

Use of Dual-Task Balance Training among Athletes for Better Performance

Gaurav Bhatnagar¹, Risha Kamble², Sandesh Londhe³,
Vishvnath S. Pawadshetty⁴, Madhura Deshpande⁵

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¹Professor, Department of Musculoskeletal Physiotherapy, Maharashtra Institute of Physiotherapy, Latur, India

²Associate professor, Department of Musculoskeletal Physiotherapy, Maharashtra Institute of Physiotherapy, Latur, India

³Associate Professor & PhD Scholar, Department of Cardio-Respiratory Physiotherapy, Maharashtra Institute of Physiotherapy, Latur, Maharashtra, India

⁴Professor & HOD, Department of Cardiovascular & Respiratory Physiotherapy, Maharashtra Institute of Physiotherapy, Latur, India

⁵Assistant Professor, Department of Musculoskeletal Physiotherapy, Maharashtra Institute of Physiotherapy, Latur, India

Email: 1bhatnagaurav8@gmail.com, 2rishakamble9@gmail.com,

3drsandeshlondhe@gmail.com, 4physiovish@gmail.com, 5madhura2697@gmail.com

Abstract

Dual tasking refers to the process of performing more than two tasks at the same time. Dual task training among athletes provides an opportunity to develop the ability to do more than one thing simultaneously. The risk of failure can also be avoided by following this process. However, dual-task assessments can be frequently completed for determining cognitive performance in relation to musculoskeletal injury and concussion risks. Many athletes went through dual task balance training to enhance their performance. Thus, embracing the performance of an individual is possible through adopting the strategy of dual task balance training sessions. For completing this study, secondary qualitative data has been collected by the researcher. Data that are already available in online books, articles and journals are accessed by the researcher in order to complete this study effectively. Ethical norms are followed properly while including data and completing this study. Moreover, the findings of this study represent that DT (Dual Task) develops the coordination between 2 or multiple tasks. Hence, performance in various settings can be improved through taking proper training sessions. Individual tasks can be improved by attending this training session. DT helps in developing the functional capacity as well as cognition capability of an individual. The findings of this study concluded that dual task balancing training is crucial for improving the performance of an athlete. Hence, training sessions are important to be taken by young athletes in order to manage more than one task at a time.

Keywords: Dual Task Training, Performance, Athletes, Injury, Skills

1. Introduction

Dual-task (DT) training is beneficial for developing the ability of an individual to do more than two things in a simultaneous manner to avoid the risk of falling. DT assessments are used for determining the deficits within cognitive performance in relation to musculoskeletal injury or concussion risk. Thus, DT paradigms are associated with two behaviours that are performed concurrently. However, a motor task is paired with a cognitive task. Dual-task assessments are essential for developing basic human abilities. In addition to this, DT training among athletes helps in providing an opportunity to perform more than one task in a simultaneous manner. DT refers to the concurrent performance of two tasks which can be measured and performed in a separate manner and also these tasks have separate goals. Thus, the performance of individual tasks depends on the ability to manage the involvement of the person in two tasks. Especially, in sports, situations like ball dribbling, and changing directions while observing others' movement.

DT assessments are important in determining the deficits within the cognitive performance of an individual. Thus, the dual-task paradigm is associated with a motor and a cognitive task. In the opinion of Moreira *et al.*

(2021), DT assessments are supported through a capability model of attention that helps in managing all the cognitive demands of an individual. In addition to this, cognitive motor tasks are essential to complete any kind of sports activity. Hence, DT training is essential for simultaneously making decisions, and processing stimuli as well as executive movements accurately. For example, a basketball point guard needs to handle the basketball along with analysing the next movement of the defender. A scoring strategy is also identified by the basketball player at that time. Cognitive motor DT for a critical type of sports scenario includes critical steps. Existing DT robustly determines the impact of the cognitive load on the performance of the motor task under different kinds of critical conditions. However, the motor outcomes might be sensitive in determining the risks of having an injury. In addition to this, the impact of multiple motor tasks on individual cognitive performance is still under-appreciated despite the unique interactions which might be helpful in the characterisation of complex scenarios. As per the ideas of Ketcham *et al.* (2019), DT training develops the capability to perform the secondary task at the time of performing the primary task. Hence, improved coordination between multiple tasks can be observed effectively.

Dual task assessments are essential for identifying the risks associated with musculoskeletal injury. Additionally, Abdallat *et al.* (2020) mentioned that DT performance needs an individual for performing 2 different tasks at the same time. Researchers conducted an effective study in determining the effects of standard motor training. Hence, sports-specific performance can be evaluated through dribbling tests and providing proper training. Thus, cognitive performance was checked by measuring accuracy and speed within a discrimination response activity. As mentioned by Schaefer & Scornaienchi (2020), the brain activity of an individual is associated with selective attention, sensory processing as well as a decision-making process.

Improvement of the performance level of any athlete during competition and training is the main aim of a comparative sports environment. Training education can be achieved by following proper strategies in the sports industry (Büttner *et al.* 2020). The physiological parameters, as well as behaviour measures for particular sports, are important to be determined by the training manager in order to improve the performance of the specific athletes. Is an essential factor which is highly important for changing the training process of an athlete. Multiple studies that are conducted for analysing the brain functions of athletes indicate that the Moto-related functionalities, as well as high cognitive processes, are an essential part of brain processing. Methods can be applied to determining the motor training protocols that are important for understanding the sports activities of an individual (ŞİMŞEK, BIDİL & ÖZBÖKE, 2023). Decision making, bottom up attention and perception of an individual can be determined effectively for understanding the brain's reactive processes of an athlete. Basketball is known as the game where intensive body contact is needed along with demanding one-on-one situations, frequent jumping and running as well as quick direction changes. In basketball the players need to complete different kinds of strategies for throwing, catching, passing as well as giving the ball (Oneghet *al.* 2020). It can be stated that multiple activities can be completed by a basketball player by taking proper dual task balance training. According to some recent studies it has been found that the open skills of any athlete can be improved by providing a proper training session. In this regard, the neurophysiological methods with high temporal resolution may be more essential for investigating the time course of specific motor sensory nerves and cognitive functions.

2. Aim and objectives

The aim of this research is associated with analysing the impact of dual task balance training among athletes for improving performance. Hence, the objectives are as follows;

- To analyse the importance of dual task balance training among athletes
- To determine the challenges that can affect the performance of athletes
- To suggest effective strategies for improving the training session for athletes

3. Methods and Procedure

In this study, a secondary method of data collection procedure is followed by the researcher for gathering effective information regarding the concerned research topic. Journals and articles that are published in the last 5 years and which are easily accessible are included in this research paper. In order to analyse the core context of dual-task performance and its importance for athletes' performance the researcher has applied a proper data collection process. Along with that, all the ethical norms of protecting the data were followed by the researcher in order to provide a high-quality research paper full of information regarding elders' performance and its importance for athletes. Thematic analysis is followed in this research for discussing all the important elements of the dual task training process.

4. Results

Importance of dual task balance training among athletes

Dual task balance training is highly important for improving individual capabilities which may result in the effective performance of specific athletes. According to a few research reports it can be stated that more efficient and quicker working patterns can be observed as a result of dual task training sessions. In addition to this complex tasks in any kind of sports can be handled in an effective way by having DT training sessions. Dhol task training increases the demand for cognitive resources like working memory and attention. Hence the brain activates a lot of resources for satisfying the increased demands of multiple tasks. Hence extra energy is required for completing more than one task at the same time. In this regard, cognitive flexibility is required for completing more than one task at a time. Multitasking is an important part of driving simulation for completing any kind of activity of an athlete. According to the reviews of Lucia, Aydin & Di Russo (2023) dual task training sessions can help to promote psychological flexibility which is essential for getting high level productivity and efficiency of an individual. Hence a proper and supportive modern learning environment is important to be provided to all the athletes in order to handle more than one task at a time in an accurate manner. Dual tasks can also add a special value to any project. Hence according to the details of the neuroscience research reports it is essential to analyse the neurological attention base for handling multitasking situations. The productivity rate of any person can be easily influenced by providing them with proper training sessions to handle more than one task at a time.

Challenges of Athletes in Training

The sports industry of the worldwide region is facing critical issues related to adverse publicity and sports doping. Apart from that risk management practices followed by the sports industry are also improper which is causing a lot of injuries as well as the death of multiple excellent. However, the main challenge that is faced by a lot of people in the sports industry is increased mental health issues such as nervousness, lack of concentration and anxiety and lack of mental preparation (Howell, Brilliant, & Meehan, 2019). However, athletes are also facing issues due to a lack of volunteers. Improper training sessions that are arranged in multiple regions of the world are negatively affecting the performance of athletes in different sports. The demand for good performance in sports activities is increasing the stress level differently. According to the findings of multiple studies, it has been analysed that the psychosocial health and physical health of multiple athletes are not taken care of. The challenges and stress associated with high performance are causing several challenges for athletes in training sessions. The balance in expectation of athletes in the training session is not fully filled properly which is causing a lot of mental health issues that are affecting people from different sports industries. Sometimes the coaching process is very complex to handle which is the major barrier to athletes well being. However, understanding the need for the training session an athlete is an essential part of achieving growth and success. Providing proper training sessions for handling different kinds of tasks is an essential part of improving the characteristics of an individual.

Apart from that, the intense environments in the training session and enhanced media exposure are the two most impactful challenges facing athletes in modern days. The neurological pattern of the brain is also essential to be

known by the coaches in order to provide accurate training sessions to all athletes. Sometimes lack of knowledge of the coach can cause several risks of injuries among at least, which is a major concern of all the internal take holders associated with the sports industries of this world (Hamid & Shah, 2020). However, the training sessions of multiple sports events are not managed effectively and there is less communication between the coaches and the athletes which is causing several issues in the training session. However, a comparative environment should be managed by identifying the unique names of individual athletes participating in the specific event. In this regard, a lack of knowledge about the psychological condition of the absolute can cause several issues within the training session.

It has been found that proper training sessions and participating in different kinds of sports can even improve the psychological and physical health of an individual. Along with that motor skills can be improved effectively by taking part in different sports events. Presently lack of knowledge about the neurological behaviour of the human brain can cause several issues in the training session (Jaiswal, Rishi & Sen, 2022). A high-performance setting is important to be created for providing accurate training to all the athletes participating in the event. About from that the training sessions should be arranged accurately that can help to boost the capabilities of an individual. In this regard, dual-task training is an essential role in improving the performance of an individual athlete.

Strategies

After evaluating the performance of an individual athlete, the training preparation is important to be taken by the coach in order to improve the performance of the specific athlete. Past experience of the particular person is important to be recorded in order to change the practice sessions (Khan *et al.* 2022). Apart from that the frequency as well as duration of every exercise is important to be adapted in an accurate way and thereby a proper plan is essential to be created. In order to improve the specific training program of an athlete the first step is to train specific training goals.

Training specificity is an essential part of success in any kind of sports competition or taste. In more specific terms it can be analysed that various challenges within the competition can be understood effectively through creating some training goals. In the opinion of Perry (2021), the training specificity can be represented through the capability of understanding competition volume, competition speed as well as intensity. Along with that the particular unit characteristics and stressors within an environment are also important to be trained to the specific athletes in order to provide them proper knowledge regarding the complications that may impact on their performance. However, training specificity refers to the method of ultimate success before an individual succeeds. Multiple researchers also found that training specificity helps to design the training program in an effective way which is beneficial to analyse the environment of the competition. During the competition, any kind of new changes within the training session should be avoided by the athlete. Hence nutrition intake, as well as a training strategy, should be followed in an appropriate wheel for designing the training sessions appropriately. Training at competition volume and pace is a vital process of improving the performance of the athlete and also avoiding potential injuries. Along with that, the training environment should be an impossible endeavour and challenging for the athlete that can help to improve the chance of success within the competition.

Along with that compartmentalisation of training sessions are also important to be taken for improving the potential ability of an athlete. In this regard, the coach of the training session must provide proper guidance to the athlete for handling different kinds of complex situations together. Hell's dual task based training can help to improve the potential ability of the athlete. Compartmentalisation also allows all athletes to understand multiple areas of weaknesses and strengths (Tallis *et al.* 2020). Various sessions implemented in a day can help to improve the training session, reducing the risk of injuries in a large training volume. Hence frequent rest, as well as recovery periods, can also be found by following the strategy of improving the training sessions for all athletes. In this regard short as well as varied sessions can improve efficiency and also reduce the incidence of injury which is positively impactful on the performance of the athlete (Gallou-Guyot *et al.* 2020). Dual task training can also improve the physical components of an individual like cognitive component strike length

velocity and stop functioning. Hence all of these cognitive factors for improving overall performance are essential to be understood effectively by all athletes in order to achieve all the goals.

There are multiple assessments that can be arranged for improving the training experience of an athlete. The nutrition dietary assessment, body composition assessment, and weekly speed record of doing multiple strategies are essential to be observed in an accurate way for improving the training session for all athletes (Howell *et al.* 2019). Each of these areas is considered an integral part of fostering the growth of an individual athlete. From that, the confidence level of the athlete can be improved by providing them with proper training sessions. Understanding that nutrition and exercise are inseparable processes of the training session is also an important part of improving the training measures followed by any courts. Hands providing a proper combination of nutrition and exercise can help to enhance the performance of an athlete. However, nutrition planning customisation and periodization strategies are essential to be taken accurately in order to improve the overall performance of the athlete (Kang *et al.* 2022). All the professional courses of an athlete can be achieved by improving these training recommendations and following proper strategies for enhancing their skills and abilities.

5. Discussion

In order to complete daily functions a human body requires the capability for performing two or more two tasks at the same time. Therefore medical management plans and training programs can help to complete dual tasks which are essential for improving the capabilities of an individual. However, dual task training develops coordination between multiple tasks Richard is essential for improving the overall performance of an excellent. Multiple kinds of diverse environments can be controlled by improving the capability of an athlete. Providing training to handle more than two tasks at the same time is important for improving the performance of an athlete (Schnittjeret *et al.* 2021). Physiologically dual-task training helps to process the motor functions of an individual person. Activities of regular life need balance maintenance during the concurrent performance of more than one task. Older people fail to perform and a high risk of falls can be expected. The dual-task methodology refers to the primary approach which is important for analysing the interactions between motor performance and cognitive processing of individuals. Dual-task training is also given to stroke patients that help them to function properly in the virtual environment. Multiple studies examined the capability of elderly people while performing motor functions as well as other tasks that require cognitive attention.

There is a high need of providing balance training to all athletes in order to handle dual task conditions. The brain functions of athletes can be improved by providing accurate training to them for handling more than two tasks at the same time. Proper balance exercises can be arranged by the coaches of different athletic departments which can help in managing two tasks effectively (Park, 2022). Postural control is important to be maintained while performing more than two activities simultaneously. The dual-task method can be considered a primary approach that is important for investigating the interactions between motor performance and cognitive performance. Introducing task training and cognitive load training are important for performing locomotions for all athletes in order to identify the importance of balance training for improving the performance of all athletes.

Furthermore, it has been identified that the leg muscle strength and balance control of athletes can be improved by providing them with proper training sessions (Domingos *et al.* 2022). The walking ability can be improved by enhancing the training sessions and all the initiative sticks and by the coach can improve the chances of winning any game. Dual task training can help a person to complete more than one task in an effective manner which also enhances the capability of that person to handle and manage multiple tasks at the same time (McGrath *et al.* 2020). According to various studies it has been found that elderly people can improve their balance while doing dual tasks and therefore it is important to provide them with proper balance training sessions in order to improve their physical health. Traditional physical therapy can be followed for understanding the interventions in an effective manner. However, providing accurate training sessions and emphasising the balance of handling two or three tasks at the same time can help to increase the chances of getting success in any sports event.

6. Conclusion

According to the findings of this research, it has been understood that dual task balance training is an essential part of athletes' lives. The performance of any athlete in any game can be improved by providing them with proper training sessions. According to neuroscience, it is also clear that dual touch training can enhance the skills and abilities of an individual which results in higher productivity. In this regard, better time management and resolving complex functions are the main benefits of providing dual task training to all athletes. Increased responsibilities among athletes can also be found by providing them with proper training sessions. Hence the athletes participating in multitasking events can also get the position of leader in any group. Individual characteristics as a performer can be improved by providing them with proper training sessions for handling more than one task. However, it is crucial to analyse the importance of dual task balance training sessions for improving the potential of an individual. As per the findings of the study, it can be concluded that dual task training can help to develop the skills and abilities of a person to complete more than one thing simultaneously. Multiple athletes went through these training sessions for enhancing their performance and embracing the performance of any athlete is possible by adopting proper strategies to provide dual task based training sessions. The secondary data collected in the study provided enough important information regarding the necessity of dual task balance training for developing the functionalities of any athlete. Hence the capability of an individual can be improved by providing them with proper training sessions in order to handle differences in an accurate manner. The professional goals of athletes can be achieved by taking proper balance training programs in order to improve their skills and abilities which can impact their professional goals.

References

1. Abdallat, R., Sharouf, F., Button, K., & Al-Amri, M. (2020). Dual-task effects on performance of gait and balance in people with knee pain: A systematic scoping review. *Journal of Clinical Medicine*, 9(5), 1554.
2. Büttner, F., Howell, D. R., Ardern, C. L., Doherty, C., Blake, C., Ryan, J., ... & Delahunty, E. (2020). Concussed athletes walk slower than non-concussed athletes during cognitive-motor dual-task assessments but not during single-task assessments 2 months after sports concussion: a systematic review and meta-analysis using individual participant data. *British journal of sports medicine*, 54(2), 94-101.
3. Domingos, J., Dean, J., Fernandes, J. B., & Godinho, C. (2022). Professionals' Self-Reported Difficulties towards Integrating Dual Task Training in Care for People with Parkinson's Disease. *International Journal of Environmental Research and Public Health*, 19(3), 1281.
4. Gallou-Guyot, M., Mandigout, S., Prado, P. S. A., Marie, R., Daviet, J. C., & Perrochon, A. (2022). Exergame and cognitive-motor dual-task training in the healthy elderly (INCOME): a study protocol: INCOME study protocol. *European Rehabilitation Journal*, 2(1), 1-10.
5. Hamid, R. H., & Shah, P. (2020). EFFECT OF DUAL TASK EXERCISES ON REACTION TIME IN SCHOOL BASKETBALL PLAYERS. *Int J Physiother Res*, 8(6), 3688-92.
6. Howell, D. R., Brilliant, A. N., & Meehan III, W. P. (2019). Tandem gait test-retest reliability among healthy child and adolescent athletes. *Journal of athletic training*, 54(12), 1254-1259.
7. Howell, D. R., Buckley, T. A., Berkstresser, B., Wang, F., & Meehan, W. P. (2019). Identification of postconcussion dual-task gait abnormalities using normative reference values. *Journal of applied biomechanics*, 35(4), 290-296.
8. Jaiswal, S., Rishi, P., & Sen, S. (2022). Efficacy of Dual Task Training on Ankle Stability in Chronic Ankle Sprain.
9. Kang, H. Y., Lee, D. Y., Hong, J. H., Kim, J. S., Kim, S. G., Seo, Y. G., & Yu, J. H. (2022, October). Effects of Augmented Reality-Based Dual-Task Program on Physical Ability by Cognitive Stage with Developmental Disabilities. In *Healthcare* (Vol. 10, No. 10, p. 2067). MDPI.
10. Ketcham, C. J., Cochrane, G., Brown, L., Vallabhajosula, S., Patel, K., & Hall, E. E. (2019). Neurocognitive performance, concussion history, and balance performance during a distraction dual-task in collegiate student-athletes. *Athletic Training & Sports Health Care*, 11(2), 90-96.
11. Khan, M. J., Kannan, P., Wong, T. W. L., Fong, K. N., & Winser, S. J. (2022). A systematic review exploring the theories underlying the improvement of balance and reduction in falls following dual-task

- training among older adults. *International journal of environmental research and public health*, 19(24), 16890.
12. Lucia, S., Aydin, M., & Di Russo, F. (2023). Sex Differences in Cognitive-Motor Dual-Task Training Effects and in Brain Processing of Semi-Elite Basketball Players. *Brain Sciences*, 13(3), 443.
 13. McGrath, M. K., Linder, S. M., Koop, M. M., Zimmerman, N., Ballantyne, M. A. J., Ahrendt, D. M., & Alberts, J. L. (2020). Military-Specific normative data for cognitive and motor single-and dual-task assessments for use in mild traumatic brain injury assessment. *Military Medicine*, 185(Supplement_1), 176-183.
 14. Moreira, P. E. D., Dieguez, G. T. D. O., Brecht, S. D. G. T., & Praça, G. M. (2021). The acute and chronic effects of dual-task on the motor and cognitive performances in athletes: A systematic review. *International Journal of Environmental Research and Public Health*, 18(4), 1732.
 15. Onegh, A., Akbari, A., Ghiasi, F., Hosseinifar, M., & Asgari, A. (2020). The Effect of Dual-Task Training on Dynamic Postural Control in the Subjects with Functional Ankle Instability. *Journal of Biochemical Technology*, 11(3), 115-122.
 16. Park, J. H. (2022). Is dual-task training clinically beneficial to improve balance and executive function in community-dwelling older adults with a history of falls?. *International journal of environmental research and public health*, 19(16), 10198.
 17. Perry, C. A. (2021). Effects of a dual-task paradigm on tandem gait performance.
 18. Schaefer, S., & Scornaienchi, D. (2020). Table tennis experts outperform novices in a demanding cognitive-motor dual-task situation. *Journal of motor behavior*, 52(2), 204-213.
 19. Schnittjer, A., Simon, J. E., Yom, J., & Grooms, D. R. (2021). The effects of a cognitive dual task on jump-landing movement quality. *International Journal of Sports Medicine*, 42(01), 90-95.
 20. ŞİMŞEK, D., BIDİL, S., & ÖZBÖKE, C. (2023). Cognitive-Motor Dual-Task Ability of Elite Badminton Athletes. *Spor Bilimleri Dergisi*, 34(1), 32-41.
 21. Tallis, J., Bradford, C., Duncan, M. J., Ledington-Wright, S., Higgins, M. F., & Hill, M. (2020). The effect of acute caffeine ingestion on cognitive dual task performance during assessment of static and dynamic balance in older adults. *Nutrients*, 12(12), 3653.