International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Common Musculoskeletal Injuries Faced by Indian Drummers

Sagar Vedpathak[1], Dr. Purti Haral[2]

[1]Intern, School of Physiotherapy, D.Y.Patil University, Navi Mumbai, India
[2]Assistant Professor, School of Physiotherapy, D.Y.Patil University, Navi Mumbai, India

Corresponding Author: Dr. Purti Haral

ABSTRACT

In creating and performing music, drummers can experience health problems from the high physical and psychological demands of their profession. Musculoskeletal disorders related to playing are painful, chronic and disabling conditions which are prevalent among drummers.
Objective: To study musculoskeletal injuries faced by Drummers and their understanding about positioning, technique and physiotherapy.
Method: A cross sectional survey based study using self-devised pre validated questionnaire based on a convenience sample of 56 Indian drummers with mean age of 16.22 ± 5.73, from drumming academies.
Result: 26% reported middle back injury; 18% calves; 16% lower back; 13% elbows and arms; 11% upper back; 5% knee and 3% at neck, wrists, forearms, hand and back of feet.
Conclusion: Data analysis concluded that pain was experienced commonly in Middle back followed by Calves, Lower back, Elbows and arms, Upper back, Knee, Neck, Wrist, Forearm, Hand and Heel respectively. The author suggests that the incorporation of postural and ergonomic awareness into musical education could be of benefit. Drummers also need to be made aware regarding physiotherapist's role in injury prevention and post-injury rehabilitation.

Keywords: Drummer, musician, injury, prevention, physiotherapy.

INTRODUCTION

Learning to play a musical instrument is one of the most complex tasks that the human body can perform with muscles, joints and nerves often operating above its normal capacity. [1]

Drumming is a very demanding and dynamic activity requiring a tremendous amount of muscle conditioning, endurance, strength and coordination. To become a great drummer, one must practice long hours, performing the same repetitive activity over and over again to develop the necessary muscle memory to perform night after night. Training programs demand increasing levels of commitment resulting in hours of high volume and intensity practice, requiring the use of all parts of the body. Playing drums requires effort, speed and highly repetitive movements. Risk factors for drumming-related musculoskeletal disorders include high repetition, high force, and other factors, such as vibration. [2]

Drums were designed without incorporating ergonomic aspects, despite some efforts to improve its design, playing a drum can be physically challenging. The entire drum kit has specific characteristics that might predispose the musician to injury. Studies have found that the drummers either develop an injury due to overuse of the muscles due to the volume of practicing and

repetition undertaken by them or due to an uncomfortable faulty posture maintained for a long time. Also, factors that lead to an injury in a drummer like inadequate muscle strength, long hours of training/performance, poor fitness level have also been identified. [1] Biomechanical analysis of a drummer indicated that repetitive ulnar and radial deviation, hip flexion in sitting, elbow flexion and extension, and faulty posture are the major cause of musculoskeletal injuries. Low back problems in double bassists, and wrist/hand problems in drummers are found to be very common. [3]

In today's world, as music has evolved, the pressure on drummers has increased. A drummer must have increasingly more speed, control, power and endurance in order to be exceptional, but very few studies have been done to address the injuries faced by them. Thus the purpose of our study was to study the various musculoskeletal injuries faced by Indian drummers.

METHODOLOGY

The study includes 56 Indian Drummers, both male and female in 18-30 years of age group. Written informed consent from all the subjects was taken before enrolling.

For the survey, a questionnaire was drafted following with due deliberations of the relevant literature and thereby validated with an expert in the field. The survey Questionnaire contained information on four broad domains: 1) Demographic Details2) Practice-specific details 3) Technical details 4) Injury Profile.

Anthropometric measurements of height and weight were noted. BMI values of the individual were calculated. Khadilkar's Revised IAP Growth Charts for Height, Weight and Body Mass Index for 5 to 18 year old Indian Children was used to categorize overweight/obesity in drummers up to 18 years of age. [4]

Ethical approval

Permission for the study was obtained by making a petition prior to collecting data. This was achieved by contacting and receiving approval from the Institutional Ethics committee of Dr. D. Y. Patil University, Nerul, Navi Mumbai. This study was conducted in accordance with the ethical standards of institutional review boards.

OBSERVATION AND STATISTICAL ANALYSIS

The data was processed using Descriptive statistics – for demographic data (age & BMI) and percentages were used to depict proportions. Tables were made using Microsoft Word and figures were plotted using Microsoft Office Excel 2013.

Gender and Age Distribution: Sample included 4 females with mean age of 16 ±4.97 years; and 52 males with mean age of 16.24 ±5.83.Players were found to have started drumming at a mean age of 12.25 ±3.93.

Table 1. Demographic Details

Age			
	Females (%)	Males (%)	Total (%)
Early Adolescent (10-13)	3.57	37.5	41.07
Mid Adolescent (14-16)	1.79	14.29	16.07
Late Adolescent (17-19)	-	7.14	7.14
Adults (>19)	1.79	33.93	35.71
Body Mass Index			
	Females (%)	Males (%)	Total (%)
Obese	-	15.39	14.29
Overweight	-	21.15	19.64
Normal	100	50	53.57
Underweight	-	9.62	8.93

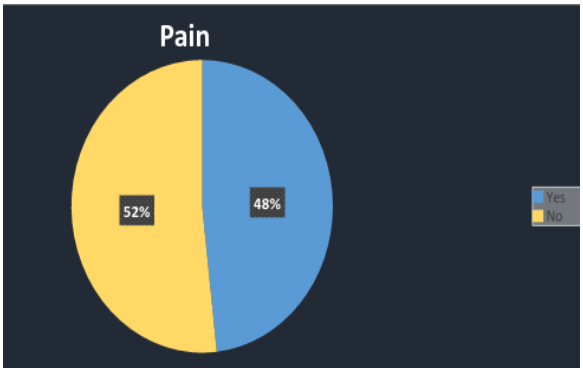

Figure 1. Pain

According to Figure 1, 48% of drummer's experienced pain while 52% did not.

Table 2. Injury Profile

Groups	Total Number	No. of Injured	No. of Injuries	Prevalence
Total	56	25	37	0.66
Gender				
Male	52	24	35	0.63
Female	4	1	1	0.02
Age				
Early Adolescent (9-13)	20	6	7	0.13
Mid Adolescent (14-16)	6	4	4	0.07
Late Adolescent (17-19)	4	3	7	0.13
Adult >19	20	12	20	0.36
Body Mass Index				
Obesity	8	3	7	0.13
Overweight	11	9	10	0.18
Normal	32	13	22	0.39
Underweight	5	1	1	0.02
Drum Throne Height				
Adjustable	47	22	34	0.61
Non-Adjustable	9	3	3	0.05
Number of Cymbals				
1-4	50	20	30	0.54
4+	6	5	7	0.13
Drum sticks				
5A	30	13	25	0.45
5B	16	10	10	0.18
7A	9	1	1	0.02
2B	1	1	1	0.02

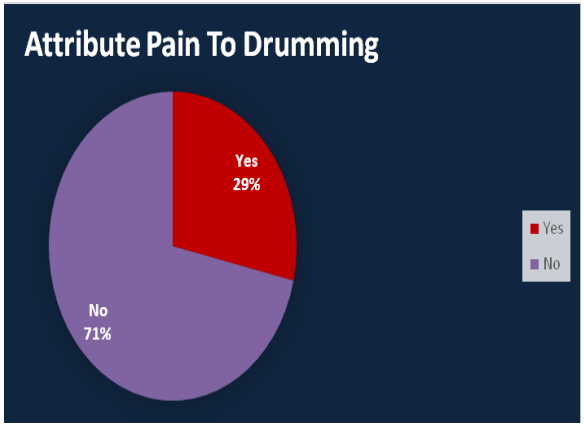

Figure 2. Attribute Pain to Drumming

According to Figure 2, 29% of drummers attribute their pain to drumming while 71% do not.

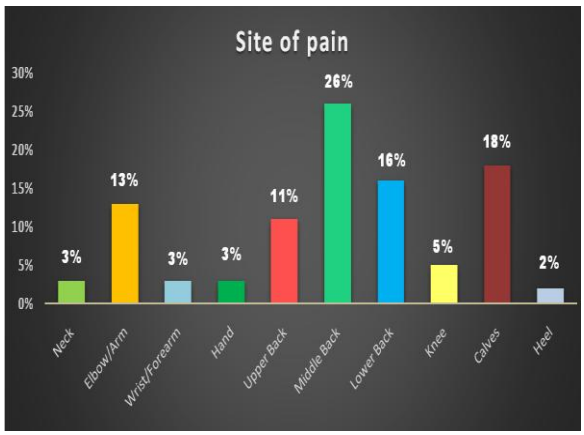

Figure 3. Site of Pain

Site of Injury: According to Figure 3, 26% experience pain in their middle back; 18% experience pain in their calves; 16% experience pain in their lower back; 13% experience pain in their elbows and arms; 11% experience pain in their upper back; 5% experience pain in their knees; 3% experience pain in the neck; 3% experience pain in their wrist and forearm; 3% experience pain in their hand; and 2% experience pain in the heel.

Practice Details

The study found 80.36% drummers played drums as a recreational activity whereas 19.64% of drummers played drums as a profession. Also, 71.43% drummers did not play in a band, while 28.57% played in a band. It was observed that 62% of drummers took breaks between their practice sessions while 38% did not take breaks. When asked, 61% of drummers specialized in covering songs while 39% specialized in making their own solos/rhythms. From the survey conducted, we found that 59% of drummers played Rock music; 14% played Metal; 10% played Jazz and 17% played Blues.

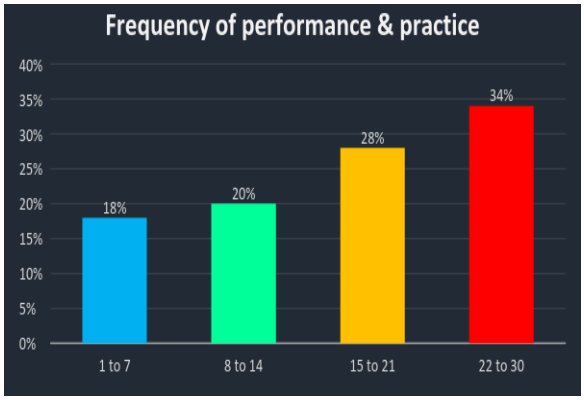

Figure 4. Frequency of Performance and Practice

According to Figure 4, 34% play around 22 to 30 days per month; 28% play around 15 to 21 days per month; 20% play around 8 to 14 days per month; 18% of drummers played around 1 to 7 days per month.

This study also highlights the fact that 92.86% drummers were aware about warm up and cool down as a part of the activity whereas 7.14% drummers were not aware.

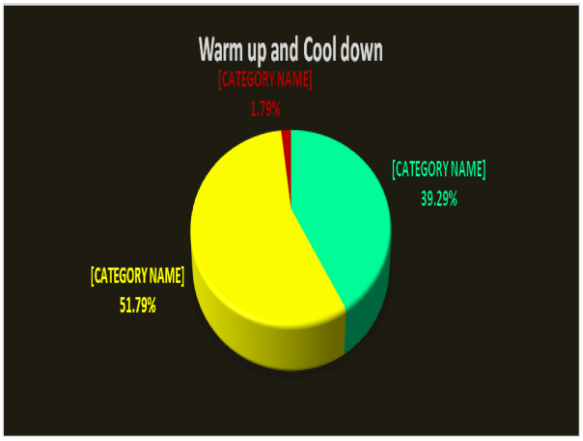

Figure 5. Warm up and Cool Down

According to Figure 5, warm and cool down was sometimes performed by 51.79%, always performed by 39.29% and never performed by 1.79% drummers who were aware of it.

Technical Details:

According to Figure 6, 5A type of drum sticks was used by 53% of drummers 5B type used by 29% drummers; 7A type used by 16% drummers; while 2B type was used by 2% drummers. Data analysis revealed that 77% of drummers use less than or equal to 3 cymbals while playing; 21% use around 4 to 6 cymbals and only 2% use around 7 to 9 cymbals while playing. It also showed that 21% of the drummers use double bass while 79% of the drummers do not. This study found that 84% of drummers use an adjustable Drum Throne while 16% do not.

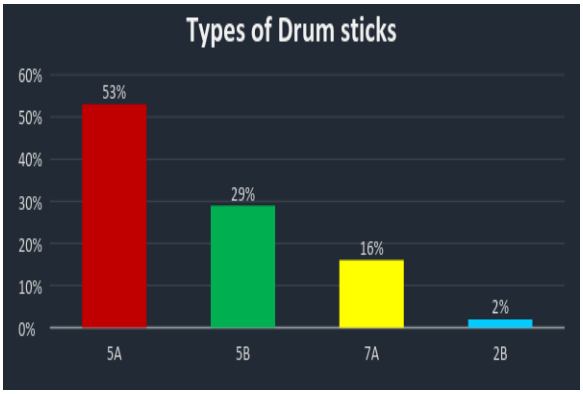

Figure 6. Types of Drum Sticks

DISCUSSION

Playing drums is a very physical form of art because it requires the use of both hands and feet. [5] Drumming is characterized by involvement of several muscle groups as different kind of genres require different beat to be played by a drummer; e.g. A heavy metal song requires continuous use of double bass and use of a variety of drum rolls and a fast beat whereas playing blues requires a slow pace beat and can do with a single bass. The predominant causes of pain in drummers are errors of technique, errors in practice habits, inadequate rehabilitation of previous injuries and improper body mechanics and posture. Overuse injuries potentially occurs due to abnormal stress on musculoskeletal tissue, especially when drummers first begin a repetitive or strenuous activity performing too much too soon.

Non-ergonomic drum kit set-up also adds up to the already existing injury risk factors experienced by drummers. [5] On an average, a professional drummer tends to play for 3 to 6 hours daily, during which they have to forcefully maintain a very uncomfortable posture. [1] Data analysis

found that 26% of the drummers experience pain in their middle back, 16% in their lower back and 11% in their upper back. Back injuries and pain often occurs due to over-use from postural stresses or due to frank spraining or straining of the tissues of the back. [6] Steinmetz et. al. (2010) concluded that insufficiencies of the postural stabilization systems play an important role in the manifestation of musculoskeletal pain and playing-related musculoskeletal disorder in musicians. [7]

For an ideal posture, a drummer must have the legs form a 90-degree angle at the knees. Also, if the throne is too low, then there is a general tendency of pulling legs toward the drummer. This can create hip flexors and lower back issues. On the contrary, sitting too high can inhibit the power that the entire leg can offer. [8] Long duration of faulty posture increases the risk of overuse injuries that develop over time and are more subtle in their presentation. Lower crossed syndrome can cause pain and dysfunction and an overarching of the lower back. The combination of weak gluteus, weak abdominals, tight hip flexors, and a tight lower back sets up an anterior tilt of the pelvis that puts excessive stress on the lumbar region. Excess tilt also creates an inappropriate position for the pelvis and low back, and in turn increases torque on the back. This imbalance of the muscles creates an unfavorable environment to properly stabilize the core. The increased curvature in the lower back causes the abdominal muscles to relax, thus deactivating the core muscles. Lack of core stability can cause a loss of posture or reverse spine angle during the backswing. [9]

Many drummers play a single bass drum and have it positioned dead center. A drummer must carefully align himself with the bass drum. It is important to have the right leg in line with the bass drum and the pedal. Sometimes drummers center themselves more to the left, which can create a stretching and pulling force on the body when reaching for drums and cymbals on the right. [9]

There are mainly three types of double bass pedals i.e. direct driven, chain driven, and belt driven. Each style has their own pros and cons which depends on the style of drumming, and how a drummer prefers the pedals to feel. It is important to realize that the only difference in these types of pedals is the connection between the pedal and the beater. Proper set-up modification of the drum kit would result to easier access on each drum piece, thus minimizing the movements and the fatigue of the drummer. [5]

For the bass drum and hi-hat, the pedals should be placed where the feet are most comfortable. Ankles should never be twisted in any direction in using the pedals. The surface of the bass drum should be perpendicular with the leg of the drummer for straight energy channeling. [5]

According to the survey analysis, 18% of the drummers experienced pain in their calves. Drummers rely on their feet to play effectively. Various genres of music are more demanding on the feet than others, placing the drummer at a risk for developing a variety of repetitive stress injuries to the supporting muscles and tendons.

The Achilles tendon connects the Gastrocnemius and Soleus to the Calcaneus, providing the power to push down on the kick pedal. This tendon shortens or contracts to push the foot down while playing heel up, and stretches when the foot lifts off the pedal in the heel down position. The Achilles tendon is commonly inflamed from overuse as well as from a number of other contributory factors. Since it has a poor blood supply, making it vulnerable to injury and slow to heal. Achilles tendonitis can be acute or chronic. Acute Achilles tendonitis may be the result of overuse, practicing or training in excess, whereas Chronic Achilles tendonitis may often develop from acute Achilles tendonitis if the acute tendon injury is not treated properly or allowed to heal. Plantar fasciitis can be caused due to increased repetitive use of the foot by drummers. [10]

Cymbals are common percussion instrument used in many ensembles ranging from the orchestra, jazz bands, heavy metal bands, marching groups, etc. Many studies indicate that percussionists are among the instrumentalists at higher risk for playing-related musculoskeletal disorders. [2] Drum kits usually include at least a crash, ride or crash/ride, and a pair of hi-hat cymbals. More the cymbals farther the drummer has to reach out to every cymbal, thereby causing quick trunk rotation, shoulder flexion, radio-ulnar deviation at various angles.

Many drummers select their stick size in order to produce volume, with little attention to an individual's hand/finger/arm size. Whereas, drumstick should be selected based on the hand/finger size and the drummer's control. Inappropriate stick selection causes hand pain and blistering. Blisterscan and will occur due to suddenly introducing more drumming per day than the hands are ready for. This can happen after a lay off or when preparing for a new project. When possible try to slowly increase playing time. Blisters are actually a natural (and required) response to the friction generated while playing.

If the stick is too small or too large for the hand, it will force in alteration of the drummer's grip, which should be light and not a strangle hold. Different stick models made by the same manufacturer or different manufacturer have different abilities to dissipate energy away from the hands. Some stick sizes and shapes have more vibration or "buzz". An ideal stick on the other hand helps dampen buzz and impact energy. [6]

The health effects of vibration exposure in drummers can result from extended periods of contact between a drummer and the vibrating surface they are exposed too. Drummers particularly are at risk since they can be exposed to vibration through multiple body parts such as the hands-stick-drum head, feet-pedals-bass drum head and or hi hat or from the buttocks-seat-floor interfaces. Drummers can develop symptoms including back pain, diminished sensation and dexterity in the hands or feet, decreased grip strength, vascular injury resulting in finger blanching or "white fingers", tendonitis or a variety of nerve entrapment neuropathies such as carpal tunnel syndrome. Vibration levels depend on numerous properties including size and weight of the drumstick, hand grip and handle location on the stick. Hand and arm vibration may be more difficult to control. The wooden 7A drum sticks are smaller and thinner. They are more lightweight than the 5As. 2B and 5B sticks are much heavier than these two types, and as a result, they pack a lot more power. 5B sticks are ideal for heavy rock music. [10] Several drummers with musculoskeletal disorders have reported an alleviation of symptoms and a return to pain-free playing with the use of a newly developed oriented polymer drumstick compared to the wooden drumstick commonly used. [2]

Training errors are also the most common factors predisposing to overuse injuries. These injuries develop when the drummer increases the volume, duration and/or intensity of the activity too quickly. These training errors result in inadequate recovery time, preventing the proper tissue adaptations from taking place. It most commonly occur early on in the training program when new skills are introduced into the program stressing different tissues, or when the practicing intensity is increased too rapidly. Overuse injuries are also noted to occur during the later phases of the rehearsal programs when the musician is pushing towards peak performance. It is during this time that the tissues are close to their ultimate breakdown point and vulnerable to injury. [10]

The three major factors leading to overuse are: (1) The genetic factor which cannot be changed. (2) Faulty technique displayed by the drummer. (3) Intensity x time of practice is a controllable factor and seems to be the most important of the three factors. [11] Poor mechanics while playing can place lateral or sideways stresses into

the elbows. Using too much elbow force and too little rebound can over-load the muscles and tendons in the arms. In drummers, brachial neuritis (in the arm/wrists) can occur creating pain or altered sensation in the wrists, fingers, elbow shoulder or neck. Playing "through" the drums is another common mistake seen. The drummer may play too hard and lose the physical energy of drum head rebound. Playing "through" the drum or striking too deeply will only increase stress on your hands and decrease your use of rebound energy. [6]

The weight of the instrument may generate ergonomic issues related to both the static and the dynamic loading exerted on the musculoskeletal system. Static loading relates to the long periods of continuous muscular contraction required to hold the instrument and/or the maintenance of the upper limb in a particular position for a sustained period. Dynamic loading of the muscles, joints and other supporting anatomical structures results from the motion involved in playing the instrument. These efforts all have a cumulative effect on the musculoskeletal system. [12]

CONCLUSION

As judged by these findings, regional musculoskeletal pain is common in Indian Drummers, the main sites of complaint being as follows: Middle back > Calves > Lower back > Elbows and arms > Upper back > Knee > Neck, Wrist, Forearm, Hand and Heel. Most of the drummers were aware about the importance of warm-up and cool down exercises but very few were found to follow it regularly. Also, drummers need to be made more aware regarding Physiotherapy and its role in injury prevention as well as in complete rehabilitation post-injury.

Clinical Significance: Learning to play a musical instrument involves a large number of practicing hours, assuming postures necessary for the interpretation of the instrument. Playing a musical instrument is one of the most complex tasks that the human body can perform. Muscles, joints and nerves are often operating above its normal capacity. Drummers are at high risk of developing musculoskeletal problems, including pain and injury by highly repetitive movements, their skills are threatened when they are no longer able to play the instrument due to pain. The employment status of drummers has a potential impact on risk factors, often working conditions provide a significantly greater risk of injury, and many drum thrones are not totally suitable for drummers, including poor lighting conditions and noise level.

Clinical Implication: Diagnosing injuries suffered by drummers is challenging, and simply taking a break from an activity that has caused physical problems does not address the ergonomic and biomechanical causes of the problem. Under these circumstances, it is not surprising that drummers are reluctant to seek care, and when they do, lack trust in the care that is provided to them. Physiotherapy camps and seminars could be implemented at various music schools and institutes in order to help them understand the importance of physiotherapy in injury prevention and rehabilitation post – injury. Also, various applications of physiotherapy treatment strategies could help improvise a drummer's performance on long term basis giving them physical as well as mental boost and motivation. All drummers, from casual players to seasoned performers, should learn the causes of overuse injuries in order to prevent their occurrence, and how to recognize the signs of such injuries at the earliest possible time.

ACKNOWLEDGEMENT

The authors express sincere gratitude to all the drummers who gave their invaluable time. We are also grateful to Furtados School of Music, (Nepensea Road and Powai branch), to allow us to carry out our research. A special mention to our family and friends for their unconditional support. This study would not have been possible without them.

REFERENCES

1. Blanca del Carmen Flores-Olivares., Amalia Yoguez-Seoane, Orlando Susarrey-Huerta, & Claudia del Carmen Gutiérrez-Torres. (2015). Preliminary Study on the Evaluation of Musculoskeletal Risks through Infrared Thermography for Drummers. *6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences, AHFE 2015.3*, pp. 4415-4420. ELSEVIER. Retrieved from http://www.sciencedirect.com/science/article/pii/S2351978915004436
2. Zaza, C., Fleiszer, M. S., Maine, F. W., & Mechefske, C. (2000, March). Beating Injury with a Different Drumstick: A Pilot Study. *Medical Problems of Performing Artists, 15*(1), 39. Retrieved from https://www.sciandmed.com/mppa/journalviewer.aspx?issue=1093&article=1028
3. Gray, O. (2003). *Incidence of musculoskeletal problems among instrumental music students.* Thesis (Coursework Master thesis), Victoria University, Melbourne. Retrieved from http://vuir.vu.edu.au/912/
4. Khadilkar, V. V., & Khadilkar, A. V. (2015). Revised Indian Academy of Pediatrics 2015 growth charts for height, weight and body mass index for 5–18-year-old Indian children. Indian Journal of Endocrinology and Metabolism, 19(4), 470–476. http://doi.org/10.4103/2230-8210.159028
5. Cuden, R. V., League, V. T., Portus, A. J., & San Miguel, C. A. (2015). An Ergonomic Evaluation on the Set-up of the Modern Drum Kit for Filipino Drummers. *6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences, AHFE 2015, 3*, pp. 4440-4447. Quezon City. doi:http://dx.doi.org/10.1016/j.promfg.2015.07.454
6. Busch, D. (2013, January 28). *Health for Drummers*. Retrieved from DrummersHealth.com: http://www.sportsrehab.com/drummingiinjuries.htm
7. Steinmetz, A., Seidel, W., & Muche, B. (2010, October 8). Impairment of Postural Stabilization Systems in Musicians With Playing-Related Musculoskeletal Disorders. *Journal of Manipulative and Physiological Therapeutics*, *33*(8), 603-611. doi:http://dx.doi.org/10.1016/j.jmpt.2010.08.006
8. Monroy, M. (2013, March 22). *MD Education Team Weighs In On: Ergonomics.* Retrieved from Modern Drummer: https://www.moderndrummer.com/
9. Kochoa, P. (n.d.). *lower crossed syndrome*. Retrieved from Professional Physical Therapy & Training: http://www.professionalptandtraining.com/general-health-information/lower-crossed-syndrome/
10. Podesta, L. (2011, March 17). *Overuse Injuries In Drummers.* Retrieved from Podesta Orthopedic And Sports Medicine Institute: http://podestasportsmedicine.com/articles/overuse-injuries-in-drummers/
11. FRY, H. J. (1987). Prevalence of overuse (injury) syndrome in Australian. *British Journal of Industrial Medicine* , *44*(1), 35-40. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1007775/pdf/brjindmed00153-0043.pdf
12. Y. Kaufman-Cohen, & N. Z. Ratzon. (2011, January 26). Correlation between risk factors and musculoskeletal disorders among classical musicians. *Occupational Medicine, 61*(2), 90-95. doi:https://doi.org/10.1093/occmed/kqq196

How to cite this article: Vedpathak S, Haral P. Common musculoskeletal injuries faced by Indian drummers. Int J Health Sci Res. 2017; 7(5):151-158.

****