

# Amateur endurance athletes' use of non-steroidal anti-inflammatory drugs

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## Amateur endurance athletes' use of Non-Steroidal Anti-Inflammatory Drugs: A cross-sectional survey

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Keywords:	Non-prescription Medicines < Community Pharmacy, Adverse Drug Reactions < Patient Safety, Drug Utilisation, Consumer Attitudes, Patient Attitudes < Lay Perspectives, OTC Medicines < Pharmacovigilance, Pharmacoepidemiology < Pharmaceutical Public Health
Abstract:	<p><b>Objective</b> To explore amateur endurance athletes' use and views about non-steroidal anti-inflammatory drugs (NSAIDs)</p> <p><b>Methods</b> An online cross-sectional survey of amateur athletes at 4 athletic clubs.</p> <p><b>Key findings</b> Of a sample of 129 of amateur athletes, 68% (n=88) reported using NSAIDs in the previous 12 months (84.4% in triathletes, 70.9% in runners, and 52.5% in cyclists). Overall, ibuprofen was the most popular drug (n=48). There was a lack of knowledge of adverse drug reactions, with only 26% of use advised by a doctor or pharmacist.</p> <p><b>Conclusions</b> There is high usage of NSAIDs in amateur athletes, including before and during events, largely without professional health advice. Informational needs of amateur athletes are not being met.</p>

### **Objective**

To explore amateur endurance athletes' use and views about non-steroidal anti-inflammatory drugs (NSAIDs)

### **Methods**

An online cross-sectional survey of amateur athletes at 4 athletic clubs.

### **Key findings**

Of a sample of 129 of amateur athletes, 68% (n=88) reported using NSAIDs in the previous 12 months (84.4% in triathletes, 70.9% in runners, and 52.5% in cyclists). Overall, ibuprofen was the most popular drug (n=48). There was a lack of knowledge of adverse drug reactions, with only 26% of use advised by a doctor or pharmacist.

### **Conclusions**

There is high usage of NSAIDs in amateur athletes, including before and during events, largely without professional health advice. Informational needs of amateur athletes are not being met.

## **Introduction**

Non-steroidal anti-inflammatory drugs (NSAIDs) are used by athletes (1-4) and are widely available over-the-counter in the UK. They are for control of injury pain, pain during training and events, and pain post intense effort (such as delayed onset muscle soreness).(5) Although not listed on the World Anti-Doping Agency (WADA) list of prohibited substances, a recent review has suggested a performance enhancing effect by reducing the perception of effort and exercise-induced pain.(6)

NSAIDs are associated with adverse effects, such as gastric ulcers, acute renal failure, and cardiovascular events.(7) Prophylactic use of NSAIDs prior to an endurance event has been associated with gastrointestinal and cardiovascular events.(3) Although NSAIDs are licenced for pain relief, and used for pain associated with exercise, NSAIDs are now suspected to be detrimental to muscle healing(5), suggesting the benefit/harm balance of their use associated with exercise needs review.

In 2013, a coroner concluded that ibuprofen contributed to the death of a 23-year-old amateur runner at the Brighton Marathon. After ingesting ibuprofen prior and during the event, he fell ill at mile 16 of the marathon, dying of bowel ischaemia and gastrointestinal haemorrhage.(8) Although an anecdotal report, it is supported by known adverse effects of ibuprofen(5) and increased rates of gastrointestinal adverse effects in a marathon.(3)

Current knowledge of pharmacoepidemiology in amateur athletes is limited, and mainly focused on elite performers.(5) We aimed to examine the usage patterns and knowledge of NSAIDs by amateur endurance athletes.

## **Methods**

We developed an online questionnaire asking participants about their use of NSAIDs, their management of injuries, and knowledge of adverse events. Questions consisted of multiple answer questions, and numeric entry. Demographic information was also collected. This was piloted with a number (n=6) of amateur endurance athletes and pharmacists. The survey was communicated to

members of four amateur athletic clubs (consisting of one cycling club, two running clubs, and one mixed athletic, running, and triathlete club) by the club organisers using their websites or email. Participants were informed that participation in the survey would be taken as consent to the survey. Ethical approval for this process was granted by the University of Birmingham's Ethics Committee. Data analysis was carried out using IBM SPSS (Version 21.0, IBM Corp).

## **Results**

There were 129 respondents, of whom 30% were female. The respondents had a mean age of 33 (age range 18-70). NSAID usage was 84% in triathletes, 71% in runners and 53% in cyclists (Table 1). There was no association between usage and age. There was a small gender difference in NSAID usage (female 75%, male 65.2%), but this was statistically insignificant.

When respondents were able to name a specific NSAID, ibuprofen was the most popular drug used (n=48), followed by aspirin (n=11), diclofenac (n=7), naproxen (n=3), and celecoxib (n=1).

Sixty-eight percent (n=88) of respondents reported using NSAIDs in the previous 12 months to treat sport-related aches and pains. NSAID usage was associated with occurrence of an injury in the past 12 months ( $\chi^2$  value 12.187,  $p < 0.001$ ). Forty-five percent of athletes (n=58) used NSAIDs immediately before or after an activity (runners 56%, triathletes 70%, and cyclists 33%). Eight respondents used NSAIDs during an event.

Non-users and users of NSAIDs had similar knowledge of expected benefits and adverse effects of NSAIDs (Table 2). NSAID users had a higher rate of indigestion remedy use than non-users (27% and 17% respectively). Only 26% of NSAID use was informed by a doctor or pharmacist.

## **Discussion**

This study shows a high use of NSAIDs usage by recreational/amateur athletes. There is higher use in runners and triathletes, compared to cyclists, logically a consequence of the lower impact nature of cycling compared to running.

Limitations include the small sample size, which may reduce the representativeness of the findings to the wider endurance athlete community. Respondent bias may also over-estimate the use of NSAIDs, since non-users of NSAIDs may be less likely to engage with a survey of NSAID use. The method of survey distribution means an accurate response rate cannot be calculated. While these limitations impair the generalisability of this study, this paper provides some early data on amateur athletic use of NSAIDs. Further pharmacoepidemiology of NSAIDs in a larger national population of amateur athletes is needed.

Other studies have shown 60% of triathletes (Study size, n=327) using NSAIDs(2), 59% of runners (Study size, n=3913) using NSAIDs at the Bonn Marathon (3), and 57% of runners (study size, n=109) at the London Marathon using NSAIDs.(4) Evidence of use of NSAIDs during an event we found is of concern, given the increased risk of adverse effects associated with longer endurance events. Not all users of NSAIDs in our study were aware of the gastro-intestinal and renal effects of NSAIDs.

Perceived benefits reported by study participants, such as reduced bowel movements and an anti-emetic effect are unsupported by evidence. Others, such as the anti-inflammatory effect of NSAIDs, may reduce pain, but lengthen recovery times.(5) Advice on harm/benefit of NSAIDs given to athletes by health care professionals, coaches, and race event organisers about the use of NSAIDs should be revised. In particular, the risk of NSAIDs before and during endurance events should be clearly described. Changes in renal function have been shown in marathon runners taking NSAIDs prior to an event (9) Additional consequences of NSAID use exist in the context of endurance sports; runners in endurance events have been found to be at increased risk of hyponatraemia (10). The prevalence of NSAID use found in this study found prior to events and during events, and the lack of professional advice received, highlight that greater information needs to be provided to the amateur athletic population.

## **Conclusion**

This study shows high usage of NSAIDs in amateur athletes, similar to previous studies in elite athletes. As might be expected usage is associated with injuries, but also before and during events when the risks of NSAIDs may be heightened due to increased physiological stresses. Despite limitations in generalisability, and the need for further studies, our data suggests that usage of NSAIDs is at odds with current evidence; and is used without professional health advice. Amateur athletes need better information about the benefits and potentially serious harms associated with NSAIDs.

## References

1. Corrigan B, Kazlauskas R. Medication use in athletes selected for doping control at the Sydney Olympics (2000). *Clin J Sport Med.* 2003;13(1):33-40.
2. Gorski T, Cadore EL, Pinto SS, da Silva EM, Correa CS, Beltrami FG, et al. Use of NSAIDs in triathletes: prevalence, level of awareness and reasons for use. *Br. J. Sports. Med.*. 2011;45(2):85-90.
3. Küster M, Renner B, Opperl P, Niederweis U, Brune K. Consumption of analgesics before a marathon and the incidence of cardiovascular, gastrointestinal and renal problems: a cohort study. *BMJ Open.* 2013;3(4).
4. Whatmough S, Mears S, Kipps C. The use of non-steroidal anti-inflammatories (NSAIDs) at the 2016 London Marathon. *British Journal of Sports Medicine.* 2017;51(4):409.
5. Ziltener JL, Leal S, Fournier PE. Non-steroidal anti-inflammatory drugs for athletes: An update. *Ann Phys Rehabil Med.* 2010;53(4):278-88.
6. Holgado D, Hopker J, Sanabria D, Zabala M. Analgesics and Sport Performance: Beyond the Pain-Modulating Effects. *PM&R.* 2017.
7. Aronson JK. Meyler's side effects of drugs: The international encyclopedia of adverse drug reactions and interactions. Amsterdam: Elsevier Science; 2015.
8. Brighton Marathon runner died after reaction to ibuprofen and supplements <https://www.theguardian.com/uk-news/2013/aug/30/brighton-marathon-runner-reaction-supplements>: The Guardian; 2013 [accessed on 7<sup>th</sup> of January 2018]
9. Reid SA, Speedy DB, Thompson JM, Noakes TD, Mulligan G, Page T, et al. Study of hematological and biochemical parameters in runners completing a standard marathon. *Clin J Sport Med.* 2004;14(6):344-53.
10. Page AJ, Reid SA, Speedy DB, Mulligan GP, Thompson J. Exercise-associated hyponatremia, renal function, and nonsteroidal antiinflammatory drug use in an ultraendurance mountain run. *Clin J Sport Med.* 2007;17(1):43-8.

Table 1: Use of NSAIDs by specialism, age, and gender

Discipline	Any use for sport related aches and pains in the previous 12 months	Use immediately before, during, or immediately after a single bout of activity
Cyclist (N=40)	21 (53%)	7 (33%)
Triathlete (N=32)	27 (84%)	19 (70%)

Runner (N=57)	40 (71%)	32 (56%)
Age		
18-23 (N=38)	24 (63%)	9 (24%)
24-40 (N=51)	35 (69%)	27 (53%)
41-60 (N=38)	28 (74%)	21 (55%)
60+ (N=2)	1 (50%)	1 (50%)
Gender		
Male (N=89)	58 (65%)	37 (42%)
Female (N=40)	30 (75%)	21 (53%)
Total (N=129)	88 (68%)	58 (45%)

Table 2: Expected NSAID benefits and adverse effects reported by respondents

Expected Benefit	NSAID user (n=88)	Non-Users (n=41)
Anti-inflammatory effect	77 (88%)	32 (78%)
Analgesia	35 (40%)	10 (24%)
Reduced nausea	7 (8%)	4 (10%)
Reduced bowel movements	3 (3%)	0 (0%)
Expected Adverse effect		
Gastrointestinal effects	50 (57%)	17 (42%)
Gastrointestinal bleeding/ulcers	56 (64%)	27 (66%)
Kidney impairment	42 (48%)	19 (46%)