



## Forward Leaning and Two Axis Operation for Effective and Safe Running

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### Abstract

The players have felt the swaying of the gravity center and smooth running without sports injuries. As a future prospect, Masters Athletes encouraged to acquire more flexibility of the body trunk and to improve the interlocking of the body. Consequently, further progress will be expected to make evolution for better running using the power of the gravity.

### Keywords

Masters athletics; Body manipulation; Center of gravity line; Center of body axis; Intra-abdominal pressure (IAP); Sole hallucal area (football)

### Short Communication

In various sports, some common characteristic motion would be found in several leading players. They include natural movement without tactility or tension, speedy starting motion than expected, smooth acceleration, persistent high speed, long endurance, and so on [1,2].

What is the secret that produces these impressive performances? Authors have been continued practice, research and coaching of sports medicine so far, especially on Masters Athletics [3,4]. In this paper, we investigate and compare top sports players with average sports players and usual healthy people. In particular, we would focus on the difference in physical manipulation with them. For these methods, adequate and rational manipulation methods of the body could be proposed [5].

Traditionally, it has been believed that performance can be raised by "strengthen muscular power". In other words, it is considered effective to increase the reaction force from the ground in order to demonstrate high performance at many sports circumstances. As a representative method for that, weight training has been widely recommended and continued [6]. Specifically, common idea for training was that it is possible to run fast by kicking with the sole hallucal area (foot ball) strongly, and to sharply cut back the feint by stepping on the shaft foot strongly.

However, behavior analysis of top players has been recently advanced. As a result, a different body manipulation was observed than before, and its secret has gradually become elucidated and clears [7].

For the top players, the secret of the movements was "use of gravity" that can make the most of them into generating the necessary power (Figure 1). What is the characteristic point of the first class athletes? They show flexible movement in trunk in various competitions. Anatomically, the trunk has the maximum mass with the flexible backbone as the axis, which is connected to four extremities by some joints. For that reason, they can move the center of the gravity by swaying and tilting the trunk [8].

As a result, the trunk motion can lead the movements of the limbs. The displacement between the center of gravity line and the center of body axis support line can generate the position energy of falling of the center of gravity. Figure 1 schematically reveals that this mechanism can be converted into driving force.

There are three aspects of posture in Figure 1. At first, a man stands evenly on both feet (Figure 1B). It is a posture that weakened in a neutral position where the body axis and gravity line coincide and the body was supported by the skeleton (Figure 1B) [9].

Second is the utilization of potential energy in the anteroposterior direction. By tilting the body

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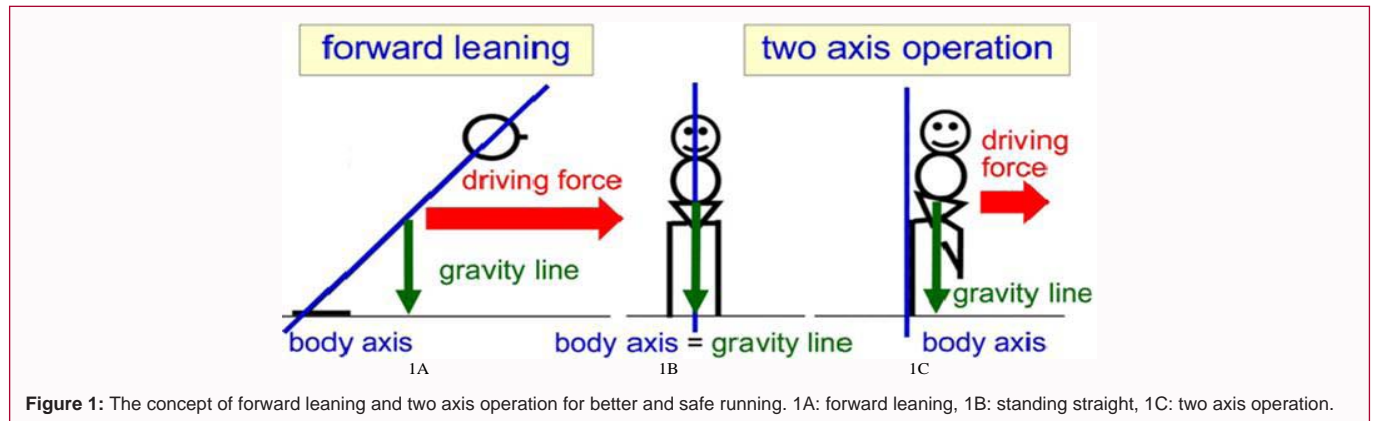
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**Figure 1:** The concept of forward leaning and two axis operation for better and safe running. 1A: forward leaning, 1B: standing straight, 1C: two axis operation.

deeper forward, large deviation occurs between the body axis and the gravity axis (Figure 1A). As a result, the position energy of the fall of the center of gravity can be converted to the forward propulsive force [10]. This situation is found by acute acceleration of top baseball players and fast dash in deep leaning of the short distance runner.

Third is the utilization of potential energy in the horizontal direction. By separating either the left or right foot from the ground, there is a gap between the body axis and the gravity line (Figure 1C). As a result, the potential energy can be converted to the propulsion force in the direction of the foot away from the ground (Figure 1C). There is no wasteful force or no preliminary action in this operation. Therefore, frequent feint motion seen in basketball and soccer is basically on this mechanism. It is also observed in the running of a top-notch sprinter or a long distance runner, which includes two-axis motion method [11,12].

Why can top players make most use of gravity? There are three possible reasons for that.

The first would be the formation of center of body axis. At a glance, a top player seems to show smart movement. It is due to the good attitude that the center axis passed straight. Since the center is clear, it is unconsciously possible to adjust and integrate the motion of each part [13]. The second is deeply decreased muscle tension. Due to the straight center axis, subject is constantly without strain [14]. From the decreased body tension, he can increase the sensitivity of the body inside, muscle spindle and tendon spindle, and so on. Therefore, the sense of position of the center of gravity felt from the ground can be clarified with improved accuracy of the operation.

The third is a flexible trunk with prompt bending of the knee joint. By instantaneously decreasing the knee's force, he can at once drop the position of your lower back [15].

As described above, the first-class athlete can tilt deeply with a flexible trunk. Then, he can move the center of gravity smoothly and dynamically. At the same time, bending the knee instantaneously produces gravitational energy. Consequently, enormous reaction power from the ground can be changed into the acute speed up and direction change.

The authors have instructed mainly Masters Athletes for long, aiming at moving the center of gravity using gravity smoothly [16,17]. The important points on guidance are

1. Formation and maintenance of center body axis.
2. Flat and smooth grounding on feet.

3. Prompt relaxing of knee with grounding.

Among them, the basal point is the formation and maintenance of the center axis. When subject stretch his abdomen with both hands on the front, he can raise the consciousness of the center axis [18]. In order to hold the posture, maintenance of Intra-Abdominal Pressure (IAP) is required [19]. For that reason, we have instructed to memorize the status that keeps IAP with conscious of expiration.

## References

1. Frank C, Kobesova A, Kolar P. Dynamic neuromuscular stabilization & sports rehabilitation. *Int J Sports Phys Ther.* 2013;8(1):62-73.
2. Sakamoto A, Sinclair PJ, Naito H. Strategies for maximizing power and strength gains in isoinertial resistance training: Implications for competitive athletes. *J Phys Fitness Sports Med.* 2016;5(2):153-66.
3. Murakami M. How to run for masters athletes without injury-Natural run with usage of gravity and reflex. *Kagawa exercise Bulletin.* 2017;3:45-48.
4. Bando H, Nakamura T, Yonie Y, Takenaka Y, Seki K. Lipid profile of masters athletes in ice-skating, a model of anti-aging research. *Glycat Stress Res.* 2015;2(2):52-7.
5. Moriyasu A, Bando H, Murakami M, Inoue T, Taichi A, Wakimoto K, et al. Pole exercise causes body changes in physical flexibility and exercise function. *J Nov Physiother.* 2018;8(1):377.
6. Schoenfeld BJ, Grgic J, Ogborn D, Krieger JW. Strength and hypertrophy adaptations between low- vs. high-load resistance training: A systematic review and meta-analysis. *J Strength Cond Res.* 2017;31(12):3508-23.
7. Murakami M, Bando H. Smooth running without power on sole hallucal area. *Res Inves Sports Med.* 2018;3(5).
8. Moriyasu A, Bando H, Akayama R, Wakimoto K, Dakeshita T, Inoue T, et al. Thorax flexibility can be increased by standing pole exercise. *Int J Phys Med Rehabil.* 2018;6(1):450.
9. Danis CR, Krebs DE, Gill-Body KM, Sahrman S. Relationship between standing posture and stability. *Physical Ther.* 1998;78(5):502-17.
10. Shu Y, Mei Q, Fernandez J, Li Z, Feng N, Gu Y. Foot Morphological difference between habitually shod and unshod runners. *PLoS One.* 2015;10(7):e0131385.
11. Takano S. Creation of running. *Biomechanism.* 2010;20:1-8.
12. Yamada N. What is the motion difference in top athletes? - Secrets of top players from sports science. Tokyo: Kagaku-Dojin Publishing; 2011.
13. Gantar S. Differences in postural activity during quiet standing when breathing abdominally [dissertation]. Prague: Charles university in prague. 2016.
14. Izzo R, Guarnieri G, Guglielmi G, Muto M. Biomechanics of the spine. Part I: Spinal stability. *Euro J Radiol.* 2012;82(1):127-38.

15. Bruno P. The use of “stabilization exercises” to affect neuromuscular control in the lumbopelvic region: a narrative review. *J Can Chiropr Assoc.* 2014;58(2):119-30.
16. Bando H, Takenaka Y, Nakamura T, Kounoike K, Yonei Y. Investigation for Quality of Life (QOL) and self-esteem for health in masters' athletes. *Glycat Stress Res.* 2015;2(4):174-81.
17. Murakami M. Physical motion and care in integrative medicine. *J Integr Med Jap Shikoku Div.* 2016;9:3-5.
18. Hodges PW, Eriksson AEM, Shirley D, Gandevia SC. Intra-abdominal pressure increases stiffness of the lumbar spine. *J Biomech.* 2005;38(9):1873-80.
19. Yamada T. *The stanford method for ultimate super recovery.* Tokyo: Sunmark Publishing, Japan; 2018.