

Prevalence of Injuries in Junior Conventional Powerlifter in Maharashtra Population

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Abstract

Background: Powerlifting is a widely practiced sport known for its focus on increasing muscular strength and endurance through exercises like the deadlift. Understanding the prevalence and characteristics of injuries among powerlifters, particularly in the context of the conventional deadlift style, is essential for injury prevention and athlete well-being.

Study Design: This study utilized a survey-based approach to assess the injuries and experienced by powerlifters in the Maharashtra population. A sample of 150 junior conventional deadlift powerlifters, aged 18 to 24, was selected through convenient sampling. Data were collected using a Nordic scale questionnaire, focusing on injury locations, severity, and impact on training.

Methods: Participants were screened based on inclusion and exclusion criteria, and informed consent was obtained before data collection. Demographic details were recorded, and participants responded to the questionnaire regarding their injury experiences over the past 12 months. Descriptive statistics and correlation analyses were conducted to analyse the data.

Results: in a study involving 150 individuals, about a third reported injuries, with the lower back being the most common (50%), followed by shoulder (28%) and knee injuries (10%). Overall, 88% experienced trouble within the last year, with 38% unable to work normally due to it. Only 4% reported trouble in the last week, and 10% suffered injuries from accidents. Most troubles lasted 7 days (64%) or 30 days (26%), with 36% seeking medical attention. These findings emphasize the prevalence and impact of injuries, particularly on work and daily activities, suggesting the need for effective prevention and management strategies.

Conclusion: The findings underscore the importance of injury prevention strategies in powerlifting, including proper technique training and load management. Early intervention and appropriate medical care are crucial for minimizing the impact of injuries on athletes' training and overall well-being. Further research with prospective designs and larger sample sizes is recommended to deepen our understanding of injury patterns and risk factors in powerlifting.

Keywords: Powerlifting, conventional deadlift, injuries, overuse syndromes, prevalence, injury prevention, athlete well-being

INTRODUCTION

Weight training is a popular physical activity that is typically performed to increase muscular hypertrophy, strength and endurance. Weight training typically uses the force of gravity acting upon resistances including the exerciser's own bodyweight or specialized forms of equipment such as barbells, dumbbells

and resistance training machines to target specific muscle groups and joint actions. While many people who regularly exercise perform weight training along with cardiovascular or flexibility exercise for overall health benefit, several athletic groups also compete in sports in which weight training is the primary form of training and/or the competitive event. ⁽¹⁾

Powerlifting is a discipline of competitive weightlifting that is included in both the Paralympic and World Games. ⁽¹⁾

Powerlifting is a sport consisting of the squat, the bench press and the deadlift exercises. In competition, maximal loads corresponding to up to four times body-weight are lifted for single effort. ⁽¹⁾

Men's world records of the World Powerlifting Federation (superheavyweight > 140 kg, open class) are: squat 455.0 kg, bench press 345.0 kg, deadlift 380.0 kg ⁽²⁾

In powerlifting, the only supportive equipment allowed is a lifting belt, neoprene knee sleeves, and wrist wraps. In the equipped division powerlifting, a squat and dead-lift suit, knee wraps, and a bench-press shirt are allowed ⁽²⁾

The deadlift is multi-joint exercise that demands on lower extremity joints and large muscle groups, such as the glutes, hamstrings, quadriceps, and spinal erectors, and stimulates adaptations related to strength and hypertrophy. ⁽²⁾

Generally, training for powerlifting is very repetitive as the three lifts, or variations of them, make up most of the exercises. ⁽³⁾

Injuries occur due to any of the specific demands that the squat, bench press or deadlift exercises place on the musculoskeletal system. In this regard, a recent systematic review found the squat, bench press and deadlift ⁽⁴⁾

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While the primary purpose of the deadlift may be to strengthen the muscles supporting the lower back, hip and knee, secondary benefits include resistance to muscular injuries and increased bone density and physical quality of life ⁽²⁾

The deadlift requires lifting the barbell from the ground until the lifter is standing erect. The starting position, the lifter usually flexes the ankles, knees and hips and forward flexion of lumbar spine and hold the barbells with both the hand. During competition, the lifter grasps the barbell with straight arms, lifts the barbell and stands erect until the referee gives a 'DOWN' command, on which the barbell may be lowered to the ground. The prime movers during the deadlift are the hip, knee and back extensors. ⁽⁴⁾

There are two types of Dead lift - conventional style deadlift and sumo style deadlift The dead lift is typically associated with the conventional and sumo styles, commonly used by power- lifters. The conventional style is characterized by a shoulder width stance of the feet and the arms outside of the thigh. The sumo style deadlift differs primarily by the wide stance used and a handgrip that is between the thigh. ⁽⁵⁾

Materials and Methods

Study design : This survey was conducted as an epidemiological study. Data was collected by Nordic scale questioner Participation in the study was voluntary and anonymous. This study has been performed in accordance with the ethical standards.

Participants : Participants were screened based on inclusion and exclusion criteria, and informed consent was obtained before data collection. Demographic details were recorded, and participants responded to the questionnaire regarding their injury experiences over the past 12 months.

Ethics, consent and permissions : Participants in this study received a consent form which introduced the research project by including the title of the study, the aims of the study and reassuring the participants their information confidentiality as well as of their responses. Consent was given by each participant.

Data collection: A sample of 150 junior conventional deadlift powerlifters recruited from Maharashtra state around fitness clubs and gyms. aged 18 to 24, was selected through convenient sampling.

Questionnaire : The Nordic scale questioner was used to assess the musculoskeletal injuries in junior powerlifter.

Statistical analysis: done using SPSS, descriptive statistics, Correlation by Kendall's tau_b and Spearman's rho, graph using excel.

Results

In a sample set comprising 150 individuals, approximately 33.33% reported experiencing injuries. These injuries were distributed across various body parts, with the lower back being the most prevalent at 50%, followed by the shoulder at 28%, knees at 10%, and others. The majority, 88% of respondents, reported experiencing trouble within the last 12 months, with 38% being prevented from their normal work due to these issues. Additionally, 4% reported trouble within the last 7 days. Moreover, 10% admitted to having suffered injuries in accidents. Concerning the duration of trouble, 64% reported experiencing it for 7 days, 26% for 30 days, and 8% for over 30 days, while 2% did not provide this information. A notable proportion, 36%, sought medical attention due to their troubles in the last year. These findings underscore the prevalence and impact of injuries on individuals within this demographic, emphasizing the importance of injury prevention and effective management strategies. The prevalence of injuries in powerlifter are shown in table no.1

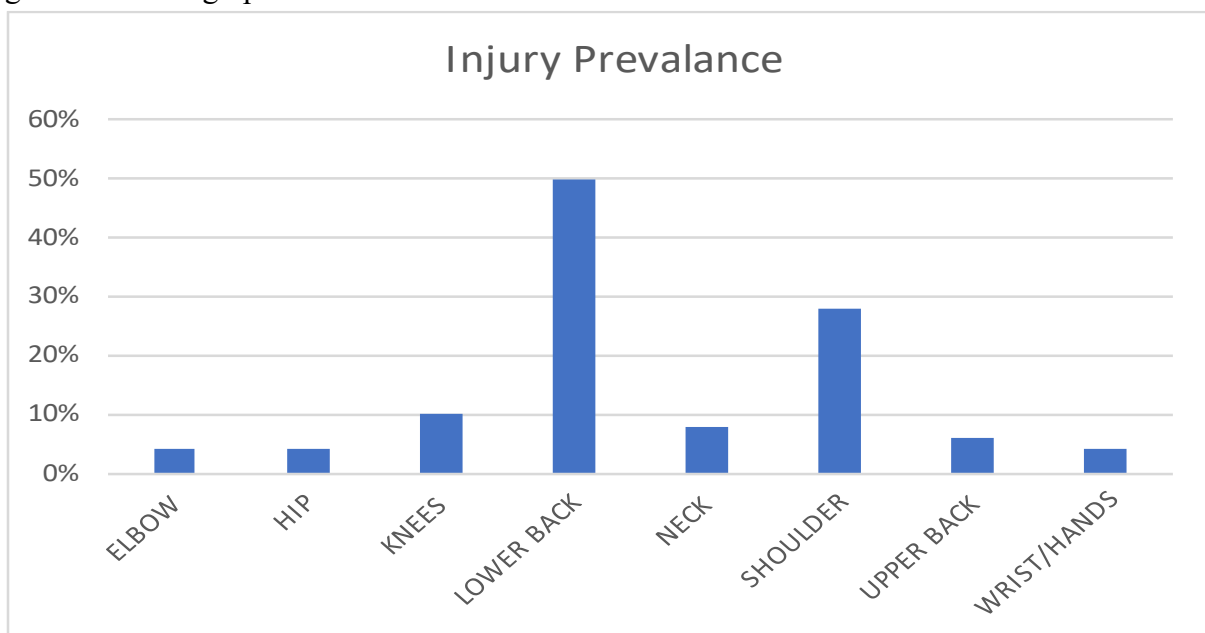
			Prevalence %
Total Sample Set		150	
Subset with noted Injuries		50	33.33
ELBOW		2	4%
HIP		2	4%
KNEES		5	10%
LOWER BACK		25	50%
NECK		4	8%
SHOULDER		14	28%
UPPER BACK		3	6%

WRIST/HANDS		2	4%	
Have you at any time during the last 12 months had trouble		44	88	
Have you at any time during the last 12 months been prevented from doing your normal work because of the trouble?		19	38	
Have you had trouble at any time during the last 7 days?		2	4	
Have you ever hurt your body part in an accident?		5	10	
What is the total length of time that you have had trouble during the last 12 months?	7 days	32	64	
	30 days	13	26	
	>30 days	4	8	
	NA	1	2	
Have you been seen by a doctor because of trouble during the last 12 months?		18	36	

Table no.1

Demographics

in a study involving 150 individuals, about a third reported injuries, with the lower back being the most common (50%), followed by shoulder (28%) and knee injuries (10%). Overall, 88% experienced trouble within the last year, with 38% unable to work normally due to it. Only 4% reported trouble in the last week, and 10% suffered injuries from accidents. Most troubles lasted 7 days (64%) or 30 days (26%), with 36% seeking medical attention. These findings emphasize the prevalence and impact of injuries, particularly on work and daily activities, suggesting the need for effective prevention and management strategies. Shown in graph no.1



Graph no.1

Discussion

The purpose of the study is to describe the injuries associated with conventional style deadlift in powerlifting.

In close association with lifting technique, the load itself is often considered an important risk factor in the development of injury. Especially, the combination of high loads and improper technique is said to increase the risk of injury. ^[1]

In conventional style deadlift lifter takes narrower stance than that of sumo style lifter (wider base of support) that reduces base of support in conventional style dead lifter and also the range of lifting weight because of this their greater load on musculoskeletal system in conventional deadlift and there increases chances of injuries. ^[3]

In conventional style dead lift many lifters make their stance stiff that full extension of knee. This decreases quadriceps activity and increases hamstrings and erector spinae activity but perhaps, more importantly, causes a less upright position. Furthermore, since the forces exerted on the on back and causes rounding of spine and more forces are exerted on other joints as well that causes the injuries. ^[2]

in conventional style deadlift muscle group stressed are pectoralis major, spinal erectors, shoulder retractors, gluteus, quadriceps, hamstrings and all the major group of muscle. ^[3]

The deadlift related injuries upper extremity includes pectoralis muscle rupture, bicep brachii tendon rupture back includes vertebra stress fracture, and lumbosacral injuries lower extremity includes acetabular stress fracture, hamstring muscle rapture, avulsion of anterior superior iliac spine, knee meniscus injuries. ^[15]

During the deadlift postural injurie typically occur due to posterior chain dysfunction, resulting in either lumbar or excessive thoracic spine kyphosis commonly referred to as 'rounding'. As you move into this position, the lower back musculature can become deactivated, when this occurs, a proportionally larger stress is applied to the spinal ligaments, neural arch, disc, and facet joints of the lumbar spine The lower back and knees may be injured from increased moment arms putting excessive shear forces on the knee. And there are excessive strain forces on upper arms due to deactivation of lumber spine musculature. ^[4]

Pain or loss of bodily function that affects powerlifters' training is common in powerlifters. The most commonly injured body areas were the lumbopelvic region, shoulder, and hip. Concerning injuries in the lumbopelvic region, the high prevalence was confirmed by earlier studies It has previously been suggested that the high loads placed on the lumbopelvic region during maximal weights in the dead lift are an important risk factor. ^[4]

It is also known that for most powerlifters, the dead-lift exercises involve a large amount of torque around the lumbopelvic region and hip and a nonoptimal technique could negatively affect the distribution of loads and thereby increase the risk of injuries to these regions, as suggested by the localization of injuries in the present study. Like injuries in lower back, shoulder, hip and knee. ^[4]

More than half of the powerlifters reported injuries in at least 2 different body regions. The multi joint movements of all the powerlifting disciplines mean that if poor alignment exists in one part of the kinetic chain, then a consequential increased load may be evident in one or several regions of the body ^[4]

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The shoulder injuries may be a result of the large stretch forces that the deadlift applies to the shoulder joint. Based on the findings from similar studies, a more possible explanation is due to overuse in training

and a higher frequency of deadlift. Another possible reason for the shoulder injuries could be muscular imbalances such as if the shoulders are internally rotated due to the chest muscles become tight being in a shortened state while the posterior shoulder muscles become lengthened and weak then there are greater chances of injuries in shoulder joint^[7]

The significant finding of this study was that all dead lift injuries occurred on the supinated side during the deadlift with a mixed grip, in which one forearm was in supination, the other forearm was in pronation, and both elbows were in full extension. No injuries were observed in pronated side extremities^[8]

during the deadlift most of injuries occurs during the lifting of maximal and hyper maximal weights both acute and chronic injuries^[10]

Forces acting in deadlift are different in every position of barbell in deadlift (floor, knee, lockout) forces acting on the body as barbell moves upward increases^[9]

Why powerlifters develop injuries is still unclear; however, it is likely that the management of training loads and optimization of the lifting technique during dead lift are important^[11]

In cross fit training deadlift is primary exercise to improve overall strength of the athlete, due to this there are injuries to upper and lower extremities occurs.^[12]

Rates of injuries and severity of injuries is low in strength sports like powerlifting & weightlifting other than regular others impact sports^[13]

Powerlifting injuries are more common in junior powerlifters than in senior because of lesser practice and experiences to lift maximal weight in training and competition^[14]

While the majority of the research we reviewed utilized retrospective designs, the weight training sports appear to have relatively low rates of injury compared with common team sports. Future weight-training sport injury epidemiology research needs to be improved, particularly in terms of the use of prospective designs, diagnosis of injury, and changes in risk exposure^[16]

Limitations

Selection criteria focusing on injured or medically seeking individuals could inflate injury prevalence rates, while reliance on self-reported data introduces potential bias. Additionally, findings may lack generalizability due to differences in training practices and competitive levels among populations. Underreporting of minor injuries may further skew prevalence estimates, exacerbated by the lack of standardized injury definitions in powerlifting. Confounding factors like training history and concurrent activities complicate interpretation, while limited longitudinal studies hinder understanding of long-term injury trends. Thus, while studies provide valuable insights, caution is warranted in extrapolating findings to broader contexts.

Conclusion

Based on the data provided, the research concludes that musculoskeletal injuries are prevalent among the sampled population. The lower back and shoulder regions appear to be particularly susceptible, with significant percentages reporting trouble and seeking medical consultation. This underscores the importance of workplace safety measures and the need for preventive strategies to reduce the occurrence of such injuries. Additionally, the data highlight the impact of these injuries on individuals' ability to perform normal work duties, emphasizing the importance of early intervention and appropriate medical care to minimize disruption and facilitate recovery.

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References

1. Victor Bengtsson, Lars Berglund, Narrative review of injuries in powerlifting with special reference to their association to the squat, bench press and deadlift 4 (1), e000382, 2018
2. J siewe, G Marx, Injuries and overuse syndromes in competitive and elite bodybuilding. 2013 march 21.99 This study aimed to investigate rates of injury, pain during workouts and/or overuse syndromes
3. Variations of the Deadlift Timothy J. Piper, MS, CSCS, *D Physical Education Department Western Illinois University, MacombMichael A. Waller, CSCS, *D; NSCA-CPT Highland Park Hospital Health and Fitness Center Buffalo Grove, Illinois. 2015
4. Thomas Reichel *, Martin Mitnacht', Annabel Fenwick", Rainer Meffert? Olaf Hoos? and Kai Fehskel in their study entitled Incidence and characteristics of acute and overuse injuries in elite powerlifters 2019
5. Anton MM, Spirduso WW, Tanaka H. Age-related declines in anaerobic muscular performance: weightlifting and powerlifting. *Med Sci Sports Exerc* 2004; 36: 143 – 147
6. Bahr R. No injuries, but plenty of pain? On the methodology for recording overuse symptoms in sports. *Br J Sports Med* 2009; 43: 966 – 972
7. Bukhary HA, Basha NA, Dobel AA, Alsufyani RM, Alotaibi RA, Almadani SH. Prevalence and Pattern of Injuries Across the Weight-Training Sports. *Cureus*. 2023 Nov 30;15(11): e49759. doi: 10.7759/cureus.49759. PMID: 38046743; PMCID: PMC10689975.
8. Kapicioglu M, Bilgin E, Guven N, Pulatkan A, Bilsel K. The Role of Deadlifts in Distal Biceps Brachii Tendon Ruptures: An Alternative Mechanism Described with YouTube Videos. *Orthop J Sports Med*. 2021 Mar 25;9(3):2325967121991811. doi: 10.1177/2325967121991811. PMID: 34250167; PMCID: PMC8237209
9. George K Beckham, Hugh S Lamont, Kimitake Sato, Michael W Ramsey, Isometric strength of powerlifters in key positions of the conventional deadlift
10. Spencer, Kirsten, and Mathew Croiss. "The effect of increasing loading on powerlifting movement form during the squat and deadlift." (2015).
11. Strömbäck E, Aasa U, Gilenstam K, Berglund L. Prevalence and Consequences of Injuries in Powerlifting: A Cross-sectional Study. *Orthop J Sports Med*. 2018 May 14;6(5):2325967118771016. doi: 10.1177/2325967118771016. PMID: 29785405; PMCID: PMC5954586.
12. Nicolay RW, Moore LK, DeSena TD, Dines JS. Upper Extremity Injuries in CrossFit Athletes-a Review of the Current Literature. *Curr Rev Musculoskelet Med*. 2022 Oct;15(5):402-410. doi: 10.1007/s12178-022-09781-4. Epub 2022 Jul 22. PMID: 35867271; PMCID: PMC9463423.
13. Butragueño, J. & Benito, Pedro J & Maffulli, Nicola. (2014). Injuries in strength training: review and practical application. *European Journal of Human Movement*. 32. 29-47.
14. Calhoon G, Fry AC. Injury rates and profiles of elite competitive weightlifters. *J Athl Train*. 1999 Jul;34(3):232-8. PMID: 16558570; PMCID: PMC1322916.
15. Kapicioglu M, Bilgin E, Guven N, Pulatkan A, Bilsel K. The Role of Deadlifts in Distal Biceps Brachii Tendon Ruptures: An Alternative Mechanism Described with YouTube Videos. *Orthop J Sports Med*. 2021 Mar 25;9(3):2325967121991811. doi: 10.1177/2325967121991811. PMID: 34250167; PMCID: PMC8237209.

16. Keogh JW, Winwood PW. The Epidemiology of Injuries Across the Weight-Training Sports. *Sports Med.* 2017 Mar;47(3):479-501. doi: 10.1007/s40279-016-0575-0. PMID: 27328853.
17. Alekseyev K, John A, Malek A, Lakdawala M, Verma N, Southall C, Nikolaidis A, Akella S, Erosa S, Islam R, Perez-Bravo E, Ross M. Identifying the Most Common CrossFit Injuries in a Variety of Athletes. *Rehabil Process Outcome.* 2020 Jan 22; 9:1179572719897069. doi: 10.1177/1179572719897069. PMID: 34497463; PMCID: PMC8282166.
18. Willick SE, Webborn N, Emery C, Blauwet CA, Pit-Grosheide P, Stomphorst J, Van de Vliet P, Patino Marques NA, Martinez-Ferrer JO, Jordaan E, Derman W, Schweltnus M. The epidemiology of injuries at the London 2012 Paralympic Games. *Br J Sports Med.* 2013 May;47(7):426-32. doi: 10.1136/bjsports-2013-092374. Epub 2013 Mar 20. PMID: 2351571