

A Status Study of Indian Commonwealth Games Ranking Weightlifters on Relative Strength of Different Weight Categories

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Abstract

The primary objective of this study would have been to focus on the overall comparative strength of the composites bodyweight groupings among powered gymnasts. The powerlifting competitions effectiveness or scoring system within every weight gain was supplied to measure relative importance among some of the numerous different weight classes of powerful gymnasts. Power lifters' relative strength may be calculated by dividing their reported performance or scoring by their body weight. A lift (in weightlifting) is required whilst also performing the snatch, clean, but also jerk in order to achieve maximum muscular strength by gathering the pressure of working as well as associated muscles in performance, particularly the legs as well as arms muscles, in attempt to improve gravitational force as well as bar weight resistances. The purpose of this research would have been to assess the relative strength of Indian Commonwealth Games 2020 rankings weightlifters across various weight divisions: 55kg, 61kg, 67kg, 73kg, 81kg, 89kg, 89kg, 96kg, and 102kg. The 2020 Commonwealth Rankings pdf was used to gather data on relative strength for this study. A total of 48 Indian young Commonwealth ranked weightlifters competed in the competition, with six within every weight group. At the 0.05 level of significance, T-test results indicated significant variations in the relative strength of the composites weight divisions of rating weightlifters.

Keywords : Athletes, Commonwealth, Power Lift, Relative Strength, Weightlifting.

I. INTRODUCTION

Olympic weightlifting, often known as Olympic-style weightlifting, seems to be a sport inside which competitors participate by carrying a barbell laden with bodyweight exercises from either the ground to above, among each athlete attempting to lift the highest weights. The snatch as well as the clean and jerk are two different techniques for athletes to move the barbell above. The snatch is a wide-grip lift that involves lifting a weighted barbell overhead in one motion[1]. The clean as well as jerk is a combined exercise during which the weight is lifted from the floor toward the front of the shoulders (clean), and then from the front of the shoulders to beyond (jerk). The clean but also press, which consisted of a clean accompanied by an overhead press, was once a

competitive lift but had been dropped owing to difficulty assessing appropriate form.

Each weightlifter is provided 3 snatches as well as clean as well as jerk chances, with both the snatch efforts to try coming first. The aggregate sum of something like the highest successfully lifted weights in kilos with each lift determines an athlete's score[2]. Athletes compete in a variety of weight classes, which vary by gender so have evolved through time. Lifters who manage to perform at least one snatches so one clean as well as jerk are considered "incomplete" or would earn a "incomplete" participation for such tournament.

At the quadrennial Commonwealth Games, weightlifting has become one of the sports. This being fundamental sporting activity that really should be featured in every edition of the Games' athletics department[3].

There were 8 traditional male events and seven women's activities somewhere at 2010 Commonwealth Games held Delhi, comprising 2 weightlifter competitions. The inaugural women's tournaments were conducted in 2002. From 1990 through 2002, a gold were given for every one of the snatch, clean, and jerk phases, as well as the overall total, including 46 medal winners being given out in 2002. Since 2006, trophies have only ever been awarded relation to the amount of each of these phases, which seems to be the case somewhere at Olympics. Weightlifting categories have already been held at the Commonwealth Games since 2002, as well as the scores have always been tallied underneath weightlifting[4].

Weightlifting is a sort of athletic activity that involves the gradual lifting of heavyweights with in current environment. A lift is required while doing the Snatch, Clean, and Jerk for maximal physical strength by gathering the force of working and associated musculature in performances, particularly the legs as well as arms muscles, to overcome gravitational forces as well as bar weight resistances. Because even in creating a shift in weight movement throughout maximal strength development, power has a relationship with demanding speed[5].

In India, weightlifting is the most popular sport. Weightlifting has made it a habit to award a medal to the winner of every nationally and internationally championship. The performance of human capabilities may be focused towards developing self-control, accountability, concentration, and compassion through organised sports coaching, allowing sports accomplishments to become a matter of pride. As a result, the sports development programme in the context of national development requires greater proportional commitment including mentoring, administration, methodical planning, and execution. A long-term coaching method is required to develop or generate an outstanding athlete, which necessitates systematic, focused, planned, and ongoing management[6].

As a result, in a tiered and methodical coaching pattern, the achievement must be developed

into a full idea. Aiming for the best national sports growth possible necessitates the inclusion of key components after the training methods have been determined. A coaching programme is not only a one-time activity that is done in a short period of time; it is a continual activity that implements policy. As a result, a coaching programme may be completed over a lengthy period of time. The programme is always implemented in an organisation, which implies it must involve a group of individuals[7].

Today's period is defined by lowest input as well as maximum output, and every effort is made to enhance efficiency. Every facet of the individual's behaviour is thoroughly researched through scientists and researchers collaborating collaboratively, because then competitors can gain the greatest significant advantage possible. Homer's epic era reflects a clear understanding of athletics throughout the Greek period[8]. Games were a part of people's daily lives or any significant occasion. 1 Strength, speed, durability, flexibility, as well as suppleness are all components of fitness that may be improved via sports. Strength, or the capacity to produce muscular force, is a characteristic of physical health that has piqued people's curiosity since antiquity, with numerous accounts of superhuman abilities to lift enormous weights. Progressive training refers to the systematic notion of continuing to increase the amount of resistance that musculature must work against each other in order to acquire endurance. People interested in compression strength and cardiovascular endurance have employed it extensively in recent years [9].

According to studies, untrained persons who will not engage in intense physical activity or exercise reach their maximum strength and endurance between both the ages of 18 and 45 as well as twenties, after which it rapidly falls. Muscle strength can be significantly reduced when people become older and stop using their muscles.

In modern games and sports, strength is also a crucial factor in success. Although such a statement may appear excessive, it is a real

strength; nevertheless, is it the important factor since it is better than other elements? It is, in fact, the single aspect that can only be enhanced with a 100% success rate[10]. Strength training is an important component of sports training for athletes who want to enhance their performance. Resistance training was, therefore continues to be, an important component of sports training aimed at enhancing effectiveness. Resistance training was, as well as continues to be, an important component of sports training aimed at enhancing effectiveness.

Power weightlifting consists of three movements: squats, press-ups, and dead lifts. Weight divisions are established, or otherwise contestants participate alongside others with the same heavyweight division [11]. For a movement to be considered excellent, at least two of the three judges must agree that it would be a decent movement that adhered to most of the bodybuilding tournament's rules.

Lampung has great potential in a variety of sports, including baseball, softball, gymnastics, and athletics, in addition to weightlifting. National multi-event championships, or PON, are allowed to award medals to athletes, but not as many as powerlifting and weightlifting. Weightlifting and powerlifting dominate medal presentations in multi-event championships such as the National Sports Week (PON), and have become one of the sport's most likely medal presenters[12]. Athletes' performances demonstrated that, in addition to powerlifting and weightlifting, all sports fields contributed significantly to deciding the placement in participation with National Sports Week and also served as a training centre for nurturing the disciplines of powerlifting and weightlifting.

Lifting barbells as well as other heavyweights is a sports and activity. In contemporary weightlifting, there seem to be two basic lifts: this same single-movement snatching (from floor through extended position) as well as the two-movement snatch (from floor reaching shoulders posture as well as from shoulders into flexed conformation) (the clean and jerk).

We concentrate on relative strength rather than general strength when it comes to fitness. The strength about an individual in associated with body weight is referred to as relative strength. It's easy to be big and strong, but it doesn't always mean you're serving the best purpose. Being incredibly powerful for your stature is what this type of strength growth entails[13]. You must understand the value of competition... Competition seems to be the driving force behind greatness, whether it's in sports, fitness, the job, or any other aspect of life. It is what is accountable for the progress of humanity on an evolutionary basis. All of humanity's major advances in development have already been fuelled by competitions over resources, power, as well as riches.

Man has been pitting his might against others for thousands of years. Human beings having long prized the collection as well as development in fundamental physical violence, dating back thousands of years Olympic Games. But how do we determine a person's true strength? Today, I'll go through the benefits, drawbacks, as well as distinctions of the two forms of strength: objective and subjective strength. We'll begin with maybe some fundamental definitions[14]. The sort of strength that the ordinary person seems to be most acquainted with which is fundamental strength. "How long should you sit on the bench?" Everyone that has spent enough time in a gym has certainly heard challenged, "How much more can you crouch?" or "How much more can you bench?" These are issues regarding material stiffness, as well as the most energy a human would exert independent matter their height or shape.

In many muscle mass exercises, 1-rep optimum computations are the optimum way to quantify this type of endurance (i.e. max bench, max squat, max clean). The highest amount of force that someone else can exert in proportion to their physical height or shape is known as relative strength. Bodyweight activities like push-ups and pull-ups are widely used to assess relative strength. These sorts of measurements, however, are not always reliable since they

occasionally assess muscular strength and endurance but instead of power[15]. As a result, using a 1RM measurement and comparing it to a body weight scale, or using a maximum athletic effort like the 40-yard sprint or high jump, seems to be more accurate.

Throughout most muscle contractions, the mass exerts almost all of its potential to exert energy somewhere at specific interval of time during the convulsions phase, which is considered to as compensating accelerating, since effectiveness is dependent on the consequent strength and endurance. Strength divisions in weightlifting are used to highlight the link amongst body composition as well as muscle development for lifters participating. As a result, the sport of weightlifting has been separated into a number of new weight categories in order to better assess the performance of weightlifters.

II. LITERATURE REVIEW

Living things are competitive as well as aim to perfection in every subject, according to G. Kaur and Y. Singh sport has always been like this; it is a constantly changing environment. Every day, changes occur in all aspects of life. People's lives, their philosophies, their methods of life, among others are all changing as a result of fundamental and applied research in many disciplines. Because of constant change, humanity has progressed from the primordial "Stone Era" to the space age. As a consequence of simultaneous improvements in mentoring and conditioning techniques, records have been improving. In laboratories, new procedures are developed, as well as scientific approaches are used to achieve the desired degree of performance. Games are even by their own nature enjoyable, hard, and entertaining, and they necessitate a certain degree of skill as well as physical condition. Bucher We are all aware that today's society has the shortest inputs as well as maximum outputs, therefore every effort will be made for improve efficiency [16]. S. Adhikari, et al. explain about the games and sports are common recreational activities for both young as well as elderly, boys and girls, men and women. They provide an opportunity for everyone to get some exercise, have some

fun, as well as relax. They can help build physical fitness and abilities that can be used in leisure time now though and, perhaps more significantly, inside the future. Many of the skills learned via games and sports may be utilised to stay physically healthy in the future. The single most crucial aspect in making this degree of success seems to have been weight training. Take, for example, tennis champion Serena Williams as well as Giants slugger Barry Bonds' accomplishments this year. Most other persistence properties are closely related to the concept of high compressive properties [17].

M. Joseph, et al. discussed how sprint reaction time as well as anaerobic power have been contrasted in juvenile football players, softball players, as well as wrestlers. This research evaluated and assessed the sprinting, situational awareness, as well as anaerobic power of football coaches, basketball players, as well as wrestlers. The athletes were categorized into three groups according to respective athletic specialization, as well as their speed, situational awareness, and metabolic endurance have all been measured. On the basis of quantitative assessment regarding reaction cost and reduced power in sporting professions, the Kruskal Wallis & Dunn's Multiple-Comparison test was employed to discover differences between the different. The (one-way ANOVA) as well as the Tukey Multiple-Comparison testing would be used to highlight the differences between both the branch offices performance sprint, capacity factor, reference voltage, as well as fatigue indices.[18].

A. Krishnan et al. , the objectives of this paper is to evaluate the bodily components of hearing-impaired wrestlers with healthy wrestlers, as well as their static or dynamic balancing levels. Thirty-five H-IW but also twenty-two HW participated in this experiment. The wrestlers' body constituents were determined that used the Inductive coupling Impedance Analyzer, as well as steady state and transient balance assessments using the Biodex Balance System, but also back as well as leg strengths utilising back and leg dynamometry protocols. To see if

the data were conventional, the Kolmogorov-Smirnov test was applied. The paired - Samples t Method is used to compare comparative group factors having a healthy distributions [13].

In this article, we continue our examination of international patterns in sports science development. We looked into current difficulties in women's sports at this point. The activity was completed as part of a public assignment assigned by the Russian Federation's Ministry of Sport. The goal of the study was to conduct a scientific investigation of women's nutrition as well as recovery features in bandwidth but also strength sports, as well as to highlight existing research priorities inside the domain. The researchers looked including over a hundred studies on the biological and biomedical components of female athletes' preparation in professional boxing as well as related activities. The papers on recuperation strategies in female athletes, as well as publications dealing in nutritional regulation in women's sports, were the emphasis. Women are more likely than males to suffer from eating problems in sports. This disease enhances an athlete's sensitivity to osteoporotic fractures as well as being a substantial major risk for such a range of illnesses [7].

Turkish as well as 135 German wrestling responded to the questionnaires, according to K. Singh et al. Among some of the 170 Turkish wrestlers, there would have been 104 Turkish champions, 55 European champions, including 60 World champions. There must have been eight heavyweights who already had received an Olympic medal at the same time. Among the 135 German wrestlers, there were 65 German champions, 32 European champions, as well as 28 World champions. A total of 20 German wrestlers were also awarded Olympic medals. Various pieces of evidence regarding the wrestler's weight loss were discovered using a 29-question questionnaire. Just after following considerations, the discrepancies were examined [14].

K. EBADA, Multidisciplinary Research of Religious Convictions of Turkish National

Team Athletes in Individuals in Various Spite of These differences 209-213. Journal of Education and Training Studies. "No matter what submission to a proper authorities, to receive applications as well as arrangements which it going to arise from any of this jurisdiction as that the regulations that must be followed, because when reward cooperate with many of these regulations will indeed be chosen to take because when punishment argument against is the general name of something like a living system into wanting to believe this same area" is the general name of a living system into believing the neighbourhood in its largest context. The athletes competing in different branches of something like the Turkish premier league make up the studies demographic. The study included 50 ladies and 102 boys, totaling 152 national athletes who competed for Turkey in different sports also including boxing, taekwondo, as well as wrestling. The data was gathered using a Personal Information Survey and a Religious Belief Scale. Because when information is scientifically evaluated, it is discovered that there have been considerable inequalities in terms of gender, relationship status, as well as educational attainment. As a consequence, it has been discovered that religion is acknowledged by almost everyone unacknowledged by someone but considered toward being 2017 Compilation of Wrestling Research page 2 in every regard and worshipping is available by incredible athletes, although it is dissimilar among regular women in terms of sportspersons [8].

Kryst et al., Kryst et al., Kryst et al., Krys The athletes competing in individual branches of the Turkish national team make up the study's demographic. When the information being quantitatively investigated, it is discovered there are substantial disparities in gender, marital status, as well as educational attainment. As a consequence, it has been discovered that religion is understood by just about everyone unacknowledged by somebody else considered toward being 2017 Compilation on Wrestler Research page 2 in every regard as well as worshipping is available by great athletes,

although this is different in regular population in terms of sports and athletes [9].

Research Question:

Examine the relative strength of Indian commonwealth games 2020 ranking weightlifters in different new weight categories 55kg, 61kg, 67kg, 73kg, 81kg, 89kg, 96kg and 102kg.

III.METHODOLOGY

1.1. Design:

The information was chosen from either the results of a study of something like the relative strength from several strength training from numerous weight classes of "2020-Commonwealth-Rankings.pdf". The sum of the best six (6) weightlifters of respective events was reflect as the total weight lifted as a score.

1.2. Sample:

For the purpose of this study, the researcher selected the data from the official link Web Link 1 of the 2020 Commonwealth Weightlifting Federation Ranking data sheet (2020-Commonwealth-Rankings.pdf). Total forty-eight (N=48) young (Age in between 20 to 30 years) Indian Commonwealth ranking weightlifters 2020 and six (6) of each weight category 55kg, 61kg, 67kg, 73kg, 81kg, 89kg, 89kg, 96kg, 102kg were selected as the subjects.

1.3. Data Collection:

The information was acquired from of the findings of "2020-Commonwealth-Rankings.pdf," which compared the comparative characteristics of various wrestlers from multiple organizations. The lifters' points were calculated by adding the best three lifts from each event.

1.4. Formula of Relative strength

Researcher calculating the relative strength as per the Singh, H. (1991) book adopted method and measured to all in ratio unit.

Relative Strength = Maximum Strength/Body Weight

1.4.1. Statistical Technique

To find-out the significant difference of relative strength in between the different weight categories of the weightlifters 55kg to 61 kg; 55kg to 67kg; 55kg to 73kg; 55kg to 81kg; 55kg to 89kg; 55kg to 96kg; 55kg to 102kg The t-test was applied at .05 level of significance.

Table 1: Relative Strength (ratio) of Indian 2020 Commonwealth Ranking Weightlifters.

Mean, SD and t-value, of 55kg, 61kg, 67 kg, 73kg, 81kg, 89kg, 89kg, 96kg and 102kg Weight categorize of Indian Male Weightlifters						
Variable	Weight category	N	df	Mean	SD	t-value
Relative Strength	55kg	6	10	4.39	0.08	2.67*
	61kg	6		3.86	0.15	
	55kg	6	10	4.39	0.08	2.58*
	67kg	6		4.14	0.22	
	55kg	6	10	4.39	0.08	4.94*
	73kg	6		4.03	0.15	
	55kg	6	10	4.39	0.08	9.28*
	81kg	6		3.86	0.11	
	55kg	6	10	4.39	0.08	12.78*
	89kg	6		3.53	0.14	
	55kg	6	10	4.39	0.08	12.67*
	96kg	6		3.31	0.12	
	55kg	6	10	4.39	0.08	21.09*
	102kg	6		3.09	-	

*significant at 0.05 level

Tab. $t_{.05} (2,10) = 2.22$

1.5. Data Analysis:

Since the all-calculated t-value {2.67, 2.58, 4.94, 9.28, 12.78, 12.67 and 21.09} is greater than the tab. t-value {2.22} thus the data provide sufficient evidence to ensure that the mean relative strength of 55kg Weight category is significantly higher for weightlifters in comparison to 61kg, 67 kg, 73kg, 81kg, 89kg, 89kg, 96kg, and 102kg at .05 level of significance (Figure 1).

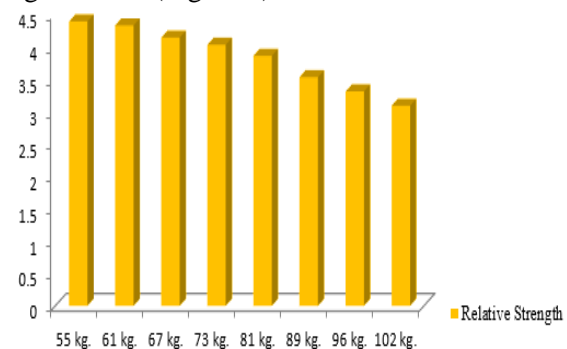


Figure 1: Graphical Representation of higher to lower Relative strength ratio of different

weight categories (55kg, 61kg, 67kg, 73kg, 81kg, 89kg, 96kg and 102kg) of Indian commonwealth games ranking weightlifters.

From the graphical analysis of the data got the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (3.86) of 61kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (4.14) of 67kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (4.03) of 73kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (3.86) of 81kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (3.53) of 89kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (3.31) of 96kg weight category weightlifters; the mean value (4.39) of 56kg weight category weight lifters is higher than the mean value (3.09) of 102kg weight category weightlifters.

IV. RESULTS AND DISCUSSION

In the given Table 1 56kg weight category weightlifters are stronger in comparison to others respective weight categories 61k., 67kg, 73kg, 81kg, 89kg, 96kg, 102kg Gautam (2012) Weightlifting is a dynamic physically demanding sport that requires both glycolytic energy production related to bursts of intense muscular activity of few seconds. A high level of physical fitness with superb muscular strength is needed to prevent injury. Ball, et al. (2010) found a substantial variation in relative importance among some of the several weight divisions of powerful gymnasts, with the greatest relative performance having the highest average value between all subgroups. Raza & Peter (2019) studied weightlifters and found considerable heterogeneity in all 3 groups (low weight divisions (48 kg & 53 kg), intermediate classifications (63 kg, 69 kg), and upper weight classifications (90 kg, +90 kg). Group Lower, on the other hand, had a proportionately larger efficiency.

V. CONCLUSION

The goal of the present study would have been to assess the relative strength of energy from various lifters. In kilos, their proportional strength was determined. The data analysis demonstrates so at the chosen level of statistical significance, there's now a substantial difference throughout relative importance between distinct categories of bodybuilders, indicating indicating various classifications of lifters have varying levels of relative importance. The means of something like the lifters' scores were calculated, as well as the data was subjected between one analysis of variance (anova to determine the significance of the differences inside the averages.

The results revealed that the relative strength of lifters in various categories differed substantially. In order to overcome gravitational force as well as bar weight resistances, the snatch, clean, as well as jerk lift requires the accumulation of force from working as well as related muscles in performances, particularly the legs as well as arms muscles. The purpose of this research was to look at the relative strength of Indian commonwealth games weight training in various weight categories. Significant disparities in overall power across weight categories among power gymnasts have been most likely related to variances with training as well as pre-requisite elements for athletes.

REFERENCES

1. S. H. Hong, J. Y. Byeon, J. H. Min, D. H. Park, W. H. Cho, and J. Y. Jeon, "Relationship between handgrip strength and the prevalence of diabetes mellitus among korean adults: Korean national health and nutrition examination survey, 2014-2018," *Exerc. Sci.*, vol. 30, no. 1, pp. 110–121, 2021, doi: 10.15857/ksep.2021.30.1.110.
2. J. M. Kvamme, T. Wilsgaard, J. Florholmen, and B. K. Jacobsen, "Body

- mass index and disease burden in elderly men and women: The Tromsø Study,” *Eur. J. Epidemiol.*, vol. 25, no. 3, pp. 183–193, 2010, doi: 10.1007/s10654-009-9422-z.
3. E. Smpokos, C. Mourikis, A. Tsikakis, N. Katsikostas, and M. Linardakis, “Reference performance values of pre-seasonal physical fitness in elite youth male football players in Greece,” *J. Public Heal.*, 2020, doi: 10.1007/s10389-020-01408-7.
 4. J. C. Refsgaard, S. Christensen, T. O. Sonnenborg, D. Seifert, A. L. Højberg, and L. Trolborg, “Review of strategies for handling geological uncertainty in groundwater flow and transport modeling,” *Adv. Water Resour.*, vol. 36, pp. 36–50, 2012, doi: 10.1016/j.advwatres.2011.04.006.
 5. K. Kodzoman, “PHYSICAL FITNESS AND BODY COMPOSITION IN CORRELATION WITH BODY WEIGHT OF PUPILS IN PRIMARY SCHOOLS ON THE TERRITORY OF THE CITY OF SKOPJE,” *Res. Phys. Educ. Sport Heal.*, vol. 9, pp. 125–132, 2020, doi: 10.46733/pesh2090125k.
 6. M. Wright, M. Levy, and J. Citrin, “Public Attitudes Toward Immigration Policy Across the Legal/Illegal Divide: The Role of Categorical and Attribute-Based Decision-Making,” *Polit. Behav.*, vol. 38, no. 1, pp. 229–253, 2016, doi: 10.1007/s11109-015-9311-y.
 7. N. S. Adıgüzel, “Strength, Jump Heights and Physical Characteristics of Young Male Basketball Players by Their Positions,” *J. Educ. Train. Stud.*, vol. 7, no. 3S, p. 17, 2019, doi: 10.11114/jets.v7i3s.4005.
 8. K. EBADA, “Curved characteristics best suited for Growth rates, Relative strength and Performance Time of female Olympic weightlifters,” *Turkish J. Sport Exerc.*, vol. 16, no. 1, pp. 116–116, 2014, doi: 10.15314/tjse.201416172.
 9. Ł. Kryst et al., “Physical fitness of overweight and underweight preschool children from southern Poland,” *Anthropol. Anzeiger*, vol. 73, no. 2, pp. 117–124, 2016, doi: 10.1127/anthranz/2016/0561.
 10. S. K. Verma and P. Malhotra, “Assessment of physical fitness from BP-HR relationship during exercise and recovery in athletes,” *Sport. Szemle/Hungarian Rev. Sport. Med.*, vol. 27, no. 4, pp. 243–253, 1986, [Online]. Available: <http://articles.sirc.ca/search.cfm?id=203367%5Cnhttp://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=SPH203367&lang=pt-br&site=ehost-live>.
 11. J. L. Bhanot and L. S. Sidhu, “Comparative study of reaction time in Indian sportsmen specializing in hockey, volleyball, weightlifting and gymnastics,” *J. Sports Med. Phys. Fitness*, vol. 20, no. 1, pp. 113–118, 1980.
 12. S. Amrinder, S. Gursumeet, and S. J. Singh, “Prevalence of low back pain and fatigue levels in Indian athletes,” *Sport. Med. J. / Med. Sport.*, vol. 9, no. 4, pp. 2241–2246, 2013, [Online]. Available: <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=93298270&site=ehost-live>.
 13. A. Krishnan, D. Sharma, M. Bhatt, A. Dixit, and P. Pradeep, “Comparison between standing broad jump test and wingate test for assessing lower limb anaerobic power in elite sportsmen,” *Med. J. Armed Forces India*, vol. 73, no. 2, pp. 140–145, 2017, doi: 10.1016/j.mjafi.2016.11.003.
 14. K. Singh, A. Krishnan, D. Sharma, and C. S. Guru, “Body composition in selective groups of elite Indian sportsmen: A comparative study,” *Indian J. Physiol. Pharmacol.*, vol. 63, no. 4, pp. 303–308, 2019.
 15. K. Susan Cherian, A. Sainoji, P. R. Dundigalla, B. Nagalla, and V. R.

- Yagnambhatt, “Resting Metabolic Rate of Junior National Weightlifters in India: Development and Validation of Prediction Models,” *Indian J. Nutr. Diet.*, vol. 55, no. 3, p. 278, 2018, doi: 10.21048/ijnd.2018.55.3.21323.
16. G. Kaur and Y. Singh, “Injury ridden all India varsity championship-a survey on Indian female weightlifters and powerlifters,” *Man India*, vol. 96, no. 9, pp. 3089–3097, 2016.
17. S. Adhikari, A. Perla, S. B. Sayana, M. K. Tiwari, and T. Medabala, “Evaluation of lung function among the Indian elite female weightlifters,” *Int. J. Res. Med. Sci.*, vol. 5, no. 3, p. 987, 2017, doi: 10.18203/2320-6012.ijrms20170648.
18. M. Joseph, R. Das Gupta, L. Prema, M. Inbakumari, and N. Thomas, “Are predictive equations for estimating resting energy expenditure accurate in Asian Indian male weightlifters?,” *Indian J. Endocrinol. Metab.*, vol. 21, no. 4, pp. 515–519, 2017, doi: 10.4103/ijem.IJEM_563_16.