

Original Research

The Role of the Sports Kinesiologist to Prevent Grade II Ankle Sprains in Volleyball

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Abstract: In sports such as volleyball, characterized by repetitive high-intensity movements that heighten the risk of musculoskeletal injuries, particularly to the ankle, critical management of diagnosis, rehabilitation, and re-athletisation phases by specialized professionals comes to the forefront. In the realm of sports medicine and rehabilitation, there is a growing need to comprehensively assess the effectiveness of various professionals involved in the recovery process after injuries. The validity of such evaluations can only be established through prospective studies that follow individuals' post-injury. This study aims to evaluate the effectiveness of sports kinesiologists in ankle injury rehabilitation through the lens of athlete perception. By establishing valid relationships between recovery outcomes and the professionals involved, this research seeks to provide valuable insights into the world of sports rehabilitation. To attain a comprehensive understanding, qualitative data were collected and analyzed. Surveys were administered to 52 volleyball athletes (27 males and 25 females), all of whom had experienced at least one Grade II Ankle Sprains injury during their athletic careers. The survey questions encompassed aspects such as weekly training frequency, engagement in preventive exercises, the number of career injuries, injury recurrence events and knowledge of the kinesiologist. The Chi-Square test identified a significant correlation between reduced injury relapse and regular engagement in preventive exercises ($p < 0.05$). This study emphasizes the importance of sports kinesiologists in the context of volleyball injury prevention, highlighting the necessity of customizing protocols to cater to individual athletes' needs and preferences. It clarifies the distinction between the standard protocols of athletic trainers and the specific protocols of kinesiologists specializing in preventive and adapted physical activities. This study contributes to clarifying the professional role of preventive and adapted physical activities kinesiologists, setting them apart from other professionals working in the realm of sports training.

Keywords: sports science and exercise; ankle; prevention; professional sport profile

1. Introduction

Volleyball is a sport of an intermittent nature that requires the athlete to make quick

gestures, with maximal or sub-maximal intensity, both in jumping in various directions and in lateral movements (D'Isanto et al., 2018). Vertical jump and



speed of play in volleyball require considerable physical strength and speed of execution of the technical gesture (Altavilla et al., 2022; D'Elia et al., 2021), with the aim to express the power needed to gain an advantage over the opponent to anticipate him in the action or to reach the position in time (Alminni et al., 2019). Therefore, the reiteration of high-intensity gestures is the most frequently used method of improving performance, and it affects the frequency of musculoskeletal injuries in this sport (Bere et al., 2015). Most sports injuries, both acute and from overload, occur during the jumping movement (Eerkes, 2012). Overload injuries are more common than acute injuries and occur because of continuous incorrect execution of the technical gesture, high number of repetitions or type of playing surface (Reeser et al., 2006). Elite athletes have a higher risk of overload injuries, presumably due to longer training hours and more matches played (Verhagen et al., 2004). These injuries result in high costs for the sports club, both in terms of direct medical expenses and the athlete's unavailability in competitions (Kilic et al., 2017). It is therefore necessary to take effective preventive measures not only to reduce the incidence of injuries in volleyball, but also to prevent consequential costs from such injuries. In particular, the ankle injury is the most frequent in volleyball players, as the ankle is frequently stressed and strained in the practice of this discipline (Bahr et al., 1994). Previous studies have found an incidence of approximately 3.5 injuries per 1000 hours during competition and 1.5 injuries per 1000 hours during training (Bahr et al., 1994; Bahr & Bahr, 1997). With an overall average between training and competition of about

1.7 injuries per 1000 training hours. Verhagen et al. (2004) found a rate of 2.6 injuries per 1,000 hours in a sample of 486 male and female volleyball athletes in the Dutch 2nd and 3rd leagues. The main injuries occurring to the ankle are sprains, accounting for 41% of all volleyball-related injuries. Following a sprain, ankle ligaments can be stretched or ruptured, requiring long recovery times that affect the health and well-being of the athlete and the performance of the team. In addition, acute ankle sprains have a high recurrence rate, which is associated with the development of chronic ankle instability (Roos et al., 2017).

To promote the prevention and recovery of athletes from such injuries, the intervention of certain professional figures is necessary, such as that of the kinesiologist, recently introduced in Italy by means of a state decree. In line with Article 41 of Legislative Decree (Dlgs) no. 36 of 28 February 2021, the kinesiologist collaborates with doctors specialising in sports and exercise medicine, physical medicine and rehabilitation, and health professionals (Gazzetta Ufficiale, 2021). This step taken by the delegated legislator is the result of a process that began some time ago and which, not without great effort, has led to the valorisation of a figure that, in the past, has not been accorded adequate importance. While there have been many attempts to recognise the professional dignity of exercise and sports science graduates, at the same time, they have never managed to establish themselves clearly. The reason is to be found in the desire of specific professional categories not to see their prerogatives infringed; that has impeded the growth and professional recognition of the exercise and

sports science graduates over time (Gaetano et al., 2018). First, it was problematic within the organisation to carry out professional activities that could seemingly interfere with healthcare activities' sphere (Raiola, 2020). The category of graduates in exercise and sports science has never been included among the health professions, which makes the relationship between them and figures working in this field problematic since the competencies of these figures are all oriented towards prevention's area (D'Elia et al., 2018; D'Isanto et al., 2022).

Therefore, the function of the kinesiologist differs from that of the physiotherapist, specialised health professionals whose function is to prevent or treat physical difficulties caused by trauma or other causes (e.g., neurophysiological) (Gazzetta Ufficiale, 1994). The physiotherapist, following the provisions of the Ministry of Health and the specific regulations on the training of professional profiles (Gazzetta Ufficiale, 1992) has a professional health function, which aims to rehabilitate and reactivate physical functions. According to Law no. 251 of 10 August 2000 (Gazzetta Ufficiale, 2000) he is the only figure appointed to carry out prevention, treatment and functional assessment activities with ownership and professional autonomy towards individuals and the community. The academic pathway that confers the title of physiotherapist is the specific degree (class of degrees in rehabilitation health professions) as defined by the decree of 19 February 2009 (Gazzetta Ufficiale, 2009).

On the other hand, kinesiologist works on a medical-pedagogical basis, concentrating his work on the educational aspect. Through the teaching of movement

and structured physical exercise, he attempts to educate and re-educate to achieve the athlete's health and well-being (D'Isanto et al., 2023). The reason behind the recognition of the figure of the kinesiologist is to be found in three distinct aspects: in addition to enhancing figures to whom, over time, the national legislature had never reserved adequate and suitable discipline, the aim is to promote, through sporting activity, correct lifestyles, and the protection of the safety of those who perform physical exercise. The delegated legislator through Decree no. 36 of 2021, did not merely introduce the profile of the kinesiologist in general, but went so far as to outline the traits of two different professional figures. There is a need to clarify this to avoid overlapping of functions between the two roles of the kinesiologist: that of preventive and adapted physical activities, which designs, conducts, and evaluates individually structured exercise pathways for re-education and re-athletisation, and that of sport, which designs, conducts, and evaluates for performance improvement for everyone in a state of complete efficiency. The professional activity of a kinesiologist of preventive and adapted physical activities, as established by Article 5 of Dlg no. 36 of 28 February 2021, has as its object: "a) the design and implementation of physical activity programmes aimed at achieving and maintaining the best conditions of psychophysical well-being for individuals in various age groups and in different physical conditions; b) the organisation and planning of particular activities and lifestyles aimed at preventing disease and improving quality of life through physical exercise; c) the prevention of postural vices and post-

rehabilitation functional recovery aimed at optimising physical efficiency; *d*) the planning, coordination and evaluation of adapted physical activities for people with disabilities or in individuals with clinically controlled and stabilised health conditions” (Gazzetta Ufficiale, 2021). On the other hand, the figure of the sports kinesiologist, as stated in Article 2 of the Dlgs, deals with personalised physical and technical preparation for individual and team competition.

Subsequently, Dlgs no. 163 of 5 October 2022 (Gazzetta Ufficiale, 2022) provides for additions and corrections to the previous decree, stipulating that “the kinesiologist of preventive and adapted physical activities, or another professional with specific skills, supervises adapted physical activity performed in groups and supervise structured physical exercise performed individually. This additional specification avoids the misunderstanding of overlapping functions between the two roles of the kinesiologist because the one who conducts individually structured physical exercise does not have the same value as the role of the athletic or personal trainer, professional figures formed by the Italian National Olympic Committee (CONI) and its bodies (National Sports Federations, Sports Promotion Bodies and Associated Disciplines) and regulated in the National Qualifications System (SNaQ) (Italian National Olympic Committee, 2018). Another indication provided by the legislator is the recognition of 'health gyms', indicated as facilities of a non-healthcare nature, both public and private, where structured exercise and adapted physical activity programmes are performed. With the term 'structured

physical exercise', the legislator refers to those planned and repetitive physical activity programmes defined through professional and organisational integration between general practitioners, freely chosen paediatricians and specialists. Within these structures, the kinesiologist of preventive and adapted physical activities will be called to coordinate and plan activities, collaborating with medical specialists in sports and exercise medicine, physical and rehabilitation medicine, and nutritional sciences (Gazzetta Ufficiale, 2022). In addition, the collaboration will also include health professionals, such as the physiotherapist and the dietician.

Until now, personal, and athletic trainers have improperly performed the function of re-education and re-athletisation due to a lack of knowledge concerning the correct process of approaching the complete state of health and physical well-being after injury and, consequently, the application of this specific knowledge. One of the problems plaguing sports organizations because of the reform of structured work in the field of exercise and sports is the lack of knowledge on the part of the professionals working there of the role they play within the organization and, therefore, the functions they are expected to perform. As a result, even the exercise of the function of pre-injury prevention, post-injury functional recovery is covered by profiles that do not have the appropriate skills in reference also to the qualifying title obtained. Considering the differentiation and the potential critical points that may arise from recognizing this new professional figure, the study aims to assess the effectiveness of sports kinesiologists in the process of re-

athletization after ankle injuries, with a specific emphasis on the athletes' perspective. Through an examination of the athlete's viewpoint and experiences, the study seeks insights into the impact of sports kinesiology on their recovery. To achieve a comprehensive understanding of this subject, qualitative data was collected and analyzed. This approach allowed for the capture of athletes' perceptions and personal insights, providing a distinct perspective on their training experiences.

2. Materials and Methods

Subjects — Participants were recruited from volleyball clubs affiliated with the Italian Volleyball Federation. Inclusion criteria required that athletes had a history of second-degree ankle sprain, while exclusion criteria excluded individuals who were still undergoing rehabilitation at the time of the study. Recruitment was conducted through emails and in-person invitations during training sessions. To ensure a representative sample, a mix of male and female athletes across different regional teams was included. All participants in the study had experienced at least one second-degree ankle sprain during their volleyball careers. To address concerns about the severity of these injuries, information regarding the assessment and categorization of second-degree ankle sprains in the participants has been included. This assessment relied on clinical evaluations conducted by experienced sports medicine professionals, following established field guidelines. These injuries were effectively treated and healed through rehabilitation administered by physical therapists and kinesiologists. The participants are actively involved in competitive activities and are

affiliated with the Italian Volleyball Federation. The substantial sample size and its representativeness at the territorial level make it suitable for professional and scientific discussion.

Data Collection — After choosing the target population, data collection was carried out considering both methodological implications and available economic and human resources. On this basis, it was decided to administer a survey, the writing of which was based on the conceptual dimensions and related indicators identified during the definition of the research objective. The survey was administered online through a web-based platform, ensuring anonymity and ease of access for participants. Responses were collected over a 4-week period to ensure sufficient participation. The survey was only intended to analyze, through the athletes' responses, the effectiveness of the protocols administered by the different professional profiles, without specifying the characteristics of the protocols administered. This information can provide valuable insights into aspects such as weekly training frequency, commitment to preventive exercises, the number of career injuries and recurrences and knowledge of the kinesiologist, which can have a significant impact on overall athletic performance. Some studies in the literature have demonstrated the validity of the survey in detecting the perceptions of stakeholders (Robbins & Rosenfeld, 2001; Fuller & Myerscough, 2001; Podlog & Eklund, 2009).

Validity and Reliability procedure — Validity refers to the fact that an instrument measures exactly what it purports to measure (Souza et al., 2017). In this study, face and

content validity were assessed. Face validity refers to the conciseness of the items of the instrument concerning clarity, brevity, and completeness (Sangoseni et al., 2013). Content validity refers to the degree to which items in an instrument reflect all aspects of the construct (Haynes et al., 1995) and is based on the judgement of a group of experts in a specific area of interest. To guarantee these two types of validity, the surveys were revised by two study groups. The first group were survey construction experts who adapted the structure of the surveys as they

saw fit. The second group were experts who assessed whether the questions correctly captured the topic. Items with content validity index (CVI) greater than 0.78 were included in the final instrument. Items had a dominant focus on weekly training frequency, the practice of preventive exercises and the number of career injuries in addition to injury recurrence events. Reliability is the ability to reproduce a result consistently across time and space or from different observers (Sangoseni et al., 2013). The survey administered is shown in Table 1.

Table 1. Survey administered to the stakeholders.

Q1	Specify gender
	(a) Male
	(a) Female
Q2	What is your position in the field?
	(a) Setter
	(b) Hitter
	(c) Middle blocker
	(d) Libero
	(e) Defensive specialist
Q3	Do you know the professional profile of the kinesiologist defined in the Sports Reform Act of 2021?
	(a) Yes
	(b) No
	(c) Fairly
Q4	Which professional figure do you turn to for reathletisation and return to sport?
	(a) Physiotherapist
	(b) Sports kinesiologist
	(c) Preventive and adapted physical activities kinesiologist
Q5	How many training sessions per week do you do?
	(a) 2
	(b) 3
	(c) 5 or more
Q6	Do you suffer from chronic ankle instability?
	(a) Yes
	(b) No
Q7	How many ankle injuries have you received in your career?
	(a) No one
	(b) Several with relapse
	(c) One without relapse
Q8	Did you receive surgery after your injury?
	(a) Yes
	(b) No
Q9	How long was the rehabilitation period?
	(a) 3-8 weeks
	(b) 2-6 months
	(c) 6-12 months
Q10	During training, after the injury and recovery (rehabilitation and reathletisation) do you perform preventive ankle exercises?
	(a) Yes
	(b) No
Q11	Did you have a relapse?
	(a) Yes
	(b) No

The reliability criteria calculated in this study were stability, which measures how similar the results measured at two different points in time are through the test–retest with a sample of at least 50 subjects and the calculation of the intraclass correlation coefficient (ICC) (Terwee et al., 2007), and internal consistency, which shows whether all items of an instrument measure the same characteristic through Cronbach's α coefficient (Streiner, 2003).

Statistical Analysis — To validate the surveys, we first assessed its internal consistency through Cronbach's and associated 95% confidence intervals (CI). A Cronbach's α of 1 indicated perfect reliability, with a cut-off of 0.70 indicating an acceptable internal consistency. The ICC was interpreted using the criteria suggested by Portney and Watkins (2009) as poor reliability ($ICC \leq 0.50$), moderate reliability ($ICC 0.50–0.75$), good reliability ($ICC 0.75–0.90$), and excellent reliability ($ICC \geq 0.90$). A chi-square analysis (χ^2) was performed to identify associations between the various participant responses. Significance was set at $p < 0.05$. The statistical analysis was performed using the Statistical Package for

Social Science software (IBM SPSS Statistics for Windows, version 25.0, IBM).

3. Results

The internal consistency of the survey for presidents was excellent (Cronbach's α coefficient [95% CI] 0.92 [0.89–0.94]; $p < 0.000$). In addition, the survey for trainers had a good internal consistency (Cronbach's α coefficient [95% CI] 0.85 [0.81–0.89]; $p < 0.000$). The test–retest reliability of the survey ranged from moderate to excellent.

A first significant difference in perception was found between question 3 and question 4. This shows the lack of knowledge about the figure in charge of the re-athletisation phase and about the professional figure of kinesiologist. A similar relationship was found between question 4 and question 11. It was confirmed the lack of knowledge about the figure in charge of the re-athletisation phase. An inadequate choice can lead to the risk of relapse. Finally, significant difference in perception was found between question 10 and question 11. Of the 37 participants who responded that they had not experienced a relapse of an ankle injury in 31 cases, there was a relationship with regular practice of structured preventive exercise given by a sports kinesiologist, athletic or personal trainer. A detailed description is shown in Table 2.

Table 2. Chi Square Associations.

		Q4. Which professional figure do you turn to for reathletisation and return to sport?			χ^2	p
		Preventive and adapted physical activities kinesiologist	Sports kinesiologist	Physiotherapist		
Q3. Do you know the professional profile of the kinesiologist defined in the Sports Reform Act of 2021?	Yes	10	4	3	8.34	0.000
	No	2	5	4		
	Fairly	12	6	5		
		Q11. Did you have a relapse?			χ^2	p
		Yes	No			
Q4. Which professional figure do you turn to for reathletisation and return to sport?	Physiotherapist	3	9		7.84	0.001
	Sports kinesiologist	8	12			
	Preventive and adapted physical	4	16			

activities kinesiologist		Q11. Did you have a relapse?			
		Yes	No	χ^2	P
Q10. During training, after the injury and recovery (rehabilitation and re-athletisation) do you perform preventive ankle exercises?	Yes	6	25	9.77	0.002
	No	13	8		

4. Discussion

The purpose of this study was to check whether the ordinary protocols designed, conducted, and evaluated by the sports kinesiologist were effective in preventing ankle injury recurrence. Half of the participants have been playing volleyball for at least 10 years. 75% of the participants stated that they carry out at least 3 training sessions per week. This data is indicative for defining the weekly training load (Impellizzeri et al., 2019; Foster et al., 2001), which, if properly dosed, guarantees the development and maintenance of physical abilities that are associated with the reduction of injury risk, creating a protective effect for athletes (Gabbett, 2016). The 34.6 % of the participants suffered only one injury episode during their career as an athlete, while the remaining 65.4 % suffered at least one relapse, but at different times and without a specific cause, since we do not know from the answers received whether these relapses can be attributed to the lack of practice of preventive exercises or the incorrect management of the training load. It is evident that excessive loading causes tissue damage (Kalkhoven et al., 2021). Although only 3.85% required surgery, recovery took at least 1-3 weeks, resulting in the temporary absence and considerable direct and indirect health costs because of probable impairment in daily life, sport and/or work (Verhagen et al., 2014). It was confirmed in question 3 that stakeholders have little knowledge of the figure of the kinesiologist introduced by Dlgs no. 23 of 2021. 46.5% of the athletes claim to be aware of the professional figure of the kinesiologist, compared to 28.84 % who claim not to know him or 25% who claim to know

him in part. Similarly, in question 4, confusion emerges regarding the figure assigned to the re-athletisation phase. 44% indicate the kinesiologist of preventive and adapted physical activities, 31% the sports kinesiologist and 25% the physiotherapist. Finally, the most significant finding was the statistically significant association ($p < 0.05$) found between the practice of preventive exercises after recovery from an ankle injury given by a sports kinesiologist and the reduction in the rate of ankle injury recurrence. Specifically, 59.6 % of the participants stated that they regularly performed preventive exercises given by the sports kinesiologist within each training session and that only 19.35 % of them had suffered ankle injury recurrences; while among those who did not perform preventive exercises regularly after recovery (40.4 %), 62 % of them suffered ankle injury recurrences. This data showed that the protocols adopted by the sports kinesiologist, as for the personal trainer and the athletic trainer, in the ordinary activity of planning, conducting, and evaluating the athletic and technical preparation of athletes up to the highest levels of competition, helped reduce the ankle injury rate.

5. Practical Applications.

The data obtained give rise to some considerations related to the academic training that qualifies one to exercise the various professions working within health, fitness, and sports centers. For this reason, there is a need for greater consistency between training activities for each individual academic pathway and congruence in the characterizing areas of the

new professional profiles. Therefore, regarding the professional profile of the kinesiologist, in its two declinations (sport, and preventive and adapted physical activities), there is a need to prepare curricula that are coherent and compatible with the training objectives of these profiles, which are distinct from each other and from all the others that also operate in the same organizational context. These practices are not limited to any single country but are instead embraced internationally. Moreover, international sporting organizations, such as the International Olympic Committee and FIFA, have established standardized guidelines for athlete rehabilitation and injury prevention (Junge et al., 2008; Bizzini et al., 2013). These guidelines reflect a global consensus on the importance of these practices and further bolster the argument for the international relevance of this study. Further research is needed to explore how kinesiologists specializing in sports, preventive, and adapted physical activities fulfill their roles in the context of prevention and functional recovery. It is also essential to determine whether the protocols they follow are standardized, allowing for comparisons with those used by other professionals in the field (Brewer et al., 2000; Arvinen-Barrow & Clement, 2015). Future studies should also assess the effectiveness of the protocols designed and implemented by the kinesiologist of preventive and adapted physical activities and compare them with the results of this study to assess whether there is indeed a difference in the functions of the two distinct professional roles. This distinction is essential to avoid overlapping of professional roles within the exercise and sports sciences because they perform the same function even though they have different roles and functions. One potential cause of this overlap may be the structure of academic programs which, do not specify the difference between these professional figures (D'Isanto et al., 2022; 2023). There is probably a lack of a clear definition of objectives that

consistently meet the occupational outlets defined by Dlgs no. 36 of 28 February 2021 and that are shared by all universities. Moreover, this profile within their company organigramme could be seen as a heavy economic cost burden by the operators (Avancini et al., 2022; Shirley et al., 2010). The presence of an additional professional might represent a significant cost for the employer, which is why, if there is no sanctioned obligation in place, it is easy to see how it will be difficult for the professionals involved to obtain an employment contract.

On the other hand, it is the same Dlgs no. 36 of 2021, in paragraph 6, Article 41 refers to possible equivalences to exercise the profession. Equivalences between the sports federations' training courses and university courses would be difficult to achieve because these are determined according to the European Qualifications Framework (EQF) scheme that stratifies official qualifications. According to this scheme, a bachelor's degree is level 6 and a master's degree level 7, whereas technical specialisation certificates issued by national sports federations (NSF) are level 4 and, therefore, cannot be made equivalent. The study results show that little attention has been paid to the legislation introducing this new professional figure (Raiola et al., 2022). It will be necessary to review the discipline concerning the kinesiologist, a profile that has been considerably penalised by what has been outlined. The study has the unavoidable limitation of originality due to the necessary distinction between sports kinesiologist and kinesiologist of preventive and adapted physical activities for reathletisation. Another limit is represented by the sample size, certainly limited to be able to support conclusions. A further limitation includes the self-reported nature of the survey, which may introduce recall bias, and the reliance on participant perceptions, which might not always align with clinical outcomes. Additionally, while the sample is representative of regional volleyball teams,

findings may not generalize to athletes in other sports or countries.

6. Conclusions

From the survey, in the sample examined, there is a considerable number of cases of ankle injuries with both individual consequences, referring to the athlete's state of health and well-being, and sports injuries requiring long recovery periods. An important finding is the reduction of injury relapses for those who regularly practice a structured exercise protocol also by the sports kinesiologist, as in this case, aimed at prevention. The ordinary protocols of the sports kinesiologist, the athletic and the personal trainer must be unbundled with the special protocols of the preventive and adapted physical activity kinesiologist for individually and group structured exercise for recovered injured persons also with the specification of injury recurrence. This may contribute to the clear definition of the professional role of the preventive and adapted physical activity kinesiologist, which is distinct from the role of the sports kinesiologist and other figures working in the field of sports training.

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