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ORIGINAL ARTICLE

Training Contents, Competition Preparation, Recovery Activities, Soreness and Injuries, A Survey of Elite High Divers

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Abstract

Introduction: High diving is an emerging aquatic discipline and part of the World Aquatics Championships since 2013. Some information is available on injuries and illnesses during competitions, but information on training is scarce. The primary goal of this study was to survey elite high divers on training contents, competition preparation, recovery activities and their experiences with soreness and injuries.

Methods: A comprehensive internet survey.

Results: 24 athletes completed the survey, 9 females and 15 males, representing 56% of all 2025 World Aquatics Championships participants.

Training and recovery: These divers spend more hours per week preparing in the gym, practicing skills in the dryland area, in low diving and in recovery activities than in high diving. Six female high divers (67%) and six males (40%) do not practice, or do not have access to a diving platform at competition height on a weekly basis.

Competition preparation: These divers build competition confidence by more diving, from high and low platforms.

Soreness and injuries: Female and male high divers both report the neck, calves and low back as sore body areas after competition, but they describe different injuries over the last year and attribute to those different causes (females 50% acute, 50% overuse; males 88% acute, 12% overuse) and they differ in injury severity. Correlations reveal strong associations with the number of injuries for the subgroups females and divers with less years of high diving experience.

Conclusions: This comprehensive survey of 56% of elite high divers describes how they partake in their sport. Findings provide possible directions for athletes, officials and healthcare professionals to help advance health and sport performance. Continuous injury and illness registration and prospective research are necessary to formally identify risk factors and to formulate evidence-based prevention measures.

Keywords

Aquatic sports, High diving, Training, injuries, Prevention

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Introduction

Since 2013 high diving is one of the events at the World Aquatics Championships organized biannually by World Aquatics, the world governing body for all aquatic sports. High diving has its roots in cliff diving but started as a formal sport in Switzerland (World High Diving Federation, 1996) and was popularized by the Red Bull Cliff Diving World Series from 2009 onwards [1]. In competitions women and men both compete with four dives, the women from a fixed platform at 20 meters high, the men at 27 meters. Diving in competition from these heights is limited to athletes with an age of 18 years and above and water entry is always feet-first.

Epidemiological data on high diving is available from the 2013 and 2015 FINA World Championships. In two publications information is provided on injury and illness during the championships and the four weeks immediately prior [2,3]. High divers report competing with injuries (in 2013 23.5% and in 2015 61.5% of competitors) and sustaining new injuries during competition (in 2013 5% and in 2015 37% of competitors). The rise in injuries from 2013 to 2015 was partially attributed to improved compliance and response rate to the epidemiological studies at the championships.

Only one study reports on training injuries in high diving [4]. It describes an 8-month study period in 2013, involving 81 cliff divers. The injury rate was found to be 9.7 injuries per 1000 hours of participation and the risk of injury during practice was estimated to be 2.5 times higher than in competition. The average absence from sport due to injury was 24.9 days, with the longest absence 150 days. Most injuries were to the ankle / foot / toes (18%) and to the neck /cervical spine (14%), all occurring at the time of impact with the water. The reported average diving height for this cohort of cliff divers was 15 meters, which is significantly lower than the current competition heights (women 20m, men 27m).

High diving is considered an extreme sport with the potential for catastrophic accidents as well as chronic overuse injuries [1,5]. To find possible risk factors for injury and formulate evidence-based injury prevention recommendations, more information is necessary on the current training routines of elite high divers and their medical setbacks [1,5]. Therefore, the primary goal of this study is to survey elite high divers on their training contents, competition preparation, recovery activities and their experiences with soreness and injuries. A comprehensive survey can disclose how contemporary elite high divers partake in their sport and provide associations between factors surveyed and the number of injuries reported per high diver.

Methods

This study was an internet survey (cross sectional). The survey was composed by the authors for single use. A large majority of the questions were multiple choice, only a few questions were open for personal explanation. Topics of interest were training contents, competition preparation, recovery activities and experiences with soreness and injuries. Face and expert validity were obtained, by asking several international experts to review the survey.

The survey was executed using the Microsoft Forms software. Participation was promoted by email, word of mouth and with posters in the athlete lounge during the days of training and competition at the 2025 World Aquatics Championships in Singapore.

The study was designed and executed in accordance with the ethical principles of the World Medical Association Declaration of Helsinki, version 2024 and accepted by the World Aquatics Sports Medicine Committee. The survey showed an opening page explaining the goals of the study and the customary rights of participants, such as voluntary participation, anonymous reporting and safe data storage. To protect athlete identity, names were not asked and athletes were described by their continent of origin, not their country.

All data collected were transferred to a database (Microsoft Excel) and shared among the authors only.

Demographic and sport characteristics were presented with appropriate measures of central tendency and dispersion. Spearman's rank correlation coefficients (ρ) were used to determine the strength of the association between the number of injuries per high diver and obtained variables, looking for strong correlations (ρ = +0.6 to + 0.8 or -0.6 to -0.8) or very strong correlations (ρ = > + 0.8 to + 1.0 or < -0.8 to -1.0). Based on previous recommendations an initial subgroup analysis for sex (females and males) was made [1].

Some questions ask how often a certain event occurs. The following definitions were presented to the respondents: sometimes = every few weeks; regularly = every week; often = once a day; very often = every high dive.

Sport specific terminology, like "dryland", "low diving" and "traditional diving" is explained in the paragraph Terminology at the end of this article.

Results

Survey participants

Nine female and fifteen male elite high divers completed the survey, which was open for participation between May 1, 2025 and August 1, 2025.

The survey respondents represent 9/16 (56%) of the female competitors, 13/23 (57%) of the male competitors and 22/39 (56%) of all competitors at the 2025 World Aquatics Championships. Table 1 shows characteristics of the survey respondents.

Table 1: Characteristics of the survey respondents.

	Female (n = 9)	Male (n = 15)
World aquatics championship participant	9 (100%)	13 (87%)
Age (average; min-max)	28.2 (21-40)	32.5 (22-40)
Continent Europe	3 (33%)	10 (67%)
Continent Americas	4 (44%)	5 (33%)
Continent Oceania	2 (22%)	0
Years in high diving (average; min-max)	6.0 (2-15)	10.1 (3-16)
Previous sport diving	8 (89%)	13 (87%)
Previous sport gymnastics	2 (22%)	5 (33%)
Previous sport trampolining	1 (11%)	1 (7%)
Previous sport power tumbling	1 (11%)	0

Table 2: The coaches involved and the total hours elite high divers spend in their sport.

	Female (n = 9)	Male (n = 15)
Diving club coach	4 (44%)	12 (80%)
Diving private coach	4 (44%)	1 (7%)
Diving no coach	1 (11%)	2 (13%)
Gym (S&C) club coach	1 (11%)	1 (7%)
Gym (S&C) private coach	5 (56%)	4 (27%)
Gym (S&C) no coach	3 (33%)	10 (67%)
Mental coach yes	4 (44%)	2 (13%)
Total sport hours per week 5-10	2 (22%)	2 (13%)
Total sport hours per week 10-15	0	7 (47%)
Total sport hours per week 15-20	7 (78%)	6 (40%)

Gym (S&C) = Gym, strength and conditioning.

Training contents

Table 2 shows the coaches involved and the total hours elite high divers spend in their sport.

Table 3 shows activities (hours per week) that elite high divers include in their training time. Two female high divers (22%) report that they practice on average 1-5 high dives per week from competition height (20 meters) and one diver (11%) makes 5-9 dives. The other six female high divers (67%) do not practice, or do not have access to a diving platform at competition height on a weekly basis. Four male high divers (27%) report that they practice on average 1-5 high dives per week from competition height (27 meters), four divers (27%) make 5-9 dives, one diver (7%) more than 15 dives. Six male high divers (40%) do not practice, or do not have access to a diving platform at competition height on a weekly basis.

High divers were presented with a list of strength and conditioning exercises and asked which were in their gym routines. Table 4 shows the top answers for female and male respondents. In addition, high divers were asked how many repetitions they perform when doing strengthening exercises and the level of exertion they strive for. The answers most recorded by females were for repetitions, 6-14 repetitions (71%); for exertion "I can do 5 more (3/9 = 33%)" and I can do 2 more (3/9 = 33%). The answers most recorded by males were for repetitions, 6-14 repetitions (93%); for exertion, "I can do 2 more (8/15 = 53%)".

Competition preparation (building confidence)

The high divers were asked which activities are important in the weeks before competition to feel confident in competition on a scale of 1 to 5 (not important - very important). Female high divers reported in order of importance: 1. More low height diving (median 5; min-max 2-5); 2. More high diving (median 4; min-max 2-5); 3. More gym, strength and conditioning (median 3; min-max 2-5). Male high divers reported in order of importance: 1. More high diving (median 4; min-max 2-5); 2. More low height diving (median 4; min-max 2-5); 3. More gym, strength and conditioning (median 3; min-max 2-5).

Recovery activities

Table 5 shows recovery activities reported by the elite high divers. Most time is spent stretching, taking ice baths, massage and physiotherapy. Most high divers sleep 7-8 hours a night (F 6/9 = 67%; M 13/15 = 87%), some sleep 9 hours or more (F 3/9 = 33%; M 1/15 = 7%). One male diver (7%) sleeps 4-6 hours a night.

Soreness

High divers were asked which of eight body parts were sore after competition on a scale of 1 to 5 (not sore - very sore). Female high divers reported in order of importance: 1. Neck (median 4; min-max 2-5); 2. Calves (median 3; min-max 1-5); 3. Lower back (median 3; min-max 1-5). Male high divers reported in order of importance, with minimal scoring differences: 1. Other

Table 3: Activities (hours per week) that elite high divers include in their training time.

	0 hrs	0 hrs	1-3 hrs	1-3 hrs	4-6 hrs	4-6 hrs	7-9 hrs	7-9 hrs
	F	M	F	M	F	M	F	M
Gym, S&C (hrs)			3/9 (33%)	4/15 (27%)	6/9 (67%)	11/15 (73%)		
Stretching (hrs)	2/9 (22%)	2/15 (13%)	7/9 (78%)	10/15 (67%)		2/15 (13%)		1/15 (7%)
Dryland (hrs)			6/9 (67%)	6/15 (40%)	2/9 (22%)	6/15 (40%)	1/9 (11%)	3/15 (20%)
Low diving (hrs)			1/9 (11%)	2/15 (13%)	2/9 (22%)	11/15 (73%)	6/9 (67%)	2/15 (13%)
High diving (hrs)	6/9 (67%)	6/15 (40%)	3/9 (33%)	6/15 (40%)		3/15 (20%)		

Responses of 9 female and 15 male high divers. F = Female, M = Male; Gym, S&C = Gym, strength and conditioning.

Table 4: Strength and conditioning exercises most used by elite high divers in their gym routines.

Females	Exercise	N = 9	Males	Exercise	n = 15
1	Abdominal muscles	7 (78%)	1	squats	14 (93%)
2	Bback hyperextensions	7 (78%)	2	abdominal muscles	14 (93%)
3	Deadlift	7 (78%)	3	pike ups	14 (93%)
4	Calf raises	6 (67%)	4	calf raises	13 (87%)
5	Pike ups	6 (67%)	5	pull-ups	13 (87%)
6	Squats	6 (67%)	6	deadlift	11 (73%)
7	Copenhagen side plank	5 (56%)	7	plyometric jumps	11 (73%)
8	Bunny hops	4 (44%)	8	shoulder press	11 (73%)
9	Plyometrics	4 (44%)	9	back hyperextensions	10 (67%)
10	Shoulder press	4 (44%)	10	bunny hops	10 (67%)
11	Biking (in- or outdoor)	4 (44%)	11	running (in- or outdoor)	10 (67%)

Note: Similarity between exercises and the relative importance of aerobic exercise.

Table 5: Recovery activities by elite high divers, hours per week.

	0 hrs	0 hrs	1-2 hrs	1-2 hrs	3-4 hrs	3-4 hrs	> 4 hrs
	F	M	F	M	F	M	M
Stretching	2/9 (22%)	3/15 (20%)	5/9 (56%)	6/15 (40%)	2/9 (22%)	3/15 (20%)	3/15 (20%)
Ice baths	5/9 (56%)	6/15 (40%)	4/9 (44%)	9/15 (60%)			
Massage	5/9 (56%)	7/15 (47%)	3/9 (33%)	6/15 (40%)	1/9 (11%)	2/15 (13%)	
Physiotherapy	4/9 (44%)	9/15 (60%)	4/9 (44%)	5/15 (33%)	1/9 (11%)	1/15 (7%)	
Sauna	7/9 (78%)	7/15 (47%)	2/9 (22%)	8/15 (53%)			
Electro stimulation	7/9 (78%)	14/15 (93%)	1/9 (11%)	1/15 (7%)	1/9 (11%)		
Compression boots	8/9 (89%)	13/15 (87%)	1/9 (11%)	2/15 (13%)			

Note: The hours spent stretching, taking ice baths, massage and physiotherapy. F = Female, M = Male.

body parts (median 3; min-max 1-5); 2. Neck (median 3; min-max 1-5); 3. Low back (median 3; min-max 1-5); 4. Calves (median 3; min-max 1-5).

Injuries

The nine female high divers reported 16 injuries over the last year (average 1.8 per diver; min-max 1-3 injuries). The top 3 of body parts named are: 1. Knee (6/16); 2. Lumbar spine (4/16); 3. Hamstring muscles and adductor muscles (both 2/16). The females consider 50% of their injuries acute and 50% overuse. Even when entering the water straight, which means correct technical execution, female divers may get an injury (4/16 = 25%). Table 6 shows the description of the injuries, given by the female high divers. Table 7 shows injury severity as described by the female and male elite high divers.

Female specific questions

Female specific questions show that 7/9 (78%) experience perineal pain. Water entering the vagina is reported by all (sometimes 3/9, regularly 3/9, often 2/9, very often 1/9). Three female high divers (33%) report a history of urogenital infections. Water entering the anus is also reported by all (frequency of occurrence: sometimes 7/9, regularly 1/9, often 1/9). None of the female elite high divers use protective swimsuits, six (67%) are interested in the development of a swimsuit that can protect the perineal area.

The fifteen male elite high divers report 24 injuries over the last year (average 1.7 per diver; min-max 0-4 injuries). The top 3 of body parts named are: 1. Neck (4/24); 2. Shoulder (4/24); 3. Ribs (3/24). The males consider 88% of their injuries acute and 12% overuse injuries. Even when entering the water straight, which means correct technical execution, male divers may get an injury (6/24 = 25%). Table 8 shows the description of the injuries, given by the male high divers.

Male specific questions

Male specific questions show that 8/15 (53%) experience perineal pain. Twelve male high divers (80%) report to experience testicular pain “sometimes”, and three (20%) have a history of testicular hematoma. Water entering the anus is reported by 12/15 (80%;

Table 6: Nine female elite high divers self-report 16 injuries in the last year, of which eight (50%) acute.

nr	Diver #	Bodypart	Diagnosis	Cause	Activity	Injury Severity
1	5	Knee	Jumper's knee	Overuse	High diving	No training < 1 month
2	7	Ankle	Calcification in the ankle	Overuse	Gym/Conditioning	No training < 1 month
3	8	Lumbar spine	Compressed disc	Overuse	Gym/Conditioning	No training < 1 week
4	8	Lumbar spine	Bone bruise	Acute	HD: Entry short	Adjusted training
5	12	Neck	Whiplash	Acute	HD: Entry over	Adjusted training
6	12	Knee	Jumper's knee	Overuse	Low height diving	Adjusted training
7	12	Lumbar spine, hip	hypertonia m. psoas	Overuse	Gym/Conditioning	Adjusted training
8	13	Coccyx, hamstr.	Inverted tailbone, hamstr. strain	Acute	HD: Lost control	Adjusted training
9	13	Hamstrings	Muscle strain	Overuse	Dryland training	Adjusted training
10	17	Lumbar spine	Disk inflammation	Overuse	Dryland training	no training < 1 week
11	23	Knee	Hyperextension	Acute	HD: Entry straight	No training > 1 month
12	23	Knee	Hyperextension	Acute	HD: Entry straight	Adjusted training
13	23	Knee	Hyperextension	Acute	HD: Entry straight	No training < 1 week
14	24	Neck, adduct.	Neck, L4-L5, adductor tendons	Overuse	High diving	No training < 1 week
15	24	Hip, adductors	Hip labral tear, add. tendons	Acute	HD: Entry straight	Adjusted training
16	27	Knee	Sprained MCL	Acute	Dryland training	No training > 1 month

Note: That high dives with a straight entry, which means correct technical execution, may lead to acute injury (4/16 = 25%).

Table 7: Injury severity as reported by the elite high divers. Females described 16 injuries, men 24 injuries.

Injury severity	Female (16 injuries)	Male (24 injuries)
Normal training	0/16	1/24 = 4 %
Adjusted training	8/16 = 50%	9/24 = 38%
No training < 1 week	4/16 = 25%	5/24 = 21%
No training < 1 month	2/16 = 12,5 %	2/24 = 8 %
No training > 1 month	2/16 = 12,5 %	7/24 = 29%

Note: Females are more often able to continue training with adjustments (50% of injuries), males seem to have more injuries keeping them sidelined for more than one month (29% of injuries).

Table 8: Fifteen male elite high divers self-report 24 injuries in the last year, of which 21 (88%) acute.

nr	Diver #	Bodypart	Diagnosis	Cause	Activity	Injury Severity
1	6	Neck, Rib, Shoulder	Hernia C4-C5	Acute	HD: Entry over	Adjusted training
2	6	Knee	Medial Meniscus Tear	Acute	Gym/Conditioning	No training > 1 month
3	6	Shoulder, elbow	AC + elbow sprain	Acute	HD: Entry short	No training > 1 month
4	10	Wrist	Bone contusion	Acute	Low height diving	Adjusted training
5	10	Head	Concussion	Acute	HD: Entry short	No training < 1 week
6	11	Neck	Bruised vertebrae, m. strains	Acute	HD: Entry straight	No training > 1 month
7	11	Neck	Bruised vertebrae C5-C6	Acute	HD: Entry straight	No training > 1 month
8	14	Knee	Hyperextension	Acute	HD: Entry over	Adjusted training
9	14	Adductor muscles	Muscle strain	Acute	HD: Entry straight	Adjusted training
10	16	Achilles	Achillodynia	Overuse	High diving	Adjusted training
11	16	Hamstrings	Strained hamstring	Overuse	Gym/Conditioning	Adjusted training
12	16	Shoulder	Torn rotator cuff	Acute	HD: Entry short	No training > 1 month
13	18	Coccyx	No doctor	Acute	HD: Entry straight	Adjusted training
14	19	Chest	Lung contusion	Acute	HD: Entry short	Adjusted training
15	19	Ribs	Fracture	Acute	HD: Entry sideways	No training < 1 month
16	20	Neck	Discopathy C5-C6	Acute	HD: Entry over	No training < 1 week
17	22	Spine	Herniated disc	Acute	Gym/Conditioning	No training > 1 month
18	25	Perineal, coccyx	Perineal injury, coccyx fract	Acute	HD: Entry over	No training > 1 month
19	25	Ribs	Torn intercostals	Acute	HD: Entry short	No training < 1 month
20	26	Shoulder	Torn tendon	Acute	HD: Entry straight	No training < 1 week
21	26	Chest	Muscle strain	Acute	HD: Entry short	No training < 1 week
22	26	Teeth	Chipped tooth	Acute	HD: Entry short	Normal training possible
23	29	Low back muscles	None	Overuse	Low height diving	No training < 1 week
24	29	Adductor muscles	Muscle strain	Acute	HD: Entry straight	Adjusted training

Note: That high dives with a straight entry, which means correct technical execution, may lead to acute injury (6/24 = 25%).

frequency of occurrence: sometimes 11, regularly 1). None of the male elite high divers use protective swimsuits, four (27%) are interested in the development of a swimsuit that can protect the perineal area.

Correlations with injury

With Spearman's rank correlation coefficient (ρ) the following factors were tested for correlation strength with the number of injuries reported by a high diver: sex, age, years of high diving experience, hours training high diving per week, hours training low diving per week, total hours training per week, hours training in the gym (strengthening and conditioning) per week, hours of sleep per night, all recovery activities separately and having a coach. A strong correlation was found for females: more hours training in high diving per week were correlated with more injuries (ρ = + 0.78); more hours per week training in the gym were also strongly correlated with less injuries (ρ = - 0.78). Based on the median score the correlation with the number of injuries was tested for all factors mentioned above, e.g., the subgroup less years of high diving experience was below the median score (8.5 years), the subgroup more years of high diving experience was above this median score. For high divers with less years of experience more hours training high diving per week was very strongly correlated with more injuries (ρ = 0.85). For high divers with more years of experience a strong protective correlation for injury was found for more hours training in the gym (ρ = -0.79). None of the other factors tested against the number of injuries reported, showed a strong or very strong correlation.

Discussion

This comprehensive survey inventoried training routines, competition preparation (building confidence), recovery activities, soreness and injuries among contemporary elite high divers. Study participants represented 56% of all competitors in the 2025 World Aquatics Championships high diving event.

The most important findings are that these athletes spend more hours per week training in the gym (strength and conditioning), stretching, practicing diving specific skills in dryland, in low diving and in recovery activities, than in actual high diving. A large proportion of high divers, females 67% and males 40%, do not practice, or do not have access to a diving platform at competition height on a weekly basis. Female and male high divers report different body parts when asked to describe their injuries over the last year, attribute those to a different cause (females 50% acute, 50% overuse; males 88% acute, 12% overuse) and they differ in injury severity. Correlations reveal an association with the number of injuries, for females the factor hours of training high diving increases injuries, the factor hours training in the gym is protective. For athletes with less years of high diving experience the factor hours of training high diving increases injuries, for divers with more years of high diving experience the factor hours training in the gym is protective. None of the other factors tested against the number of injuries reported, showed a strong or very strong correlation.

In this discussion we point at possible actions for athletes, officials and healthcare professionals to help advance health and sport performance.

In order to win medals, elite competitive athletes must compare their training efforts with peers. This survey clearly shows that not all participants at the highest level, the world championships, have weekly access to platforms at competition height. In order to gain sport specific experience and confidence, athletes may want to relocate to cities with permanent training facilities.

The correlation analysis reveals an association of some factors (training activities), with the number of injuries the high divers report. To scientifically prove that a certain factor is a risk factor for injury requires a prospective investigation which takes a long time and is not easy to perform in a small group of athletes spread over several continents. Therefore, promoting a pragmatic injury reduction approach, athletes may already act upon the current findings [6].

Both female and male elite high divers spend several hours per week training in the gym, performing strengthening and conditioning exercises. Female athletes who spend less hours training in the gym report more injuries. Increasing the hours in the gym, to work on strength and conditioning, may reduce the number of injuries for females. Females may also benefit from expanding their strength and conditioning repertoire and the level of exertion per exercise. Both female and male high divers report neck soreness and injuries in the top 3 of anatomical problem areas. This was also reported in the only other study on high diving training injuries, even though these cliff divers were diving from lower heights and probably not training the same way as contemporary elite high divers [4]. Adding neck exercises to the conditioning routine seems a logical measure. Finally, from this survey it may be concluded that high divers with less experience (in this study defined as < 8.5 years in the sport) may reduce the number of injuries by reducing the hours of training high diving per week, whereas experienced high divers (in this study defined as >8.5 years in the sport) may reduce the number of injuries by spending more hours training in the gym.

Officials strive to present safe and exciting competitions. This survey shows that high divers gain confidence in the weeks leading up to a competition by doing more diving from low and high platforms. It is therefore essential that officials try to increase the number of pools worldwide that provide permanent training facilities at competition height. Also, at

competition sites, in addition to the platforms at competition height, lower platforms should be present so the high divers can do preparatory dives and build confidence. From the survey questions on recovery, it is clear that high divers use ice-baths, massage and physiotherapy on a weekly basis. Therefore, these recovery services must be available at every event. A recent review of recovery strategies proclaims that availability of cold-water immersion therapy at major events may be beneficial [7].

This study confirms that most high divers come from traditional diving (21/24 = 88%) [5]. High diving is still an emerging sport, with a limited number of participants. Health care providers with experience in traditional diving may be best suited to care for high divers. High divers could benefit from a multi-disciplinary health and performance support team in national training centers, as described for elite traditional divers [8]. High divers may also benefit from such services as preparticipation and periodical medical screening, psychological support and nutritional advice. Just as in 10-meter platform diving, medical screening may include taking x-rays of the neck and spine, to identify inborn anomalies or unacceptable progression of lesions [9,10]. From this survey it is clear that 78% of female high divers experience perineal pain. Water entering the vagina or anus is reported by all, and 67% of them would appreciate the development of a swimsuit that protects the perineal area when diving from competition height. One case report warns that female divers can sustain serious perineal injuries, describing a case of a deep laceration, after jumping from 10 meters. In such cases specialist care is a necessity for optimal outcome [11]. Healthcare providers and officials may take the task of designing better swimsuits upon them to improve comfort and health of female high divers.

A survey study always comes with limitations, and some will be discussed here. First, the non-response bias. Not all elite high divers took part in the survey. It is not known why they chose not to and what their answers to the questions would have been. Second, poorly designed questions: In this survey a few mistakes were discovered at analysis, e.g. an overlap in multiple choice items: total sport hours 1-5, 5-10, 10-15, 15-20. There should have been no overlap per item: 1-5, 6-10, 11-15, 16-20. Also, when asked for sore body parts after competitions, the male top answer was ‘other”. This means the survey did not offer enough possible answers for sore body areas and the option “other” should have led to a follow up question: “please specify”. Lastly, the group of respondents was small. So, all findings must be interpreted with caution. The fact that more than half of the population that can be described as world ‘elite high divers” has been reached can be seen as a strength of this study. So, weighing limitations and strengths, the authors feel confident that valuable new information has been presented on the way contemporary elite high divers partake in their sport.

The current literature on the medical aspects of high diving encompasses information on injury and illness during the 2013 and 2015 world championships and the four weeks immediately prior [2,3] and information on the number of accidents and near accidents in competition [1]. This study presents information on the training habits of contemporary elite high divers. Future research should focus on injury and illness registration year-round. The authors recommend some factors that could be studied as possible risk factors for injury: performing a new dive (<10 repetitions), body position at water entry, and environmental factors such as water movement and cold ambient temperature [1] and sex, years of experience, hours training in high diving and hours training in the gym (this study).

Scientific research takes a long time and evidence-based recommendations do not always solve complex sporting problems. A pragmatic approach to injury prevention, involving athletes, officials and medical personnel, may be very suitable for this small community of elite performers in an extreme sport [6].

Conclusion

This comprehensive survey of 56% of elite high divers competing at the 2025 World Aquatics Championships describes how they partake in their sport. Findings provide possible directions for athletes, officials and healthcare professionals to help advance health and sport performance. Continuous injury and illness registration and prospective research is necessary to formally identify risk factors and to formulate evidence-based prevention measures.

Terminology

Dryland = a training facility resembling a gymnastics gym, usually equipped with a large trampoline and a springboard leading to a landing pit (cushion for landing). The facility is used to practice diving specific movements away from the water, therefore “dry”. The dryland area allows for more repetitions of movements per hour because it is not necessary to climb out of the water after a specific dive movement and coaches can physically support divers during movements, “spotting” with hands or supportive safety ropes (also known as ‘belts”, ‘longes”, or ‘harnesses”).

Low diving = diving from platforms lower than high diving competition height (F 20 m, M 27 m); usually referring to diving in a traditional pool, with platforms at 5, 7.5 and 10 meters high. In some pools platforms at 12 and 15 meters are available.

Traditional diving = Olympic springboard and platform diving, with events for women and men on springboard (3 meter) and platform (10 meter).

Entry short = entering the water with not enough somersault rotation, “short” of vertical.

Entry over = entering the water with too much somersault rotation, ‘over-rotating” vertical.

Lost control = the diver loses position awareness in mid-air. It is usually associated with a bad (“crash”) landing.

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Author Contributions

WZ: Survey design, data analysis, manuscript first and successive versions

AP: Study initiative, survey design, survey execution, data analysis

AK: Study initiative, survey design, survey execution, data analysis

JL: Logistics coordinator, legal and ethical support

KW: Manuscript corrections, English language

Declarations

This manuscript provides new information; it has not been submitted to any other journal.

Artificial intelligence or large language models were not used at all to create any portion of the manuscript.

The research conducted was not preregistered in an independent registry.

The authors declare that there is no conflict of interest regarding the publication of this article.

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All authors agree with the final version of the manuscript.

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