International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Prevalence Of Musculoskeletal Disorder and It's Correlation with Core Endurance, Body Mass Index Among Indian Classical Musical Instrument Players

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Abstract

Background and need of study: Commonly all classical musical instruments are played in cross leg position and without back support for prolonged periods. Core is the central part of the body, core muscles have to spare the spine from excessive load, to transfer force from the lower body to the upper body and vice versa. Strong, stable core and normal body mass index helps us to prevent musculoskeletal injuries. Therefore; the present study was conducted to find the prevalence of musculoskeletal disorder (MSD) and correlation with core endurance and body mass index (BMI) in Indian classical musical instrument players.

Methodology: Observational, analytical study was conducted on 35 Indian classical musical instrument players. Male and female, age 20-60 years old, with ≥2 years of experience as a classical musical instrument player, practicing instrument for minimum 2 hours/day were included. Participation was voluntary and informed consent was taken. Nordic questionnaire was assessed for the prevalence of MSD. Weight and height assessed by BMI. Core endurance was assessed by McGill's core endurance test. Each subject was given appropriate rest period between all tests. Outcomes were correlated using Spearman's correlation of coefficient.

Results: The common painful sites of the body were as follows: wrist/hand(91%),low back (89%),neck(71%),upperback(49%),shoulders(49%),knees(31%),elbows(29%),ankles(20%),hips(11%) among musical instrument players. Correlation was found between BMI and trunk flexor test (r=-0.696, p≤0.001), BMI and trunk extensor test (r=-0.658, p≤0.001), BMI and right side bridge test (r=-0.649,p≤0.001,)left side bridge test (r=-0.675,p≤0.001).

Conclusion: A relatively high prevalence of musculoskeletal pain amongst Indian classical musical instrument players. There is moderate negative correlation between BMI and core endurance in Indian classical musical instrument players. Ergonomic advices, adapting healthy lifestyle along with overall improvement in their working efficiency, prevent MSD and thus indirectly improve their Quality of Life.

Keywords: Body mass index, Core endurance, Indian classical musical instrument players, musculoskeletal disorders.

Introduction:

Indian classical musical instrument players basically the one who plays musical instrument or the one who generates amazing music from the instrument is known as musical instrument player. They are also known as Instrumentalist or Instrumental Musician. Many Instrumentalists are known for playing specific musical instruments such as Tabla, Seetar, Veena, Mridingam, Bansuri, Dhol, Khanjari, Bass, Drum, Santoor, Taal ,Shehnai Tambura,Vina, Guitare etc,.[1] Different type of Instrumentalists can perform together in a music group. A person who can play a number of instruments is called a 'multi – instrumentalist'.

Musculoskeletal Disorders (MSD)are defined as "conditions that affect the loco-motor system; that is, muscles, bones, joints and associated tissues such as tendons and ligaments, as listed in the International Classification of Diseases" (WHO, 2019). It also reduces people's ability to work and cooperate in social roles. Musicians used their musculoskeletal systems for long periods outside their normal position. Overusing of specific muscle groups result in musculoskeletal disorders due to overloading. There are many reasons for pain and disability, such as long term performance, posture disorders, muscle weakness and loss of fitness, and inappropriate instrument selection.[2]

Core endurance is defined as the ability to maintain a position or perform multiple repetitions, for core muscles. The core is the central part of the body. It includes Pelvis; Lower back, Hips and Stomach. The importance of strong core is prevention of injury, reduction of back pain, balance, stability, improved lifting mechanics, posture.[3] Core muscles help the human body to maintain the balance against the gravity and the forces created by the uneven surface. Thus core muscles also play a vital role in maintaining the balance when there is a challenge for the human body to maintain the upright position. [4]

Body adiposity has been consistently linked to a greater risk of musculoskeletal pain and injury in the general population. Increases in body mass index (BMI) are sufficient to induce musculoskeletal pain and difficulties in ambulation. Higher BMI has profound effects on soft-tissue structures, such as tendons, fascia and cartilage. The negative consequences of a higher BMI extend well beyond physiological aspects; obese individuals are less efficient and at greater risk for injury than normal-weight individuals in a large number of work-related tasks and daily activities that involve upright sitting and standing positions [5]

Musculoskeletal disorders at work are widespread, incurring substantial cost and affecting Quality of Life. They are prevalent in all occupations including Indian classical musical instrument players. As well as commonly all classical instruments are played in cross leg position and without back support for prolonged periods. Core is the central part of the body, core muscles have to spare the spine from excessive load, to transfer force from the lower body to the upper body and vice versa. Strong, stable core and normal body mass index helps us to prevent musculoskeletal injuries Therefore; the present study was conducted to find the prevalence of musculoskeletal disorder (MSD) and correlation with body mass index (BMI), core endurance in Indian classical instrument players.

Methodology:

Observational analytical study was conducted by Convenience sampling. The study was conducted at different classical musical academies from Mumbai, Maharashtra, India. Study duration was September 2022 to December 2022. A sample size was estimated on the basis of pilot study and the sample size obtained was 35.

- $N= \{Z\alpha+Z\beta) / C^2\}$
- Where; $C = 0.5 \times \text{in } \{(1+r)/ (1-r)\}$
- r=correlation coefficient

Male and female, age 18-60 years old, with ≥ 2 years of experience as a Indian classical musical instrument players, practicing instrument for minimum 2 hours/day was included. Neurological disorders, severe cardiovascular or pulmonary disease, recent traumatic conditions, any type of recent surgery (last 3 months), dementia, depression, etc., malignancy were included.

46 Indian classical musical instrument players were taken from different academies of Mumbai city. Those willing to participate and fulfilling inclusion criteria were included in the study. They were explained about the need of the study and procedure in the language they understand. Written informed consent was taken. Those willing to participate and fulfilling inclusion criteria were include in the study. Assessment was done according to the proforma in Indian classical Instrument players. Data was analysed.

Outcome measures:

1. Nordic Musculoskeletal Questionnaire (NMQ):

The NMQ is completed by self-administration or face-to-face interview and provides reliable information on the onset, prevalence and outcomes of MSP in nine body regions (the neck, shoulder, upper back, elbow, wrist/hand, low back, hip/thigh, knee, and ankle/foot). The NMQ interrogates ache, pain or discomfort experienced in the nine body parts to date, for the last 12 months, for the last four weeks and on the day of the administration, with binary choice questions (yes or no). [6]

2) Body mass index (BMI):

The weight in kilograms and height in centimeters was measured as per the standard guidelines laid down by World Health Organization (WHO). Height (HT) was measured in barefoot to the nearest 0.1cm using a vertical height scale. Bodyweight (WT) was recorded to the nearest 0.1kg using a portable weighing machine. Body Mass Index (BMI) was calculated using the standard formula weight (in Kg) divided by height (in cm) squared (kg/cm^2). [7]

3) McGill's core endurance test:

McGill test has been used to assess core muscle endurance which is composed of trunk flexor (sit-up position withholding the back in 60° from the floor), trunk extensor (prone position with upper limb above the Anterior Iliac Spines (ASIS) hanging off the table), and right and left lateral trunk musculature tests (left or right side-lying on the floor with 90° bent elbow and positioned under the shoulder with raised off pelvis). The participants were encouraged to maintain the isometric postures instructed by the examiner completely for each test position as long as possible, and they did the test only once. The

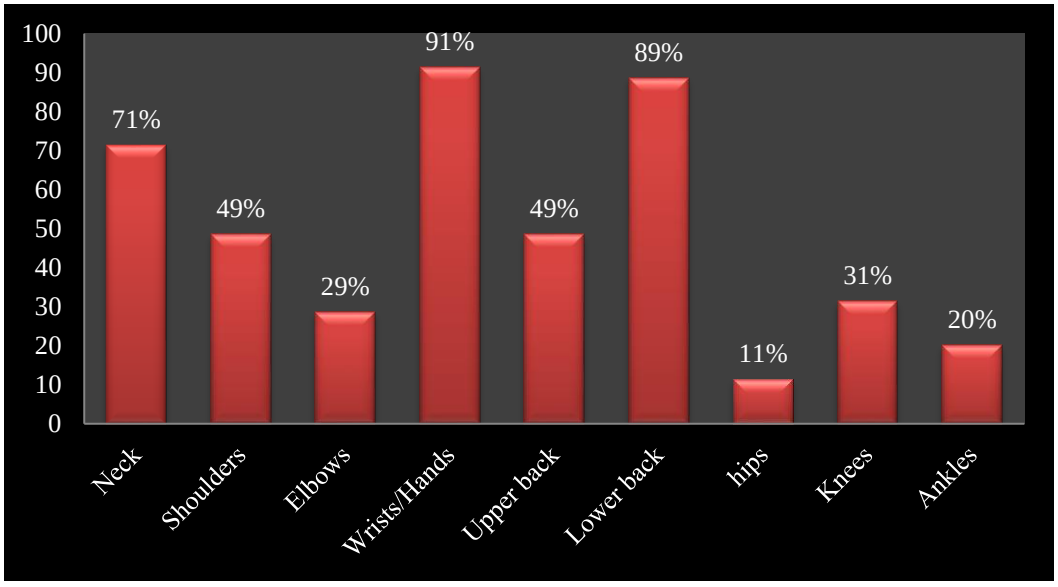
length of time they could hold the correct position for each posture was recorded, and the results of four subtests were added to get an overall score. [8]

STATISTICAL ANALYSIS:

Data analysis was done using SPSS version 20 and Microsoft excel 2019. Prior to statistical tests, the data was screened for normality. As the sample size was less than 50 in shapiro wilk test was used to check normality. Prevalence for WRMSD using Nordic Musculoskeletal Questionnaire (NMQ) was done by Microsoft excel 2019. Data of all the outcomes were not normally distributed. Correlation between BMI and McGill's core endurance test was done by non- parametric test – Spearman's correlation. Level of significance was kept at 5% ($p<0.05$).

Results:

Thirty five Indian classical musical instrument players participated in present study. Age group was between 20-60 years (38.29 ± 9.83). 96% male and 4% female were participated in present study. Work load (4.66 ± 2.39 hour/day) distribution in Indian classical musical instrument players. Graph 4 shows prevalence of musculoskeletal disorder among Indian classical musical instrument players. Correlation between BMI and trunk endurance test in Indian classical musical instrument players present in table 1.



Graph 4: Prevalence of musculoskeletal disorder among Indian classical instrument players

Outcome measures	r - value	p – value
BMI and trunk flexor test	-0.696	<0.001
BMI and trunk extensor test	-0.658	<0.001
BMI and right side bridge test	-0.649	<0.001

BMI and left side bridge test	-0.675	<0.001

Table 1: Correlation between BMI and trunk endurance test

Discussion:

In present study more commonly affected areas were wrist/hand, lower back, neck, upper back and shoulder among Indian classical musical instrument players. Mishra W et al found that in Indian tabla players prone anatomical areas were the low back, right shoulder, neck, left shoulder, upper back, and knees. Kaczorowska A et al found that musculoskeletal disorders are very common among professional musicians. They Concluded that greater the number of hours playing per week and the longer the history of playing, the greater the pain intensity.[9]

In present study moderate negative correlation was observed between BMI and Core endurance in indian classical musical instrument players. Mayer JM et al found that increased BMI is associated with decreased back and core muscular endurance in firefighters. Increased body fat mass has a negative impact on postural stability. Core muscles play a vital role in postural stability. Pardeshi T et al found that negative significant relationship between BMI and core muscular endurance in general population age between 20-55 years. Milton JA et al reported that increasing body mass negatively impacted on front bridge times in children and adolescent boys and girls[10]. Core muscles provide spinal stability which is necessary for activities of daily living and strong core is prevention of injury, reduction of back pain, balance, stability, improved lifting mechanics, posture.Limitation of study of present study was age ranges were wide and multivariate analysis using confounding factors could not be done.

Conclusion:

A relatively high prevalence of musculoskeletal pain was present and moderate negative correlation between body mass index and core endurance in Indian classical musical instrument players. Ergonomic advices, adapting healthy lifestyle along with overall improvement in their working efficiency, prevent musculoskeletal disorder and thus indirectly improve their Quality of Life in classical instrument players.

Conflict of interest: None

Acknowledgement: We thankful to all Indian classical musical instrument players those who have participated in present study.

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