Prevalence of Altered Postural Alignment in Recreational Weightlifters with Low Back Pain

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***Abstract*—Background-Weightlifting is a popular sport among adolescents and young adults, promoting muscular development and a healthy lifestyle. However, improper technique can lead to musculoskeletal and neurological injuries, with low back pain (LBP) being a common complaint. This study aims to determine the prevalence of altered postural alignment among recreational weightlifters with LBP**

Methods

Recreational weightlifters reporting LBP underwent numeric pain rating scale (NPRS) evaluation and functional movement screen (FMS) assessment. Data on age, lifting experience, and lumbar belt usage were recorded. Participants with congenital/systemic illness or postoperative conditions were excluded.

Result

In a study involving 81 recreational weightlifters with low back pain, 33% (27 participants) exhibited altered postural alignment, while 67% (54 participants) had normal scores on the Functional Movement Screen (FMS). Most participants (64) were aged between 18 and 24 years, with a mean age of 22.63 (±3.36) years. Interestingly, a higher prevalence of postural alterations was observed in participants aged 25 and above, with 64.70% of those aged 25 to 30 exhibiting decreased FMS scores (17 participants, mean age 27.5, SD 1.87).

Conclusion

This study underscores the susceptibility of recreational weightlifters with low back pain (LBP) to postural alterations, indicating a heightened risk of injury. LBP, with or without postural deviations, adversely affects individuals' quality of life and sports performance. It stresses the necessity for spine surgeons, physiotherapists, and physical trainers to promote awareness regarding biomechanical principles, proper weightlifting techniques, and execution to prevent future physical injuries.

***Index Terms*—Recreational weightlifting, FMS, low back pain, postural alignment, musculoskeletal injuries.**

I. INTRODUCTION

Weightlifting is a popular choice among adolescents and young adults, promoting muscular development and a healthy lifestyle. It enhances muscle size, shape, and symmetry[1,2]. However, it poses risks of musculoskeletal and neurological injuries without proper coaching and technique. Both upper and lower body muscles are engaged, increasing the risk of injury. Proper training and supervision mitigate these risks, especially in prepubescent and older athletes[2,3.]

Weightlifting, encompassing various forms of strength training, has gained popularity across age groups and athletic abilities. However, increased participation has led to higher rates of injuries, particularly acute injuries like muscular strains and ligamentous sprains, with shoulders and knees being the most affected joints[1]. Utilizing barbells, dumbbells, and resistance training devices, weightlifting offers numerous physical and mental benefits, contributing to overall fitness maintenance. When performed safely and with proper technique, weightlifting can be a valuable addition to a young adult's fitness regimen, aiding in core strengthening and reducing the risk of low back pain[27].

Healthcare providers stress the importance of postural alignment to prevent mechanical stress or injury during daily and leisure activities. Proper posture, defined by the American Academy of Orthopedic Surgeons, maintains body balance and safeguards against injury[4]. When weightlifting is performed with proper alignment and combined with aerobic fitness training, it promotes a healthy lifestyle. Conversely, focusing solely on body image improvement without proper technique and awareness can lead to harmful

effects, such as low back pain, a common complaint among weightlifters[1].

Low back pain affects 60-80% of adults at least once in their lives, with adolescents and those in their third decade of life facing it more frequently, especially with high physical activities[5]. Incorrect execution of weightlifting, using excessive weights, or maintaining poor posture during exercise directly contribute to lower back injuries, strains, and mechanical stress, leading to acute or chronic low back pain[1].

Recreational weightlifters engage in weightlifting primarily for exercise and enjoyment rather than professional or competitive purposes. They lift weights to enhance their fitness, strength, and body composition, tailoring their routines to personal goals and preferences[1,6]. While recreational weightlifters may not have the same level of resources or coaching as professionals, recreational weightlifters still experience benefits like increased muscle mass, improved metabolism, and functional strength for daily activities[28,29].

Developed by physical therapist Grey Cook and kinesiology specialist Lee Burton in 1995, the Functional Movement Screen (FMS) serves as a systematic screening tool for healthcare professionals to detect poor fundamental movement patterns in individuals. FMS evaluates functional movement limits, assessing range of motion, dynamic stabilization, and balance deficits[21].

Therefore, gaining a deeper understanding of the prevalence of altered postural alignment during weightlifting in individuals experiencing LBP is crucial for preventing potential musculoskeletal and neurological conditions. By conducting the present study on the prevalence of altered postural alignment in recreational weightlifters with LBP, valuable insights will be gleaned

II. METHODS

This observational study titled "To study prevalence of altered postural alignment in recreational weightlifters" was conducted in the Kolhapur region, focusing on recreational weightlifters experiencing low back pain (LBP). Participants, recruited from various gyms, were between 18 and 30 years old, engaged in weightlifting for a minimum of two years, and reported LBP onset after starting weightlifting. Exclusion criteria included professional weightlifters, recent spine injuries, and diagnosed congenital or systemic diseases, ensuring a homogeneous sample. Written consent was obtained from all participants, and demographic data were collected. Assessments using the Functional Movement Screen and Numeric Pain Rating Scale were conducted and recorded for all 81 participants, with data organized into a master chart for analysis.

The Functional Movement Screen (FMS) comprises seven subtests, each scored from 0 to 3, with 3 indicating optimal performance. The total score ranges from 0 to 21, with a cutoff of 14 points often used to identify individuals at higher risk of injury. During the FMS test, each movement is performed three times, with a "Clearing Test" conducted for specific subtests to assess pain. A positive clearing test or any pain during the test results in a score of zero for that movement. Compensations during movement earn two points, while correct execution without compensations earns three points. Scores are recorded for both sides, with the lower score considered. Imbalances between sides are noted for further analysis.

The seven components of the Functional Movement Screen (FMS) are:

1. Deep squat
2. Hurdle step
3. Incline lunge
4. Shoulder mobility test
5. Active straight leg raises
6. Trunk stability push-up
7. Rotatory stability

The study employed biostatistical analysis using data from the master chart to determine the prevalence of altered postural alignment in recreational weightlifters with low back pain (LBP). Correlations between Functional Movement Screen (FMS) scores and Numeric Pain Rating Scale (NPRS) scores, FMS scores and age, and FMS scores and years of weightlifting practice were assessed. Graphical representations were used for clearer presentation of results. Additionally, the study calculated the average age of participants with postural alterations and the proportion of participants using a lumbar belt.

III. RESULT

A total of 81 participants, comprising 57 males and 24 females, engaged in recreational weightlifting with

complaints of low back pain (LBP), were selected from various gyms in and around the Kolhapur region. The participants' ages ranged from 18 to 30 years, with a mean age of 22.63 (±3.36) years. Exclusion criteria included systemic or congenital illnesses and prior spinal surgery causing LBP.

Most subjects (64) were aged between 18 and 24 years. Participants had been engaged in recreational weightlifting for 2 to 7 years. Only 7 out of 81 participants (8.64%) reported using a lumbar belt.

The study revealed that 33% (27 participants) exhibited altered postural alignment among recreational weightlifters with LBP, while the remaining 67% (54 participants) had a normal Functional Movement Screen (FMS) score of 14 or higher.

The correlation between FMS and NPRS revealed a significant negative correlation, indicating that as NPRS scores increased, FMS scores decreased, suggesting a link between low back pain severity and altered dynamic posture. Similarly, the correlation between FMS and age showed a significant negative correlation, with older participants exhibiting lower FMS scores, particularly those above the age of 25. Among participants aged 25 to 30 (mean 27.5, SD 1.87), 64.70% had FMS scores below 13.

Furthermore, the correlation between FMS and years of weightlifting practice also demonstrated a significant negative correlation. This suggests that longer durations of recreational weightlifting without proper technique and without using a lumbar belt may negatively impact dynamic posture. While a low degree of negative correlation was observed in this analysis, all data points in the graphs displayed a declining tendency from left to right, indicating negative correlation. The statistical analysis revealed that the correlation between FMS and NPRS had the strongest significant negative correlation (p value 0.00000).

IV. DISCUSSION

Low back pain (LBP) is one of the conditions that commonly affects many sports activities and can also affect any gender or any age. Literature suggest LBP is very much common in adolescent and young adults [10]. Studies suggest that prevalence of LBP in adolescent and young adults may affect growth spurt, physical activity and participation in sports[10,11,12]. In our study we targeted the similar age group from the age of 18 to 30 years and both genders were included to find out prevalence of altered postural alignment in recreational weightlifting with LBP.

Weightlifting requires many defined movements and proper technique that engages muscle in the back for the heavy weight[14]. This all impacts the high joint movement and as well as increases the compressive load and shearing forces on the spine and joints. Hence, it is also prone for injuries, when improper execution or techniques are used, or heavy weights are used[14-18]. Previous literature has stated that LBP is the commonest complaint in weightlifters with incidence rate of 40.8% [11,13].

The previous studies, on posture suggests that good postural alignment provide a base for effective as well as safe and secure movement during activities of daily living as well as during sports performance. Therefore, posture influences in practice of sport performance. Studies suggests that good posture and good postural habits are important to maintain stretch intensity on sensory fibres, force intensity and joint position during static as well as dynamic posture[4]. In our study, we used functional movement screen to assess the postural alterations in weightlifters.

Functional movement screen (FMS) is a method to understand the postural deviation during dynamic activity. Functional movement is a movement sequence based on day-to-day scenarios. Functional movement are all those movement you perform in multiple planes of motions with multiple joints to assists you achieve sport performance more effectively. Functional movements are important because difficulty with any of the parts required for specific functional movement can lead to more difficulty in managing crucial tasks of daily living and sports performances[34,35]. In our study, recreational weightlifters were included to understand that technique or execution. It is crucial to know that the lack of guidance may lead to LBP which gradually affects to postural alterations. So that in future studies; effect of specific stabilizing exercise would be studied to find prevention to the injuries. In our study we have used Functional Movement Screen, Through FMS clinician or a professional can screen individuals for risk of injury and for a dysfunction or performance-limit movement pattern [8,20,21].

In the previous study it was suggested that usage of excessive heavyweight, improper execution, lack of

guidance and supervision, use of number build can take a toll on body posture and lead to body tilt and back flexion. This all together leads to, stress on spine of weightlifters especially in recreational weightlifters and renders the lumbar area highly prone to injury. Hence proper knowledge of weightlifting technique and professional or trained person's supervision can reduce the incidence of back injury in weightlifters with LBP [1]. In our study we found out that, 33% participant were having FMS score less than 13 which suggests that total 27 participants out of 81 have high risk of injury due to weightlifting and additional LBP. In our study along with prevalence rate we also found out correlation between FMS and NPRS, FMS and age and FMS and years since weightlifting. Summarizing it all we have found, improper technique, execution, supervision and use of lumbar belt leads to postural alteration. In other studies, it is also seen that pain affects functional movement in activities of daily living, social life and sport performance[36]. Our study supports the same as it was seen LBP was the reason for decreased FMS score.

Studies suggest that specific stabilizing exercises on strength and balance for beginner weightlifters help to improve digital level for beginners and all this exercise program can be incorporated into training regime of beginner weightlifters to improve core stability as well as dynamic balance and this can prevent future injuries[19]. Future study should aim to find effect of specific exercise to treat altered postural alignment in adult age group as correlation suggest not much postural changes was seen in young adults specifically below 25 with that study should consider large sample size as this was conducted in relatively smaller sample size, also to explore other predisposing factors for LBP and alteration in posture and extrapolate the preventive measures to help eradicate alteration in postural alignment and LBP complaints from weightlifting sports setting.

V. CONCLUSION

This study was conducted among recreational weightlifters including participants ageing from 18 to 30 years in and around Kolhapur region reveals, recreational weightlifters with LBP are prone to postural alterations which suggests high risk of injury. This study also identified co relation of postural changes and LBP, age and years since practicing weightlifting. As LBP with or without postural alterations impact individual's quality of life along with their sports performance, creating awareness by spine surgeons, physiotherapist and physical trainers about biomechanical property, proper techniques and execution of weightlifting is necessary to prevent any physical injuries in future.

Conflict of interest

Acknowledgement

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