade 3. Functionally, At the follow up stage patient was assessed with 6min walk test and RAND36. Patient was able to complete 6min continuous walk test (160m) with fatigue stops further for every 2min(20m) and vitals blood pressure increasing to 150/70mmhg, oxygen saturation 98% and pulse rate 102/min. when comparing to pre-test vitals except blood pressure increased but within 2 mins of recovery time reached normal limits.

Figure:4 Shows outcome measure RAND 36 (Patient and Normative values)



In figure 4, Axis represents1- Physical functioning, 2- Role limitations due to physical health, 3-Role limitations due to emotional problems, 4-Energy/ fatigue, 5- Emotional wellbeing, 6- Social functioning, 7- Pain, 8-General Health.

Through the RAND 36, we can infer that patient's functionally affected in all the eight criteria of the outcome measure, but to some extent emotional wellbeing is better and worsen in 2 &3criteria.

Initially, patient had insignificant neuromotor deficits after composite resection. The initial Exercise training gave a significant improvement and possibly served as a Prehabilitation for the unanticipated second surgical intervention. Patient level of cooperation/ understanding of exercise training was commendable which may be attributed to practice done in the initial days. Patient regained the neuromotor abilities and ambulant to get discharge with 10 days. Previously also there have reports of such marginal improvement with structured exercise training along with psychosocial interventions.(9)

CONCLUSION: Thus, postoperative period has the potential risk of unpredictable complications i.e. sudden onset of muscle weakness and restricted mobility. This case study experience reaffirms exploring the emerging trend of "Prehabilitation" in facilitating enhanced recovery in this unpredicted terrain of patient care

with Randomised Controlled Trials in this population.

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Electromagnetic Field Therapy Effects in Respiratory Disease: A Systematic Review and Meta-Analysis

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ABSTRACT
Background: Pulmonary function and functional capacity decline in chronic respiratory diseases, especially in chronic obstructive pulmonary disease (COPD) and Asthma. Physiotherapy is an integral part of treating respiratory patients since it helps combat muscle depletion and respiratory symptoms. Nevertheless, the knowledge about applying Electromagnetic Field (EMF) therapy as a therapeutic option in Chronic respiratory patients is minimal. Objective: Electromagnetic Field Therapy affect Pulmonary Function and 6-minute walk distance in Chronic Respiratory disease Patients (COPD and Asthma) Data Sources: Database including Pubmed, PeDRO, Scopus, COCHRANE and Web of Science was searched. Eligibility Criteria: Randomised control trials investigate EMF on pulmonary function and 6MWT distance in any COPD and asthma population, published before January 2022. Study appraisal: Three reviewers assessed the study's quality after data were extracted into a trial description form. A meta-analysis was conducted with Mean differences, Standardised Mean difference and 95% Confidence Intervals. Result: Four studies met the inclusion criteria, two on pulmonary function and 6MWT distance. The sample size ranges from 10 to 37 for EMF. The improvement in pulmonary function was not significant in FEV_1 (0.61, 95%CI: -0.31 to 1.53, p=0.19), FEV_1/FVC (0.41, 95% CI: -0.17 to 1, p=0.17) and significant in PEF (1.64, 95% CI: 0.05 to 3.22, p<0.00001) versus control. The change in 6MWT distance was 21.68m which is not significant (p=0.65). Conclusion: Electromagnetic fields (EMF) therapy have been shown to improve pulmonary function and 6MWT distance. The study was the first to examine and synthesise existing EMF data. A meta-analysis revealed a significant increase in PEF and FEV1/FVC ratio after EMF treatment.
Keywords: Electromagnetic Field, COPD, Asthma, Magnetic Stuimulation, Chronic Respiratory Disease

INTRODUCTION

Chronic respiratory disease (CRD) accounts for a significant worldwide disease burden. Diseases associated with chronic respiratory distress are among the most common causes of mortality and morbidity, with Chronic Obstructive Pulmonary Disease (COPD) and Asthma being the most common. Each has some degree of inflammation as the primary cause of disease progression. Every iteration of the Global Burden of Illness survey has indicated that COPD and Asthma are substantial contributors to the fatal and non-fatal illness burdens, respectively, and increasing in prevalence. These diseases were ranked 8th (COPD) and 23rd (Asthma) in terms of disease burden, which was measured in terms of disability-adjusted life years (DALYs), among the top causes of disability in the world. Although these diseases are preventable and treatable with low-cost intervention, they have received less attention than non-communicable diseases. [1,2]

Inflammation is being treated using pulsed electromagnetic fields (PEMFs), showing promise as a new therapy option. These fields have the potential to have significant impacts on tissue regeneration. The PEMF controls inflammatory processes by modulating pro-and anti-inflammatory cytokines at various phases of the inflammatory response. Researchers have discovered that employing PEMF as an alternative or supplemental therapy to pharmacological medicines may provide consistent results in animal and human tissue studies. Consequently, PEMF therapy may provide a unique nonpharmaceutical method of controlling inflammation in diseased tissues, resulting in improved functional recovery. [3]

Researchers' interest in Electromagnetic Fields (EMF) is still present today, as seen by more recent articles indexed in the National Library of Medicine in the United States. [4–7] EMF may have anti-inflammatory properties [8] and analgesic impact owing to their tendency to cause vasodilation, myorelaxation, and ion exchange modulation across the cell membrane. [9,10] EMF offers a prospective therapy or an alternative therapeutic intervention for a wide variety of disorders, although its application in respiratory patients is currently entirely restricted, given the lack of solid evidence. Despite the fact that electromagnetic field therapy (EMFs) are often applied in physiotherapy, little is known regarding their potential therapeutic value in the treatment of Asthma and COPD. For patients with respiratory illnesses, there are few published evaluations or assessments of the use of EMF. Accordingly, this review aimed to study the effect of EMF on Pulmonary function in patients with COPD and Asthma. Patients with COPD were also evaluated to see if their 6-minute walk distances were affected by exposure to electromagnetic fields (EMFs).

Review Question

Does Electromagnetic Field Therapy affect Pulmonary Function and 6-minute walk distance in Chronic Respiratory disease Patients (COPD and Asthma)?

Methods and Method

Systematic Review and Meta Analysis

Prospectively registered with PROSPERO, this quantitative systematic review protocol (CRD42022307550).

In January 2022, a systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[11] Articles from multiple databases, including Scopus, PubMed, PEDro, Web of Science, and COCHRANE, that had a target population suffering from COPD and/or Asthma were obtained. The articles were chosen using the PICOS qualifying criteria mentioned here (participants, intervention, comparator, outcomes, study design).

Participants were both male and female of any age group, and intervention was Electromagnetic Field Therapy delivered for COPD and/or Asthma. The comparator was any comparator or sham/control that did not include pharmacological therapy.

The search strategy was included the term "Pulsed electromagnetic field", "electromagnetic field", "magnetic field", "magnetic stimulation",

"diathermy", "thermal effect", "radio wave", "COPD", Chronic obstructive pulmonary/airway/lung or respiratory disease", "emphysema", " chronic respiratory disease". Boolean terms AND and OR were used to concentrate the search terms. The authors consider articles published in the English language only for this review. The reference lists of each included paper and relevant reviews and guidelines were manually searched. We contact the writers if extra information is required.

Search

(COPD AND Pulsed electromagnetic field), (Chronic obstructive Pulmonary/airway/lung/respiratory disease AND Pulsed electromagnetic field), (COPD AND electromagnetic field), (Chronic obstructive Pulmonary/airway/lung/respiratory disease AND electromagnetic field), (COPD AND magnetic field), (Chronic obstructive Pulmonary/airway/lung/respiratory disease AND magnetic field), (COPD AND magnetic stimulation), (Chronic obstructive Pulmonary/airway/lung/respiratory disease AND magnetic stimulation). Validated techniques were used to measure Pulmonary Function and randomised controlled trials were required for the research.

Study Design: Only RCTs used in the evaluation.

Participants

Inclusion: Patients of any age group with COPD as per GOLD (all stages) and Asthma (There is no upper age limit.) and treatment was given at any stage of the disease (Acute or Chronic), Male and Female.

Exclusion: Studies for diagnostic purposes, non-RCTs, observational, cross-sectional studies

Interventions and Comparators

Studies of Electromagnetic Field treatment or Stimulation were included. Intervention combinations were not included (e.g., Laser, Photo-biomodulation). Comparators included a control intervention, a sham intervention, and Conventional Pharmacological therapy.

Outcome Measures

Pulmonary Function Test was the key outcome measure. The Six-Minute Walk test distance was the secondary outcome.

Study selection

The references were exported to Mandley when the search was completed, and duplicates were detected and removed. Two reviewers (GJ and DM) independently assessed titles and abstracts against inclusion criteria, and inclusion was verified by discussion and consensus.

Quality Assessment

As suggested by the Cochrane Guidebook for systematic reviews of interventions, the Cochrane risk of bias tool was used to evaluate the included studies. [12,13] The PEDro scale was used to assess the Randomised Controlled Clinical Trials (RCTs). [14] This is an 11-item scale intended to assist users in quickly assess internally valid trials (criteria 2–9) and contain enough statistical information to aid clinical decision-making (criteria 10–11). Simply calculating how many provided criteria were clearly met in the trial report can get a score ranging from 0 to 10. Based on this interpretation, the greater the result, the stronger the methodological quality and the lesser bias potential. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) for Pulmonary Function Test (PFT) and 6MWT distance were used to evaluate the level of evidence (6MWTD). [15]

Data Extraction, Synthesis and Analysis

Study details were extracted to a trial description form (pre and post of PFT and 6MWTD). Due to the clinical heterogeneity of the included studies, a meta-analysis was performed using Review Manager software (RevMan version 5.4.1). The I_2 statistic was used to measure the degree of heterogeneity, with percentages indicating the extent of heterogeneity: 25% = low, 50% = medium, and 75% = high. If I_2 was 50%, a random-effects model was chosen. All of the results were derived from data on pulmonary function (FEV1, FVC, PEF, MEF 25-75% and FEV1/FVC%), and the 6MWT distance and mean difference with a 95% CI were employed in the study. Interventions to improve pulmonary function and 6MWTD were illustrated in forest plots.

Results

Six hundred sixteen (616) articles were identified, and 451 were examined based on their title and abstract after duplicates were removed (Figure 1). These were reviewed based on the inclusion criteria, and 417 irrelevant studies were excluded. The entire text was obtained and reviewed if there was any doubt about the study's eligibility based on the title and abstract. Two researchers (GJ and DM) devised the search technique, who sought advice from a third researcher (ARK) whenever they disagreed. Following an initial examination, 34 papers were identified as possibly relevant, and their entire texts were thoroughly examined, with specific emphasis on the intervention (kind of therapy), changes in PFT and 6MWTD, number of sessions, and length of treatment. Finally, four papers were determined by identifying the aim and criteria for this evaluation. Figure 1 depicts the rationale for selecting papers that met the research goals and inclusion/exclusion criteria. The last four articles included a total of 94 persons. Tables 1 and 2 provide a short summary of each included research.

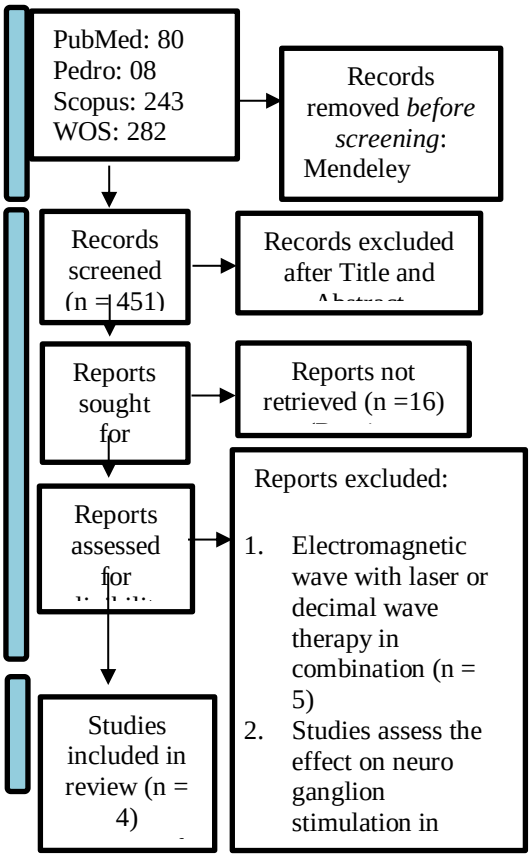


Figure 1 Article-selection flowchart (PRISMA)

Table 1. Study and participant features (PEMF: Pulsed Electromagnetic Field Therapy; BTS: British Thoracic Society; 6MWT: Six Minute Walk Test; PFT: Pulmonary Function Test; MVC: Maximal Voluntary Contraction; QOL: Quality of Life; FVC: Force Vital Capacity; FEV1: Force Expiratory Volume in 1 sec; $MEF_{25-75\%}$: Mean Expiratory Flow ay 25,50 and 75% ; PEF: Peak Expiratory Flow)

Table 2. Study interventions' characteristics.

Interventions or Treatment

A. Pulmonary Function

1. COPD and Asthma: MTU 500H (Therapy System, Brno, Czech Republic) provided a pulsatile electromagnetic field to adults with CRD on the thorax. The dosage was given in ten doses, once a day for 20 minutes. The electromagnetic field had a frequency of 4.5 Hz and magnetic induction of 3 mT, and the first three doses were about 25% less than the complete dosages that followed. The manufacturer advised these dosages (Biotrop parameters for MTU 500H).
2. Asthma: The apparatus M 500H (Therapy System, Brno, Czech Republic) was used to apply a pulsatile electromagnetic field to children for 5 days, twice a day, for 10 minutes, with a magnetic induction of 3 mT and a frequency of 4 Hz.

Six Minute Walk Test

COPD: A Medtronic Magpro electromagnet (Medtronic Denmark A/S, Copenhagen, Denmark) with 60 mm radius MCF 125 circular stimulation coils was used to stimulate the quadriceps muscle magnetically. Quadriceps muscles in both lower limbs were activated in these patients. On the quadriceps muscle's superior third (over rectus and vastus lateralis), a small coil head was positioned with minor alterations to establish an appropriate location in each lower limb. Once this position was established, it was used for the duration of the

eight-week procedure, which included three 15-minute sessions of quadriceps muscle stimulation each week. As tolerated, magnetic stimulation intensity was gradually increased from 40% to 70% of the stimulator's maximal output with 2T of magnetic induction. As a result, the frequency was dropped as the intensity grew (2 percent to 3 percent after every two sessions), ranging between 15 and 7 Hz, to avoid overheating the coil (15Hz at 40 percent and 7Hz at 70 percent). The stimulation was administered on an intermittent basis, with 2 seconds of ON and 4 seconds of OFF.

Methodological Quality of the Included Articles

Three of the four stidies included in this reveiew [16–18] got a score of 7 or higher (Table 3). These are the ones that have a high degree of methodological integrity. The remaining article [9] scored the lowest, with a score of 6. Many of the criteria for acceptance were not met by these articles, calling into question the high standard of methodology for RCTs, as no allocation was made, and neither therapists nor assessors were blinded to the study, except Bustamante et al. in 2008, where only the assessor was blinded. As a result, the dependability of these studies is called into question. Cochrane risk of bias [12,13] was also applied to analyse the studies that were included in the evaluation (figure 2).

Table 3. Summary of the quality of the randomized clinical trials included in this review based on

the PEDro scale

Meta-Analysis or Quantitative Analysis of the Included Articles

A. Six Minute Walk Test Distance

Over total participants of 33 in two studies [16,17] favoured EMF intervention with a slight change of 0.16 (95% CI: -0.54 to 0.87) which was not significant (p=0.65; Fig 4) compared with control. The homogeneity is high (I^2=0%) with a mean change in 6MWT distance of 21.68 meters, which is clinically significant (figure 3).

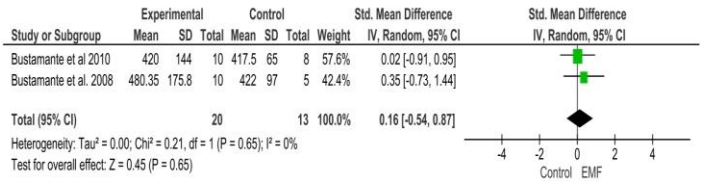
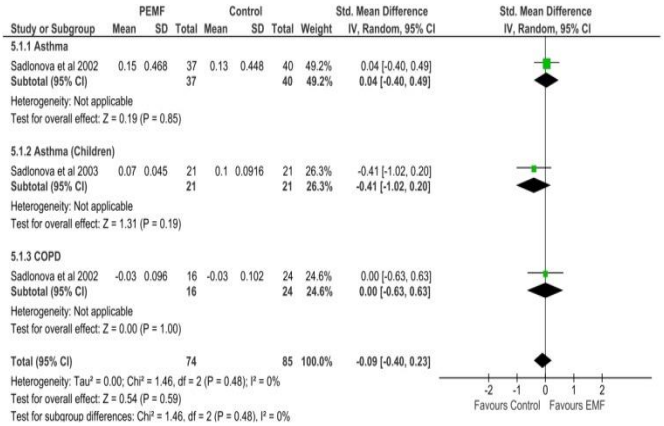


Figure 3. Forrest plot of change in Six-Minute Walk Test Distance (6MWTD) following Electromagnetic Field (EMF) Stimulation versus Control

B. Pulmonary function Test

Two studies [9,18] assessed the Pulmonary function as outcome measures, reporting FVC, FEV_1, FEV_1/FVC ratio and PEF. There was no change in FVC, though it reduced by 0.09 (95% CI: -0.40 to 0.23), which is not significant at p=0.59, and the result is highly homogeneous (I^2 = 0%) but are not significant (p=0.48). The rest of the parameters, FEV_1, FEV_1/FVC ration and PEF, showed a rise of 0.61, 0.41 and 1.64, respectively and only PEF was significant (p= 0.04), though the heterogenicity was relatively high (I^2 = 94%, p < 0.0000) in PEF. Figure 5 shows the forest plot of the pulmonary outcome variables for EMF with control in Asthma and COPD (figure 4).

The evidential quality was poor (table 4), and the primary limitations were inconsistency (studies revealed highly diverse outcomes due to various subgroups of the population and ages) and the potential of bias linked to blinding and allocation (where both the researchers and the patients were aware of the treatment they would be receiving).



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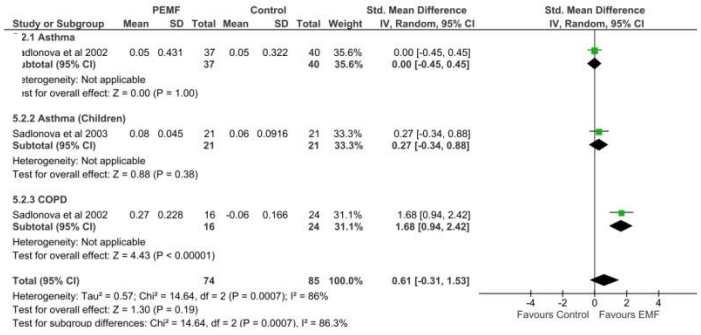

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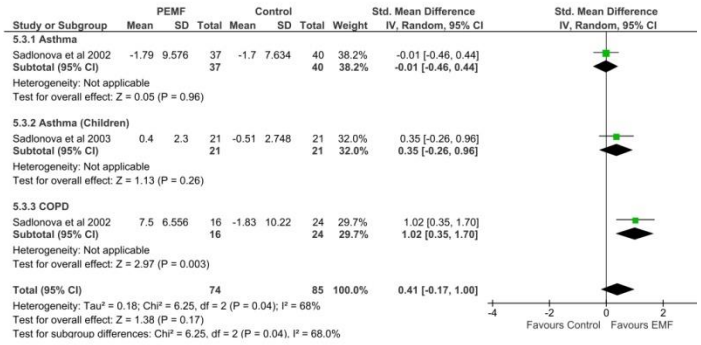

D

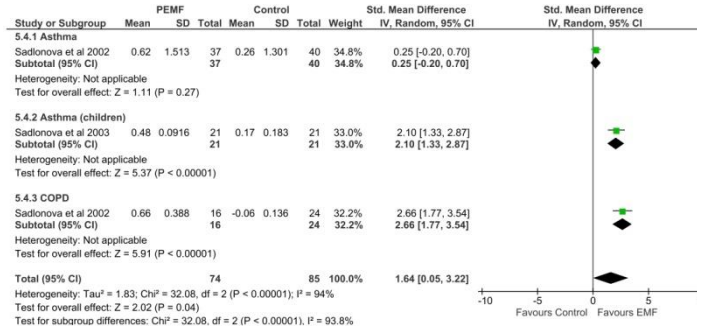

Figure 4. Forrest plots illustrating the change in Pulmonary Function in COPD and Asthma following Electromagnetic Field (EMF) versus control: (A) FVC; (B) FEV_1; (C) FEV_1/FVC ratio; and (D) PEF

Electromagnetic Field Therapy compared to Control in Chronic Respiratory Disease (COPD and Asthma)

Patient or population: Chronic Respiratory Disease (COPD and Asthma)
Setting: Hospital Based
Intervention: Electromagnetic Field Therapy
Comparison: Control

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with Control	**Risk with Electromagnetic Field Therapy**				

Electromagnetic Field Therapy compared to Control in Chronic Respiratory Disease (COPD and Asthma)

Patient or population: Chronic Respiratory Disease (COPD and Asthma)
Setting: Hospital Based
Intervention: Electromagnetic Field Therapy
Comparison: Control

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with Control	**Risk with Electromagnetic Field Therapy**				
6MWT	-	SMD **0.16 SD higher** (0.54 lower to 0.87 higher)	-	33 (2 RCTs)	⨁⨁◯◯ Low[a,b]	IMPORTANT CLINICAL CHAGE
FVC	-	SMD **0.09 SD lower** (0.4 lower to 0.23 higher)	-	159 (2 RCTs)	⨁⨁◯◯ Low[b,c]	-
FEV1	-	SMD **0.61 SD higher** (0.31 lower to 1.53 higher)	-	159 (2 RCTs)	⨁⨁⨁◯ Moderate[c,d]	-
FEV1/FVC%	-	SMD **0.41 SD higher** (0.17 lower to 1 higher)	-	159 (2 RCTs)	⨁⨁◯◯ Low[c,d]	-
PEF	-	SMD **1.64 SD higher** (0.05 higher to 3.22 higher)	-	159 (2 RCTs)	⨁⨁◯◯ Low[c,d,e]	IMPORTANT

The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **SMD:** standardised mean difference; 6MWT: Six Minute Walk Test; FVC: Force Vital Capacity; FEV1: Force Expiratory Volume in 1 Sec; PEF: Peak Expiratory Flow

Explanations
a. High risk of bias for allocation and detection bias
b. Small sample size with large Confidence interval
c. High risk for allocation
d. High Hetrogenicity
e. High Confidence interval and sample is of different ages

Table 4. Grading of Recommendations Assessment, Development and Evaluation (GRADE) evidence profile

The existing low-quality data show that EMF treatment may enhance pulmonary function clinically, particularly in PEF. Given the general health advantages of EMF and the minimal risk of

documented adverse effects (no side effects were observed), COPD patients may consider utilising it for improved lung function either alone or in combination with other therapy options.

Discussion

The use of EMF as a treatment for musculoskeletal system dysfunctions and pain has a long history, it is a good idea, and its effectiveness has been supported by various research. [19–21] Because of the limited scope of the research, we could not find any previous reviews on using EMF in respiratory patients. COPD is a disabling illness that predominantly impairs respiratory and motor functioning during acute and chronic phases. According to the studies, to address COPD's underlying symptoms, including dyspnoea and muscular depletion, pulmonary rehabilitation is the most often recommended and most effective treatment approach. [22–24] A proper design of rehabilitation activities for COPD patients is essential to lower the high hospital readmission rate in this group. [25,26] An EMF programme involving stimulation with a suitable intervention length of 8 weeks and 5-10 days improved lung function and exercise capacity in COPD and asthma patients. The intervention's impact on pulmonary function, on the other hand, was unclear since only a small number of RCTs reported these results.

This study aimed to analyse the evidence for EMF on pulmonary function and 6MWT distance in diverse chronic respiratory illness populations (COPD and Asthma). Following EMF, a minor and non-significant rise in FEV1, FEV1/FVC ratio, and PEF was seen, indicating an improvement. There was no indication that EMF influenced $MEF_{25\%-75\%}$ and FVC. Because EMF is a feasible intervention for improving pulmonary function, it is critical to evaluate its efficacy in a clinical population. A further meta-analysis of the patient population shows that after applying EMF to Asthma in children, FVC decreases by 0.41 (95% CI: -1.02 to 0.20; p=0.19); however, adults with COPD and Asthma exhibited no change (0.00 and -0.04). In contrast, the FEV_1 revealed a substantial rise in COPD by 1.68 ($p<0.00001$), and the changes in Asthma were not significant as there was no change in adults while there was a slight increase of 0.27 (p=0.38) in children. As FEV_1 rises in COPD and very mildly in children with asthma, the FEV1/FVC ratio increased by 1.68 ($p<0.00001$) in COPD and 0.27 (p=0.38) in children, which is not significant. The most significant improvement was reported in PEF in Asthma in children and COPD by 2.10 ($p<0.00001$) and 2.66 ($p<0.00001$), respectively, whereas asthma in adults exhibited a 0.25 increase that was not significant (p=0.27).

According to the research analysed, EMF appears to have a favourable impact on COPD patients, notably those by Sadlonova et al. [9,18] Pulsatile electromagnetic fields improved respiration and mucociliary clearance in patients compared to those who received placebo therapy. Only patient-reported data was utilised to quantify the volume and density of mucus in this investigation, limiting its ability to evaluate mucus clearance accurately. Spirometry measurements such as FEV1, FEV1/FVC ratio, and Peak Expiratory Flow (PEF) improved quantitative data; however, there was no statistically significant impact on overall lung function except for PEF. It is not clear from this study's evidence analysis whether EMF impacts the airways (i.e., inhibits airway remodelling) or on the lung parenchyma (i.e., avoids alveolar damage). The paucity of data on the efficacy of EMF on respiratory symptoms needs deeper experimental study, particularly given that peripheral muscle function is well accepted as a link with disease severity.

According to the data acquired from the retrieved citations, EMF often are applied to improve muscular function, as shown in the research by Bustamante and Colleagues. [16,17] One of the most incapacitating disorders in COPD patients is quadriceps muscle weakness, which results in exercise restriction and, as a consequence, lower motor activity. One of the most intriguing features of this analysis is that EMF seems to have a favourable impact on expanding the size of quadricep fibres in COPD patients.[17] Lower limb

muscle movement and all other motor skills associated with everyday living tasks are critical biomechanical components of walking. Changes in functional capacity and lower limb functional improvement post EMF application were assessed by 6MWT, and it improved by 21.68 meters (EF of 0.16 at 95% CI: -0.54 to 0.87, p=0.65) was not statistically significant, but the improvement is of clinical relevance. The change in 6MWT distance was nearly close to the MCID of 30m in COPD post pulmonary rehabilitation with lower-limb endurance training. [27] As a result, a specific therapy aimed at improving muscular strength is precisely in line with the peculiarities of COPD and the demands of patients. Electrical muscle stimulation, on the other hand, is an effective method for the prevention of muscle atrophy in a variety of populations, including COPD patients.[28–30]

Conclusion

This study aimed to examine and synthesise existing EMF data to identify the influence on pulmonary function and 6MWT distance. The existing low-quality data show that EMF stimulation may produce clinically substantial symptom relief with no adverse effects, primarily pulsed. Despite heterogeneity in intervention methods and populations, the meta-analysis revealed a minor but statistically significant increase in PEF and FEV1/FVC ratio after EMF. Only a few studies included outcome measurements of 6MWT distance with evidence to show a change in distance walked measures after EMF stimulation.

Limitations: Consider the likelihood of underestimating the current treatment impact due to the limited number of qualifying studies; number of participants; differences in age, population, and intervention design.

Conflict of Interest: No conflict of interest

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Author, Year	Type of Research	Sample Size (Participants)	Disease	Indicators of Change	Results
Bustamante et al. 2008	Randomized clinical trial	COPD (n=10) Control (n=5)	Stage 4 (GOLD)	Oxidative stress and 6MWT	An individual percentage change in walking distance was significantly correlated with baseline muscle protein carbonylation levels (r = -0.767, P = 0.016) in the group of patients who underwent magnetic stimulation training.
Bustamante et al. 2010	Randomized clinical trial	COPD (n=10) Control (n=8)	Stage 3 &4 (GOLD)	MVC, 6MWT, QOL	6MWT distance increased by 23.4 m (CI: 11; 36) compared to the control group's -6 m (CI: -18; 24).
Sadlonova et al 2002	Randomized clinical trial	COPD PEMF (n= 16) Control (n= 24) Asthma PEMF (n= 37) Control (n= 40)	Diagnosis was based on BTS (1997)	PFT	• In patients with COPD and with applied PEMF, all values PFT showed statistical significance, except FVC • In Asthma patient's despite of PEMF did not show statistical differences of measured values in PFT
Sadlonova et al 2003	Randomized clinical trial	Asthma (Children) PEMF (n=21) Control (n= 21)	Diagnosis was based on BTS (1997)	PFT	• FVC, FEV_1, MEF_{75} and PEF showed statistically significant increase. • FVC/FEV_1, MEF_{25} and MEF_{50} were not statistically significant.

Table 1. Study and participant features (PEMF: Pulsed Electromagnetic Field Therapy; BTS: British Thoracic Society; 6MWT: Six Minute Walk Test; PFT: Pulmonary Function Test; MVC: Maximal Voluntary Contraction; QOL: Quality of Life; FVC: Force Vital Capacity; FEV1: Force Expiratory Volume in 1 sec; $MEF_{25-75\%}$: Mean Expiratory Flow ay 25,50 and 75% ; PEF: Peak Expiratory Flow)

Author, Year	Description (Intervention)	Duration of Sessions	Dosage
Bustamante et al. 2008	• 60 mm Refrigerated MCF 125 circular stimulating coil of Medtronic Magpro (Medtronic Denmark A/S, Copenhagen, Denmark). • The coil head was placed on the upper portion of the quadriceps, over rectus and vastus lateralis.	15 min/day for 3 days/week for 8 weeks	• From 40% to 70% of the maximum output of the stimulator, the magnetic stimulation intensity was gradually raised. • The frequency was lowered from 15 to 8 Hz as the intensity increased.
Bustamante et al. 2010	• 60 mm Refrigerated MCF 125 circular stimulating coil of Medtronic Magpro (Medtronic Denmark A/S, Copenhagen, Denmark). • Patients sat or reclined with knees flexed to 90 degree and ankles strapped.	15 min/day for 3 days/week for 8 weeks	• Stimulation was ON for 2 sec and 4 sec OFF for burst of twitches. • Intensity was in between 40% to 70% • Stimulation starts at 40% at 2T at 15 Hz and end at 70%, 2T at 7 Hz.
Sadlonova et al 2002	MTU 500H (Therapy System, Brno, Czech Republic)	10 Sessions/20 mins 1 session/day	• 4.5 Hz and 3 mT. • Initial 3 administrations were about 25 % lower in strengths than the later full doses.
Sadlonova et al 2003	MTU 500H (Therapy System, Brno, Czech Republic)	10 session/10 mins 5days, 2 session /day	4.5 Hz and 3 mT

Table 2. Study interventions' characteristics.

Criteria	Bustamante (2008)	Bustamante (2010)	Sadlonova (2002)	Sadlonova et (2003)
Eligibility	**Y**	**Y**	**Y**	**Y**
Randomly Allocated	**Y**	**Y**	×	**Y**
Concealed Allocation	×	×	×	×
Baseline Comparability	**Y**	**Y**	**Y**	**Y**
Blind Subjects	×	×	×	×
Blind Therapists	×	×	×	×
Blind Assessors	**Y**	×	×	×
Adequate follow up	**Y**	**Y**	**Y**	**Y**
Intention to Treat	**Y**	**Y**	**Y**	**Y**
Between-Group Comparisons	**Y**	**Y**	**Y**	**Y**
Point Estimates and Variability	**Y**	**Y**	**Y**	**Y**
Total	**8**	**7**	**6**	**7**

Table 3. Summary of the quality of the randomized clinical trials included in this review based on the PEDro scale

PILATES AND PREGNANCY

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ABSTRACT

Exercise during pregnancy has a significant impact on the mother's and unborn child's health. The current worldwide recommendations call for performing at least 150 minutes of moderate-intensity physical activity (PA) dispersed throughout three or more days of the week. Pilates integrates flexibility and strength training with body awareness, breathing, and relaxation. It consists of a series of gentle postures and exercises. The Pilates technique is becoming more and more popular as a potential form of exercise and as a tool to use while pregnant. Pilates workouts emphasize core muscle development, which can assist support the expanding belly and lessen back discomfort during pregnancy. It might be difficult to have good posture throughout pregnancy due to the changes the body goes through. By augmenting the muscles that support the spine, Pilates can help improving the overall posture. Pilates includes breathingexercises that can ease tension and encourage relaxation. The muscles of the pelvic floor, which are crucial for labour and delivery, are strengthened using Pilates exercises. Pilates can help pregnant women stay strong and flexible so that they recover more quickly during thepostpartum period. Keeping in view the benefits of these exercises, it should be regularly incorporated into the antenatal care.

Key Words: *Pilates, Pregnancy, Antenatal, Exercise During Pregnancy*

Introduction

Exercise during pregnancy has a significant impact on both the mother and the unborn child's health. Previously, when a woman got pregnant, she was advised to take rest. The American College of Obstetricians and Gynaecologists (ACOG) published the first set of recommendations for exercise during pregnancy in 1985 which has changed the perception of women towards exercise during pregnancy. Similar advice has been offered in many other nations.[1]

The current worldwide recommendations call for at least 150 minutes per week of moderate-intensity physical activity (PA). The emphasis now is on recommending exercise to promote maternal-fetal health rather than concentrating on the possible dangers of exercise.[1]

Recent research shows that PA during pregnancy reduces the risk of several pregnancy-related disorders by around 40% and the risk of developing depression by over 70%. Major pregnancy complications include gestational diabetes mellitus, preeclampsia, gestational hypertension, and having a big baby. Interventions to avoid these issues may also lower the risk of acquiring chronic illnesses including diabetes, obesity, and diabetes in both the mother and the foetus. This data for PA during pregnancy also shows that there is no increased risk of miscarriage, having an underweight baby, or giving delivery prematurely associated with the activity.[1–3]

During pregnancy and during the first six to eight weeks following birth, postural stability decreases. Also, during pregnancy, there is a greater dependence on visual feedback to keep one's equilibrium.[4] Compared to their pre-pregnancy state, women in late pregnancy may exhibit less static stability, especially when they are visually deprived.[5] Proprioceptive training, a type of exercise, is useful in reducing postural sway during pregnancy. Even after 8 weeks of follow-up, this improvement stays there.[6] The focus of health promotion programs across the world has recently changed to include prenatal Pilates. According to research, Pilates helps healthy women's postural alignment, lower extremity endurance, quality of life, flexibility, balance, and helps in decrease of pain. Additionally, Pilates has been advocated as a safe kind of exercise for pregnant women, especially when they are in good health and pain-free. Pregnancy-related physiological changes, such as ligamentous laxity, can be accommodated with certain movements.[7]

Physiological Effects of Pilates in Pregnancy

Pilates is a method of movement-based exercise that emphasises whole-body movement, breathing, focus, centering, accuracy, and rhythm. Pilates encourages awareness of body structure, muscle activation, and proper body alignment while moving, which is a mindful approach to exercise. According to Joseph Pilates, this programme of corrective exercises fosters physical and mental energy, good posture, core muscle stabilisation during dynamic movement, and voluntary control over the body. Pilates can be done on a mat with just the body's weight or with special apparatus.[8]

According to recent research, Pilates has beneficial effects on women's quality of life, enhanced pelvic muscle function, lower back pain, post-menopausal osteoporosis, body mass index, subcutaneous fat, and improved sleep after birth. The advantages of Pilates in pregnancy are still up for debate despite the stated health benefits and the ACOG's guidelines in this respect, and there aren't many effective therapies in this area.[9]

For pregnant women with low back pain (LBP), Pilates exercises have been shown to improve physical mobility, decrease discomfort and disability, strengthen the lumbopelvic stabilisation, and improve sleep. This programme can help with pregnancy-related musculoskeletal issues and promote an active and contented pregnancy. An efficient and secure strategy for the therapy of pregnancy-induced LBP is the use of clinical Pilates exercises. Pilates is an alternate workout that is simple to use for the suppression of pain in the third trimester of pregnancy since it is an efficient, healthful, and practical means of lowering pain.[10,11]

Numerous variables, including postural alterations, lumbar hyperlordosis, and pelvic ligament loosening, may cause pain during pregnancy. About 30% of pregnant women experience significant pain symptoms that may limit their functional ability and quality of life. This pain may persist even after the

delivery in the postpartum period. The Pilates method provides an alternative to traditional physiotherapeutic approaches specifically for the lower- and middle-income group, offering advantages like as pain reduction, improvement of the lumbopelvic area, increased functional ability, and improved quality of life.[12]

To avoid developing diseases like hypertension and gestational diabetes mellitus, pregnant women today are concerned about maintaining a healthy body weight. Since the Pilates approach offers physical training as well as body control and awareness, physical therapists frequently adopt it as one of their strategies. Furthermore, it doesn't subject thebody to unnecessary strain.[1]Guidelines for Pilates Exercises During Pregnancy

In order to enhance their training, as well as to be educated about and more involved with the treatment, pregnant women who do Pilates should collaborate with their physiotherapists. This will provide better circumstances and resources for an integrated and collaborative therapy.

In order to increase muscular strength, especially in big muscle groups (such as the gluteal, external rotators, transverse abdominal, paravertebral, latissimus dorsi, and shoulder girdle muscles), stretching exercises should be done in the first trimester of pregnancy. They can also be used to strengthen the pelvic floor. During this stage of pregnancy, it is crucial to undertake low-impact workouts, increase body awareness and spine mobility, and refrain from eccentric stomach activities.[13,14]

During the second trimester the focus shifts to strengthening. From the 20th gestational week on, more consideration should be given to the advice for pregnant women to exercise safely by avoiding prolonged supine postures. Excessive or forceful stretching activities should be avoided, and strengthening exercises should take precedence at this time because the amount of the hormone relaxin also rises during this period. Due to modifications in gestational biomechanics, workout adjustments should be made. The significance of strengthening the rhomboid, paravertebral, internal and external hip rotator, transverse abdominal, and doing pelvic floor exercises should be emphasised.[13,14]

During the third trimester, exercise rate and intensity diminish as weight gain and limits increase. Continuous pelvic floor muscle training will develop awareness of relaxationand flexibility. To better prepare pregnant women for the postpartum period, the load in the upper and lower limb exercises, as well as the pelvic mobilisation exercises, should be increased during the latter stages of gestation. If a pregnant woman chooses vaginal birth, abdominal contraction and pelvic floor contraction are not done simultaneously, because during the delivery of the baby, she must do abdominal contraction and relax the pelvic floor muscle.[13,14]

Conclusion

The Pilates technique may encourage and contribute to a pregnancy without difficulties, as well as lower the likelihood of low back pain and osteoarticular discomforts. Exercises for stabilising, strengthening, and stretching should be done during the antenatal period and Pilates can provide all those benefits by addressing the above-mentioned fitness components. Pilates being a low impact exercise, would really come in handy specially in the pregnant population and would decrease the incidence of the pregnancy related complications considerably. As it goes with any other form of exercise program during pregnancy, an initial screening by a gynaecologist should be done to rule out any contraindications and the Pilates exercise should be incorporated with necessary precautions in place.

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COMPARISON OF PINCH AND GRIP STRENGTH AMONG SPINNERS AND FAST BOWLERS

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ABSTRACT

Background: Cricket is a strenuous sport to play. It is played all around the world both professionally and recreationally. Allpositions in the game depend heavily on hand grip and pinch grip. To hold the ball and change its speed and direction of travel, a strong grip is imperative. Therefore, the purpose of thestudy is to compare the pinch and grip strength among recreational fast and spin bowlers. **Methodology:** 40 healthy male recreational bowlers between 25-45 years of age participated in the study. Consent to participation and demographic data were obtained. Subjects were allocated to Group 1 (spinners) and group 2 (fast bowlers)according to their specialty in bowling. A Jamar hand-held dynamometer was used to assess the strength of the pinch and grip of dominant hand**.** For pinch strength Tip to Tip, Palmar and Key pinch strength were assessed. **Result:** Level of significance was $p<0.05$. Independent t-test revealed no significant difference between spinners and fast bowlers for grip strength ($p=0.79$), tip to tip strength ($p=0.22$), palmar strength ($p=0.61$) and key pinch ($p=0.15$) strength. **Conclusion:** It was concluded that there was no significant difference found between the spinnersand fast bowlers for grip strength and pinch strength.

Key Words: Pinch Strength, Grip Strength, Spinners, Fast Bowlers, Cricket

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Introduction

Cricket is the one of the most widely played sports in the world. This well-liked hobby is engaged in by almost 2.5 billion people of various ages and abilities. This game is played by more than 5 million people in India.[1] It is additionally played for fun on parks, streets, stadiums and playgrounds. With the addition of the T-20 format, players are now expected to perform to higher standards. Hour-long cricket matches put players at risk for injuries from impact (with the ball orbat), collision (with other players, fences), slips/falls, and repeated and overuse ailments. Overuse is the main cause of chronic injury patterns in recreational athletes.[2,3] It's interesting to note that across all age groups, men experience injuries more frequently than women. Cricket injuries occur on average every 10,000 hours of play at a rate of 53.16 (95% confidence interval 51.84-54.52).[4] It is played on a cricket pitch with wickets at each end between two teams of 11 players on a 22 yard (20 m) pitch.[5] This sport comprises fielding, wicket-keeping, batting, and bowling. Bowlers are divided into two categories: spin and pace, which are further divided into slow, medium-quick, and fast. Since holding the bat when hitting the ball and throwing and catching the ball is a crucial part of the game, all of these positions call for strong pinches and grips. Therefore, it is crucial to have strong muscles in order to bat and ball efficiently, especially while trying to hit a boundary. While fast bowlers also heavily utilize their arm, shoulder, and hand muscles, spinners engage particular hand and wrist muscles. In order to acquire the turn from the pitch, spinners use their fingers to spin the ball, and a good grip keeps the ball spinning, on the other hand quick bowlers make faster balls as a variation to grab the wicket and control the ball while bowling by using grip and pinch strength. Dexterity, which refers to the small, deliberate motions of the hand needed to manage the ball, is crucial for spin bowling. Dexterity testing offers a distinctive method of assessing the operation of the complete hand. Dexterous movements are made possible by intrinsic hand strength combined with manipulative abilities.[6,7] A well-liked method of evaluating muscular performance in sports and exercise has been the assessment of handgrip muscle strength tests.

According to studies, the ability to grip a sporting object firmly has a beneficial impact on how well a person performs in sports. An important physical characteristic that contributes to effectiveness and efficiency in daily job and athletic activities is hand grip strength. The maximal voluntary force that the individual is able to apply in a typical setting results in the forceful flexion of all finger joints, thumbs, and wrists, which determines the strength of a hand grip. From the previous studies it was observed that there are various studies regarding measurements and correlation of different fitness and anthropometric variables in cricketers but no study has been conducted on comparison of hand and pinch grip strength in fast bowlers and spinners.[8]

Therefore the purpose of this study is to compare the pinch and grip strength among spinners and fast bowlers.

Methodology

40 healthy male recreational bowlers between 25-45 years of age participated in the study. Subjects were selected from various playgrounds of Gurgaon on the basis of inclusion and exclusion criteria. Consent to participation and demographic data were obtained. Subjects were allocated to Group 1 (spinners) and group 2 (fast bowlers). A Jamar hand-held dynamometer was used to assess the strength of the pinch and grip as it is a reliable method.[9]

Inclusion Criteria:

1. Age: 25 -45 year
2. Playing Experience of more than 1year

Exclusion Criteria:

1. Individuals having recent history of musculoskeletal injury of upper limb in past 6 months
2. Individuals having any neurological condition.

Materials and Tools:

1. Weighing Machine
2. Stadiometer
3. Hand Held Dynamometer
4. Jamar Pinch Dynamometer

PROCEDURE:

The study's goals were explained to the participants, as well as the numerous tests that were administered. Informed consent was obtained, 40 participants were chose as per the inclusion and exclusion criteria, and demographics (name, age, gender, height, weight etc.) and pinch and grip strength were measured. Three trials worth of readings for each component were taken, and their means were utilized to analyze the data. Each test included three trials with a break of 1-2 min between trials in order to minimize the effect of muscle fatigue.

Pinch Strength:

Utilizing the Jamar pinch dynamometer which has reliability and validity of 0.97, the pinch grip was evaluated using the tip (two point), key (lateral), and palmar (three-jaw chuck) pinches. The participants were seated for each of the hand-strength tests with their shoulders adducted and neutrally rotated, elbows flexed at 90°, forearms in neutral position, wrists between 0° and 30° dorsiflexion, and between 0° and 15° ulnar deviation. The results of three consecutive trials were recorded for each hand for each strength test in kg.[10]

Hand Grip Strength:

The test was conducted using a portable, hand-held manual dynamometer. The participants were relaxed in chairs with back and arm supported. The individuals had their shoulder in adduction orneutral position, elbows flexed to 90 degrees, wrists in a neutral position, and forearms in a neutralposture. Each participant placed his or her contralateral hand on his or her thigh and was instructed to hold that position throughout the trials. The participants told to maintain a steady grip on the dynamometer for around three seconds at their maximum capacity. Participants were allowed to practice holding the device once with each hand prior to testing. Scores for grip were obtained andrecorded in kg. This test has a reliability score of 0.97, which is noteworthy.[11]

Data Analysis and Result

Level of significance was $p<0.05$. Independent t-test revealed no significant difference between spinners and fast bowlers for grip strength ($p=0.79$) and for tip to tip ($p=0.22$), palmar ($p=0.61$), and key pinch ($p=0.13$) strength.

Table-1 shows the comparison of mean, standard deviation and p values between spinners and fast bowlers.

Variable	Group	Mean ± SD	p value
Hand Grip Strength	Spinners	23.71 ± 2.56	0.794
	Fast Bowlers	22.19± 4.67	
Tip to Tip Strength	Spinners	8.37 ± 1.12	0.22
	Fast Bowlers	7.95± 1.41	
Palmar Strength	Spinners	8.58± 1.18	0.61
	Fast Bowlers	8.29± 1.23	
Key Strength	Spinners	11.42±2.3	0.13
	Fast Bowlers	11.73± 2.90	

Discussion

In this study we compared the hand grip strength and pinch strength and concluded that there was no significant difference found between the spinners and fast bowlers for grip strength and pinch strength. Pinch and hand grip strength are two essential components for optimal performance in cricket. All of the positions in cricket like batting, bowling, fielding and wicket keeping require firm pinches and grips. Holding the bat while striking the ball and throwing and catching the ball are essential aspects of the game. Therefore, having strong muscles is essential to effectively bat and bowl, especially when attempting to strike a boundary. While quick bowlers employ faster balls as a variety to grab the wicket and control the ball while bowling by using grip and pinch power, spinners use their fingers to spin the ball in order to acquire the turn off the pitch. A good grip keeps the ball spinning.

Previous studies showed the significance difference related to hand grip strength between medium pacers and spinners (Khichadiya & Kanase 2017) whereas there was no significance difference inhand grip strength between medium pace bowlers and spinners (Kanwaldeep Singh and Mithun Chandra Roy 2021). There is lack of literature in comparison of hand grip strength between different categories of bowlers and no studies have been found regarding the difference in pinch strength between spinners and medium pace bowlers. Therefore the results of our study will contribute knowledge in the existing literature.

Limitation of the Study

The sample size was small due to limitation of time frame. Only males participated in the study. Therefore, the results cannot be generalised to both genders.

Conclusion

It was concluded that there was no significant difference between the spinners and fast bowlers for grip strength and pinch strength

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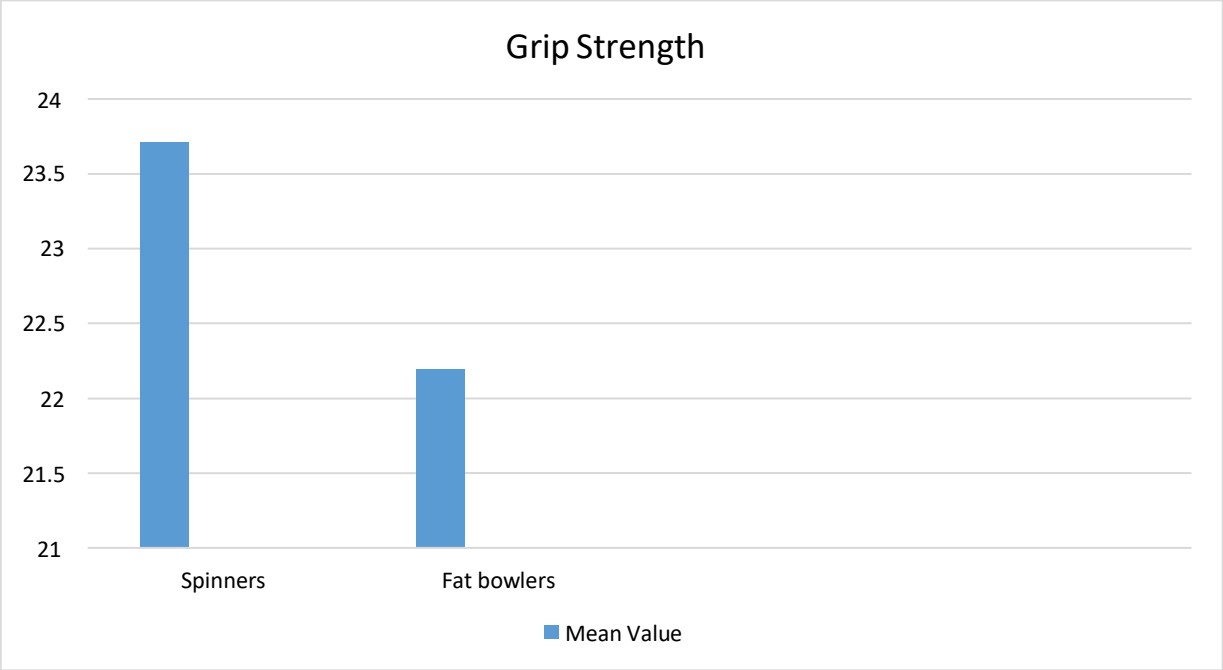


Fig. 1 shows the comparison of mean values of the hand grip strength in spinners and fast bowlers.

Fig. 2 shows the comparison of mean values of the hand grip strength in spinners and fast bowlers.

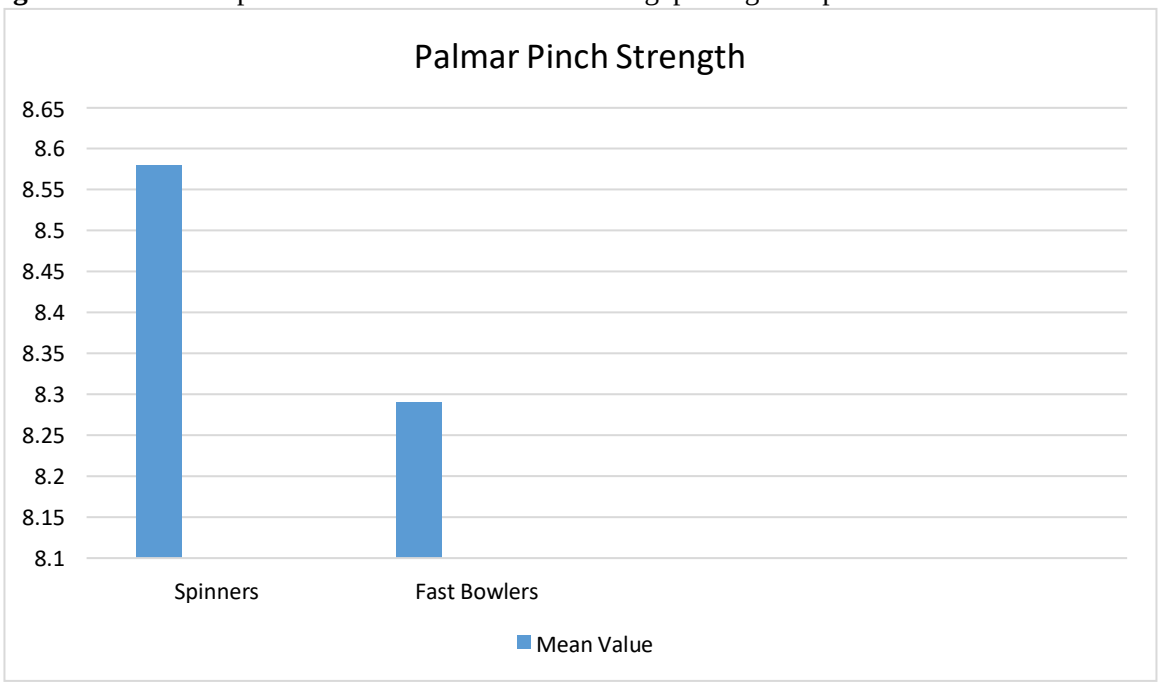
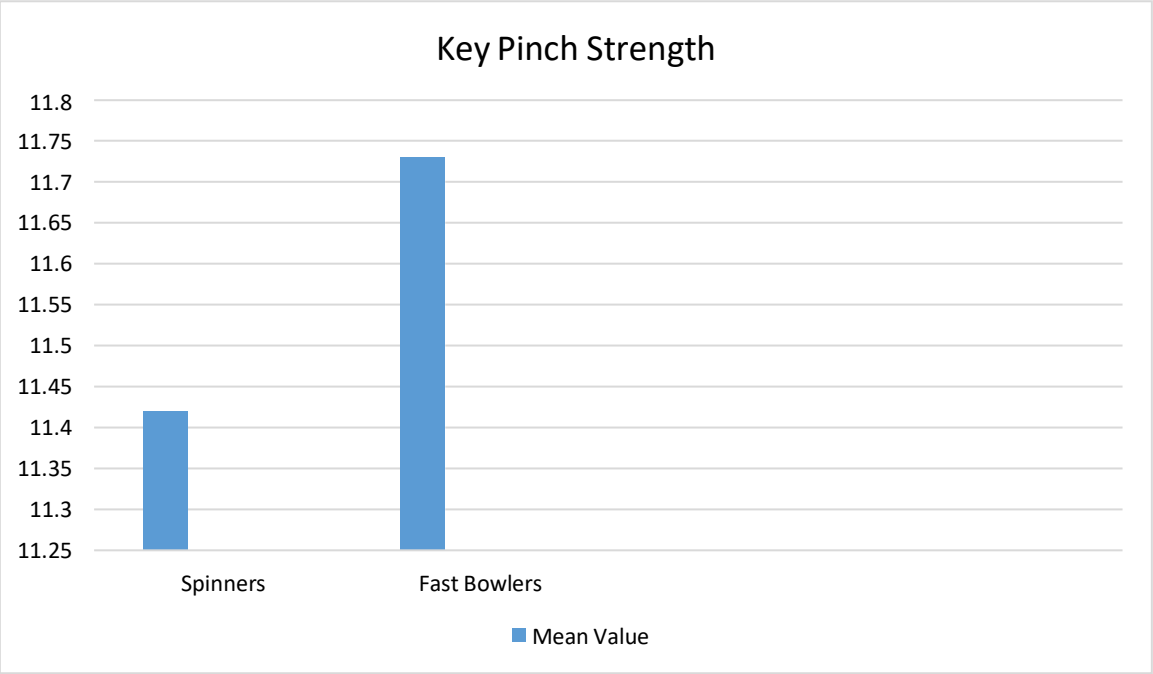


Fig. 3 shows the comparison of mean values of the palmar pinch strength in spinners and fastbowlers.



KNOWLEDGE OF EXERCISE TRAINING AMONG GYM TRAINERS

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ABSTRACT

BACKGROUND: Exercise training is an essential component of promoting physical activity and imoroving health outcomes.Gym trainers play a critical role in providing exercise training guidance and instruction to their clients.However, the effectiveness of gym trainers inproviding exercise training is highly dependent on their knowledge and qualifications. Therefore this review aimewd to assess the current literature on the knowledge of exercise training among gym trainers. OBJECTIVE: The objective of this literature review is to evaluate the current state of knowledge of exercise among gym trainers. METHODOLOGY: Comprehensive search of electronic databases, including pubmed, scopus, google scholar was conducted to identify relevant studies published between 2013-2023. Out of 126 articles screened, 7 articles were included according to inclusion and exclusion criteria. Inclusion criteria are articles published in English language, articles available in full text RCT's, those articles in which the following keywords were used- Gymtrainers, exercise , knowledge of gym trainers, gym injuries, sources of knowledge, exercise training and fitness instructors. RESULTS: In various studies ,The studies concluded that there is a need for greater integration between the current formal (REPs) accreditation system and informal knowledge developed while working as a fitness trainer, and also found that personal fitness trainers should have licensing requirements, such as a bachelor's degree in exercise science and certification by an organization whose criteria are extensive and widely accepted, before being allowed topracticetheir craft. There are many studies from which we found that the prevalence of gym injuries also increases. CONCLUSION: This review supports that gym trainers lack proper guidance for exercise training and alsodoes not have proper certification.

KEYWORDS: Gym trainers, exercise, knowledge of gym trainers, gym injuries, sources of knowledge, exercise training and fitness instructors.

INTRODUCTION:

Physical activity and exercise have become an integral part of our daily lives, and gym trainers play a crucial role in promoting and guiding individuals towards a healthy lifestyle Exercise training is a complete process that requires an in-depth understanding of exercise physiology, biomechanics and nutrition to ensure that clients achieve their desired goals while minimizing the risk of injury. Therefore, it is crucial to assess the knowledge of exercise training among gym trainers to ensure that they can provide effective exercise training and instructions to clients. Fitness specialists examine, encourage, and teach clients according to their needs in terms oftheir health and fitness using a personalized approach (1). Fitness trainers are intimately involved with information that both includes and extends beyond physical activity domains since education is a significant component of their job (2). Gavin, for instance, showed (3) that personal trainers frequently engage in and accept responsibility for a wide range of health behaviors that go beyond the responsibilities of their position in terms of education. Furthermore, Melton et al. (4,5) emphasized how the work of the fitness trainer is complex and multifaceted in nature; nevertheless, research hasn't been able to show how fitness trainers acquire knowledge that can handle such complexity.

Stacey et al. (6) recently conducted a thorough assessment on knowledge translation initiatives aimed at fitness coaches. As a result of the findings, it was clear that fitness trainers gathered their knowledge from a wide range of resources, including textbooks, professional networking, scientific publications, and the media. Comparatively to less educated fitness trainers, who tended to rely on less reliable information sources (like the media), those with higher education levels used more evidence-based sources (like scientific journals). However, there is still limited comprehension of the method. (7,8)

Therefore, there is a need to evaluate the knowledge of exercise training among gym trainers to identify gaps in their knowledge and provide appropriate training and education to improve their effectiveness. The study aims to assess the knowledge of exercise training among gym trainers.

METHODOLOGY:

This systematic review was reported according to the principles of the preferred reporting items for systematic review and Meta -Analyses (PRISMA) guidelines.

LITERATURE SEARCH

A search of the english literature was performed in the following database: Google scholar, PubMed, Scopus. The following keywords were used: Gym trainers, exercise, knowledge of gym trainers, gym injuries, sources of knowledge, exercise training and fitness instructors.

INCLUSION CRITERIA:

METHODOLOGICALQUALITY JUDGEMENT**:**

A quality assessment-controlled studies was conducted using the Strengthening the Reporting of Observational Studies (STROBE). Strobe contains 22 items which, in case-control studies, provide information for cases and controls separately.

DISCUSSION:

This review aimed to assessed the knowledge of exercise training among gym trainers. Several studies were conducted and these studies found that while most gym trainers have good understanding of basic exercise principles, there are still areas where their knowledge islacking. For Example, some trainer may not fully understand how to modify exercise programs for clients with specific health conditions and injuries.

This review highlights the importance of ongoing education and training for gym trainers. Continuing education can help trainers stay up to date on the latest research snd best practices in exercise and fitness, allowing them to better serve the clients and provide more effective workouts.

CONCLUSION:

Personal trainers have a good understanding of basic exercise principles but there are knowledge gaps in some areas, which may impact the quality of the exercise prescription and safety of the clients. Further training and education for gym trainers may be needed to improvetheir knowledge and ensure the safe and effective delivery of exercise programs.

Study	Study design	Title	Sample size	Methods	Conclusions
Sohel Ahmed et al, 2022	Cross - sectional study	Fitness Trainers' Educational Qualification and Experience and Its Association with Their Trainees' Musculoskeletal Pain.	1177 fitness trainers	Nordic Musculoskeletal Questionaaire	Trainers lower experience was associated with higher musculoskeletal injuries.
Nikita Shinde et al, 2021	Cross -sectional study	prevalence of musculoskeletal injuries and pain in gym instructors	108 gym instructors	SELF-Administered Questionnaire was used contained:3 components and 28 questions	The prevalence of pain and injuries was high in gym instructors which demands fitness industries to adapt prevention strategies.

Study	Study design	Title	Sample size (N)	Methods	Conclusions
Moh H Malek et al, 2021	Cross sectional study	Importance of health science education for personal fitness trainers.	115 personal fitness trainers	FIKA Questionnaire	findings suggest that personal fitness trainers should have licensing requirements, such as a bachelor's degree in exercise science and certification by an organization whose criteria are extensive and widely accepted, before being allowed to practice their craft .
Alexander et al, 2013	Cross sectional study	The acquisition and development of fitness trainers professional knowledge	11 fitness trainers	Semi-structured interview guide	This study suggests that the current formal training and accreditation pathways do not equip fitness trainers with the appropriate knowledge and skills for their everyday work

Study	Study design	Title	Sample size	Methods	Conclusions
Gregory et al, 2016	Cross sectional study	Personal trainers demographics, current practice trends and common trainee injuries	6175 personal trainers	Survey and recruitment letter(demographics,common injuries seen by trainers and certifications)	There is variability in the practices between different trainers when analyzing differences in collegiate education, certifications andstrength and conditioning certification
Glenys et al, 2015	Cross sectional study	Fitness-Instructors: how does their knowledge on weight loss measure up	10 fitness instructors	Semi structured interviews	Findings revealed that inconsistencies appeared to exist with participants' development and delivery of a weight management programme. In some cases fitness instructors were not adequately preparedfor dealing with overweight and obese clients.

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PREVALENCE OF UPPER CROSS SYNDROME IN ADOLESCENT AND YOUNG ADULTS: A REVIEW OFLITERATURE

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ABSTRACT

Background: Upper cross syndrome is also known as proximal or shoulder cross syndrome. UCS occurs as a result of imbalance between weak deep neck flexors, rhomboids, serratus anterior, lower trapezius and tight pectoralis major, minor, upper trapezius and levator scapulae. Opposite group muscle imbalances in upper crossed syndrome give rise to postural disturbances. Individuals who present with upper crossed syndrome will show a forward head posture (FHP), hunching of the thoracic spine (rounded upper back), elevated and protracted shoulders, scapular winging, and decreased mobility of the thoracic spine. *Objective:* This review aimed to investigate prevalence of upper cross syndrome in adolescentsand young adults. *Methodology:* Out of 129 articles screened, 10 articles were included according to inclusion and exclusion criteria. The inclusion criteria are articles from 2013 – 2023, articles published in English language, articles available in full text and RCT's, those articles in which the following key words were used – Upper cross syndrome, shoulder girdle crossed syndrome, adolescent, young adults, forward head posture, Age group for adolescent (10 – 19 years), young adults (10 – 26). *Conclusion:* Present study provides evidence that UCS is prevalent in adolescents and young adults. While further research is needed to understand the factors contributing to variability in prevalence estimates, these findings highlight the importance of identifying and addressing postural disorders in this population.

INTRODUCTION

Posture is the attitude assumed by the body by means of the co – ordinated action of many muscles working to maintain stability.[1] In order to recognize postural deformities, one needs to have a clear understanding of what "normal" or "good" posture is. When a posture fulfils its purpose with its maximum efficiency and by taking minimum efforts, it is known as good posture.[1,2] Upper Cross Syndrome (UCS) is a musculoskeletal condition characterized by a combination of muscle imbalances and postural deviations, particularly in the neck and shoulder regions. It is commonly observed in individuals who spend prolonged periods in sedentary positions or engage in repetitive activities that promote poor posture. While UCS has been extensively studied in various populations, including adults and athletes, there is a growing interest in understanding its prevalence and impact specifically in adolescents and young adults.[3]

Adolescence and young adulthood represent critical developmental stages characterized by rapid growth, physical changes, and increased engagement in activities that may contribute to the development of musculoskeletal imbalances. The prevalence of UCS in these age groups is of particular concern due to its potential implications for long-term health and well-being. Understanding the prevalence of UCS in adolescents and young adults is essential for several reasons. Firstly, the identification of the prevalence can provide insights into the magnitude of the problem and help healthcare professionals allocate appropriate resources for prevention and treatment strategies. Secondly, by examining the prevalence, potential risk factors and underlying causes of UCS in this specific population, targeted interventions can be developed to promote healthy postural habits and mitigate the negative consequences associated with this syndrome.[4]

The individuals with upper cross syndrome will show a forward head posture (FHP), increased kyphosis of the thoracic spine (rounded upper back), elevated and protracted shoulders (rounded shoulder), scapular winging, and decreased mobility of the thoracic spine. This abnormal posture if presented for a long period of time can cause upper back and neck pain. [5,6]

Moreover, the prevalence of UCS in adolescents and young adults may have implications for their overall physical and psychological well-being. Studies have suggested that UCS can lead to a range of symptoms, including neck and shoulder pain, headaches, and reduced functional performance. These symptoms can negatively impact daily activities, academic performance, and quality of life, particularly during the critical transition from adolescence to adulthood.

While there is a growing body of literature on UCS, there remains a need for a comprehensive understanding of its prevalence in adolescents and young adults. By pooling data from relevant studies, we can provide a more robust and reliable estimate of the prevalence, explore potential variations across different subgroups, and identify factors that may contribute to the development of UCS.[7,8]

Ultimately, the findings of this review will not only contribute to the existing knowledge on UCS but also inform healthcare practitioners, educators, and policymakers about the prevalence and associated factors in adolescents and young adults. This knowledge can guide the development of targeted interventions, preventive strategies, and public health initiatives aimed at minimizing the burden of UCS and promoting musculoskeletal health in this population.

METHODOLOGY

This systematic review was reported according to the principles of the preferred reporting items for systematic reviews and Meta-Analyses (PRISMA) guidelines.

LITERATURE SEARCH

A search of the English literature was performed in the following database: Google scholar, PUBMED, MEDLINE, SCOPUS. The following keywords were used: Upper cross syndrome, shoulder girdle crossed syndrome, adolescent, young adults, forward head posture.

STUDY SELCETION

Initial screening of the studies was based on the title and abstract. Once studies were selected, they were analysed and reviewed in further detail based on the entire study content and data.

INCLUSION CRITERIA:

1. Cross – sectional studies published in English.
2. The search was limited from the year 2013 – 2023.
3. Those articles in which the following key words were used – Upper cross syndrome, shoulder girdle crossed syndrome, adolescent, young adults, forward head posture.
4. Age group for adolescent (10–19years), young adults (10 – 26)[10,11]

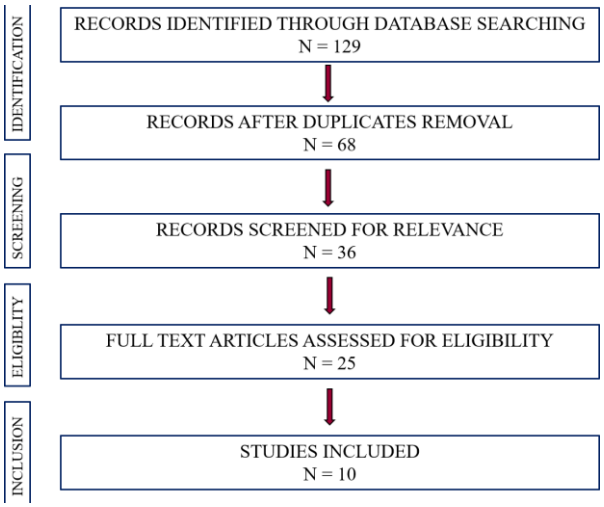

Fig 1. PRISMA flow diagram

DISCUSSION

The present study aimed to estimate the prevalence of upper cross syndrome (UCS) in adolescents and young adults. The prevalence of UCS varied widely across the included studies, ranging from 2.8% to 59%, indicating that the condition is relatively common in this population. Factors such as differences in study design, population characteristics, and UCS criteria may have contributed to variability in prevalence estimates.

This may reflect differences in the definition of

UCS used in each study, as well as differences in the population characteristics (e.g., age range, sex, occupation) and study design (e.g., sample size, recruitment method) that could influence the prevalence of UCS.

Despite the heterogeneity observed among the included studies, the present meta-analysis provides important insights into the prevalence of UCS in adolescents and young adults. The findings suggest that UCS is a common postural disorder in this population, which may have important implications for the development of targeted interventions to prevent or treat the condition. For example, strategies such as postural education, strengthening and stretching exercises, and ergonomic modifications may be effective in reducing the prevalence of UCS in adolescents and young adults.

CONCLUSION

Present study provides evidence that UCS is prevalent in adolescents and young adults. While further research is needed to understand the factors contributing to variability in prevalence estimates, these findings highlight the importance of identifying and addressing postural disorders in this population.

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STUDY	TITLE	SUBJECTS	DESIGN	METHOD	RESULT	CONCLUSION
Chandarana et al. (2022)	Prevalence of Upper Crossed Syndrome in College Going Students.	N = 140 Age group between 17-23 years.	Observational Study	Pectoralis major and minor length test, scapular retractors and deep neck flexors strength using dynamometer.	Considering diagonal pattern prevalence was 2.8%. Considering parallel pattern prevalence was 2.8%	The present the situation does not seem to be troublesome, perhaps may have a devastating impact if left unresolved.
Vishwanath et al. (2022)	Prevalence of upper-cross syndrome in college going students-a cross sectional study	N = 100 Age group between 18-23 years.	A cross-sectional study	Measurement of tightness for pectoralis major, trapezius weakness and neck disability index (NDI)	Frequency of tightness of pectoralis major was 8%, weakness of trapezius was 59%. and 55% had positive results of NDI.	Upper cross syndrome is found to be prevalent in college going students.

STUDY	TITLE	SUBJECTS	DESIGN	METHOD	RESULT	CONCLUSION
Javed et al. (2022)	Prevalence of Upper Cross Syndrome In Medical Students of Women Medical College, Abbottabad, Khyber Pakhtunkhwa, Pakistan.	N = 305 Age group 18 – 25 years.	Cross-sectional study	Neck ROM was measured using a goniometer, forward head posture was measured using ruler against the wall and posture analysis was done to check for rounded shoulders.	47.86% were diagnosed with Upper cross syndrome.	A significant number of students in were suffering with Upper cross syndrome either due to excessive smart phone usage or poor study posture.
Bhatia et al. (2021)	Prevalence of Upper Cross Syndrome among Delhi Higher Secondary School Students Due to Inadequate School.	N = 148 Age group 15 – 17 years.	Cross-sectional study	NDI, REEDCO scale, Wall push up test, knee to floor height measurement of the subjects.	NDI was having statistically significant negative correlation with Knee to floor height.	Inadequate classroom furniture dimensions can lead to musculoskeletal disorders.
Srichandan et al. (2022)	Prevalence of Upper Crossed Syndrome in Young Adults: A Cross-Sectional Study	N = 205 Age group – 17 to 26 years	A cross – sectional study	Cervical flexors strength was measured by a pressure biofeedback, middle trapezius with hand-held dynamometer and length of the pectoralis minor and length of the upper trapezius with measuring tape.	Prevalence of upper crossed syndrome was not identified among young individuals within the age group of 17 to 26 years.	Prevalence of UCS in young individuals could not be established because shortness of upper trapezius muscle was not identified in this study.

STUDY	TITLE	SUBJECTS	DESIGN	METHOD	RESULT	CONCLUSION
Srichandan et al. (2022)	Prevalence of Upper Crossed Syndrome in Young Adults: A Cross-Sectional Study	N = 205 Age group – 17 to 26 years	A cross – sectional study	Cervical flexors strength was measured by a pressure biofeedback, middle trapezius with hand-held dynamometer and length of the pectoralis minor and length of the upper trapezius with measuring tape.	Prevalence of upper crossed syndrome was not identified among young individuals within the age group of 17 to 26 years.	Prevalence of UCS in young individuals could not be established because shortness of upper trapezius muscle was not identified in this study.
Dhage et al. (2019)	Prevalence of an Upper Crossed Syndrome in Physiotherapy College Students	N = 46 Age group of 17-25 years.	A Cross-Sectional Study	Cervical flexor strength, pectoralis minor tightness, craniovertebral angle.	The prevalence of upper crossed syndrome was 30.43%	Upper crossed syndrome was highly prevalent in college students. Poor posture habit is found to be a risk factor.
Mubeen et al. (2016)	Prevalence of upper cross syndrome among the medical students of university of Lahore.	N = 384 Age between 17 to 20 years	A Cross-Sectional Study	Reed-co scale, wall push test	Upper cross syndrome in medical students of University of Lahore was found to be 37.1%	Upper cross syndrome were somehow related to bad posture.

STUDY	TITLE	SUBJECTS	DESIGN	METHOD	RESULT	CONCLUSION
Mubeen et al. (2016)	Prevalence of upper cross syndrome among the medical students of university of Lahore .	N = 384 Age between 17 to 20 years	A Cross-Sectional Study	Reed-co scale, wall push test	Upper cross syndrome in medical students of University of Lahore was found to be 37.1%	Upper cross syndrome were somehow related to bad posture.
Das et al. (2015)	Postural defect of school going children due to heavy weight bag.	N = 30 Age group – 11 to 14 years	A Cross-Sectional Study	Postural deformities photographic method	56.67 % suffered from kyphosis, 16.67 % suffered from lordosis and 26.67 % suffered from scoliosis	Heavy weight bag can cause postural disturbance in students.
Latalski et al. (2013)	Risk factors of postural defects in children at school age.	380 children aged 14	Diagnostic survey	Auditory questionnaire	Postural defect was detected in 14.7% of children.	There is a relationship between physical activity of the child and the occurrence of postural defects.
Shahid et al. (2013)	Prevalence and Risk Factors for the Development of Upper-Crossed Syndrome (UCS) among DPT Students of University of Lahore.	N = 244 Age group – 17 to 22	a cross – sectional study	A self-Administered questionnaire	23.4% were having neck pain in PROM during. There were 24.6% respondents with Thoracic pain in AROM during Flexion. 52.9% respondents had rounded shoulder posture.	Subjects having following risk factors are more prone to Upper Crosse Syndrome.

FOOT DEVIATIONS AMONG MODERN DANCER'S ASYSTEMATIC REVIEW

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ABSTRACT

BACKGROUND: Modern dance is a genre of dance that emerged in the early 20th century as a rebellion against the rigid structures of classical ballet. Unlike ballet, modern dance emphasizes the use of gravity and momentum to create movement and often incorporates elements of improvisation and individual expression. Dancers, such as ballet, jazz, modern, tap, or competitive ballroom dancers, are artists and athletes. Most dance styles are demanding,especially on the dancer's forefoot, but undoubtedly, any portion of the foot or ankle is susceptible to damage. OBJECTIVE: To review the foot deviations among modern dancers METHODS: Relevant studies taken from the period of 2010 to 2023 via PubMed and Google scholar. Studies were reviewed as eligible for inclusion in the systematic review if they met thesubsequent criteria; full text articles which were published in last 10 years, cross sectional studies, population included both the genders with age group 18-40 years. CONCLUSION: Present study provide evidence that there are foot deviations among modern dancers.

INTRODUCTION

Modern dance is carved from Classical Ballet Dance, while Contemporary Dance is evolved from Modern and Post-Modern Dance. Modern dance is full of expressions, moods, and emotions, while Contemporary Dance is more about developing new styles and dance techniques[1].

Classical ballet, modern dance and postmodern dance are the main genres of contemporary dance, but it also includes several subcategories, such as non-dance, conceptual dance. The core of contemporary dance is experimentation. Its focus is on showing ideas and emotions[2].

Professional music theatre dancers are at risk for musculoskeletal injuries due to the demandsimposed on their lower extremities. Foot and ankle injuries have been claimed to account for 23–45% of all injuries[3].

A dancer's foot and ankle are particularly prone to damage, accounting for 34% to 62% of all reported injuries. Many lower-body exercises require the hind foot to pronate or supinate in response to these stresses[4].

Due to the firmer shoe bottom and moves that do not require as much motion in the first MTPjoint as tap dancing, modern, jazz, and ballet dancers experience

MTP joint pain earlier than tap dancers do[5].

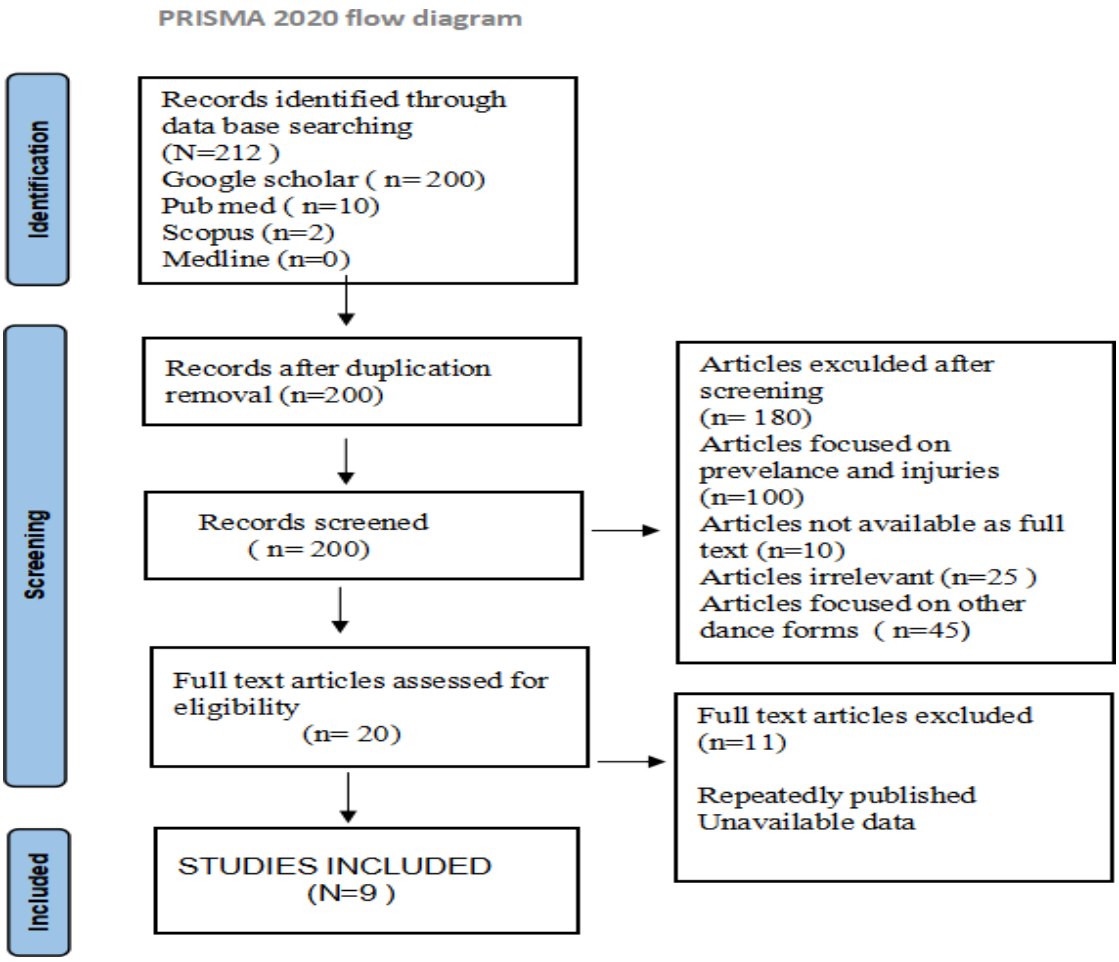
Many dancers struggle to achieve the 180-degree turnout aesthetic ideal and end up forcing theposition by abducting their feet beyond the range of their hip external rotation. Excessive pronation, external tibial torsion, valgus knee stress, a widened Q angle, and lumbar lordosis can all result from this positioning[6].

Dancers frequently experience primary and secondary kinetic-chain dysfunctions. Injuries at the foot and ankle that travel up the kinetic chain are influenced by pes cavus and planus, excessive ankle and great-toe range of motion, and abnormalities of the rear and forefoot[7].

Studies focused on several dancers have reported increase in prevalence of overuse injuries due to biomechanical alterations mainly affecting lower segments which impacted their performance, but there is need to study the deviations among modern dancers and its subcategories including contemporary dance and other genre like ballet which have some similarities in techniques Hence it is imperative to study about the foot deviations among Modern dancers[8].

Methodology

This systematic review was reported according to principles of the Preferred Reporting Itemsfor Systematic Reviews (PRISMA) guidelines



Literature review

Articles are gathered from the source of information

- Google scholar
- Pub med
- Scopus index

Inclusion criteria

Full text articles

- Articles which are referred from 2010 to 2023
- Cross sectional studies, case studies, cohort studies published in English
- Modern, contemporary, ballet dancers of age group between 6 -30 years.

Exclusion criteria

- Duplicate articles
- Articles with only abstract
- RCT

DISUCSSION

According to the results of a recent study, when performing the angle of turnout, dancers frequently pronate their hindfoot and abduct their forefoot. It is important to note that this finding might have effects on dancers that perform in a variety of genres, such as ballet, modern, and jazz. Studies have revealed that various dancing styles actually employ similar tactics when performing demi pile and en pointe, and that as many as 52% of ankle and foot injuries take place in these situations. Other research has emphasized the significance of the lower leg in dancing, with tibiofemoral passive external rotation being a significant factor in the foot posture index. When there is inadequate hip external rotation to attain the aesthetic position, it is believed that this compensatory technique—or a sequela of other compensatory techniques—is utilised to boost turnout in dancers. According to research, total turnout is the consequence of a combination of around 60° to 70° of external rotation at the hip and 10° to 35° from the remaining lower extremity. As a result, they frequently overpronate their rear footand fore foot abduction. These evidences show that Modern dancers, ballet dancers, contemporary dancers develop biomechanical alterations which can cause further deviations inFoot.

And studies are addressing the foot deviations and injuries in modern dance forms, Thefollowing search terms, combinations were used: foot deviations, modern dancers, footposture, contemporary dancers, ballet dancers.

CONCLUSION

Present studies provide evidences that foot deviations are present among modern dancers. While further research is needed to understand the factors and type of deviations with differentage group.

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Sr No.	Name of the author	Title And study design	Sample size	Age/gender	Outcome measure	Conclusion
1.	Carter SL, et al (2017)[2]	Lower-leg and foot contributions to turnout in university-level female ballet dancers	19 (classical ballet and modern dancers)	(16 - 19) yrs. female dancers	Foot Posture Index (FPI) version 6, an ordinal measure, navicular drop	Lower leg does contribute to dancers 'overall position of functional turnout. There was a negative correlation passive external tibiofemoral rotation with respect to foot posture index hence dancers do pronate
2.	Cimelli SN, Curran SA at et al (2012)[3]	Influence of turnout on foot posture and its relationship to overuse musculoskeletal injury in professional contemporary dancers: a preliminary investigation. A preliminary investigation	12 (contemporary dancers)	(26-30) yrs. Both male and female	Clinical tracing of the foot, the Foot Posture Index (version 6), and a dance background/injury questionnaire	Dancers showed a tendency toward pronation when moving into turnout.
3.	Russell JA et al (2011)[4]	Ankle and Foot Contributions to Extreme Plantar- and Dorsiflexion in Female Ballet Dancers cross sectional study	7 (ballet dancers)	(14- 23) yrs. Female	Superimposed x-rays in weight bearing position	high prevalence and negative impact of foot and ankle injuries in contemporary dancers. (Foot and ankle injuries reported to 52 %)
4.	Ladha N, Jain H et al (2021)[5]	Effect of Pronated and Supinated Foot Postures on Static and Dynamic Balance in Dancers cross sectional study	30 (contemporary dancers)	(22- 30) yrs. both male and female	flamingo balance test, star exercusion balance test navicular drop test	pronated deviations along with supinated deviations in reach distance

		female ballet dancers.				developing hallux valgus, with the tendency of worsening with training time
6.	Van Seters, et al (2017)[7]	Risk Factors for Lower-Extremity Injuries Among Contemporary Dance Students Prospective cohort study.	45 (contemporary dancers)	(18 - 25) yrs. Female	Oslo Sports Trauma Research Centre (OSTRC) Questionnaire Physical fitness test	The findings indicate that contemporary dance students are at high risk for lower-extremity injuries. Therefore, the identified risk factor (ankle dorsiflexion) should be considered for prevention purposes.
7.	Carter SL, et al (2019)[8]	An analysis of the foot in turnout using a dance specific 3D multi-segment foot model. cross sectional study	18 (ballet and modern dancers) `	(18 - 25) yrs. female	retro reflective markers, Vicon T40S	Our findings suggest dancers do pronate, via hindfoot eversion and midfoot abduction in both functional and forced turnout, however, no immediate association was found between forced turnout and first MTPJ abduction
8.	Nowicki RM, et al (2013)[9]	Hyper pronation in Dancers Incidence and Relation to Calcaneal Angle. A retrospective	24 (professional dancers)	mean age = 25 (both female and male)	Calcaneal angle measurement using goniometer, GROUP chart review for incidence of hyper pronation	The incidence of hyper pronation causing symptoms or musculoskeletal injury is common among dancers
9.	MARKETA PROCHAZKOVA et al (2014)[10]	Analysis of foot load during ballet dancers' gait	13 professional dancers 13 non dancers	Mean age =24 (both male and female)	Foot pressure data during gait were collected using a 2 m pressure plate (RS scan	higher medial immediate loading of forefoot and