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Medication and Supplement Use in Disability Football World Championships

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Abstract

Background: Individuals with an impairment make up over 15% of the world's population, many of whom can benefit greatly from participation in sport. The provision of medical services in disability sport is a challenging area with a lack of scientific evidence. Given the positive impact that sport can have on the people with an impairment, it is vital that measures are taken to better understand the medical issues posed by disability sport. It is well established that medications and supplements are over-used in sport, particularly within professional football, but there is no current evidence on medication or supplement use in elite disability football.

Objective: To examine and describe the use of medication and supplements in disability football, prior to and during international tournaments, and to identify the profile of substances used by category.

Design: Prospective, descriptive, cohort study.

Setting: International Blind Sport Association (IBSA) Football World Cup 2015 and the International Federation of Cerebral Palsy Football (IFCPF) World Cup 2015.

Participants: Two hundred and forty-two elite level disability footballers, classified with B1 visual impairment or cerebral palsy.

Methods: Team clinicians were asked to document all medication and supplements taken in the 48 hours prior to each match.

Results: This study recorded the use of 1648 substances in 242 players, with more than half (53.1%) classified as supplements. There was an overall rate of 1.26 substances used per player per match and a medication use rate of 0.59 medications per player per match. Seventy percent (170/242) of players reported using at least one substance per tournament, with 57.9% (140/242) using at least one prescribed medication (63.6% of players at IBSA World Games and 57.7% of players at IFCPF World Cup). The most commonly prescribed

33 category of medications was non-steroidal anti-inflammatory drugs (NSAIDs), representing
34 39.3% of all reported medications.

35

36 **Conclusion:** This study highlights the potential overuse of medication and supplements in
37 disability football, particularly in the use of NSAIDs. These trends are comparable to
38 previous research in FIFA World Cup competitions.

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56 **Introduction**

57 The World Health Organization reports that there are more than 1 billion people world-wide
58 with a form of impairment, representing over 15% of the world's population.¹ Individuals
59 with an impairment can benefit greatly from exercise, particularly team sport, which brings
60 with it added physical, psychological and social benefits.^{2,3} From a healthcare perspective,
61 the provision of medical services in disability sport presents many challenges not faced
62 elsewhere and has been described as "the most challenging and rewarding area of sports
63 medicine".⁴ Given the positive impact that sport can have on people with an impairment , it
64 is vital that measures are taken to better understand the medical issues posed by disability
65 sport,⁵ to further safeguard athlete welfare. The Football Association created the Centre for
66 Disability Football Research (FA-CDFR) in England, which shares Fédération Internationale
67 de Football Association (FIFA) aspirations and commitment to "Football for Health" and
68 aims to improve the care of athletes with an impairment through medical research in this
69 field of sports medicine.

70

71 The use of medication has been vital throughout medical history to help prevent and treat
72 disease. More recently, the legal and prohibited use of medical ingredients has moved into
73 elite sport to aid recovery from injury and enhance health and performance. It is well
74 established that medications, in particular non-steroidal anti-inflammatory drugs (NSAIDs),
75 are over-used in sport.⁶⁻²¹ Concerns have been raised about the legal use of prescribed
76 medications in sport and the potential drug-related adverse effects this may pose to
77 athletes. A variety of medicines are permitted for athlete use to cure illness, treat injury and
78 obtain a competitive edge⁶.

79

80 At the Sydney Olympic Games 78% of athletes used medication or supplements, with five
81 athletes using more than 18 substances in a single day.⁶ In a similar study of Olympic
82 athletes outside of competition, 40.6% of elite Serbian athletes were reported to be taking
83 medications, totalling 1.98 medications per athletes.⁸ This study also found significantly
84 higher rates of medication use in team sports rather than individual events (3.64 vs. 2.63
85 medications per user, $p < 0.01$). A study of Finnish Olympic athletes⁹ compared medication
86 use in their cohort against a representative age-matched sample found that athletes use
87 significantly more medications than controls (74.4% vs. 56.4%, $p < 0.001$, OR 2.30). At the
88 Athens Paralympic Games 2004, 64.2% of athletes declared use of medication or food
89 supplement, with NSAIDs (9.8%) and other analgesia (5.6%) being most commonly used
90 medication¹⁰. In this study the overall incidence of medication use per athlete was lower in
91 Paralympic athletes than their Olympic counterparts and fewer individual Paralympic
92 athletes used a high number of medications when compared to individual Olympic
93 athletes¹⁰. In contrast with these findings, a later study with direct comparison of
94 medication use in Paralympic and Olympic athletes¹¹ concluded that the use of physician-
95 prescribed medication, especially those used to treat chronic disease, is higher in Paralympic
96 athletes than Olympic athletes with the exception of asthma medicines.

97

98 The Fédération Internationale de Football Association Medical Assessment and Research
99 Centre (F-MARC) have been systematically monitoring and recording the use of medication
100 and nutritional supplements in international football since the 1998 FIFA World Cup.^{16,18,20}

101 Table 1 demonstrates the results of research on the use of medications in FIFA World Cups.

102 The most frequently prescribed category of medication during FIFA tournaments was

103 NSAIDs, representing 36% of all substances used. The results of the published data on

104 medication use in elite football has greatly concerned FIFA, with the conclusion that “the
105 high intake of medications in international football - especially of NSAIDs - is alarming and
106 should be addressed”.²⁰

107

108 The use of nutritional supplements among elite athletes is well documented with studies
109 reporting that 45%-81.9% of Olympic athletes use dietary supplements.^{6-7,12-13} At the Athens
110 Paralympic Games 2004, 42.1% of athletes used food supplements with vitamins (43.5%),
111 minerals (16.1%) and proteins (10.5%) being most popular¹¹. A comparison of the
112 prevalence of supplement use in FIFA World Cups²⁹ is summarised in Table 2 and suggests
113 supplement use in elite football is less prevalent than in Olympic sports. The use of
114 supplements for immunological and nutritional reasons has been declared as unnecessary in
115 athletes with an adequate diet and when using supplements, it is important to consider the
116 chance of contamination^{22,23} and the potential for adverse side-effects.²⁴⁻²⁶ The regulations
117 governing the purity of dietary supplements are not always as stringent as the
118 pharmaceutical production of clinical drugs, which could result in contamination leading to
119 the potential of a failed doping test and a subsequent ban from sport.^{27,28}

120

121 In the current medical literature, there are no studies investigating the use of medications
122 and supplements in elite disability football. By analysing the use of medications and
123 supplements in disability football, the medical profession will begin to learn more about
124 athlete medical needs, tournament medical planning and medical management of these
125 athletes. This would potentially reduce the risk of iatrogenic side effects, showing better
126 consideration of the risk-benefit profile of substance use in athletes and improve athlete
127 welfare.

128

129 The aim of this study is to determine and quantitatively describe the use of medication and
130 supplements in disability football during elite international tournaments, and to identify the
131 profile of substances used by category. This will generate new knowledge and advance
132 understanding within disability football medicine.

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152 **Methods**153 **Study Design**

154 A prospective, cohort study was performed investigating the use of medication and
155 supplements in elite disability football.

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157 **Data Collection**

158 The methodology chosen was analogous to that used by F-MARC,^{16,20} in similar studies at
159 FIFA World Cups. In connection with the medical provision for the International Federation
160 of Cerebral Palsy Football (IFCPF) World Cup 2015 and the International Blind Sports
161 Association (IBSA) World Games 2015 Football Tournament, a designated member of each
162 nation's medical team were asked to enter, in English, any medications or supplements
163 taken by the players or administered to them in the 48 hours preceding a match on a data
164 collection sheet (Appendix 1). One person per team was asked to record all data to avoid
165 duplication of results. The assigned individual was the national team doctor unless the team
166 did not have a doctor on their staff, in which case the data was collected by the team
167 physiotherapist. All data was entered in English and where English language skill was limited
168 the official team liaison officer for the nation, who was bi-lingual with English and the
169 mother tongue of the nation, supported the designated medical professional with
170 translation. In the previous research during FIFA World Cups^{16,20} the data was collected for
171 any substance taken 72 hours before each match, however this was adapted due to the
172 period between matches being shorter than 72 hours in disability football. The designated
173 team medical personnel were educated in regards to the project through a presentation on
174 the research proposal at the tournament medical meeting and via a written information

175 sheet (Appendix 2). Ethical approval was granted by the University College London Ethics
176 Committee (Project ID - 6247/001).

177

178 **Participating Players**

179 The IFCPF World Cup 2015 at St. George's Park in England, consisted of 15 national teams
180 with each country having a squad of 13 or 14 athletes. The IBSA World Games 2015 Football
181 Tournament in Seoul, South Korea, consisted of 9 national teams with each country having a
182 squad of 9 or 10 athletes. This equated to 242 athletes eligible for inclusion in the study,
183 with our data collection covering a total of 826 player-matches.

184

185 The IFCPF World Cup involves athletes with cerebral palsy (CP) who have ataxia, hypertonia
186 or athetosis, causing a permanent and verifiable activity limitation. CP football uses a
187 classification system, which groups athletes depending on how their impairment impacts
188 performance, and CP football includes 4 classes, called FT5, FT6, FT7 and FT8. As CP football
189 is a team (7-a-side) sport, classification aims at ensuring fairness in regards to the impact of
190 impairment between both teams.

191

192 The IBSA World Games Football Tournament involves athletes who have a visual impairment
193 classed as B1, B2 or B3, participating in 5-a-side football matches. Our cohort included
194 athletes classified as B1, which is defined as visual acuity poorer than LogMAR 2.6, and is the
195 only visual impairment classification at Paralympic Games. Our study did not include B2/B3
196 athletes which are classifications of visual impairment but who do not participate in
197 Paralympics. Visual impairment can arise from a variety of conditions, including genetics,
198 prenatal developmental differences or from illness or trauma.

199

Substance Classification

201 The active pharmaceutical ingredient of each substance was identified to categorise the
202 medication or supplement into one of the following: Analgesia and anti-inflammatory
203 medications (NSAIDs, other analgesia, local anaesthetics), muscle relaxants, respiratory
204 agents, gastrointestinal medications, antimicrobial medications, antihistamines,
205 supplements and others. This classification is consistent with previous pharmaco-
206 epidemiological studies in sport.⁶⁻²¹

207

Data Presentation

209 The primary outcome measure of interest was the incidence of substance consumption. This
210 was determined by calculating: (i) The number of individual athletes reported to be using a
211 substance per tournament; (ii) Mean substance use/player/match; (iii) Mean substance
212 use/player/tournament. The proportion (%) of each type of medication, by classification,
213 was also monitored and analysed.

214

Statistical Analysis

216 The statistical approaches applied were frequency analysis, cross-tabulations and Pearson's
217 correlations. Chi-square (χ^2) tests were used for analysis of substance categories. Mean
218 values and 95% confidence intervals were calculated using SPSS 22.0 (SPSS Inc. Chicago, IL,
219 USA). A p-value of <.05 was accepted as statistically significant.

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224 **Results**

225 At the two disability world championships (IBSA World Games 2015 Football Tournament
226 and IFCPF World Cup 2015) we studied 242 male, elite international disability football
227 players, with an age range from 17 to 43 (mean age = 26.02 ± 5.14 years).

228

229 A total intake of 1648 substances (medication or supplement) was reported, of which more
230 than half (53.1%) were classified as supplements. There were a wide range of medications
231 prescribed with the most commonly used categories being NSAIDs (39.3%), “other
232 analgesia” (14.7%) and antihistamines (12.7%), as seen in Figure 1.

233

234 During the two tournaments, the incidence of substance use was 1.26 substances (0.59
235 medications) per player per match, with the highest substance use in an individual athlete
236 being 8 substances (6 medications) per match. Four national teams, all of which were
237 participating in the IFCPF World Cup, gave NSAIDs to every player before every match of the
238 tournament. Seventy percent (170/242) of players reported using at least one substance per
239 tournament with 57.9% (140/242) using at least one medication per tournament (63.6% of
240 players at IBSA World Games and 57.7% of players at IFCPF World Cup), see Table 3. Twenty
241 nine percent of players reported no medication or supplement use during their respective
242 tournament.

243

244 Significantly fewer medications and supplements were taken by blind footballers at the IBSA
245 World Games 2015 Football Tournament than in footballers with cerebral palsy at the IFCPF
246 World Cup 2015 (4.67 vs. 7.46 substances/player/tournament, $p = .003$).

247

248 **Non-Steroidal Anti-Inflammatory Drugs and Analgesia**

249 NSAIDs were the most frequently prescribed group of medications, representing 39.3% of all
250 reported medications (Figure 1). 38% ($n = 92$) of players took a NSAID at least once during
251 the tournament, with 18 players using a NSAID before every match, independent of whether
252 they played or not. Substantial differences were observed between the various national
253 teams with two clinicians giving NSAIDs to every player before every match, where as
254 another team did not report using a NSAID during the entire tournament. Ten players
255 reported using more than one preparation of NSAID at the same time, often by combing
256 NSAIDs via the oral and topical routes. There was no statistical difference between the use
257 of NSAIDs at the IBSA World Games 2015 Football Tournament and at the IFCPF World Cup
258 2015.

259

260 Other analgesia accounted for 14.7% of all medications used at the tournament. Of these
261 92% were Paracetamol, but Codeine and Tramadol were also used on occasion. There were
262 only three instances of use of local anaesthetic or corticosteroid injections in this cohort.

263

264 **Antihistamines**

265 Antihistamines were the second most commonly prescribed category of medication (98 out
266 of 773 medications) with all of these being prescribed and taken at the IFCPF World Cup
267 2015. In 61 out of the 98 (62.2%) instances of antihistamine use they were taken via the oral

268 route. The remaining cases used topical antihistamine (30/98), intraocular antihistamine
269 (6/98) and in one instance an IV dose of Chloranphenamine was given for anaphylaxis.

270

271 **Medications for the Respiratory Tract**

272 Within this cohort, 10 athletes (4.1%) had diagnosed asthma or exercise-induced
273 bronchospasm and therefore used respiratory medications. We recorded 84 respiratory
274 drugs being used before matches over the tournament, which represented 5.1% of all
275 substances used and 10.9% of all medications used. As one would expect, the majority of
276 these were inhaled β 2-agonist (n = 66, 78.6%) and inhaled corticosteroids (n=14, 16.7%).

277

278 **Supplements**

279 Supplements represented a large volume (875/1648, 53.1%) of the substances taken during
280 the tournaments. Vitamins were the most commonly used supplement (420/1648, 48%),
281 followed by minerals (289/1648, 33%) and creatine (157/1648, 18%).

282

283 Five teams used multivitamins on every player in their squad before every match in the
284 tournament and some athletes were identified to take up to 6 different supplements before
285 a match.

286

287 **Relationships with Player Exposure and Team Success**

288 At both tournaments, there was no significant correlation between the number of matches
289 played by each player and the total substances used, total medications used or total NSAIDs
290 used. There was no statistically significant correlation between the success of the team

291 (measured by final ranking) in the tournament and the mean number of substances used
292 per player.

293

294

295

296 **Discussion**

297 This is the first study investigating medication and supplement use in elite disability football,
298 in comparison to prior studies which looked at either a country-specific cohort¹¹ and/or a
299 cohort of all athletes at a Paralympic Games¹⁰. The results from the present study indicate
300 the widespread use of medications and supplements at two disability football world cups. In
301 total, we recorded the use of 1648 substances for 242 players, playing an average of 3.18
302 matches each. More than half (53.1%) were classified as supplements, with a rate of 1.26
303 substances (0.59 medications) per player per match. This trend is slightly lower than seen in
304 previous research in football²⁸ at FIFA World Cups, where male footballers have a rate of
305 0.77 medications per player per match and female footballers report a rate of 0.85
306 medications per player per match. The results are, however, comparable to the rate of
307 medication use in the U-20 and U-17 FIFA World Cups, where players are reported to use
308 0.51 medications per player per match. The number and proportion of disability footballers
309 using medications is however much higher than in footballers participating in FIFA World
310 Cups, with our study finding 57.9% of players using at least one medication per tournament,
311 compared to 48.2% of elite male footballers¹⁷ and 37.9% of elite female and youth
312 footballers.¹⁶ This trend might reflect the possibility that athletes with an impairment have a
313 higher rate of injury than able-bodied athletes²⁹⁻³¹ or may be due to these athletes being

314 more commonly prescribed regular medications to manage chronic medical conditions. Do
315 disability footballers have more co-morbidities and so require regular medications? Do they
316 suffer more overuse injuries because of their disability and subsequent biomechanical
317 differences? Do athletes with an impairment have altered pain perception resulting in
318 increasing analgesic requirements? These questions, and many more, are all relevant to this
319 study and remain unanswered but are potential targets for future research in the field of
320 disability sport.

321

322 **Non-Steroidal Anti-Inflammatory Drugs**

323 Previous research in able-bodied athletes has revealed high and unexpected levels of
324 medication use especially of NSAIDs.⁶⁻¹⁹ In keeping with much of this research, NSAIDs were
325 by far the most commonly used medication in disability footballers in our cohort,
326 representing 39.3% of all medications used. Over one third (n = 92, 38%) of all players took a
327 NSAID at least once during the tournament, with 18 players (7.4%) using a NSAID before
328 every match, and with 6 players (2.5%) using two or more different preparations of NSAID
329 concurrently. The findings are lower than the 54.5% of male players, 50.9% of female
330 players and 43.4% of adolescent players using NSAIDs at FIFA World Cups.³² As suggested in
331 previous studies our findings on use of NSAIDs in sport are alarming and go against current
332 guidelines,^{33,34} which recommend using the lowest possible dose and for shortest possible
333 period and using one preparation of NSAID at a time. Of particular concern was the fact that
334 one national team used topical NSAIDs on every player before every match, independent of
335 whether the player was starting a match or was a substitute.

336

337 One possible explanation for the high rate of NSAID use is the readiness of doctors,
338 physiotherapists, coaches and players to use this class of medication prophylactically to
339 mask pain and allow continuation in sport, rather than to treat injury, but this practice
340 needs to change to reduce the potential iatrogenic side-effects of NSAIDs. Endurance
341 athletes who use NSAIDs have an almost five times higher incidence of adverse events.^{35,36}
342 NSAID-associated gastrointestinal adverse events and changes in renal function and
343 nephritis have been reported in athletes taking NSAIDs during exercise.^{37,38} NSAIDs can also
344 have a negative effect on bone turnover and osteoblast activity^{39,40} and this is particularly
345 important in our cohort as CP is associated with osteoporosis and osteopenia.^{41,42} The
346 clinical use of NSAIDs should therefore be balanced between the potential benefits and side
347 effects and should follow clinical guidelines.

348
349 The risks associated with NSAIDs³⁵⁻⁴⁰ can be reduced by using alternative analgesia, such as
350 Paracetamol, which has a similar analgesic success.⁴³ Despite this fact, alternative analgesia,
351 mainly (92%) composing of Paracetamol, only represented 14.7% of all medications used at
352 the disability football world cups. Therefore, where analgesia is required, one potential
353 target to reduce NSAID-associated risks is to try to manage pain by using Paracetamol rather
354 than NSAIDs.

355

356 **Antihistamines**

357 The relatively high use of antihistamines at the IFCPF World Cup is likely to reflect the fact
358 that the tournament took place in summer, with high pollen counts affecting the local
359 environment in the UK at this time of year.

360

361 Supplements

362 The use of supplements in disability football is relatively common, with 53.1% of the
363 substances used at the tournaments being classed as supplements, and with 30.2% of all
364 players taking at least one supplement during the tournaments. These figures compare
365 closely to the supplement use in FIFA World Cups, where 33.4% of male footballers and
366 45.6% of female footballers use supplements. The trends are, however, lower than the
367 documented use of supplements in Olympic athletes, which ranges from 45% - 81.9%.⁶⁻⁹ The
368 use of supplements, for immunological and nutritional reasons, is often unnecessary in
369 athletes with an 'adequate' diet and when using supplements it is important to consider the
370 chance of contamination^{22,23} and the potential for adverse side-effects.²³⁻²⁵ The findings of
371 this study suggest that supplements are not overused in disability football when compared
372 to other forms of football or other sports.

373

374 Limitations to the study

375 Within this study there are various limitations which need to be considered when analysing
376 the data and ahead of further research in this field. The data in the study comes directly
377 from official team clinicians on their prescribing patterns with the involvement of players,
378 but data was not taken from players themselves, which may raise an issue with
379 concordance. Self-medicating athletes who did not disclose the use of certain substances
380 were not included in our data set because their data could not be recorded or accounted
381 for, which could underestimate the true prevalence of medication use. The information
382 reported was also not verified by blood analysis so could not be objectively confirmed.
383 Another aspect to consider is that in studies taking data from team physicians, the use of
384 regular medications might have been excluded by the clinician because they did not actually

385 prescribe those medications, which might further underestimate the true use of
386 medications in athletes. Also, whilst this study looked at the prevalence of substance use
387 and the types of medications and supplements used, it did not investigate the underlying
388 reasons for this current practice. Accurate medication recall is very important to the validity
389 of pharmaco-epidemiological studies and therefore this study endeavoured to account for
390 this by asking clinicians to promptly record in a written manner substance given, but
391 unfortunately this aspect of monitoring substance use cannot be fully controlled.

392

393 **Conclusions**

394 The present study highlights the problems with overuse of medication in elite disability
395 football and indicates that the current use of NSAIDs in disability football is high but is
396 slightly lower than the “over-use”^{16,18} seen in professional football. It also suggests the use
397 of supplements is comparable to that seen in FIFA World Cups. This study highlights the
398 need for more research to establish the injury and illness patterns in disability sport to
399 better link the use of medical substances, and to understand the reasons as to why athletes
400 use medications and supplements. F-MARC have campaigned to reduce the use of NSAIDs in
401 professional football and have initiated an education programme for clinicians, but more
402 work is needed to spread this message within disability football.

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421 Federation of Cerebral Palsy Football (IFCPF) World Cup 2015 and the International Blind
422 Sports Association (IBSA) World Games 2015, who provided the data for this project and we
423 would like to thank them for their role in the data collection.

424

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427

Competing Interests

429 None.

430

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Tables and Figures

Tournament	Teams	Players	Matches	Reports	Medications Prescribed	Intake of Medication (per player, per match)
FIFA World Cup 2014	32	736	64	2944	2346	0.80
FIFA World Cup 2010	32	736	64	2944	2335	0.79
FIFA World Cup 2006	32	736	64	2944	2052	0.70
FIFA World Cup 2002	32	736	64	2944	2392	0.81
FIFA Women's WC 2007	16	336	32	1344	1200	0.89
FIFA Women's WC 2003	16	320	32	1280	1036	0.81
FIFA U-20 World Cup 2007	24	504	52	2184	965	0.44
FIFA U-20 World Cup 2005	24	504	52	2184	1248	0.57
FIFA U-17 World Cup 2007	24	504	52	2184	1036	0.47
FIFA U-17 World Cup 2005	16	320	32	1280	717	0.56

443

444

Table 1 - Medication Use at FIFA World Cups

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Tournament	Supplement per Match N (%)	Supplement per Tournament N (%)
FIFA World Cups 2002-2014	2985 (25.3%)	984 (33.4%)
FIFA Women's World Cups 2003-2007	880 (33.5%)	229 (45.6%)
FIFA U-20 & U-17 World Cups 2005-2007	3104 (39.6%)	906 (49.5%)

447

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Table 2 - Supplement Use at FIFA World Cups²⁷

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Medication Category	IBSA World Games 2015 Football Tournament		IFCPF World Cup 2015	
	No. of players (n = 48)	% of players	No. of players (n = 194)	% of players
Any Medication	28	63.6%	112	57.7%
NSAIDs	19	39.6%	73	37.6%
Other Analgesia	19	39.6%	37	19.1%
Injections	2	4.2%	1	0.5%
Respiratory Drugs	4	8.3%	8	4.1%
Gastrointestinal Agents	2	4.2%	9	4.6%
Antimicrobials	1	2.1%	10	5.2%
Antihistamines	0	0%	18	9.3%
Any Supplement	12	25%	61	31.4%

453

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Table 3 - Number of Players using Each Medication Category during Tournament



Medication Use Report Form



Player Initials: _____ Team: _____ Date: _____

Name of Medication or active pharmaceutical indigence	Drug Code see below	Daily Frequency & Dose	Route	Duration	Indication
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	
		x mg	Oral / IM / IV / Topical / Inhaled	Days	

Drug Code:

1 = NSAIDs

2 = Other Analgesia

3 = Injected Corticosteroids & Local Anaesthetics

4 = Muscle Relaxants

5 = Respiratory Drugs

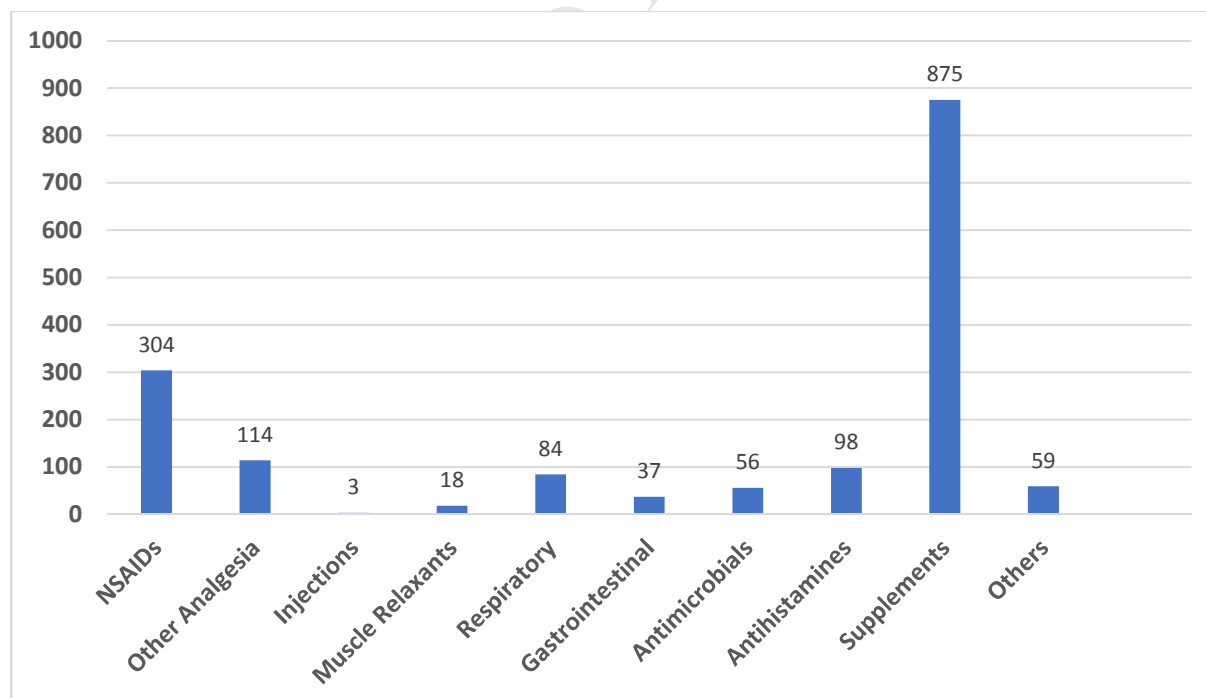
6 = Medication for Gastrointestinal Purpose

7 = Antimicrobials

8 = Supplements

9 = Antihistamine

10 = Others



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Figure 1 - Substances Used by Category

Appendix 1

Appendix 2**Information Sheet for Team Physicians involved in Research Study**

Title of Project: Medication and Supplement Prescribing Patterns in Disability Football World Championships

This study has been approved by the UCL Research Ethics Committee - Project ID Number: 6247/001

Name Dr. Daniel Broman
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We would like to invite all team physicians at the IBSA World Games 2015 Football Tournament and the CPISRA 2015 Football World Championships to participate in our study, looking into the medication and supplement prescribing patterns in footballers with a disability.

Details of Study:

Aim: To examine medication and supplement prescribing patterns in male disability football, prior to and during international elite tournaments and to compare this to the medication use in elite non-disability football players.

It is well established that medications and in particular NSAIDs are over-used and potentially abused in elite football, with Tscholl et al.¹ in 2008 concluding that "the high intake of medications in international football - especially of NSAIDs - is alarming and should be addressed". A similar study by Tscholl et al.² in 2009 highlighted "the problem of overuse of medication in professional soccer players". A follow up study by Tscholl et al.³ in 2012, looking at medication use during the 2010 FIFA World Cup showed that "there was no change in the high use of medication despite several preventative measures" and "the use of medication reported by the team physicians in international football competition is high, and still seems to be increasing. The major problems are NSAIDs".

We aim to compare this trend in elite non-disability footballers to disability football. Direct comparison between research data from FIFA World Cups and the 'International Blind Sports Association (IBSA) World Games 2015 Football Tournament' and the 'Cerebral Palsy International Sports and Recreation Association (CPISRA) 2015 Football World Championships' will be examined. By analysing the use of medications in disability football, the medical profession can better plan and manage the care of these athletes, potentially reducing the risk of iatrogenic side effects of medications and show better consideration of the risk/benefit profile of medications in athletes.

The findings of the study will be disseminated by presentation at sports medicine events/conferences and through submission of a publication in a medical journal with relevance to sports medicine.

¹ Tscholl P., Junge A. & Dvorak J. *The use of medication and nutritional supplements during FIFA World Cups 2002 and 2006. Br J Sports Med* 2008;42:725-30.

² Tscholl P., Feddermann N., Junge A. & Dvorak J. *The use and abuse of painkillers in international soccer: data from 6 FIFA tournaments for female and youth athletes. Am J Sports Med* 2009;37:260-65.

³ Tscholl P. & Dvorak J. 2012. *Abuse of medication during international football competition in 2010 - lesson not learned. Br J Sports Med* 2012;46:1140-41.

Please discuss the information above with others if you wish or ask us if there is anything that is not clear or if you would like more information.

It is up to you to decide whether to take part or not; choosing not to take part will not disadvantage you in any way. If you do decide to take part you are still free to withdraw at any time and without giving a reason. All data will be collected and stored in accordance with the Data Protection Act 1998.

468

References

469 ¹World Health Organisation. World Report on Disability. World Health Organisation, 2011.
470 Geneva, Switzerland.

471

472 ²Ahmed OH, Hussain AW, Beasley I, et al. Enhancing performance and sport injury
473 prevention in disability sport: moving football forwards in the field of football. *Br J Sports*
474 *Med* 2015;49:566-567.

475

476 ³Burgeson CR, Wechsler H, Brener ND, et al. Physical education and activity: results from the
477 School Health Policies and Programs Study 2000. *J School Health* 2001;71:279-293.

478

479 ⁴Webborn N, Van de Vliet. Paralympic medicine. *Lancet* 2012;379:65-71.

480

481 ⁵Thompson W, Vanlandewijck YC. Science and the Paralympic movement. *Br J Sports Med*
482 2013;47:811.

483

484 ⁶Corrigan B, Kazlauskas R. Medication use in athletes selected for doping control at the
485 Sydney Olympics 2000. *Clin J Sport Med* 2003;13:33-40.

486

487 ⁷Tsitsimpikou C, Tsiokanos A, Tsarouhas K, et al. Medication use by athletes at the Athens
488 2004 Summer Olympic Games. *Clin J Sport Med* 2009;19:33-38.

489

490 ⁸Lazic JS, Dikic N, Radivojevic N, et al. Dietary supplements and medications in elite sport -
491 polypharmacy or real need? *Scand J Med Sci Sports* 2011;21:260-267.

492

493 ⁹Alaranta A, Alaranta H, Heliövaara M, et al. Ample use of physician-prescribed medications
494 in Finnish elite athletes. *Int J Sports Med* 2006;27:919-925.

495

496 ¹⁰Tsitsimpikou C, Jamurtas A, Fitch K, et al. Medication use by athletes during the Athen
497 2004 Paralympic Games. *Br J Sports Med* 2009;43:1062-1066.

498

499 ¹¹Aavikko A, Helenius I, Vasankari T, et al. Physician-prescribed medication use by the
500 Finnish Paralympic and Olympic athletes. *Clin J Sport Med* 2013;23(6):478-482.

501

502 ¹²Huang SH, Johnson K, Pipe AL, et al. The use of dietary supplements and medications by
503 Canadian athletes at the Atlanta and Sydney Olympic Games. *Clin J Sport Med* 2006;16:27-
504 33.

505

506 ¹³Ronsen O, Sundgot-Borgen J, Maehlum S. Supplement use and nutritional habits in
507 Norwegian elite athletes. *Scand J Med Sci Sports* 1999;9:28-35.

- 508 ¹⁴Sobal J, Marquart LF. Vitamin/mineral supplement use among high-school athletes.
509 *Adolescence* 1994;9:835-843.
510
- 511 ¹⁵Taioli E. Use of permitted drugs in Italian professional soccer players. *Br J Sports Med*
512 2007;41:439-441.
513
- 514 ¹⁶Tscholl P, Feddermann N, Junge A, et al. The use and abuse of painkillers in international
515 soccer: data from 6 FIFA tournaments for female and youth players. *Am J Sports Med*
516 2009;37:260-265.
517
- 518 ¹⁷Tscholl P, Alonso JM, Dolle G, et al. The use of drugs and nutritional supplements in top-
519 level track and field athletes. *Am J Sports Med* 2010;38:133-140.
520
- 521 ¹⁸Tscholl PM, Dvorak J. Abuse of medication during international football competition in
522 2010 - lessons not learned. *Br J Sports Med* 2012;46: 1140-1141.
523
- 524 ¹⁹Waddington I, Malcolm D, Roderick M, et al. Drug use in English professional football. *Br J*
525 *Sports Med* 2005;39(4):e18.
526
- 527 ²⁰Tscholl P, Junge A, Dvorak J. The use of medication and nutritional supplements during
528 FIFA World Cups 2002 and 2006. *Br J Sports Med* 2008;42:725-730.
529
- 530 ²¹Pedrinelli A, Ejnisman L, Fagotti L, et al. Medications and nutritional supplements in
531 athletes during the 2000, 2004, 2008 and 2012 FIFA Futsal World Cups. *Biomed Res Int.*
532 2015;870308;1-6.
533
- 534 ²²Geyer H, Parr MK, Koehler K, et al. Nutritional supplements cross-contaminated and faked
535 with doping substances. *J Mass Spectrom* 2008;43:892-902.
536
- 537 ²³Maughan RJ. Contamination of dietary supplements and positive drug tests in sport. *J*
538 *Sports Sci* 2005;23(9):883-889.
539
- 540 ²⁴Bjelakovic G, Nikolova D, Gluud LL, et al. Mortality in randomised trials of antioxidant
541 supplements for primary and secondary prevention. *JAMA* 2007;297:842-857.
542
- 543 ²⁵Fisher AEO, Naughton DP. Iron supplements: the quick fix with long-term consequences.
544 *Nutr J* 2004;3:2.
545
- 546 ²⁶Palmer ME, Haller C, McKinney PE, et al. Adverse events associated with dietary
547 supplements: An observational study. *Lancet* 2003;11:101-6.
548

- 549 ²⁷De Hon O, Coumans B. The continuing story of nutritional supplements and doping
550 infractions. *Br J Sports Med* 2008;41(11):800-805.
551
- 552 ²⁸Maughan RJ. Contamination of dietary supplements and positive drug tests in sport. *J*
553 *Sports Sci* 2005;23(9):883-889.
554
- 555 ²⁹Willick SE, Webborn N, Emery C, et al. The epidemiology of injuries at the London 2012
556 Paralympic Games. *Br J Sports Med* 2013;47:426-432.
557
- 558 ³⁰Weiler R, van Mechelen W, Fuller C, et al. Sports injuries sustained by athletes with
559 disability: a systematic review. *Sport Med* 2016:1-13.
560
- 561 ³¹Webborn N, Cushman D, Blauwet CA, et al. The epidemiology of injuries in football at the
562 London 2012 Paralympic Games. *PM&R*. 2016;8(6):545-552.
563
- 564 ³²Tscholl PM, Vaso M, Weber A, et al. High prevalence of medication use in professional
565 football tournaments including the World Cups between 2002 and 2014: A narrative review
566 with a focus on NSAIDs. *Br J Sports Med* 2015;49:580-582.
567
- 568 ³³National Institute for Health and Care Excellence (NICE). Non-steroidal anti-inflammatory
569 drugs (NSAIDs): NICE Guidelines 2013. Available from: [http://cks.nice.org.uk/nsaids-](http://cks.nice.org.uk/nsaids-prescribing-issues#!topicsummary)
570 [prescribing-issues#!topicsummary](http://cks.nice.org.uk/nsaids-prescribing-issues#!topicsummary). [Accessed: 01/12/2015].
571
- 572 ³⁴Paoloni JA, Milne C, Orchard J, et al. Non-steroidal anti-inflammatory drugs in sports
573 medicine: Guidelines for practical but sensible use. *Br J Sports Med* 2009;43:863-865.
574
- 575 ³⁵Küster M, Renner B, Oppel P, et al. Consumption of analgesics before a marathon and the
576 incidence of cardiovascular, gastrointestinal and renal problems: a cohort study. *BMJ Open*
577 2013;3:e002090.
578
- 579 ³⁶Wharam PC, Speedy DB, Noakes TD, et al. NSAID use increases the risk of developing
580 hyponatraemia during an Ironman Triathlon. *Med Sci Sports Exerc* 2006;38:618-622.
581
- 582 ³⁷Irving RA, Noakes TD, Raine RI, et al. Transient oliguria with renal tubular dysfunction after
583 a 90 km running race. *Med Sci Sports Exerc* 1990;22:756-761.
584
- 585 ³⁸Walker RJ, Fawcett JP, Flannery EM, et al. Indomethacin potentiates exercise-induced
586 reduction in renal hemodynamics in athletes. *Med Sci Sports Exerc* 1994;26:1302-1306.
587
- 588 ³⁹Wheeler P, Batt ME. Do non-steroidal anti-inflammatory drugs adversely affect stress
589 fracture healing? A short review. *Br J Sports Med* 2005;39:65-69.

590

591 ⁴⁰Bailey Su J, O'Connor P. NSAID therapy effects on healing of bone, tendon and the
592 enthesis. *J Appl Phys* 2013;115(6):892-899.

593

594 ⁴¹Houlihan CM, Stevenson RD. Bone density in cerebral palsy. *Phys Med Rehabil Clin N Am*
595 2009;20(3):493-508.

596

597 ⁴²Sheridan KJ. Osteoporosis in adults with cerebral palsy. *Dev Med Child Neurol*
598 2009;51(4):38-51.

599

600 ⁴³Woo WWK, Man SY, Lam P, et al. Randomized double-blind trial comparing oral
601 Paracetamol and oral non-steroidal anti-inflammatory drugs for treating pain after
602 musculoskeletal injury. *Ann Emerg Med* 2005;46: 352-361.

603