

Selected determinants affecting the decision of athletes to undergo rehabilitation

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ABSTRACT

Introduction: Over the past few years, there has been a growing interest in sports activities. Scientists agree that this phenomenon is likely to be followed by an increased occurrence of related injuries. In order to better understand the nature of factors accompanying sports trauma, the authors of this paper decided to assess the individual and environmental factors leading to the decision to undergo rehabilitation.

The aim was to identify causes and individual factors affecting the decision process to undergo rehabilitation and treatment effectiveness in athletes.

Materials and methods: The study was conducted based on a proprietary online questionnaire consisting of 46 questions using Microsoft Forms in a group of athletes. From October 25th to November 29th, 2020, a total of 581 questionnaires were collected from the respondents. Due to the lack of important data or conflicting information, 94 of those had to be withdrawn from the study. A total of 487 questionnaires were finally enrolled in the study. The analysis was carried out using Microsoft Excel and Statistica 13. Values of $p < 0.05$ were identified as statistically significant.

Results: The study group consisted of 487 questionnaires ($n = 358$ men, $n = 129$ women) with a Me age of the respondents of 21 years (Q1–Q3: 18–24) and body mass index (BMI) 22.9 kg/m² (21–25.6). We found a significant correlation between age and BMI, as respondents with lower values of BMI and age were characterised by a higher frequency of training sessions. At the same time, the need for picking up excessive training loads was

associated with older respondents with higher BMI. A total of 91.4% of the respondents from the study group reported a past trauma (mostly men – 74.4%, $p < 0.001$). In our study, we did not find a relation between the sports discipline, type of employment, and the possibility of trauma. The percentage of injuries rose with the level of self-reported advancement of the respondents (beginners – 75%, medium advanced – 86%, advanced – 90%). The list of the most commonly reported causes of the trauma included actions of the opponent ($n = 173$), excessive training load ($n = 118$), and lack of concentration ($n = 110$). Out of 447 people that confirmed sustaining a sport-related trauma in the past, 47% ($n = 207$) reported using the help of a physiotherapist afterward. Physiotherapy (PT) use was more common among women than men (56% vs. 45% respectively, $p = 0.045$) and older subjects (Me: 22 years, Q1–Q3: 18–27 vs. Me: 20, Q1–Q3: 17–23; $p = 0.001$). It was also more popular among those with a stronger relation with sport (advanced, professionals; $p < 0.001$). An overall assessment of the effectiveness of PT was high, both in terms of its analgesic effect (Me: 8, Q1–Q3: 7–9) and functional recovery (Me: 9, Q1–Q3: 7–10). The highest score was identified for the analgesic effect of kinesiotherapy ($p = 0.01$).

Conclusions: There is a need for education programmes highlighting the importance of PT in sports and its effectiveness in the treatment and prevention of sports trauma (specially in younger men with limited experience).

Keywords: physiotherapy; kinesiotherapy; sports; sports-related trauma; athletes.

INTRODUCTION

In the past few years, there has been a growing interest in sports activities observed in the general population in Poland [1]. Scientists confirm the existing correlation between the popularity of sports and the increasing ratios of accompanying injuries [2]. Despite the fact that COVID-19 had affected the occurrence of sports trauma by minimizing its rates, we are currently noticing an increased trend in the opposite direction [3]. In order to reduce the number of sports-related injuries, scientists continue their long-lasting search for more efficient prophylactic methods and treatments. On one hand, COVID-19 has forced some people to reduce their physical activity, but on the other hand, it has motivated those in search of a way to minimize the negative effects of isolation [4, 5, 6].

Studies confirm that regular physical activity has multiple benefits and decreases the risk of sports-related trauma [7, 8, 9]. Physiotherapy (PT), as a form of conservative treatment, is a crucial part of the treatment of sports-related injuries [10, 11]. High-level athletes and professional sports teams identify a physiotherapist as an integral part of the training team. Despite that, there is a noticeable number of athletes who underestimate the severity of sustained injuries and decide on self-treatment. These may be associated with restarting the training regime too soon, which leads to a decrease in general physical fitness and an increase in the risk of subsequent trauma [12, 13]. In order to better understand the motivation and factors accompanying the trauma, we decided to assess the impact of individual (age, sex, body mass index – BMI) and environmental factors on the decision to undergo PT treatment.

The main aim of the study was to identify the causes and individual factors that impact the athletes' decision-making process to undergo PT. We aimed to find answers regarding the significance of age, BMI, sex, individual experience, and self-reported advancement in the decision to start PT. Additionally, we tried to determine the percentage of athletes undergoing PT and assess the need for further education on the topic among those engaged in regular physical activity. A secondary aim involved the subjective assessment, according to the respondents, of the efficacy of PT in different groups of athletes, based on their varying levels of experience.

MATERIAL AND METHODS

The study was conducted using a proprietary online questionnaire administered through Microsoft Forms, under the license of the Jagiellonian University, among a group of athletes. The URL address of the questionnaire was shared through social media platforms and groups associated with individuals who engage in regular exercise or training. To ensure the inclusion of high-level and professional athletes, the URL was also distributed to professional teams, including those involved in volleyball and basketball. Each respondent was informed about the anonymous nature and objectives of the study. Data collection took place from October 25th to November 29th, 2020, during which a total of 581 questionnaires were collected. Among these, 94 were removed due to missing or inconsistent data. Therefore, the analysis was conducted on 487 questionnaires that contained a complete set of information. The study enrolled a total of 487 respondents, with the Me age of 21 years (Q_1 – Q_3 : 18–24) and a Me BMI of 22.9 kg/m² (21–25.6 kg/m²). Men ($n = 358$; Me: 21 years, Q_1 – Q_3 : 18–24) constituted the majority of the study group compared to women ($n = 129$; Me: 20 years, Q_1 – Q_3 : 17–23).

The questionnaire consisted of 46 questions divided into several parts. The first part focused on anthropometric measures such as age, weight, and height, as well as the type of employment (pupil, student, white collar, blue collar) and the use of stimulants such as alcohol and tobacco. The second part of the questionnaire contained questions about the respondent's individual sports experience. This included the duration of warm-up, the length and frequency of training sessions, as well as the type and level of physical activity.

Two subjective scales were used to assess the respondents' sport experience. The first scale categorized the character of the sport into 3 types: recreational sport (for relaxation and health benefits without competition, $n = 139$), amateur sport (for relaxation and health benefits with competition, $n = 259$) and professional sport (with earning goals and competition, $n = 89$). The second scale assessed the level of advancement in the respondents' main discipline, categorizing them as beginners ($n = 48$ people), intermediate ($n = 299$), or advanced ($n = 140$).

The next section of the questionnaire focused on the specifics of sport-related trauma, including the nature, severity, and probable causes of the injuries. Based on the collected data,

8 types of commonly reported injuries were selected for further analysis, including sprains ($n = 142$), muscle strains/tears ($n = 104$), fractures ($n = 84$), joint dislocations ($n = 45$), contusions/bruises ($n = 20$), torn anterior cruciate ligament – ACL ($n = 13$), overuse injuries of the menisci/patella and/or knee joint ($n = 8$), and other ligament tears ($n = 6$).

All trauma-related follow-up questions provided in the questionnaire referred to just 1 trauma – the one considered to be the most severe according to the respondent. The description of the trauma treatment covered details regarding PT including the subjective assessment of its efficiency on a scale of 1–10 (where 1 represents “very bad” and 10 represents “very good”). Two aspects were analysed: analgesic effect and functional improvement. The last part of the questionnaire contained follow-up questions on the final outcome of the injury, such as whether the person continues training at the previously presented level and if their associated satisfaction is similar to what it used to be before the trauma (1 represents “definitely not” and 10 represents “definitely yes”).

The statistical analysis was conducted using Microsoft Excel and Statistica 13. Quality data was presented as both the number of reported answers and the corresponding percentage, while quantitative variables, due to their nonparametric distribution, were presented as Me and Q. Potential dependencies between qualitative variables were assessed using the χ^2 test. Relationships between quantitative and qualitative variables were assessed using the Mann–Whitney U test or Kruskal–Wallis ANOVA, depending on the number of subgroups. Statistical significance was established at $p < 0.05$.

RESULTS

Despite the fact that the average age for the group was relatively young, there was a significant correlation between age and BMI ($R = 0.47$). Furthermore, both age and BMI showed significant correlations with the type of physical activity (amateur, recreation, pro) and respondents' dedication to physical activity. The study found that lower BMI and age were associated with more intense training sessions. However, no significant differences were found in age or BMI in relation to the length of warm-up and self-reported level of advancement (beginner, intermediate, advanced). Nevertheless, both age and BMI were related to a tendency to undertake excessive training loads, particularly among older subjects with higher BMI values (Me: 23.8 vs. 21.7 kg/m²). No such dependency was found for the sex of the respondents ($p = 0.900$) – Table 1.

A total of 91.4% ($n = 447$) reported having sustained a sports-related injury in the past. Men constituted the majority of the group, accounting for 74.4% ($p < 0.001$). The study did not find a relationship between the sports discipline or the nature of employment and the likelihood of experiencing a sports-related trauma. The most commonly reported disciplines included basketball (178 cases), volleyball (109), football (98), and gym (86). The percentage of trauma tended to increase with the advancement level of the respondents (beginners – 75%, intermediate –

TABLE 1. Characteristics of the group in relation to the age and body mass index of the respondents and their sports experience

Variable	Available answers	n	Age (years)			BMI (kg/m ²)		
			Me	Q1-Q3	p	Me	Q1-Q3	p
Declared frequency of training sessions	few times a month	37	23	21–28	<0.001	24.5	21.9–26.3	0.002
	once a week	35	25	21–32		24.8	22.9–26.7	
	2–3 x per week	271	20.5	18–24		23.1	20.9–25.6	
	everyday	144	18	17–22		22.5	20.6–24.3	
For how long have you been training?	<year	32	21.5	19–24	0.006	22.4	20.4–25.7	0.014
	1 year	34	19	16–21		21.2	19.8–23.7	
	2 years	50	20	18–24		23.1	21.7–25.1	
	3–4 years	72	20	17–22		22.1	21.1–24.2	
Type of sport activity	recreation	139	21	19–25	<0.001	23.4	21–25.9	<0.001
	amateur	259	22	18–25		23.5	21.3–25.9	
	professional	89	18	16–20		21.6	20.2–23.4	
Subjective level of advancement	beginner	48	20	18–23.5	0.799	22.5	20.5–24.9	0.383
	intermediate	299	21	17–25		23.3	21.1–25.7	
	advanced	140	21	18–24		22.8	20.8–25.6	
Length of the warm-up	no warm-up	24	22	20–23.5	0.217	21.9	21.1–26.8	0.235
	<10 min	194	21	18–25		23.4	21.2–26	
	10–20 min	220	20.5	17–24		22.8	20.8–25.4	
	app. 30 min	45	20	17–23		21.9	20.3–24.3	
Using excessive training loads	>30 min	4	21	17.5–35	0.016	22.2	21.4–30.2	<0.001
	yes	265	22	18–25		23.8	21.6–26	
	occasionally	147	20	17–23		22.5	21–24.3	
	no	75	20	17–24		21.7	20–24.8	

BMI – body mass index

86%, advanced – 90%). The most frequently reported causes (respondents could mention more than 1) for sports-related injuries included actions by opponents ($n = 173$ answers), excessive training load ($n = 118$), and lack of concentration ($n = 110$). Other causes included previous trauma ($n = 90$), uneven surface ($n = 89$), insufficient warm-up ($n = 75$), improperly performed exercise ($n = 49$), and others ($n = 48$).

Out of 447 respondents who claimed to have sustained a sports-related trauma in the past, 47% ($n = 207$) reported using the help of a physiotherapist. The majority of the reported traumas occurred during the game/competition (171/38.5%) or the main part of the training (104/23.7%; $p > 0.05$). The type of the main sports discipline was not related to the respondents' decision to proceed with PT. However, PT was more likely to be reported by women rather than men (56% vs. 45%, $p = 0.045$) and slightly older subjects (Me: 22 years, Q_1 – Q_3 : 18–27 vs. Me: 20, Q_1 – Q_3 : 17–23; $p = 0.001$). No such differences were found in relation to BMI. There was a significant difference in terms of the length of the warm-up and the decision to undergo PT. Those who decided on PT reported longer warm-ups in the questionnaire ($p = 0.004$). The frequency of training sessions

also played a role, as those who trained less were more likely to undergo PT. Self-assessed type of sports activity (amateur, recreation, pro) and level of advancement (beginner, intermediate, advanced) had an opposite relationship with the decision to start PT. It was more popular among those who identified themselves as more committed to physical activity ($p < 0.001$) – Table 2.

Analysis of the types of reported trauma revealed that torn ligaments (including ACL) and knee joint injuries were associated with a greater probability of undergoing PT. A majority of respondents who underwent PT were forced to take a break from training sessions, whereas the percentage of those who did not undergo PT was noticeably smaller (60% vs. 44%, respectively, $p = 0.019$).

In our study, we found that causes like old trauma, excessive training load, and other unspecified causes were significantly associated with the decision to undergo PT (Tab. 3).

For the purpose of the subsequent study, PT was divided into 3 groups: kinesiotherapy (treatment with movement), physical therapy (treatment with physical factors), and massage. The majority of respondents reported receiving kinesiotherapy

TABLE 2. The influence of individual analysed factors (experience, type of injury) on the decision to use the help of physiotherapists

Variable	Available answers	Physiotherapy treatment number (%) of answers in subgroups		p
		yes	no	
Declared frequency of training sessions	few times a month	21 (65.6%)	11 (34.4%)	0.002
	once a week	19 (63.3%)	11 (36.7%)	
	2-3 x per week	123 (52.6 %)	111 (47.4%)	
Subjective level of advancement	everyday	60 (44.8%)	74 (55.2%)	<0.001
	beginner	11 (30.6%)	25 (69.4 %)	
	intermediate	110 (41.9%)	152 (58.1%)	
Type of sport activity	advanced	87 (64.9%)	47 (35.1%)	<0.001
	recreation	51 (44.4%)	64 (55.6%)	
	amateur	96 (41.4%)	136 (58.6%)	
Type of injury (most severe)	professional	60 (72.3%)	23 (27.7%)	0.003
	sprain	70 (51.1%)	67 (48.9%)	
	muscle stretch/torn	43 (42.2%)	59 (57.8%)	
	fracture	32 (41%)	46 (59%)	
	joint dislocation	20 (45.5%)	24 (54.5%)	
	contusion	7 (36.8%)	12 (63.2%)	
	ACL torn	12 (92.3%)	1 (7.7%)	
menisci/patella/knee joint overuse	5 (62.5%)	3 (37.5%)		
Length of the warm-up	ligament torn (other than ACL)	6 (100%)	0 (0%)	0.004
	no warm-up	7 (36.8%)	12 (63.2%)	
	<10 min	67 (40.6 %)	98 (59.4%)	
	10-20 min	104 (52%)	96 (48%)	
	30 min	26 (61.9%)	16 (38.1%)	
	>30 min	3 (75%)	1 (25%)	

ACL – anterior cruciate ligament

(n = 158), followed by physical therapy (n = 112) and massage (n = 82). In most cases, the therapy included at least 2 PT groups. Single option PT referred mostly to kinesiotherapy (n = 58) and physical therapy (n = 29). Overall, the subjective assessment provided by respondents was considered very positive on a scale of 1–10, both in terms of analgesic effect (Me: 8, Q₁–Q₃: 7–9) and functional recovery (Me: 9, Q₁–Q₃: 7–10). The highest effectiveness was noted in cases where kinesiotherapy was included in the treatment plan. When compared to cases when kinesiotherapy was not included, it was mainly valued by the respondents for its analgesic effect (p = 0.01). Differences in efficacy related to other PT groups (when included vs. not included in the treatment plan) were not statistically significant. In our study, we found that 94% of respondents who opted for PT continued training in the same sports discipline as before the injury occurred (compared to 91% in the group without PT, p = 0.414). Sports-related trauma led 20 individuals (4.5% of the injury group) to switch to a different discipline from what they trained in before the incident.

DISCUSSION

According to the Multisport Index report, the interest in physical activity, which was reduced during the COVID-19 pandemic, is now on the rise again [1]. Various sports activities, especially contact sports, are inherently associated with the risk of related injuries, including overuse trauma [14]. In our study, we found that regardless of the discipline, the incidence rate for sports-related trauma was approx. 91%. The occurrence of injuries depended on the self-assessed level of advancement and the type of activity (recreation, amateur, professional). Our findings are consistent with studies conducted by other authors. Wójcik et al. reported that the injury rate among professional women volleyball players exceeded 96% [15]. In another study, by von Rosen et al., which focused on young high-level athletes, the injury rate was found to be over 90%. During a 52-week observation period, a new injury was reported by at least 30% of athletes every week. The authors identified women as a group at a higher risk of sustaining injuries and experiencing slower recovery [16]. In our study, we observed that despite men being

TABLE 3. Causes of injuries (related to the most severe indicated trauma) reported by respondents in relation to their use of physiotherapy

Causes of injuries indicated by the respondents	Physiotherapy treatment number (%) of answers in subgroups		p
	yes	no	
Action of the opponent	75 (54.6%)	93 (55.4%)	0.224
Excessive training load	69 (59.5%)	47 (40.5%)	0.016
Lack of attention/focus	44 (41%)	63 (59%)	0.614
Old trauma	56 (63.6%)	32 (36.4%)	0.002
Short warm-up	33 (45.2%)	40 (58.8%)	0.483
Differential surface	43 (48.9%)	45 (51.1%)	0.986
Incorrectly carried-out exercise	23 (47%)	26 (53%)	0.765
Other	30 (62.5%)	18 (37.5%)	0.046

at a higher risk of injury, it was women who were more inclined to choose PT as a form of treatment. The current literature lacks publications regarding the factors that influence athletes' decision-making process to undergo PT. The topic of patient motivation has been extensively discussed in the literature, particularly in relation to stroke patients. However, there is still insufficient information on the factors influencing the decision-making process of young athletes to undergo PT [17, 18]. In our study, we noticed that age might be an important factor in the decision-making process, as older subjects more frequently opted for PT. However, it is worth noting that although statistically significant, the difference was relatively small. This could be attributed to the relatively low average age of the study group. Possible dependency should be confirmed in a larger, more age-diverse study sample. The significance of age as a motivating factor for undergoing PT has been previously reported by Brewer et al. and Rice et al. [19, 20].

The decision-making process is also influenced by the level of advancement reported by the respondents in their respective sports. Aicale et al. stated that those who train professionally and/or identify themselves as advanced in their disciplines are significantly more likely to undergo PT [21]. This finding is crucial, as the probability of overuse injuries tends to increase with the intensity of training. It is worth emphasizing that the interest in PT among beginners, intermediate, and recreation/amateur athletes was relatively limited. According to Joëlsson et al., improper or insufficient treatment of sports-related injuries puts athletes at risk of subsequent chronic injuries [22].

In our study, we did not find a relationship between a shorter warm-up and the decision to undergo PT. However, we did identify a connection between a longer duration of warm-up and the probability of using the help of a physiotherapist. The majority of authors agree on the positive effect of warm-ups on the occurrence of sports-related injuries (and therefore the need for PT). However, they also highlight that the warm-up should be tailored specifically to the sports discipline [23, 24]. Due to the nature of our study, we did not have the opportunity to assess whether the warm-up was performed properly.

On the other hand, a longer warm-up duration may be an indication of greater awareness among athletes about their own health and a better understanding of the importance of PT in sports. We believe that the reported difference in the "need to take a break from training sessions" (reported more often by respondents undergoing PT), may be a result of recommendations provided by the physiotherapists involved in the treatment. However, due to the study protocol, we were unable to follow up and verify the exact reasons behind such decisions. It is possible that those who choose self-treatment may be more biased in their decision-making process due to their limited knowledge of treating sports-related trauma, such as taking a break from training sessions and the appropriate timing for a return to full training. At the same time, the effectiveness of PT in chronic musculoskeletal pain (observed in overuse injuries), led by an experienced physiotherapist, is well-proven in the literature. According to Trulsson Schouenborg et al., physiotherapy-led interventions are highly effective even in cases where other therapies have failed [25]. In recent years, the use of PT in the prophylaxis of sports-related injuries has gained significant importance among practitioners aiming to improve athletes' motor preparation [26, 27].

In our study, we found significant differences in relation to the severity of the reported trauma and the decision to undergo PT. However, it is important to note that these differences were observed in subgroups with a limited number of respondents. Interestingly, there was no such relationship observed in relation to fractures, which are also considered severe sport-related injuries. Kinesiotherapy was found to be the most common form of PT treatment. The respondents assessed the therapeutic effects of PT they received as highly positive. However, only PT treatment plans that included kinesiotherapy showed significant differences in terms of analgesic effect compared to those without it. Results regarding functional recovery and analgesic effect when physical therapies and/or massage were involved (compared to cases where they were not included in the treatment plan) were less effective. These findings are consistent with studies by other authors that compared the effectiveness of exercises and different forms of physical therapy, such as Medeiros et al. (comparing low-level laser therapy to exercises) or Vibe Fersum (comparing manipulation + exercises superior to exercises + ultrasound) [28, 29]. It should also be mentioned that there are reports showing the advantage of physical procedures (such as transcutaneous electrical nerve stimulation) over exercises (such as non-steroidal anti-inflammatory drugs + exercises) [30]. The high heterogeneity of studies on the effectiveness of PT, combined with a limited number of patients in the study samples, affects our ability to properly assess the effectiveness of kinesiotherapy and other forms of PT. Therefore, it makes it difficult to form unambiguous conclusions. Authors generally agree on the positive effects of kinesiotherapy and the benefits it provides (not only in relation to injury treatment) but they also emphasize the need for further randomized studies [31, 32, 33, 34].

Despite our best efforts, there were some study limitations to our study that we were unable to overcome. The

main limitation is associated with the retrospective nature of the study. To minimise the potential effect of forgetfulness, we focused our study on the most severe trauma indicated by the respondents. The relatively low average age of the study group limits the generalizability of our findings to the broader population. This may be attributed to the online form of the study (online questionnaire). We believe that in order to verify the results of our study, further analysis should be conducted on a more diverse age group.

CONCLUSIONS

There is a need for prophylactic programmes that highlight the importance of PT, particularly targeting young men with basic or limited experience in sports. Kinesiotherapy has shown to be particularly effective when compared to other forms of PT and should be considered an integral part of PT treatment plans, as well as in physioprophyllaxis of sports-related injuries.

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