Review Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2024.58.009102

Predictors of Cognitive Performance 72 Hours Following a Sports-Related Concussion

María Julieta Russo[1-3]*, Agostina Kañevsky[1,3], Fernando Salvat[1], María Belén Helou[3], Luciana Lamaletto[3], Aldana Marinangeli[3], Ricardo Francisco Allegri[1-3] and Gustavo Emilio Sevlever[2,4]

[1]*Clínica de Conmoción Cerebral, Departamento de Neurología, Argentina*

[2]*Instituto de Neurociencias Fleni-CONICET, Argentina*

[3]*Centro de Memoria y Envejecimiento, Departamento de Neurología, Argentina*

[4]*Departamento de Neuropatología y de Biología Molecular, Argentina*

***Corresponding author:** María Julieta Russo, Cognitive Rehabilitation, Language and Music Therapy Section, Department of Neurology, Fleni, Buenos Aires, Argentina

ARTICLE INFO

Received: August 01, 2024

Published: August 08, 2024

Citation: María Julieta Russo, Agostina Kañevsky, Fernando Salvat, María Belén Helou, Luciana Lamaletto, Aldana Marinangeli, Ricardo Francisco Allegri and Gustavo Emilio Sevlever. Predictors of Cognitive Performance 72 Hours Following a Sports-Related Concussion. Biomed J Sci & Tech Res 58(1)-2024. BJSTR. MS.ID.009102.

ABSTRACT

Keywords: Cognition; Concussion; Post-traumatic amnesia; Rugby; Symptoms

Abbreviations: PCSS: Post- Concussion Symptom Scale; SRC: Sport-Related-Concussion; TBI: Traumatic Brain Injury

Introduction

Current Sport-Related-Concussion (SRC) approaches usually emphasize the total number of symptoms and severity related to neurotrauma, being a key component of the comprehensive evaluation of concussion. Recently, researchers have proposed multidisciplinary conceptual models of assessment and clinical care that emphasize concussion subtypes based on clinical profiles (Kontos, et al. [1]). From a clinical perspective, neuropsychological assessment is now recognized by many international sporting organizations as a mainstay of the diagnosis and management process following a concussion. Evidence now shows that concussed athletes demonstrate subtle cognitive deficits that may persist beyond self-reported symptom resolution (Fischer, et al. [2,3]). In addition, neuropsychological tests provide objective measures compared to self-reported questionnaires, which is essential to making good diagnostic and therapeutic management decisions (Echemendia, et al. [4,5]). The rationale for knowing the cognitive abilities after a mild traumatic brain injury (TBI) in the field of sports is broad. First, cognitive dysfunction is one of the most frequent consequences in patients suffering from TBI. The most common neurocognitive consequences at all levels of severity of TBI are attention, executive functioning, and memory deficits. Second, disruption of basic cognitive functions might cause or increase secondary disturbances in decision-making function, communication, sleep, mood, behavior, and even in motorsports performance.

Third, a neuropsychological evaluation, in addition to determining the presence and severity of cognitive dysfunction, provides information about the player's attitude and behavior regarding having suffered a concussion. Lastly, systematic neurocognitive and neuropsychiatric assessment of the players is a precondition for any treatment of impaired cognition in sports concussions. Therefore, knowledge related to cognition functioning adds to the know-how of the total recovery curve following SRC. The present brief report was aimed at integrating several individual variables known early during sports concussions to determine if they independently predict cognitive functioning in a group of adult rugby players with a concussion during the first 72 h. We hypothesized that more severe or longer-lasting concussion symptoms would be associated with poorer cognitive performance during the first 72 h after a sports concussion. Finally, we wonder whether these associations would be modified by the number of prior concussions or the years playing rugby. The answer to this question would allow us to hypothesize for a future longitudinal study if the lower cognitive performance would be an immediate consequence of the brain injury or a possible cumulative effect of repeated blows to the head.

Materials and Methods

Participants

92 male rugby players, aged 17-34, from the Argentina-Sports Concussion Assessment & Research Study (Arg-SCARS).

Inclusion Criteria

Age 17+, male rugby union players, on-field evaluation, and office- based assessment within 72 hours post-concussion.

Exclusion Criteria

Minor or unconfirmed head contact, incomplete assessments, positive neuroimaging findings, or Glasgow Coma Scale score below 14.

Procedures

The methodological organization of Arg-SCARS has been described in detail (Russo, et al. [6,7]). Players were assessed through a clinical interview, symptom self-report, neurocognitive testing, and vestibular-oculomotor screening.

Tools Used

On-field Concussion Signs Checklist, Concussion Symptom Report, Post- Concussion Symptom Scale (PCSS), and a battery of neuropsychological tests. Six domain-specific composite scores were created by averaging several scores from different neuropsychological tests, after first converting raw scores to z-scores based on published normative references.

Statistical Analysis

The study used ANOVA, bivariate correlations, and linear regression analyses to explore relationships between cognitive performance and concussion severity, controlling for the number of previous concussions and years playing rugby.

Key Findings

The ANOVA test showed a linear relationship between the set of predictor variables and global cognitive performance ($F(6) = 6.708$, $p = 0.002$). Longer duration of post- traumatic amnesia ($p=0.037$) and higher severity of post-concussion symptoms ($p=0.01$) were associated with lower global cognitive composite scores even after adjusting for other variables. Duration of post-traumatic amnesia and severity of post-concussion symptoms may help prognosticate cognitive performance in adult rugby players within the first 72 h following a concussion, suggesting that poor cognitive functioning might be an immediate negative consequence of concussion in players with a more severe clinical profile.

Discussion

The severity and duration of concussion symptoms are critical in predicting cognitive performance in the early post-injury period. Immediate attention to these factors can aid in the effective management and rehabilitation of concussed athletes, potentially mitigating long-term cognitive impairments.

Future Directions

Longitudinal studies are recommended to further explore the long- term impacts of repeated concussions and to improve assessment and management strategies for SRC.

Acknowledgments

The authors sincerely appreciate the support of the Argentine rugby union and the Buenos Aires rugby union for the realization of this research project.

References

1. Kontos AP, Elbin RJ, Trbovich A, Womble M, Said A, et al. (2020) Concussion clinical profiles screening (CP screen) tool: Preliminary evidence to inform a multidisciplinary approach. Neurosurgery 87(2): 348-356.
2. Fischer TD, Red SD, Chuang AZ, Jones EB, McCarthy JJ, et al. (2016) Detection of Subtle Cognitive Changes after mTBI Using a Novel Tablet-Based Task. Journal of Neurotrauma 33(13): 1237.
3. Langlois JA, Sattin RW (2005) Traumatic brain injury in the United States: research and programs of the Centers for Disease Control and Prevention (CDC). The Journal of Head Trauma Rehabilitation 20(3): 187-188.
4. Echemendia RJ, Putukian M, Mackin RS, Julian L, Shoss N, et al. (2001) Neuropsychological test performance prior to and following sports-related mild traumatic brain injury. Clinical Journal of Sport Medicine: Official Journal of the Canadian Academy of Sport Medicine 11(1): 23-31.

5. Kontos AP, Elbin RJ, Schatz P, Covassin T, Henry L, et al. (2012) A revised factor structure for the post-concussion symptom scale: baseline and postconcussion factors. The American Journal of Sports Medicine 40(10): 2375-2384.

6. Russo MJ, Salvat F, Sevlever G (2020a) Creation of the Argentina- Sports Concussion Assessment & Research Study (Arg-SCARS). Neurology 95(20 Supplement 1): S13.

7. Russo MJ, Salvat F, Sevlever G (2020b) Predictors of cognitive performance after sports concussion: preliminary report of Arg-SCARS. Neurology 95(20 Supplement 1): S3-S4.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2024.58.009102

María Julieta Russo. Biomed J Sci & Tech Res