CENTRO ANDALUZ DE MEDICINA DEL DEPORTE

Revista Andaluza de Medicina del Deporte

Volumen 16. Número 1. Suplemento 1 Marzo 2023

RAMD

III International Conference on Technologies applied to Physical Activity and Sport. TAPAS 2022 16th-17th November 2022

Partners:

Junta de Andalucía Consejería de Turismo, Cultura y Deporte
Scopus
Dialnet
ibecs Índice Bibliográfico Español en Ciencias de la Salud
SciELO
SJR SCImago Journal & Country Rank
REDIB Red Iberoamericana de Innovación y Conocimiento Científico
latindex
REBIUN Red de Bibliotecas Universitarias
idea Información y Documentación Especializada de Andalucía
EBSCOhost

CENTRO ANDALUZ DE MEDICINA DEL DEPORTE

Revista Andaluza de Medicina del Deporte

Publicación Oficial del Centro Andaluz de Medicina del Deporte*

Disponible en internet:
https://www.juntadeandalucia.es/deporte/ramd/

Declaración de privacidad: Los nombres y las direcciones de correo electrónico introducidos en esta revista se usarán exclusivamente para los fines establecidos en ella y no se proporcionarán a terceros o para su uso con otros fines.

Contacto:
Centro Andaluz de Medicina del Deporte
Glorieta Beatriz Manchón, s/n (Isla de la Cartuja). 41092 Sevilla
Teléfonos: (+34)600 147 508/638
Correo electrónico:
ramd.ced@juntadeandalucia.es (Principal)
editor.ramd.ced@juntadeandalucia.es (Soporte)

Depósito legal: SE. 2821-2008
ISSN: 1888-7546
eISSN: 2172-5063
Publicada en Sevilla (España)

Junta de Andalucía
Consejería de Turismo, Cultura y Deporte

Rev Andal Med Deporte. 2023; 16(1 Supl. 1): *S1-S12*

Junta de Andalucía
Consejería de Turismo, Cultura y Deporte

Revista Andaluza de
Medicina del Deporte

https://www.juntadeandalucia.es/deporte/ramd/

Abstracts

III International Conference on Technologies applied to Physical Activity and Sport. TAPAS 2022. 16th-17th November 2022

ARTICLE INFORMATION: Received 08 February 2023, accepted 08 February 2023 , *online* 20 February 2023

An exploratory analysis of physiological and physical characteristics in national soccer referee

A. Castillo Rodríguez[a], W. Onetti Onetti[b], F. T. González Fernández[a]
[a] *Departamento de Educación Física y Deportiva, Universidad de Granada, Granada, España.*
[b] *Facultad de Educación. Universidad Internacional de la Rioja, Logroño, España.*

Objective: The objectives of this study were to define the different performance variables in national soccer referees and to classify the referees observed according to these performance variables in order to create a common profile.

Method: Data from 50 national referees of the Federation First Division League (Group 1) of the 2022-2023 season were collected using the GPS system (WimuPro, Realtrack, Almería, Spain). An exploratory factor analysis was performed using principal components analysis (PCA) on 2 performance indicators with orthogonal rotation (varimax). In this sense, factor analysis is a statistical method to identify groups of variables.

Results: It has been obtained that 79% of the variance of age and mean heart rate predict the performance of national referees. Only 7% of the variance of the distance covered in the match could be the performance of the national referees.

Conclusions: The main findings of this study showed that through the PCA analysis, the metrics that most explained the performance of national referees were age and average heart rate, in an analysis of more than 20 performance variables

Keywords: PCA, Football, Referee, GPS, Age, Heart Rate, Distance.

Analysis of small-sided games 3 versus 3 in football in terms of playing space, directionality with goalkeepers and coach feedback

I. Asín-Izquierdo[a,b], C. Galiano[b], M. Barrios-Egea[a], L. Gutiérrez-García[a]
[a] *Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, University of Alcalá, Madrid, Spain.*
[b] *Physical Performance and Sports Research Center, Department of Sports and Computer Sciences, Faculty of Sport Sciences, Pablo de Olavide University, Seville, Spain.*

Objective: Small-sided games (SSG) are a frequent method in football training programmes and their design has been analysed in the scientific literature. The aim of this study was to examine 3 versus 3 SSG in order to analyse differences in mechanical and physiological demands of amateur football players.

Method: Football players (21.59±4.35 years, 72.74±9.01 kilograms and 178.16±0.93 centimeters), completed 93 recordings in the MD-4 sessions using CatapultSport OptimEye-S5 devices, synchronised with Polar system. Training structure was similar for all measurements. Tasks consisted in 3 sets of 2 minutes and 1 minute of recovery. Statistical analysis was performed with JASP software.

Results: RPE, Total Distance (TD), velocity bands (VB) (11-14/14-17/17/17-21 km/h), maximum velocity (MV), high metabolic power efforts (HMPE) and meta-energy in 40x30 showed larger results ($p<.001$) than in 30x20 and 20x20 meters. 20x20 showed larger results for VB (0-11), Total Accelerations and Decelerations ($p<.05$) compared to 40x30. The presence of goalkeepers in 30x20 showed larger scores in MV and Accelerations +2.5m/s^2 ($p<0.025$; ES>0.75) but lower scores in RPE, TD and VB (0-11/11-14) ($p<0.032$; ES>0.7). In 40x30, the absence of goalkeepers showed larger scores in RPE, TD, mean heart rate, VB (11-14/14-17), HMPE, metaenergy, TRIMPs, Player Load, work/rest ratio and changes of direction +2.5m/s^2 ($p<0.045$; ES>0.86).

Conclusions: Dimensions and presence of goalkeepers significantly modify the response of amateur football players. Coach's feedback, at least in the smallest space 20x20, seems not alter players response. Therefore, SSG should be analysed from the complexity of its design.

Keywords: Time-motion Analysis, Training, Small-Sided Games, Football players, Dimensions, Goals.

Assessment of Spatiotemporal characteristics of gait, trough the Phyphox® App

C. A. Cabo[a,b], J. A. Parraca[a,b], J. Alegrete[a,b], S. Santos[a,b], O. Fernandes[a,b]
[a] *Departamento de Desporto e Saúde, Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Portugal.*
[b] *Comprehensive Health Research Centre (CHRC), Universidade de Évora, Portugal.*

Objective: Spatiotemporal characteristics from human locomotion can provide effective clinical metrics to assess motor control and brain function. Mobile apps such as “Phyphox” app can assess time series data of stride time. This pilot study aims to assess the temporal structure of variability in stride-to-stride time

and calculated the intrinsic fractal frame that is hidden below the repetitive structure of physiological gait.

Method: A smartphone was placed, on the inner lower edge of the tibia, on the surface of the skin, to quantify the number of steps and stride-to-stride time. Five participants were asked to walk with a natural cadence.

Results: Regarding the number of steps per min, two of the participants presented a value greater than 80 step's/min (81.14±0.01; 86.67±0.02); and the others had values between 55 and 65 step's/min (55.20±0.02; 55.78±0.05; 61.02±0.05). Regarding the coefficient of variation, only one participant presented 10.08%, and the others presented values between 2% and 4%. For the total number of steps, three of the participants had values greater than 1000 steps and the other two had approximately 600 steps. The variability of these stride-to-stride time has been quantified through detrended fluctuation analysis to quantify long-range correlations, i.e., the fractal dimension. Only one participant presented a value above 1, (strong long-range correlations or persistence) the others four presented values between 0.7 and 0.8.

Conclusions: This study provides evidence that a smartphone might provide a valid measure to assess the spatiotemporal characteristics of gait.

Keywords: Biofeedback, Biomechanics, Gait, Smartphone, Complexity, Fractals.

Cognitive and physical effects of re-warm-up on soccer players

F.T. González Fernández[a], A. Castillo Rodríguez[a], F.M. Clemente[b]
[a] *University of Granada, Granada, Spain.*
[b] *Escola Superior Desporto e Lazer, Instituto Politécnico de Viana do Castelo, Portugal.*

Objective: The aim of the present study was to examine the cognitive (PVT) and physical (CMJ and 30-m sprint) effects of a re-warm-up in soccer players.

Method: 22 soccer player (age 22 ± 0.50) participated in a counterbalanced cross-sectional studying which two conditions were tested: (a) re-warm-up condition and (b) control condition. A30- m sprint test and countermovement jump (physical), and psychomotor vigilance task (cognitive) were applied. In addition, hear rate were monitored during the present research.

Results: The re-warm-up condition revealed significant improvements in countermovement jump (p=.001), 30-m sprint test performance (p=03), and reaction time in psychomotor vigilance task (p=.001) in comparison to control condition.

Conclusions: A 5-min of a re-warm-up improved the cognitive and physical performance of soccer players, in comparison with when they do not perform re-warm-up

Keywords: Re-warm-up, Soccer, Cognition, Football, Performance, Physical condition.

Control and assessment of foot race training through the use of garmin wearables

O. DelCastillo-Andrés, M.C. Campos-Mesa, J.E. Moral-García, S. Morillo-Mateos
Universidad de Sevilla, Sevilla, España.

Objective: The aim of this study is to analyse the reliability and validity of different models of Garmin devices, Forerunner 235 and 735XT, for the estimation of VO2max in the athletic discipline of running on foot (half marathon).

Method: On a sample of 11 athletes (n=11), the indirect field test on a treadmill 'Montreal Test' is carried out, in order to obtain VO2Max. data. It is compared with the estimation made by the sports watches analyzed. Pearson's correlation test is performed.

Results: The Pearson test shows different correlation indexes depending on the model used. Based on these, Garmin Forerunner 235 devices do not estimate VO2Max. validly and reliably. However, the Garmin Forerrunner 735XT show linearity in their data.

Conclusions: The chosen Garmin device is essential when it comes to being able to establish the VO2Max. in a valid and reliable way of a half marathon athlete. It is recommended the use of the Garmin Forerrunner 735XT.

Keywords: Running, Wearables, Garmin, Heart rate, VO2Máx.

Comparative study of strain gauge to measure abdominal wall strength in patients undergoing incisional hernia surgery

A. García-Moriana[a], A. Sánchez-Arteaga[a], L. Gil-Delgado[b], R. Maroto-Sánchez[b], A. Feria-Madueño[b], L. Tallón-Aguilar[a], B. Sañudo-Corrales[b]
[a] *Servicio de Cirugía General y Aparato Digestivo, Hospital Universitario Virgen del Rocío, Sevilla, España.*
[b] *Departamento de Educación Física y el Deporte, Facultad de Ciencias de la Educación, Universidad de Sevilla, Sevilla, España.*

Objective: The aim of the study was to analyse trunk flexion strength in patients undergoing incisional hernia surgery, obtaining the data using both isokinetic dynamometer and strain gauge.

Method: Observational cohort study, including patients with incisional hernia (July-October 2022). Collected data were demographic characteristics, clinical characteristics related with the hernia, and measures of the abdominal wall strength using an isokinetic dynamometer and a strain gauge. Comparative analysis was performed using Pearson correlation test adjusted for body composition parameters.

Results: 29 patients were enrolled (55,2% female) with a mean age of 57,8 age (SD 11,2). Median BMI was 30,99 (IQR 24,4-33,4), and maximum diameter of hernia defect was 6,83cm (SD 0,88). Bending force moment measurement was 67 N·m (SD 33.7) and moment of force relative to weight was 77.2 N·m (SD 38.6). Results obtained with the strain gauge were: force peak with hip and knee flexion at 90º 149,8 N (IQR 117-188,3), rate of force development (RFD) 500 N·s-1 (IQR 237-816). Adding 45º trunk rotation, peak force was 149,8 N (IQR 114,2-181) and RFD 284,8 N·s-1 (IQR 197,7-522,1). Significant Pearson correlation indexes were found exceeding r= 0.510 for peak force and r= 0.372 for RFD when compared to isokinetic moment values.

Conclusions: In our group of study, we found a correlation between data obtained using isokinetic dynamometer and strain gauge. Further studies should analyze these associations controlling for other variables such as gender, age or hernia defect size.

Keywords: Trunk Flexion Strength, Isokinetic Dynamometer, Strain Gauge, Incisional Hernia.

Could a force platform detect ergogenic effect of sport supplements?

R. Illescas-Quiroga[a], B. Sañudo[b], S. Fernandes da Silva[c], A.J. Sánchez-Oliver[a,c], R. Domínguez[a,c]
[a] *Departamento de Motricidad Humana y Rendimiento Deportivo, Facultad de Ciencias de la Educación. Universidad de Sevilla, Sevilla, España.*
[b] *Departamento de Educación Física y Deporte. Facultad de Ciencias de la Educación, Universidad de Sevilla, Sevilla, España.*
[c] *Studies Research Group in Neuromuscular Responses (GEPREN), Universidad de Lavras, Lavras, Brasil.*

Objective: The aim of this study was to analyse the effectiveness of the force platform to detect the possible ergogenic effect of beetroot juice (BRJ) and caffeine (CAFF) supplementation on the performance of CMJ.

Method: Along 4 experimental sessions, 16 resistance trained athletes in a randomized order ingested: i) BRJ (140 ml) + placebo (PLA) of caffeine (6 mg/kg) (BRJ+PLA); ii) PLA of BRJ (140 ml) + 6 mg/kg of CAFF (PLA+CAFF); iii) BRJ + CAF; iv) PLA+PLA, in this way, each assessment session in the laboratory, 25% of the sample will encounter a different experimental condition. During CMJ (Quattro Jump model 9290AD; Kistler Instruments, Winterthur, Switzerland) was assessed VPEAK, and peak power (PPEAK). It was performed a repeated of measures ANOVA (ANOVA-RM), and a Post-Hoc of Bonferroni.

Results: Statistical differences in VPEAK (F=4.269; p=0.010), and PPEAK (F=5.761; p=0.002) were reported. CAFF increased VPEAK (+1.9%; p=0.049), and PPEAK (+5.1%; p=0.032) compared to PLA+PLA. Also, it was reported a higher VPEAK (+3.3%; p=0.018), and PPEAK (+5.6%%; p=0.016) after BRJ+CAFF compared to PLA+PLA, but not differences were reported between BRJ+PLA and PLA+PLA (p>0.005).

Conclusions: The force platform is a useful tool for detecting the ergogenic effect of sports supplements. These results confirm the increased performance in explosive actions after CAFF (Guest et al., 2021), but no additional effects could be detected after adding BRJ.

Keywords: Caffeine, Ergogenic aid, Neuromuscular, Nitrate, Strength.

Could serve Peak Inspiratory Flow as a tool to control swimming training loads?

A. Feria[a, c], C. González[b], D. Sánchez[b, c], G. Monterrubio[b, c]
[a] *Departamento de Educación Física y Deporte, Universidad de Sevilla, Sevilla, España.*
[b] *Centro de Estudios Universitarios Cardenal Spínola CEU, Sevilla, España.*
[c] *Club Natación Mairena del Aljarafe, Sevilla, España.*

Objective: To analyze whether inspiratory spirometry values can serve as a training load control tool in swimmers and compare values with the vertical jump (CMJ).

Method: Vertical jump (CMJ), Inspiratory Force Index (S_INDEX) and Peak Inspiratory Flow (PIF) were evaluated with a load of 3cm H2O before, during and after performing a swimming performance test (critical speed test, specific warming up, 400m and 100m).

Results: Positive correlations were found between S_INDEX and jump height after warm-up, after 400m and at the end of 100m (Spearman=0.470, R2=0.280; Spearman=0.508, R2=0.392; Spearman=0.458, R2=0.359 p< 0.05, respectively). Positive correlations were also found between PIF and jump height at the same moments evaluated (Spearman=0.461, R2=0.305; Spearman=0.493, R2=0.386; Spearman=0.454, R2=0.374, p<0.05).

Conclusions: Both the S-INDEX and the PIF could serve as useful tools for training load control, allowing coaches to make more immediate decisions.

Keywords: Peak Inspiratory Flow, Counter Movement Jump, Swimming, Fatigue, Performance.

Does winning or losing game segments show relationships with internal and external load metrics in elite beach handball?

I. Asín-Izquierdo[a,b], E. M. Paramio[c], J. C. Zapardiel[a]
[a] *Department of Biomedical Sciences, Area of Sport Physical Education, Faculty of Medicine and Health Sciences, University of Alcalá, Madrid, Spain.*
[b] *Physical Performance and Sports Research Center, Department of Sports and Computer Sciences, Faculty of Sport Sciences, Pablo de Olavide University, Seville, Spain.*
[c] *CEIP Antonio Mingote, Alcalá de Henares, Madrid, Spain.*

Objective: Beach handball has evolved extensively in recent years. The study of internal and external load variables is necessary to structure specific training and to develop knowledge about the variables determining performance in competition. The aim of this study was to compare segments of matches won and lost in an attempt to determine relationships on internal and external load variables in elite beach handball.

Method: 25 elite beach handball players (25.38±4.82 years, 86.96±9.53 kilograms and 187.52±7.48 centimetres) were analysed during the preparation for the European Championships. The matches were divided into 2-minute time segments, with the score of the partial being recorded. Data were collected using GPS-GNSS technology through CatapultSport OptimEye-S5 devices, synchronised with Polar system. Statistical analysis was performed using SPSS v.27 software.

Results: The results showed significant differences with higher values during segments won in the variables of distance per minute (d=large), distance in speed band 2 (6-8.9 km/h), 3 (9-11.9 km/h) (d=very large) and 4 (12-14.9 km/h) (d=medium), number of accelerations (d=large) and decelerations (d=medium), Player Load (d=large) and total number of jumps (d=medium). The minimum heart rate showed significantly higher values (d=median) in the segments lost.

Conclusions: The load variables shown to have the greatest impact on winning or losing a game segment, or vice versa, in elite men's beach handball were distance per minute, distance at speeds of 6-8.9 and 9-11.9 km/h, number of accelerations and player load. These findings should be confirmed in future research.

Keywords: Competition, Match, Time-motion Analysis, Situational Effects, Sand.

Menuba, a sports nutrition app for basketball

I. Escribano-Ott
Department of Physical Education and Sport, Faculty of Education and Sport, University of the Basque Country, Spain.

Objective: Mobile applications are a proven solution for nutritional improvement. However, to enhance engagement, applications must be specially designed for a specific target. Therefore, this work describes the design and development of Menuba ® (https://menuba.com/), a sports nutrition application applied to basketball.

Method: Specific functions of hydration, nutritional recovery and nutrition planning for basketball were developed. The application was developed in Android and IOS programming languages. A sample of male and female basketball players of different gender, age and category voluntarily tested both the product under test and the final product.

Results: Within the first 12 months following the application launch, a cumulative total of 566 users downloaded the application and 379 uninstalls were accumulated, maintaining a mean of 128.28 ± 46.02 active users with 2.83 installation events compared to 1 .22 uninstalls. The average number of daily installations is 1.16 users. Despite mHealth generate non-supervised interventions, Menuba helps users to have a highly detailed recommendation

Conclusions: Menuba ® meets the three fundamental objectives of a sports nutrition app: low cost, easy access and easy handling, designed specifically for basketball. The first usage tests have shown high acceptance, adherence and retention, representing its potential as a sports nutrition tool in basketball.

Keywords: Nutrition, Basketball, App, Smartphone.

Effects of a combined training program online vs presential on body composition parameters in overweight adults

V. Bilro[a], A. Duarte-Martins[a,b], N. Batalha[a], J.A. Parraca[a]
[a] *Comprehensive Health Research Centre (CHRC), Departamento de Desporto e Saúde, Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Portugal.*
[b] *Life Quality Research Centre, Portugal.*

Objective: This study aimed to compare the effects of the program, during twelve weeks, in the online format and in the face-to-face format, on the parameters of body composition.

Method: Nineteen overweight adults were divided into two groups: the online group (OG) (n=9, age, 42.44±6.27y), where the sessions were performed autonomously and the face-to-face group (PG) (n =10, age, 47.40±5.10y), where the group had sessions supervised by a sports professional. Participants were assessed for weight, waist circumference (WC) and body mass index (BMI) at baseline (M0), after six (M1) and twelve weeks (M2). The MTC lasted twelve weeks, with three weekly sessions of 60 min. Each training session was divided into three phases: first, general warm-up for 5-10 min at 65% of maximum heart rate (HRmax); second, specific 20-25 min at 80-95% of HRmax (continuous training protocols of moderate intensity, functional training of high intensity and interval training of high intensity were used); and third, active recovery of 5-10 min at 65% of HRmax.

Results: No differences were found on body composition parameters at M0, M1 and M2. The PG showed significant reductions in weight, BMI, and WC from M0 to M1 (p>0.01, effect size [ES]=-0.41; p>0.01, ES=-0.60; and p=0.002, ES=-0.46, respectively) and M1 (p>0.01; ES=-0.84; p>0.01, ES=-1.24; and p=0.001, ES=-1.07, respectively). The OG revealed significant reductions in weight, BMI, and WC from M0 to M1 (p>0.01; ES=-0.53; p>0.01, ES=-0.62; and p>0.01, ES=-0.66, respectively), and to M2 (p>0.01; ES=-0.80; p>0.01; ES=-0.92; and p>0.01, ES=-1.14, respectively).

Conclusions: The CTM is an effective and safe exercise approach to reducing body composition parameters and that both interventions are effective in improving study outcomes in overweight adults.

Keywords: Overweight, Exercise, Intensity, Online, Presential.

Effects of beetroot juice supplementation on competitive female swimmers

J. Moreno-Lara[a], I. López-León[a], A.J. Sánchez-Oliver[a,b,c], R. Domínguez[a,b,c], L. Leitão[c]
[a] *Departamento de Motricidad Humana y Rendimiento Deportivo, Universidad de Sevilla, Seville.*
[b] *Studies Research Group in Neuromuscular Responses (GEPREN), University of Lavras, Lavras, Brazil.*
[c] *Sciences and Technology Department, Superior School of Education of Polytechnic Institute of Setubal, Setúbal, Portugal.*

Objective: Beetroot juice supplementation (BRJ) is a riched nitrate (NO3-) dietary source that has demonstrated to increase nitric oxide (NO) bioavailability. Across NO elevations, BRJ has been proposed as an ergogenic supplement. Studies about BRJ in female athletes have been underappreciated, and more studies are needed. Therefore, the aim of this study was assessing the possible ergogenic effect of BRJ in a swimming test protocol in competitive female swimmers.

Method: In a randomized double-blind study, 6 female competitive swimmers (gold and silver medallists in a regional championship) ingested 140 ml of BRJ enriched in NO3- (~12.8 mmol of NO3-) or depleted in NO3- as placebo (PLAC). Participants executed a push-off start of 8 x 50m swimming protocol with 2 minutes of passive recovery between repetitions. For determining differences along the swimming test, a repeated ANOVA (ANOVA-RM) was performed. In variables with statistical differences, a Post-Hoc of Bonferroni was performed.

Results: It was found differences for time, with a progressively slower time along repetitions (p<0.001). In addition, it was reported statistical differences for supplementation, with a faster time in BRJ compared to PLAC (33.21 ± 0.96 s vs. 33.64 ± 1.04 s; p=0.010). In the comparison of the different repetitions, it was reported statistical differences in the third (p=0.032), sixth (p=0.005), and seventh (p=0.023) repetitions.

Conclusions: Results of this study suggest a possible ergogenic effect of BRJ in competitive female swimmers. These results are in line with the ergogenic effect reported in male populations during intermittent high-intensity exercise efforts.

Keywords: Aquatic Sports; Ergogenic Aids; Nutrition; Swimming.

Evaluation of abdominal wall strength and diameter of hernia defect in patients undergoing incisional hernia surgery

A. García-Moriana[a], A. Sánchez-Arteaga[a], J.L. Gil-Delgado[b], R. Maroto-Sánchez[b], A. Feria-Madueño[b], J. Padillo-Ruiz[a], B. Sañudo-Corrales[b]
[a] *Servicio de Cirugía General y Aparato Digestivo, Hospital Universitario Virgen del Rocío, Sevilla, España.*
[b] *Departamento de Educación Física y el Deporte, Facultad de Ciencias de la Educación, Universidad de Sevilla, Sevilla, España.*

Objective: Our aim was to analyse the abdominal wall strength profile in patients with incisional hernia and the relationship between the hernial defect diameter and the abdominal wall strength.

Method: Observational cohort study of patients with incisional hernia (July-October 2022), classified as W2 according to the European Hernia Society. Collected data was demographic characteristics, clinical characteristics related with the hernia, and measure of the abdominal wall strength using an isokinetic

dynamometer and a strain gauge. We analysed the relationship between hernia defect and abdominal wall strength with correlation tests to adjustment by age, sex, BMI, and body composition.

Results: 29 patients were enrolled (55,2% female) with a mean age of 57,8 age (SD 11,2). Median BMI was 30,99 (IQR 24,4-33,4), mean percentage of fat mass of 35,07% (SD 8,3), mean percentage of lean mass of 62,4% (SD 8,4) and a maximum diameter of hernial defect of 6,83cm (SD 0,88). The linear regression model determined age (p = 0,04) and sex (p = 0,01) as predictor variables of the abdominal wall strength measured with isokinetic dynamometer. In terms of the relation between the hernial defect diameter and abdominal wall strength, we found a tendency to a statistically signification (p = 0,07).

Conclusions: In our study, the most statistically significant predictor variables of abdominal wall strength were age and sex. Hernial defect diameter showed a tendency to a statistically signification.

Keywords: Trunk Flexion Strength, Isokinetic Dynamometer, Strain Gauge, Incisional Hernia.

Is it possible to influence the well-being of sedentary or physically inactive workers with a three-month multidisciplinary programme? The "Activamos" programme at Mahou-San Miguel

J.M. Núñez-Sánchez[a], R. Gómez-Chacón[b], C. Jambrino-Maldonado[a], J. García-Fernández[c]
[a] *University of Málaga, Málaga, Spain.*
[b] *CEU Cardenal Spínola, Seville, Spain.*
[a] *University of Seville, Seville, Spain.*

Objective: There is a great scarcity of case studies investigating the effects of promoting employees' well-being in companies for sedentary workers. Therefore, the aim of this exploratory study is to research the results of a quarterly multidimensional wellness programme for less active workers in one of the leading companies in corporate well-being in Spain, Mahou-San Miguel.

Method: Quantitative methodology was used with validated measurement instruments. The investigation took place from 26 April to 12 August 2022, with a sample of n= 89, of which 55 carried out the programme and 35 were a control group. To ensure the success of the programme, the company relied on the technology and on a multidisciplinary team of personal trainers, nutritionist and doctor.

Results: Very positive results were obtained in all the items measured in the participants. Specifically, physical activity and strength increased, while weight, metabolic age, cholesterol, glucose and fat percentage were reduced, with the latter two showing significant differences.

Conclusions: Developing effective programmes for inactive workers is one of the challenges raised in previous research. It could be stated that it is possible to achieve, through a quarterly wellness plan, very positive effects on sedentary employees. Therefore, it would be advisable to introduce such multidimensional programmes in companies, as a tool to improve less active workers' well-being.

Keywords: Well-being, Sedentary Workers, Physical Activity, Corporate Well-being Programmes.

MagnoJump: reflections on a platform that may magnify isoinertial and eccentric training

M. A. B. Bache[a,b]
[a] *University of Sevilla, Sevilla, Spain.*
[b] *HUM-962*

Objective:

To review specific scientific and historic related bibliography.

To review and reflect on the practice and application of isoinertial technology over conditioning (Sports Performance, but also avail on Health & Physical Rehab).

To propose some observations about SSC (both, performance, and improvement).

To propose technology to overcome difficulties and isoinertial technology limitations.

To share and deepen on the subject matter (not only on sport performance, but also on its application on health contexts).

Method: Basic and problem oriented research was conducted under the Iowa model (Clarke, Hopewell, & Chalmers, 2007; Lund et al., 2016; Titler et al., 1994; 2001).

Results: After the review of the bibliography, and the usage of isoinertial technology for 7 years at different levels, including professional high performance training, we ascertained that the best technology at our disposal could be not sufficient to avoid some loss to the SSC improvement, which, since SSC is the natural and main system for human (and animals) ground locomotion (Hill, 1922; Komi, & Bosco, 1978; Nicol, et al., 2006), it inherently would affect physical and sport performance.

Conclusions: (1) Magnetic technology could offer an improvement over current isoinertial technology. (2) A magnetic platform could solve both, improvement & power training benefits loss, and self-restriction. (3) Our proposal could increase the avail, not only for sport & performance training, but also for health & rehabilitation.

Keywords: Isoinertial Platforms, Physical Training, Health & Performance Training, Physical Rehabilitation, TAPAS.

mHealth interventions for the management of osteoporosis: a systematic review

H. Sanchez-Trigo, J. Pecci, B. Sañudo
Departamento de Educación Física y Deporte, Universidad de Sevilla, Spain.

Objective: Osteoporosis is a highly prevalent disease. It is estimated that one out of every three women over the age of 50 will suffer a fracture due to osteoporosis. mHealth interventions are becoming increasingly popular in healthcare and the management of certain diseases. The purpose of this study is to systematically review the literature concerning mHealth interventions for the prevention and management of osteoporosis.

Method: A comprehensive search of electronic databases (n=3) was conducted including (a) prospective randomized controlled trials comparing at least one intervention group vs. a control group; (b) women over 30 years old; (c) non-supervised mHealth-based interventions for osteoporosis management and prevention.

Results: 14 articles met the inclusion criteria. These mHealth interventions targeted different areas of osteoporosis management such as diet (n=5), exercise (n=4), diagnosis (n=3) and medication (n=2). Significant positive effects in multiple outcomes (e.g., bone mineral density or calcium intake) were found in these mHealth interventions. Nevertheless, adherence seems to be low, especially in longer interventions.

Conclusions: This systematic review shows that mHealth interventions can be effective in supporting osteoporosis patients in different areas of treatment. Still, the number of mHealth

interventions specifically designed for osteoporosis are scarce despite the high incidence of this disease. Further efforts are required to design mHealth interventions that are effective, affordable and achieve a high adherence among users.

Keywords: Osteoporosis, Bone, mHealth, Applications.

No Effect of Mental Fatigue on the accuracy in the Perception of Barbell Velocity

R. Romagnoli[a,b], D. Paris[a], L. Filipas[c], M. F. Piacentini[a]
[a] *University of Rome Foro Italico, Department of Movement, Human and Health Sciences, Rome, Italy.*
[b] *Italian Weightlifting Federation (FIPE), Rome, Italy.*
[c] *Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milan, Italy.*

Objective: Acute mental fatigue(MF) is a psychobiological state that may arise during or after prolonged cognitive activities and results in an acute feeling of tiredness and/or a decreased cognitive ability. Perception of velocity(PV) is the ability to estimate repetition velocity during resistance training(RT) exercises. The aim of this study was to investigate whether MF could affect RT performance and PV accuracy.

Method: 10 resistance-trained participants underwent 5 sessions: 2 familiarization sessions with the combined use of a linear encoder (Vitruve, Madrid-Spain) and the PV-Squat-Scale, 1RM-test for the Back Squat and 2 PV assessment sessions where we recorded the real(Vr) and the perceived velocity(Vp). PV was assessed with 3 blinded loads in 2 conditions, one day rested(REST) and one day after mental fatigue(POST-MF). MF was induced by a 45-minute Stroop-Task and assessed by a VAS-scale, along with Motivation. PV accuracy was analyzed by calculating the delta score(DS=Vp−Vr). Mann-Whitney tests were used to compare DS and Vr between conditions for the 3 loads.

Results: After the Stroop-Task MF increased significantly (REST:32.4±22.5%, POST-MF:67.6±23.8%) and Motivation shows a tendency to decrease (REST:55.7±28.1%, POST-MF:47.3±33.3%). Vr remained unchanged between REST (0.603±0.261m·s−1) and POST-MF (0.602±0.257m·s−1) conditions and DS shows no significant change (REST:0.045±0.105m·s−1, POST-MF:0.028±0.104m·s−1).

Conclusions: As previously observed MF did not induce changes in RT performance. Furthermore, PV accuracy was not affected so even in conditions of MF it is possible to base training by relying on the perceived velocity.

Keywords: Velocity-based Training, Autoregulation Training, Cognitive Fatigue, Mental Exertion, Motivation.

Physical demands in young football players during matchs, training and soccer tournament

A. Hernández-Martín, C. Majano, S. Manzano, L.Moreno
IGOID Research Group, Physical Activity and Sport Sciences Department, University of Castilla-La Mancha, Toledo, Spain.

Objective: The aim of the present study was to analyse physical demands of U10 football players according to playing position, pre-match training and match (MD-4, MD-2 and MD) and 7-a-side soccer tournament.

Method: Ten U10 amateur players were analysed using the GPS, with a total of 250 observations. The variables of total distance, distance in high intensity and sprint, maximum speed, time interval between accelerations, maximum speed acceleration, maximum acceleration, acceleration distance and number of high-intensity accelerations were analysed in absolute values during, matchs, trainings and 7-a-side soccer tournament.

Results: The midfielders in matches covered higher distance and higher intensity acceleration than in training (p<0.05;) and at a with respect to defenders and forwards (p<0.05). Respect to the 7-a-side soccer tournament midfielders covered higher total distances than defender and strikers (p <0.05). The total distance travelled, and high intensity actions increased in the final rounds with respect to the group stage (p <0.05).

Conclusions: The playing position influences the physical performance in such a way that the U10, midfielders cover longer distances and perform a higher number of high-intensity actions in training and matches than the defenders and forwards. The physical demands of the players in training are higher than in matches. Respect to the tournament, the physical demands in children's age depending on the position and importance of the match.

Keywords: Young children, Playing Position, Match, Training, Tournament, Load, GPS.

Phase angle can predict muscle strength in older adults: A cross-sectional study

A. Duarte Martins[a,b], J.P. Brito[b,c,d], O. Fernandes[a], N.Batalha[a]
[a] *Comprehensive Health Research Centre (CHRC), Departamento de Desporto e Saúde, Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Portugal.*
[b] *Life Quality Research Centre, Rio Maior, Portugal*
[c] *Sports Science School of Rio Maior, Polytechnic Institute of Santarém, Rio Maior, Portugal.*
[d] *Research Centre in Sport Sciences, Health Sciences and Human Development, Vila Real, Portugal.*

Objective: This study aimed to verify a relationship between phase angle (PhA) with muscle strength. We also intend to analyse the ability of PhA to predict muscle strength after adjusting for potential confounders.

Method: This cross-sectional study included fifty-six physically independent older adults (age, 70.57 ± 3.79 years; BMI, 28.09 ± 4.37 kg/m2). Bioelectrical impedance analysis was used to measure PhA at 50 KHz. Additionally, we assessed muscle strength through the handgrip test (dominant side) and maximal isokinetic strength of the dominant knee flexor and extensor during 3 repetitions of concentric actions at 60◦/s using an isokinetic dynamometer (Biodex System 3). The University of Évora Ethics Committee approved this study (approval no. 22030).

Results: There was a large correlation between PhA and knee extension (p< 0.01; r= 0.600) and there were moderate correlations between PhA and knee flexion (p< 0.01; r= 0.459) and with handgrip test (p= 0.002; r= 0.400). In addition, after adjusting for potential confounders the linear regression analysis demonstrated that PhA was a significant predictor of muscle strength in older adults: knee extension, β= 44.696; p< 0.01; R2= 0.694; knee flexion, β= 129.411; p< 0.01; R2= 0.410; and handgrip test, β= 39.915; p< 0.01; R2= 0.787.

Conclusions: PhA can be considered a marker of muscle strength and can predict muscle strength in older adults.

Funding: This work is funded by national funds through the Foundation for Science and Technology, under the project 2021.04598.BD; UIDB/04923/2020 and UIDP/04748/2020.

Keywords: Older adults; Phase angle; Bioelectrical impedance analysis; Muscle strength.

Sports tourism destinations and the importance of online social networking sites

C.S. Einsle[a], S. Bambauer-Sachse[b]
[a] *Universidad Nacional de Educación a Distancia (UNED), Spain.*
[b] *University of Fribourg, Switzerland.*

Objective: The use of social networking sites (SNS) as a marketing tool is growing in all sectors. Yet, knowledge about SNS usage behavior especially in the field of sports tourism remains limited. Thus, the main aim of this study is to understand which content aspects determine sport tourists' use of a destination's SNS.

Method: Drawing on the "uses and gratifications" theory and the theory of planned behaviour (Icek Ajzen 1985, 1991), we developed eight versions of Instagram-style stimulus material, based on a 2 (extent of provided information: limited, extensive) x 2 (entertainment value: low, high) x 2 (invitation to interact: weak, strong) design.

Results: While this research is in progress, we obtained preliminary results from the pretest (n=31). We measured the information value, the entertainment value, and the interactive value with three items each that we averaged for further analyses. Depending on the stimulus version, the mean values differ clearly (information value: Mlow = 3.40 vs. Mhigh = 4.85; entertainment value: Mlow = 3.09 vs. Mhigh = 5.17; interaction value: Mlow = 3.04 vs. Mhigh = 5.07).

Conclusions: The preliminary findings show that user develop different perceptions of Instagram posts depending on the value of information, entertainment and interaction invitation. These are important aspects to be considered by sports tourism destinations.

Keywords: Sport Management, Social Media, Online Marketing, Instagram.

The digitalization of the Pilota Valenciana: TicTec App

M. Reig Giner, A. Vidal Vilaplana
Department of Physical Education and Sport, University of Valencia.

Objective: The aim of this study was to create and develop an app that would facilitate the management of small Pilota Valenciana clubs.

Method: For the development of the TicTec platform we had two developers, one of whom was also the product owner and the other the software architect, and a User Experience designer.

A survey was carried out with different clubs, using a Google form to find out their interest in this platform and their needs. Nine face-to-face meetings were also held with these entities and one with the Federation of Pilota Valenciana for the same purpose.

Results: After analysing results from the surveys, all this resulted in the creation of the mobile application TicTec, for Android and Apple, a management tool for clubs of Pilota Valenciana. This application works like social network, whose members, who enter their personal data and pay his membership fee corresponding to their club, have a user and can access the publications of other clubs or the calendar of competitions, among other functions. This application also serves as a scoreboard which reports the results of the day in real time and the main statistics of each meeting.

Conclusions: In this way, the Pilota Valenciana adapts to the new times, making use of technology to achieve the union of its practitioners and facilitate management processes.

Keywords: Pilota Valenciana, Valencian Handball, App, Sport Management, Club, Social Media.

The effects of a 12-week yoga program on the COP of military pilots before and after a flight emergency simulation

S. Santos[a,b], J.A. Parraca[a,b], J. Alegrete[a,b], C.A. Cabo[a,b], F. Melo[a,b,c], O. Fernandes[a,b]
[a] *Departamento de Desporto e Saúde, Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Largo dos Colegiais 2, Évora, Portugal.*
[b] *Comprehensive Health Research Centre (CHRC), Universidade de Évora, Largo dos Colegiais 2, Évora, Portugal.*
[c] *Universidade de Lisboa Faculdade de Motricidade Humana: Cruz Quebrada, Lisboa, Portugal.*

Objective: This study investigated the effects of ashtanga vinyasa yoga supta on CoP displacement in adult and healthy student pilots, under the premise that yoga would lead to improvements in postural control responses.

Method: CoP response through the Plux (Portugal) uni dimensional force platform was analyzed. A total of 18 military pilots in their tirocinium in the air force academy from the Portuguese Air Force course "Masters in Military Aeronautics: aviator pilot specialist" participated in this study. Participants were randomly assigned to yoga (intervention group) or waiting list (control group) and completed a flight emergency protocol in a flight simulator. The CoP displacement was collected before and after all these maneuvers and both measures were taken before and after a 12-week yoga program.

Results: Although the differences between groups are not meaningful, after calculating the effect size we can theorize that the intervention group seems to maintain CoP displacement before and after flight and the control group seems to have a higher CoP displacement after flight simulation.

Conclusions: CoP information collected through noninvasive portable devices can easily relay important information in a fast manner. Knowing when pilots are more affected can lead to developing or improving training strategies to enhance those psychophysiological responses. In this study the effects, although not significant, are present, so it may be necessary to add more training weeks to make the yoga program effective.

Keywords: Biomechanics, Postural Control, Military Pilots, Center of Pressure, Flight Emergency Simulation, Yoga.

The functional assessment of the respiratory muscles and performance in swimmers

G. Monterrubio-Fernández[a, c], C. González-Sánchez[a], D. Sánchez-Jaenes[a, c], A. Feria-Madueño[b]
[a] *Centro de Estudios Universitarios Cardenal Spínola CEU, Sevilla, España.*
[b] *Departamento de Educación Física y Deporte, Universidad de Sevilla, Sevilla, España.*
[c] *Club Natación Mairena del Aljarafe, Sevilla, España.*

Objective: To evaluate the relationship between the physical performance of swimmers through a Maximal Aerobic Speed test and the S_INDEX and PIF.

Method: The performance of 30 swimmers was evaluated by means of a Critical Swim Speed Test. In addition, functional ventilatory parameters were evaluated before, during, and after the completion of the physical test.

Results: A positive correlation was obtained between the ventilatory parameters of S_INDEX and PIF, and the Critical Swim Speed after warm-up (Spearman_S_INDEX=0.592, Spearman_PIF=0.591, R2=0.233; p<0.05), after 400m (Spearman_S_INDEX=0.658, Spearman_PIF= 0.636, R2=0.280; p<0.05), and after 100m (Spearman_S_INDEX=0.616, Spearman_PIF=0.610, R2=0.221; p<0.05).

Conclusions: There is a direct correlation between specific parameters of inspiratory spirometry with influential factors of performance in swimmers, i.e., Critical Swim Speed. Our results suggest that both the S_INDEX and the PIF evaluation could be useful indicators of the level of sports performance of swimmers, providing coaches with useful and feasible tools to use during training.

Keywords: Peak Inspiratory Flow, Critical Swim Speed, Swimming, Fatigue, Performance.

The impact of technology on quality and member´s behaviour in different fitness business models

V. Pedragosa[a], G. Ferreira[b], A. Ferreira[c], C. Gonçalves[d]
[a] *Universidade Autónoma de Lisboa & CICEE (Centro de Investigação em Ciências Económicas e Empresarias), Portugal.*
[b] *Universidade da Maia, Portugal.*
[c] *Escola Superior de Desporto de Rio Maior & CIEQV (Centro de Investigação em Qualidade de Vida - Instituto Politécnico de Santarém), Portugal.*
[d] *Universidade da Maia; Instituto Politécnico de Bragança & CIDESD (Centro de Investigação em Desporto, Saúde e Desenvolvimento Humano), Portugal.*

Objective: During COVID-19 there was a digital acceleration (i.e., Wearables Fitness Technology (WFT) and On Demand Training (ODT) and emergence of new business models (IHRSA, 2022). Technology improves service delivery to members (Pedragosa et al., 2022). This study aimed to measure the technology impact in quality and members behaviour in different business models: Traditional Fitness Centres (TFC) and Fitness Boutiques (FB).

Method: Sample was composed by 83 TFC and 92 FB members (74% women; 26% men). Was applied an Instrument composed by 35 items for quality and 6 items for behaviour (Costa, 2011) and 6 items for technology (Pedragosa et al., 2022). To evaluate the statistical correlation between the technology (independent variable), the perceived quality and the members behaviour (dependent variables) was performed simple linear regression (p<0,05).

Results: In the TFCs, quality is explained 58% by technology (R2=.58), with a statistically significant for applications (p=.007). Behaviours are explained 31% by technology (R2=.31), with statistically significant for social networks (p=.024). In FBs quality is explained 70% by technology (R2=.70), with statistically significant for perception of technology overall (p=.001). Behaviours are explained 32% by the technology (R2=.32), with a statistically significant for the perception of the technology overall (p=.05).

Conclusions: Technology is a very important dimension to explain quality better than behaviours, in both Fitness Centres. FBs technology shows a higher explained for quality and behaviours compared to TFCs. Such results indicate technology as an explanatory dimension of quality perceptions and loyalty behaviours with different results by business model.

Keywords: Fitness Technology, Business Models, Quality, Members Behavioural.

The integration of ict in physical education through challenge-based learning

L. Simón-Chico, E. Franco
Universidad Pontificia Comillas, Madrid, España.

Objective: In the field of education, there is a demand of new ways of teaching which bring new paradigms and educational models. However, integrating ICT in physical education (PE) can become a challenging task due to certain subject characteristics such as the eminently practical nature of the subject or the scarce weekly time devoted to it. The aim of this work was to design and implement a proposal for the integration of ICT in Physical Education through challenge-based learning, and to evaluate how the implementation of this experience could affect students' motivational outcomes.

Method: For the elaboration of the didactic unit oriented to teaching badminton in Secondary Education, several technological resources were used. A quasi-experimental design was followed in which two groups of the third year in Secondary Education, following challenge-based learning or a traditional teaching approach, were compared both before and after the badminton didactic unit in terms of their basic psychological needs satisfaction and frustration. M

Results: In this experience, a challenge-based learning proposal is designed to teach badminton in physical education. The findings suggest that the use of ICT supports students' autonomy in their learning process and facilitates teachers' provision of feedback to their students.

Conclusions: This experience represents an interesting ICT approach to an innovative pedagogical model and provides some empirical findings which reinforce the value of ICT to foster motivational context in physical education.

Keywords: Students' motivation, Self-determination, ICT, Educative innovation.

The use of imaging technology to assess the effects of resistance training on biceps femoris muscle architecture: A systematic review with meta-analysis

J. Pecci[a], B. Sañudo[a], R. Ramirez-Campillo[b], H. Sanchez-Trigo[a], E. Saez de Villarreal[c]
[a] *Department of Physical Education and Sport, University of Seville, Sevilla, Spain.*
[b] *Exercise and Rehabilitation Sciences Institute. Universidad Andres Bello, Santiago, Chile.*
[c] *Physical Performance & Sports Research Center, Universidad Pablo de Olavide, Seville, Spain.*

Objective: To examine the effects of the main resistance training variables on the muscle architecture of the biceps femoris in soccer players

Method: PubMed, SPORTDiscus, PsycInfo, Web of Science and CINAHL databases were searched. Studies that included resistance training intervention groups and measured muscle architecture adaptations through imaging technology in soccer players were included for analysis using Review Manager software.

Results: Six studies (152 players) and 12 training groups entered the analyses. The effects of Nordic Hamstring Exercise vs. only on-field training as exercise selection variable and the effects of one vs. two days per week of resistance training as frequency variable were possible to be analyzed. Nordic Hamstring Exercise was shown to significantly improve fascicle length (p = 0.01; ES = 0.33 [0.11, 0.55]). Training two times per week showed greater ES than training once a week in all measured outcomes.

Conclusions: Nordic Hamstring Exercise lengthens the biceps femoris long head fascicle in soccer players, which may have important implications on injury risk. Nonetheless, future research should assess wether other exercises (i.e., hip-dominants) are more efficient in improving this outcome. Training twice a week could maximize architectural adaptations on biceps femoris.

Keywords: Ultrasound, Magnetic resonance image, Injury prevention, Hamstrings, Strength.

The use of Tik Tok in higher Education: an analysis of student's perceptions according to sex

P. Jiménez-Jiménez[a], D. Ordiñana-Bellver[b], M. Huertas-González Serrano[a], R. J. González-García[b]
[a] *Departamento de Educación Física y Deportiva, Universitat de València, Valencia, España.*
[b] *Universidad Católica de Valencia San Vicente Mártir, Valencia, España.*

Objective: Previous investigations have studied the perceptions of sports sciences students about the value of this application as an educative tool (Escamilla-Fajardo et al., 2021). However, this study did not pay attention to the possible differences between sex. Therefore, the aims of the present investigation were: (1) to analyze student's perceptions of the use of TikTok as an educative tool within a Sports science course and, (2) To compare student's perceptions according to sex

Method: A sample of 52 students completed an on-line survey including information of their perceptions about Tik Tok and social media as wells as personal information regarding their use of social media and sociodemographic. Data was analyzed using SPSS v.25 (IBM) for descriptive and inferential analysis.

Results: Participants were mainly men (78%) with a mean age of 21 (±3) years old all of them previously known TikTok. Kolmogorov-Smirnoff test of normal distribution showed. On-parametrical distribution of the data. Secondly, U de Mann-Whitney test for independent means showed statistically significant differences for only one out of the eleven items evaluated.

Conclusions: According to our results, we cannot confirm significant differences between students' perceptions of Tik Tok according to their sex. This could be partly due to the sample of the population. For this reason, more investigations with larger samples are required to analyze the possible role of gender in their perception of Tik Tok

Keywords: Tik-Tok, Sports Sciences, Technology in education, Student's perceptions

Time domain, frequency domain, and readiness: a correlation study of heart rate variability measures and other derived R-R interval metrics generated by Elite®, Kubios App®, and Kubios Standard®

J. Alegrete[a,b], J. Parraca[a,b], O. Fernandes[a,b]
[a] *Comprehensive Health Research Centre (CHRC), Évora, Portugal.*
[b] *Departamento de Desporto e Saúde; Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Évora, Portugal.*

Objective: Wearable devices and mobile apps monitor heart rate variability using accurate time and frequency domains, as well as non-linear analyses to characterise autonomic nervous system activity. As mobile apps become an alternative to heart rate variability testing, new metrics emerge (readiness). Competing software processes these metrics differently. Our study examines the relationship between Elite HRV®, Kubios HRV App® 1.2.7, and Kubios HRV Standard® 3.4.3 metrics.

Method: In a case study, two sequential R-R intervals were taken for 71 days in the supine position using a Polar® H10 with a sampling rate of 1,000 Hz. First, HRV was extracted with Elite®, followed by the Kubios HRV App®. Metrics from the retrieved Elite HRV® R-R files on Kubios HRV Standard® were compared with the previous. No additional data corrections were applied. Pearson's product moment or Spearman's rank was used as appropriate.

Results: Time and frequency domains exhibited statistically significant positive correlations (p<.001) between metrics derived from all software packages. The readiness, extracted with the mobile apps, showed no correlation (r=0.01, p=.958). Readiness from both apps showed an inverse and mirror correlation with stress (relite= -0.24 and rKubiosApp= 0.30, p>.05) and poincare plot SD1(relite= 0.31 and rKubiosApp= -0.34, p>.01) and SD2(relite= -0.24 and rKubiosApp= 0.30, p>.05) when extracted from Kubios Standard®.

Conclusions: Despite the fact that the three software applications provide analogous metrics in time and frequency domains, readiness is unrelated and appears to be based on opposing estimation assumptions.

Keywords: Heart Rate, Mobile App, R-R interval, Signal processing, Wearable.

Use of technology in the assessment, training and monitoring during a season of a professional padel player. Case study

Á. Carnero-Díaz[a,b], J. Pecci[c], G. Reverte-Pagola[c], M. E. Da Silva Grigoletto[d]
[a] *San Isidoro Centro Universitario, Sevilla, Spain.*
[b] *Universidad Pablo de Olavide, Sevilla, Spain.*
[c] *Department of Physical Education and Sport, University of Seville, Sevilla, Spain.*
[d] *Universidade Federal Sergipe, Sergipe, Brazil.*

Objective: The aim of this study is to analyze using technological tools, if the improvements in conditional performance are accompanied by improvements in sports performance through a case study.

Method: An elite padel player was analyzed during the 2021 season. Agility, handgrip and force-velocity profile in squat exercise were assess using different technological tools. Monitoring was measured by means of self-filling forms and sports performance was evaluated by means of the results obtained in the World Padel Tour tests and their position in the ranking at the end of the season. During the season, integrated training was carried out, in order to achieve the maximum availability of specific and competitive training load days through training. This methodology integrates the different expressions of strength according to the force-velocity curve, as well as a selection of tasks based on the demands of the sport. For this, we rely on rotatory inertial technology, which allows training movements close to specificity with different loads and velocities. This is supported with eccentric overload training and tendon overload training in order to minimize injuries risk.

Results: The weekly average of training was 1.5 days/week and the competition load was 1 match every 2.24 days/week. The results of the assessment show slight improvements in all the tests related to physical condition. Player not suffered any severe injury what constrain him to lose days of competition. The assessment of sports performance reports substantial improvements, achieving more victories than previous years and a better position in the professional ranking.

Conclusions: The conditional maintain or improvement helps the tolerance of the workload during season, allowing the improvement of sports performance in padel and not losing days of competition. However, a multidimensional assessment is necessary to control the greatest number of athlete variables. This methodology has shown positive results in biopsychosocial assessment and performance, despite the high competitive density.

Keywords: Physical Training, Assessment, Padel, Technology.

Validation of Xiaomi Mi Band 6 in maximal and average heart rate in exergames and cycle ergometer

S. Ferreira[a,b], J. Marmeleira[a,b], N. Leite[a,b], A. Raimundo[a,b]
[a] *Departamento de Desporto e Saúde, Escola de Ciências e Tecnologia, Universidade de Évora, Portugal.*
[b] *Comprehensive Health Research Center, Universidade de Évora, Portugal.*

Objective: To validate the Xiaomi Mi Band 6 measuring maximum heart rate and average heart rate during a cycle ergometer session and exergame.

Method: Twenty-seven community-dwelling older adults participated in this study. Each participant completed a 30-minute exercise session on the cycle ergometer and in exergames to reach 60-70% of the maximum heart rate. On the cycle ergometer, participants exercised for 30 minutes at 50 rpm. The augmented reality session was conducted with Exergames running on the Portable Exergame Platform for Elderly (PEPE). We used 4 games from this platform, Exerpong, Grape stomping, Rabelos, and Toboggan. Training session was during 30-minute, with the variation of the HR within the previously defined values. The Polar Band (PB) was worn on the chest, and the Xiaomi Mi Band 6 (XMB6) was worn on the left wrist. Average and maximum heart rate values were recorded from each smartwatch. Normality of the data was assessed using the Shapiro-Wilk test, and according to the results, was used Pearson's correlation.

Results: Validity showed that there is a positive association between the PB and XMB6 in maximum HR (0.767, p=0.000) and average HR (0.730, p=0.000) in cycle ergometer and average HR (0.659, p=0.000) in exergames. There is no association between the two wearables at the maximum HR (0.018, p=0.930) for exergames.

Conclusions: The study indicates that the XMB6 is valid in the maximum and average HR in the cycle ergometer. However, in exergames, the XMB6 shows very different maximum HR values than the reference wearable.

Funding: This study was supported by the National Funds through Foundation for Science and Technology (FCT), Portugal, for the Ph.D. Grant SFRH/BD/141448/2018. – and the European Fund for regional development (FEDER).

Keywords: Augmented Reality, Older Adults, Wearable Devices, Validation, Exercise.

Imaging technique for monitoring the response of physical therapy in athletes with patellar tendinopathy

Á. Sánchez-Gómez[a], B. Sañudo[b], A. F. San Juan[c], R. Domínguez[d,e]
[a] *Departamento de Enfermería, Farmacología y Fisioterapia. Facultad de Medicina y Enfermería. Universidad de Córdoba. Córdoba. España.*
[b] *Departamento de Educación Física y Deporte. Facultad de Ciencias de la Educación. Universidad de Sevilla. Sevilla. España.*
[c] *Laboratorio de Biomecánica Deportiva, Departamento de Salud y Rendimiento Humano. Facultad de Ciencias de la Actividad Física y del Deporte - INEF. Universidad Politécnica de Madrid. Madrid. España.*
[d] *Departamento de Motricidad Humana y Rendimiento Deportivo. Facultad de Ciencias de la Educación. Universidad de Sevilla. Sevilla. España.*
[e] *Studies Research Group in Neuromuscular Responses (GEPREN). Universidad de Lavras. Lavras. Brasil.*

Objective: Patellar tendinopathy (PT) is a common sports injury, symptoms include pain (anterior & distal poles of the knee), and decreased muscle strength (MS). Imaging technique has been proposed as a good instrument for detecting abnormalities in PT, while eccentric exercises (EE), stretching, and extracorporeal shockwave therapy (ESWT) for its treatment. The aim of this study was to analyse the thickness in injured and uninjured knees and its relationship with MS in athletes with PT.

Method: During 8 weeks, 23 athletes with PT, performed EE and stretching (6 weekly sessions), and ESWT (5 sessions). Pre-intervention (PRE) and post-intervention (POST) were realized assessments of MS (5 maximum repetition test, 5-RM), and thickness of patellar tendon (echography) in the injured and uninjured knee. Differences between PRE and POST was determined by a paired T-test. A Pearson´s correlation was used for changes in 5-RM and thickness.

Results: 5-RM test values improved (71.8±20.0 vs 61.2±7.0 kg; p<0.001), with a reduction of the thickness in injured (5.2±1.3 vs 6.0±1.4 mm; p<0.001), and injured knee (3.9±0.5 vs 4.3±0.6 mm; p=0.001). A significant moderate correlation was found between the enhancement in MS and decreased of the thickness in injured (p<0.001; r=-0.507), and injured knee (p=0.003; r=-0.433).

Conclusions: An intervention based on EE, stretching, and ESWT is effective to improve MS, and reduce thickness in injured and uninjured knees in athletes with PT. Changes in thickness are moderately correlated with changes in MS.

Keywords: Jumper´s knee, Rehabilitation, Resistance Exercise, Strength.

Does winning or losing game segments show relationships with internal and external load metrics in elite beach handball?

I. Asín-Izquierdo[a,b], E. M. Paramio[c], J. C. Zapardiel[a]
[a] *Department of Biomedical Sciences, Area of Sport Physical Education, Faculty of Medicine and Health Sciences, University of Alcalá, Madrid, Spain.*
[b] *Physical Performance and Sports Research Center, Department of Sports and Computer Sciences, Faculty of Sport Sciences, Pablo de Olavide University, Seville, Spain.*
[c] *CEIP Antonio Mingote, Alcalá de Henares, Madrid, Spain.*

Objective: Beach handball has evolved extensively in recent years. The study of internal and external load variables is necessary to structure specific training and to develop knowledge about the variables determining performance in competition. The aim of this study was to compare segments of matches won and lost in an attempt to determine relationships on internal and external load variables in elite beach handball.

Method: 25 elite beach handball players (25.38±4.82 years, 86.96±9.53 kilograms and 187.52±7.48 centimetres) were analysed during the preparation for the European Championships. The matches were divided into 2-minute time segments, with the score of the partial being recorded. Data were collected using GPS-GNSS technology through CatapultSport OptimEye-S5 devices, synchronised with Polar system. Statistical analysis was performed using SPSS v.27 software.

Results: The results showed significant differences with higher values during segments won in the variables of distance per minute (d=large), distance in speed band 2 (6-8.9 km/h), 3 (9-11.9 km/h) (d=very large) and 4 (12-14.9 km/h) (d=medium), number of accelerations (d=large) and decelerations (d=medium), Player Load (d=large) and total number of jumps (d=medium). The minimum heart rate showed significantly higher values (d=median) in the segments lost.

Conclusions: The load variables shown to have the greatest impact on winning or losing a game segment, or vice versa, in elite men's beach handball were distance per minute, distance at speeds of 6-8.9 and 9-11.9 km/h, number of accelerations and player load. These findings should be confirmed in future research.

Keywords: Competition, Match, Time-motion Analysis, Situational effects, Sand.

Phase angle can predict bone indicators in older adults: A cross-sectional study

A. Duarte Martins[a,b], O. Fernandes[a], N. Batalha[a], J. Paulo Brito[b,c,d]
[a] *Comprehensive Health Research Centre (CHRC), Departamento de Desporto e Saúde, Escola de Saúde e Desenvolvimento Humano, Universidade de Évora, Portugal*
[b] *Life Quality Research Centre, Rio Maior, Portugal*
[c] *Sports Science School of Rio Maior, Polytechnic Institute of Santarém, Rio Maior, Portugal*
[d] *Research Centre in Sport Sciences, Health Sciences and Human Development, Vila Real, Portugal*

Objective: This study aimed to verify a relationship between phase angle (PhA) with bone indicators. We also intended to analyse the ability of PhA to predict bone indicators after adjusting for potential confounders.

Method: This cross-sectional study included fifty-six physically independent older adults (age, 70.57 ± 3.79 years; BMI, 28.09 ± 4.37 kg/m2). Bioelectrical impedance analysis was used to measure PhA at 50 KHz. Additionally, bone indicators represented by bone mineral density (BMD) and bone mineral content (BMC) for whole-body and dominant femoral neck were measured through dual-energy X-ray absorptiometry. The University of Évora Ethics Committee approved this study (approval no. 22030).

Results: There were moderate associations between PhA and whole-body BMC ($p= 0.019$; $r= 0.316$), femoral neck BMC ($p< 0.01$; $r= 0.469$), and femoral neck BMD ($p= 0.006$; $r= 0.365$). In addition, after adjusting for potential confounders the linear regression analysis verified that PhA was a significant predictor of bone indicators: whole-body BMC, $\beta= 1803.659$; $p< 0.01$; $R2= 0.523$; femoral neck BMC, $\beta= -1.367$; $p= 0.001$; $R2= 0.212$; and femoral neck BMD, $\beta= 0.179$; $p= 0.022$; $R2= 0.120$).

Conclusions: Good levels of bone indicators, particularly femoral neck BMD and BMC are related with higher cellularity, cell membrane integrity and better cell function, expressed by PhA. We also conclude that the PhA can be used as a marker of bone quality.

Funding: This work is funded by national funds through the Foundation for Science and Technology, under the project 2021.04598.BD; UIDB/04923/2020 and UIDP/04748/2020.

Keywords: Older adults, Phase angle, Bone Mineral Density, DXA.

Effects of beetroot juice supplementation during an interval session on female swimmers.

I. López-León[a], J. Moreno-Lara[a], A. J. Sánchez-Oliver[a,b,c], R. Domínguez[a,b,c], L. Leitão[c]
[a] *Departamento de Motricidad Humana y Rendimiento Deportivo, Universidad de Sevilla, Seville.*
[b] *Studies Research Group in Neuromuscular Responses (GEPREN), University of Lavras, Lavras, Brazil.*
[c] *Sciences and Technology Department, Superior School of Education of Polytechnic Institute of Setubal, Setúbal, Portugal.*

Objective: There is not a clear effect of beetroot juice supplements (BRJ) on high trained athletes, and more research is needed before sex-specific guidelines. Therefore, this study analyzed the effect of BRJ on swimming performance in female well-trained.

Method: A 8 x 50m swimming test with 2 minutes of recovery was executed by 6 well-trained female swimmers after ingesting 140 ml of BRJ enriched in NO3- (~12.8 mmol of NO3-) or depleted in NO3- (PLAC). The best and medium time of the swimming test, rate of perceived exertion (RPE), and blood lactate concentration (BLa) after the test was determined. A paired t-test was applied.

Results: After enhanced the medium time (33.2 ± 2.4 vs 33.6 ± 2.6 s; $p<0.001$), and the fastest repetition (32.3 ± 2.5 vs 32.4 ± 3.1 s; $p=0.002$) without differences in BLa ($p=0.078$) and RPE ($p=0.706$).

Conclusions: Results of this pioneering study suggest a possible ergogenic effect of BRJ during an interval training session in well-trained female swimmers.

Keywords: aquatic sports; ergogenic aids; nutrition; swimming

∗ Corresponding authors: israel.caraballo@uca.es (I. Caraballo), rgomez@ceuandalucia.es (R. Gómez-Chacón), ocastillo@us.es (O. DelCastillo-Andrés).
https://doi.org/10.33155/j.ramd.2023.02.001
e-ISSN: 2172-5063

Junta de Andalucía

Consejería de Turismo, Cultura y Deporte

CENTRO ANDALUZ DE MEDICINA DEL DEPORTE

Glorieta Beatriz Manchón s/n
(Isla de la Cartuja)
41092 SEVILLA

Teléfono
955 540 186

Fax
955 540 623

e-mail
camd.ced@juntadeandalucia.es