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ABSTRACTS



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On the road of world class performance in the pole vault: changes according to ages and genders

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Introduction

Pole vault performances require large panel of capabilities from athletes such as speed, force, technical drills and mental skills to become elite athletes (Frère et al. 2010). Given that the mix of skills required to achieve a high level of performance, athlete evolution can be difficult to interpret globally. Recently, several studies described typical performance reached by athletes from both gender over a large panel of age (Ganse et al. 2018). This approach more focus on performances decline with age than performances increase and do not provide information to manage athlete’s evolution. The first aim of this study was to generate performance corridor for French pole vaulters from both genders, grouped by level and proceed similarly for best world class athletes. Secondly, the study aimed to compare corridors from same gender.

Methodology

Results database from French federation were used as main database to sort all performances realized by athletes in competition over 30 years period ending in December 2019 31st. Performances realized by athletes from U16 were collected to generate personal performance history keeping best performance of each season. For national athletes, female results were sort to generate 3 corridors based on their all-time personal best (PB), from 4.2 to 4.4 m (F4.2), from 4.4 to 4.6 m (F4.4), and over 4.6 m (F4.6). World class corridor was generated using results from female over 4.8 m (FWC). For national male, corridors were created using the same methodology with range from 5.4 to 5.6 m (M5.4), 5.6 to 5.8 m (M5.6) and 5.8 to 6 m (M5.8) and over 6m for world class athletes (MWC).

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For each age categories, corridors were stated different from each other when differences between them were bigger than 20 cm as stated to generate group.

Results

Sorting of database permitted to identified 142 athletes distributed as follow: F4.2: 31, F4.4: 8, F4.6: 4, FWC:15, M5.4: 31, M5.6: 19, M5.8: 10 and MWC: 24. Regarding female, FWC and F4.6 groups get similar trajectory from U16 to U22 where FWC follow their career largely over other groups. W4.2 and W4.4 corridor are different from other groups from U16 and become closer for U21 to U23 where the difference is not significant. For all senior categories' performances became lower than FWC and F4.6. Regarding male, 4 corridors start very close at U16. M5.4 and M5.6 corridors became different than MWC after U19 and U21 respectively. M5.8 group are never different than MWC based on our criteria. We can note that MWC corridor is over M5.8 by 10 cm from Senior 4 to the end of the career.

Conclusion

According to previous studies, performance's corridor for both genders look as an inverted-U shape (Berthelot et al. 2019). Our study pointed out that this shape is different proportionally to PB with longer plateau at the top for best athletes. We also provided categories where corridors fork with world class athletes.

References

- Berthelot G, Johnson S, Noirez P, Antero J, Marck A, Desgorces FD, Pifferi F, et al. 2019. " The age-performance relationship in the general population and strategies to delay age related decline in performance ". *Archives of Public Health* 77 (1): 51
- Frère, J, L'hermette M, Slawinski J, Tourny-Chollet C. 2010. " Mechanics of Pole Vaulting: A Review ". *Sports Biomechanics / International Society of Biomechanics in Sports* 9 (2): 123-38
- Ganse, B, Ganse U, Dahl J, Degens H. 2018. " Linear Decrease in Athletic Performance During the Human Life Span ". *Frontiers in Physiology* 9

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