

## **One Year Prevalence of Musculoskeletal Disorders during Training among Boxing Players in Haryana: A Retrospective Study**

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### **Abstract:**

**Objective:** To find out overall, gender specific, site specific and type of injury specific prevalence rate of musculoskeletal injuries in boxing players.

**Methodology: Study Design:** Cross sectional, survey study, retrospective model.

**Sample size:** 105 boxing players (73 males and 32 females).

**Method:** Injury data was collected from each player using modified Nordic Musculoskeletal Injury Questionnaire.

**Data analysis:** Data was entered into MS Excel for further analysis.

**Results:** 48 players out of 105 was injured leading to 46% overall prevalence of injury among boxing players. Males injured slightly higher than females. Upper limb injuries were the most common area followed by lower limb. Wrist & Hand, Knee & Leg, Low back the most common sites of injury. Sprain and strain accounted more than 90% of total injuries.

**Conclusion:** Prevalence of musculoskeletal injuries is high among boxing players. Conditioning by coaches and early rehabilitation by physiotherapists are essential to reduce the injury rate in this population.

**Keywords:** Gender difference, Incidence, Soft tissue, Sprain. Strain, Injury rate

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### **I. Introduction**

Boxing (also known as pugilism), is the physical skill fighting with the fist, is one of the oldest Olympic sport. It is a combat sport that requires combination of well-developed hand and feet speed, footwork evasion skill, muscular strength and power as well as a high aerobic capacity (Zazryn et al., 2006). It is only amateur or professional sport in which winning is linked to intentionally inflicting physical damage to the opponent.

Competitive bouts in Olympic boxing include four round of 2 or 3 minute each, with a one minute break in between the bouts (IBA, 2007). Scoring with in this sport use a computerized system whereby two of three judges must award a point to the same boxer within one second of each other (IBA 2007). Points are awarded for blow that, land with the knuckle part of the closed glove on any part of the front or side of the head (IBA 2007). Boxing match is won either by scoring more point or when opponent is unable to continue fight (Zazryn et al 2006). Compulsory protective equipment for this sport includes headgear, 284g gloves, and a custom-fitted mouth guard.

As compared to wrestling, boxing has fewer followers in India because of danger involved in this sport. However, 1990's onward there are moderate followers in northern and eastern India. This resulted moderate success in international arena particularly in Asian games. In 2002, India won its first gold medal in commonwealth games boxing. This triggered new confidence in Indian boxer's minds. In 2010 commonwealth games, India won medals in almost all weight categories of boxing. The maximum medal winners were from Haryana state particularly from a small town called Bhiwani. Boxer's from Bhiwani achieved numerous successes in international level competitions. Notable boxers from this town are Vijender Kumar, Akhil Kumar and Jitender Kumar who were representing India in Olympics. In 2008 Beijing Olympics, Vijender Kumar won a bronze medal in boxing while Akhil Kumar and Jitender Kumar qualified for quarter final level.

Combat sports such as boxing, martial art and wrestling are more popular in Haryana. Many young adults train in these sports enthusiastically in order to win medals at national and international level. The success of Vijender Kumar in boxing further galvanized young minds to participate in this sport. Growing participation is welcoming trend as this increases the health of individuals. On the other hand this leads to increased musculoskeletal injuries in young athletes, especially in combat sports. There is numerous boxing injury prevalence studies present in literature, but less is available from Indian athletes. This requires urgent attention

from coaches and physiotherapists since prevention is better than cure.

Thus aims and objectives of the present study was to see the overall, site specific and type of injury specific prevalence of musculoskeletal injuries in boxing. To see gender difference in overall, site specific and type of injury specific prevalence of musculoskeletal injuries in boxing.

## II. Methodology

The present study was a cross sectional survey study with retrospective model, where athletes were asked to report injuries sustained in last one year. Total of 105 boxing players, 73 males and 32 females, were selected according to convenience of investigator. The data collection sites were from SAI, Giri Center, HAU, Hisar; Rajiv Gandhi Khel Stadium, Umra; Seth. Chhaju Ram Law College Hisar. The data was collected between May and June 2015. Athletes were asked to report injuries sustained from May 2014 to April 2015, One year retrospectively.

Main inclusion criteria were age between 13 to 28 years; both males and females; playing experience was at least one year; have a regular play and played in at least at the district level. Athletes with following characteristics were excluded from the present study: Use of steroids and other performance enhancing drugs; known hypertension, diabetes.

### Methods:

The investigator contacted coaches who gave the permission to take the data from the players about the injury rate. Each player gave verbal consent to participate in the present study. After getting consent, following information were collected: Name, age, sex, height, weight, BMI and other questions related to inclusion and exclusion criteria. Data was collected using Modified Nordic musculoskeletal questionnaire.

### Questionnaire:

Modified Nordic musculoskeletal questionnaire contains one full body diagram in order to be understood by illiterate players. Injury information was collected as: Anatomical site of injury (Head, neck, shoulder and arm, elbow and forearm, wrist and hand, back, hip and thigh, knee and leg, ankle and foot) and type of injury (Sprain, strain, fracture, dislocation and other injuries); whether player contacted physician or physiotherapist for treatment.

### Operational definition:

Injury was defined as “Any pain that prevents the player to stop playing/practicing, prevent them to practice or play games in subsequent days (at least 3 days); It may also lead the players to contact physician or physiotherapists for getting treatment for that pain”.

### Statistical Analysis:

All results were analyzed manually using MS Office 2011 (Microsoft excel) and were expressed as prevalence rate of injury, type of injury and role of players.

## III. Results

This is retrospective type of survey in which total boxing players were 105 (males are 73, females are 32) participated. The sample anthropometric measurements are given in table 1.

**Table 1: Anthropometric characteristic of field hockey and cricket players.**

Sports	Gender	Anthropometric character	Range (minimum-maximum)	Mean ± SD
Boxing (n = 105)	Male (n= 73)	Age (in years)	13.0 to 31.0	16.26±3.13
		Height (in cm)	140.0 to 184.0	164.58±11.90
		Weight (in Kg)	38.0 to 89.5	56.05±9.93
		BMI	16.61 to 27.02	20.65±2.46
	Female (n = 32)	Age (in years)	13.0 to 31.0	18.38±4.69
		Height (in cm)	152.0 to 176.0	159.81±7.24
		Weight (in Kg)	45.0 to 82.0	56.91±9.40
		BMI	16.79 to 34.15	22.47±4.62

Out of 105 players, 48 players sustained at least one musculoskeletal injury in the past one year leading to one year prevalence rate of 46% in boxing players.

Table 2 shows injury prevalence rate according to the modified nordic musculoskeletal questionnaire in which shows the 12 months of site specific prevalence of injury; their consultation by physiotherapist or physician.

**Table 2: Site specific one year prevalence rate of injuries in field boxing (n=48)**

Joints	Prevalence of 12 month injury	Consultation by physiotherapist or physician *
Head	2 (4.16%)	2(100%)
Neck	0 (0%)	0 (0%)
Shoulder	3 (6.25%)	3(100%)
Upper Back	0(0%)	(0%)
Elbow	3 (6.25%)	1 (33%)
Wrist / Hand	18 (37.5%)	10(55%)
Lower Back	6 (12.5%)	6 (100%)
Hips/ Thigh	2 (4.16%)	1 (50%)
Knee/ Leg	8 (16.66%)	4 (50%)
Ankle / Feet	6 (12.5%)	5 (83%)

\* % is from site specific total injuries with consultation

In boxing, the upper limb injuries are most common (49%), followed by lower limb (34%) and trunk injuries (13%). Wrist & hand is most common (37%) site of injury followed by knee & Leg (17%) and lower back injuries (13%) (Table 2).

**Table 3: Prevalence of type of injury among boxing players (n=48)**

Type of injury	Number of player
Sprain	19(40%)
Strain	25(52%)
Fracture / Dislocation	2(4%)
Other Injuries	2(4%)

Among different type of injury, strain is the most common (52%), followed by sprain (40%) as shown in table 3.

Table 4 shows gender specific injury prevalence along with site specific injury prevalence rate. Males injured slightly higher than that of females. Lower limb injuries are more common in males and upper limb injuries are more common in females. Wrist and shoulder injuries are more common in females. Back, ankle and knee injuries are more common in males.

**Table 4: Gender specific, gender on site specific prevalence of injuries in boxing**

Joints	Male (73)	Female (32)
Overall	34 (46.57%)	14 (43.75%)
Head	2 (5.88%)	0
Neck	0 (0%)	0
Shoulder	1 (2.94%)	2(14.28%)
Elbow	2 (5.88%)	1(7.14%)
Wrist	10(29.41%)	8(57.14%)
Back	5(14.70%)	1(7.14%)
Hip	2 (5.88%)	0
Knee	6(19.35%)	2(14.28%)
Ankle	6(19.35%)	0

**Table 5: Gender difference in type of injury among boxing players**

Type of Injury	Male (34)	Female (14)
Sprain	13(38.23%)	6(42.85%)
Strain	17(50%)	8(57.14%)
Fracture / dislocation	2(5.88%)	0
Others	2(5.88%)	0

Table 5 shows gender difference in type of injury in boxing players. Sprain & strain is more common in females. Fracture and dislocation were not reported in female boxers; whereas, 2 male players reported them.

#### IV. Discussion

The primary objective of the present study was to see the overall, site specific and type of injury specific prevalence of musculoskeletal injuries during training in boxing players. The results showed overall prevalence is 46%. Wrist and hand is most common site (37.5%), followed by knee and leg (16.7%), ankle and foot (12.5%) in boxing training. Strain accounted for more than 50% of total injuries, followed by sprain (40%).

Secondary objective of the present study was to see gender difference in overall, site specific, type of injury specific prevalence of musculoskeletal injuries in boxing. In boxing, prevalence of injuries in males is marginally higher than females (46.6% vs 43.8% for males and females respectively) with back (14.7 vs 7.1%) and ankle (19.4% vs 0.0%) injuries are more common in males whereas wrist (29.4% vs 57.1%) and shoulder

(2.9% vs 14.3%) injuries are more common in females boxing players. According to type of injury, strain and sprain are two most common problems in both males and females. There is no female player reported fracture/dislocation or other injuries; whereas, 2 cases for each reported by males.

Upper limb injuries (50%) are more common area in our present study. This finding is supported by **Loosemore et al., 2015**; Purcell and LeBlanc, 2012; **Oke et al., 2012**; Pappas, 2007; **Zazryn et al., 2006**; **Porter and O'Brien, 1996**; Jordan et al., 1990; **Welch, 1986**. Bolder references are similar to present study results. 33% of lower limb injury in the present study is supported by Porter and O'Brien, 1996.

According to site specific injuries, present study results are in accordance to Loosemore et al., 2015; Jordan et al., 1990. There are 4.2% of head injuries in the present study; this is supported by Loosemore et al., 2015. More than 90% of total injuries in present study are either sprain or strain. Literature shows 40-60% of sprain and strain in boxing players during training period (Oke et al., 2012; Zazryn et al., 2006; Tim et al., 1993). 4% of total injuries are fracture or dislocation in our study is supported by Siewe et al., 2015; Oke et al., 2012; Tim et al., 1993.

Most of the literature reported more incidences of head injuries especially concussion type injury in boxing players. The reason for this may be more competitive level, age, sample size and characteristics, diagnosis criteria in those studies as against safety environment received by present study sample. Minor concussions in the present study might have ignored by players, coaches during the data collection as in the present study injury acquired during training period and not at the competition period. This might have resulted in discrepancy seen in present study as compared to other literature used.

Present study has some limitations such as it lacks methodological rigor- it used convenient sampling technique where investigator selected sample according to his ease of data collection. Males, females ratio is skewed (2.5:1). Sample heterogeneity- Age, level of play, experience in training are not standardized leading to data contamination. Retrospective study like this has 'recall bias'- where subject may forget minor but significant injuries. Musculoskeletal injuries were assessed at the end of year and therapist might have misdiagnosed and misclassified the type of injuries.

## V. Conclusion

Within the limitations, the present study can be concluded with following points: Nearly half of the boxers reported at least one injury during training in a calendar year. Wrist/hand, knee/leg and ankle/foot are the most common sites of injury in boxing.

Understanding the epidemiology of this sport is important so that preventive strategies can be developed in the forms of protective equipment, conditioning and change in rules. The results of present study may also help the trainers and physiotherapists to decrease the incidences of injuries through proper conditioning program.

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