

Editorial

Development of Health and Medical Research for Long Similar to Successful Marathon Running

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Editorial

Congratulations for the inaugural issue of Journal of Health and Medical Research. The role of medical journals has been important in the world, and it is necessary to widely cover health and medical research fields. A variety of research for human should be multifaceted, including bio-psycho-social, economic, ecological, political and other aspects. This article describes the topics of sports and marathon runners with world record, and the tips of successful running for long without injury.

Tokyo Olympics Paralympic Games are approaching one year [1]. The authors have been involved in advising Paralympic candidates and Masters Athletes, and in health medicine lectures and workshops. Among them, we have proposed effective running methods such as forward leaning and flat grounding without injury [2]. The purpose of this paper is to pursue better running from analysis of excellent runners [3].

Eliud Kipchoge (1984-) is a Kenyan long-distance runner, who has been well-known across the world. He won a bronze medal at 5000 meters in 2004 Athens and silver medal in 2008 Beijing Olympics. Further, he won a gold medal in marathon in 2016 Rio de Janeiro Olympics. After that, he established marathon world record with the time of 2:01:39 in 2018 Berlin Marathon, which was breaking news [4]. Then he was been called as "The greatest marathoner of the modern era".

A series of photographs of his running are shown in **Figure 1**. There are seven consecutive images shots, and their features and advantages are described. Generally speaking, there is the most characteristic beneficial point of his running. He can convert the center of the gravity dropping into the forward thrust power. The important points will be described in the following 5 points of view.

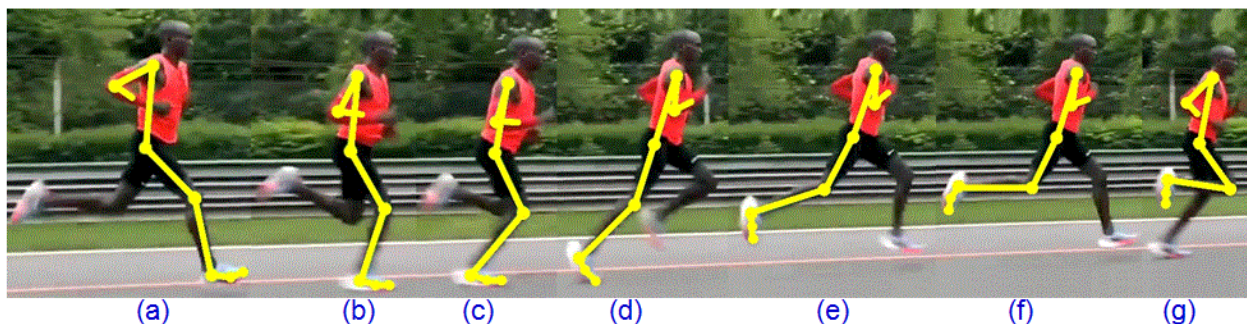


Figure 1: Consecutive images of running in the long distance by Eliud Kipchoge.

Firstly, Kipchoge can generally maintain an excellent forward leaning posture in the 7 phases of the movements (**Figures 1a and 1g**) [5]. His arm swings and leg movements are satisfactory. One of the reasons would be that good

movements are created from the stable trunk situation [6]. Concerning the anteversion posture, the body is leaned forward without muscle tension. Especially in **Figure 1d**, the body axis seems to generally straight leaning forward and down direction. From a physical point of view, a person can use the position potential energy in maximum extent. The body seems to be rather relaxed with natural posture. Consequently, he seems to obtain the power to move forward from the anteversion posture with less muscle power.

Secondly, there are several advantages to maintain forward-leaning in a relaxed position as follows:

- 1) The position of the head is on the straight extension of the spine (**Figures 1b, 1c and 1d**)
- 2) There is unremarkable tension in the waist and the abdomen, but this block seems to be naturally almost fixed as one unit
- 3) When the sole touches the ground, it can land in flat manner and soft landing on the ground (**Figure 1b**) [7].
- 4) As a result, it is not to put excessive force on the toes, but to run with no pressure [8].

Thus, all these from 1) to 4) can be performed perfectly.

Thirdly, there is an unrecommended method of running from the short distance to the long distance for years. It is a way of landing from your heel or toe at the position rather forward of the body. In this case, it causes some braking for the run in each landing. On the other hand, Kipchoge runs in the ideal manner. The landing position is almost directly under the body, and the landing place is not the toes, not the heels, but the entire sole (**Figure 1b**) [9]. Therefore, the brake for the run can be minimized. When the foot lands on the ground, the knee bends slightly at once, and the center of the gravity is dropped forward using the gravity (**Figure 1c**) [10]. This mechanism can utilize the extensional reflexes of hamstrings involved in knee flexion associated with the propulsive force without braking. The evidence that the center of gravity is falling can be observed from the movement and position of the head (**Figures 1b, 1c and 1d**).

As fourth aspect, the arm swing is found in the compact manner at the position nearby the trunk. Furthermore, the arm swing seems to be relaxed and swayed in conjunction with the movement of the body. In other words, the arm does not seem to be intentionally made swinging. On the contrary, the arm seems to be brought swinging along the movement of the trunk [11].

As fifth aspect, Kipchoge's right foot kicked the ground (**Figures 1e, 1f and 1g**), and then its position was recovered to the basal position. It has been called as the "turnover". During the phase of turnover, almost no extension of the ankle joint was observed (**Figures 1e, 1f and 1g**). Furthermore, due to the flexion of the left knee joint (**Figures 1f and 1g**), the right foot and the right knee are smoothly moved forward in a short period. This process has been significant because there are no waste movements from the clinical point of view [12].

Due to these 5 processes, Kipchoge has successfully converted the gravity into propulsion power. This is physically

changing the direction of the force vector. Here, the crucial point is how to use the knee. This movement can be commonly found in the operation when going down the stairs. Before going down the stairs, the center of gravity is placed on either the left or right axle foot. If the center of gravity of the body is in the center, one leg cannot float. When the center of gravity is firmly placed on the axle foot, then it is possible to carry the free foot to the lower step of the stairs.

In this way, it is important to move the center of gravity forward and downward, and to place one foot on the lower step moving the weight. This is exactly the same as two-axis operation that moves the center of gravity to right and left in each step by flat grounding [9]. The grounded leg receives the center of gravity of the body. The knee is bent in response to the impact, with further lowering the center of gravity (**Figure 2**).



Figure 2: The image of step down the stairway with flat grounding and bending knee.

By receiving the fall of this center of gravity with hamstrings, the response of stretching reflection occurs. It is like going down the stairs while bumping. In succession to this movement, the flexed knee joint smoothly passes the axis foot leading to the next step [13,14]. The above-mentioned movements can be observed in the series of Kipchoge's running. Therefore, if one can sense the feeling of going down the stairs and apply it on a flat ground, one will be able to get closer movement to the Kipchoge's running.

In summary, the analyses of the running of the greatest marathoner and the characteristics of down stairs were described in this article. They show the importance of center of gravity movement and relax of the knee. As the gravity on the earth can be effectively utilized, various knowledge and information of this journal will be useful for future development of health and medical research in the world.

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