THE USE OF ANALGESICS AMONG POZNAń MARATHON RUNNERS

ABstrACt

Purpose. Running is becoming an increasingly more popular form of leisure activity. However, intense physical activity, such as running a marathon, can put a significant strain on the body and lead to the use of painkillers to reduce or avoid pain. Therefore, the purpose of the research was to determine the percentage of participants in the Poznań Marathon taking analgesics before or during the run and to investigate the runners’ knowledge about the possible negative health effects of such behaviour.

Methods. The study was carried out in 3 consecutive years (2014–2016) among 308 runners participating in the Poznań Marathon. The respondents completed a survey consisting of 3 parts: (1) personal details, (2) use of analgesics before and/or during the marathon run, and (3) the runner’s awareness of the possible negative effects of using such medicines during increased physical activity.

Results. Taking analgesics before or during a marathon run was declared by 18.6%, 14.9%, and 16.8% of the participants in years 2014, 2015, and 2016, respectively. Compared with men, women used painkillers more frequently (22.3% vs. 16.1%). On average, 59.3% of runners believed that using analgesics might be harmful to their health and increase the risk of injury, but 39.8% of them took painkillers anyway.

Conclusions. Nearly every sixth participant of the Poznań Marathon used analgesics before or during running because of the pain they experienced or expected. The awareness of analgesic-related side effects did not stop the runners from using painkillers.

Key words: pain, injury, physical exercise, painkillers

Introduction

Physical activity is perceived as an important aspect of life, associated with various positive, proven health effects [1, 2]. However, excessive effort may disrupt the homeostasis of the human body [3] and, directly or indirectly, cause overload and/or injuries.

For the recent several years, growing interest in various forms of physical activity has been observed in Poland. One of the most popular forms of such activity, especially among amateurs, is long-distance running [3–5]. Indeed, the number of people competing in the Poznań Marathon has increased more than 7 times over the past 16 years [6].

In a long-distance race, the physical exertion of the locomotor system leads to a higher probability of damage to muscles, tendons, and bones [7–9], articular injury in the lower limb [4, 5], or musculoskeletal pain [10]. In turn, the incidence of injuries during long-distance runs was found to range from 3.2 to 59 per 1000 hours [4, 11, 12] and 2–8% of marathon participants made use of medical assistance during the race or immediately after the competition [13, 14]. Both those injuries and indirect consequences of high musculoskeletal load lead to the occurrence of pain in runners, with varying location and type of affected tissue. Some runners, to reduce or eliminate pain, take analgesics before the start or during the marathon [15–18].

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The use of analgesics, aside from the temporary pain relief, is associated with multiple severe side effects. None of the painkillers applied by runners is neutral to the gastric mucosa and the digestive tract [19]; they are also able to disturb the fluid and electrolyte balance [20–23] and reduce kidney function [24–26].

The increasing number of papers describing the consumption of analgesics among runners indicates a real worldwide problem, which is also present in Poland [17]. In order to obtain more information about this phenomenon in Poland, a 3-year study was carried out to explore the potential negative health effects of such behaviour and its variability over time.

Material and methods

The study material included an anonymous, voluntary survey filled in by a total of 308 runners who participated in the Poznań Marathon across 3 consecutive years: 2014 (82 runners: 58 men and 24 women), 2015 (107: 64 men and 43 women), and 2016 (119: 78 men and 41 women). This corresponded with 1.3%, 1.7%, and 2.0% of the runners who completed the marathon in the respective years.

The survey consisted of the same questions each year, with the exception of one introduced in the last 2 years, which intended to exclude runners who had taken part in this research previously, in 2014 and/or 2015. The first part of the survey included questions considering sex, age, weight, and body height, place of residence, and level of education, whereas the questions in the next section dealt with the use of analgesics immediately before and during long-distance running, the type of this medication, as well as the reason for its consumption. Moreover, the respondents were asked whether the use of analgesics before and during intensive exercise could have a negative effect on their health and, if so, which adverse effects they thought were possible. The questionnaire contained both open-ended and closed-ended questions and in some cases allowed multiple answers. The survey was conducted with the runners either personally or electronically, within 2 weeks after completing the marathon.

The surveyed indicators used in the study were presented as numbers (mean with standard deviation) and percentage rates. All tested variables were checked for normality of distribution with the Shapiro-Wilk test. In order to compare the results from the 3 analysed years, the Kruskal-Wallis ANOVA test and the Mann-Whitney U test were applied to the quantitative variables and the χ² test to qualitative variables; these were used to assess potential differences between the studied variables and to compare the differences between the sexes, respectively. All statistical analyses were performed with the use of the STATISTICA 12.0 computer statistical package (StatSoft, Inc., Tulsa, USA). Significant results were defined at $p < 0.05$.

Ethical approval

The research related to human use has been complied with all the relevant national regulations and institutional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the Bioethical Committee of the Poznan University of Medical Sciences (approval No.: 714/14).

Results

The results of this study, which spanned 3 consecutive years, confirmed that painkillers were used by amateur marathon runners in Poland. The average age of the participants involved in the study was about 30 years and the percentage rate of subjects over the age of 40 did not exceed 14.6% (Table 1). None of the parameters evaluated in the study showed statistical differences in the consecutive years (Table 1).

We found that an affirmative answer to the question ‘Did you take painkillers immediately before or during the marathon run?’ was given, on average, by 16.8% of the respondents in each of the years; however, no statistically significant differences were observed (Figure 1).

When comparing the number of people taking analgesics directly before the run in the 3 analysed years, a statistically significant difference was noted only between the results for 2014 and 2015. However, where analgesics were used during the run, a statistically significant difference was found between all test dates (Table 2).

![Figure 1. Percentage distribution of runners who used analgesics in subsequent years](humanmovement.pl)
Table 1. Description of participants in the Poznań Marathon in 2014-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Sex</th>
<th>Age (years) (mean ± SD)</th>
<th>BMI (kg/m²) (mean ± SD)</th>
<th>Place of residence (%)a</th>
<th>Level of education (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(mean ± SD)</td>
<td>(mean ± SD)</td>
<td>Village</td>
<td>Small town</td>
</tr>
<tr>
<td>2014</td>
<td>Female</td>
<td>30.1 ± 8.1</td>
<td>21.6 ± 3.2</td>
<td>12.5</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>32.8 ± 8.1</td>
<td>24.1 ± 2.4</td>
<td>8.6</td>
<td>19.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>32.0 ± 8.1</td>
<td>23.4 ± 2.9</td>
<td>9.8</td>
<td>18.3</td>
</tr>
<tr>
<td>2015</td>
<td>Female</td>
<td>29.6 ± 7.2</td>
<td>21.1 ± 1.2</td>
<td>7.0</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>29.6 ± 6.2</td>
<td>23.1 ± 1.5</td>
<td>6.3</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29.6 ± 6.6</td>
<td>22.3 ± 1.4</td>
<td>6.6</td>
<td>8.4</td>
</tr>
<tr>
<td>2016</td>
<td>Female</td>
<td>29.2 ± 6.8</td>
<td>21.3 ± 1.1</td>
<td>12.2</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>32.4 ± 7.6</td>
<td>23.7 ± 1.7</td>
<td>2.6</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>31.3 ± 7.3</td>
<td>22.9 ± 1.5</td>
<td>5.9</td>
<td>7.5</td>
</tr>
</tbody>
</table>

SD – standard deviation, BMI – body mass index

* Village – less than 10,000 inhabitants, small town – from 10,000 to 100,000 inhabitants, large city – over 100,000 inhabitants

Table 2. Comparison of available publications concerning the use of analgesic agents by runners

<table>
<thead>
<tr>
<th>Author</th>
<th>Competition</th>
<th>Type</th>
<th>Year</th>
<th>Place</th>
<th>Number of participants</th>
<th>Within 24 h before the run (%)</th>
<th>Immediately before the run (%)</th>
<th>During the run (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own research</td>
<td>Marathon</td>
<td>2014 Poznań (Poland)</td>
<td>82 runners</td>
<td>–</td>
<td>13.4</td>
<td>8.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2015</td>
<td>107 runners</td>
<td>–</td>
<td>14.9</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2016</td>
<td>119 runners</td>
<td>–</td>
<td>14.2</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brune et al. [15]</td>
<td>Marathon</td>
<td>2009 Bonn (Germany)</td>
<td>–</td>
<td>61.5</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Küster et al. [16]</td>
<td>Marathon</td>
<td>2010 Bonn (Germany)</td>
<td>3913 runners</td>
<td>–</td>
<td>49.3</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reid et al. [20]</td>
<td>Marathon</td>
<td>2002 Christchurch (New Zealand)</td>
<td>134 runners</td>
<td>13.4</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Almond et al. [21]</td>
<td>Marathon</td>
<td>2002 Boston (USA)</td>
<td>488 runners</td>
<td>55.5</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wharam et al. [22]</td>
<td>Ironman triathlon</td>
<td>2004 New Zealand</td>
<td>330 athletes</td>
<td>30.0</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brune et al. [26]</td>
<td>Marathon</td>
<td>2007 Switzerland</td>
<td>–</td>
<td>30.0</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nieman et al. [27]</td>
<td>Ultramarathon</td>
<td>2004 California (USA)</td>
<td>60 runners</td>
<td>–</td>
<td>–</td>
<td>72.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gorski et al. [28]</td>
<td>Ironman triathlon</td>
<td>2008 Florianópolis (Brazil)</td>
<td>1250 athletes</td>
<td>25.5</td>
<td>17.9</td>
<td>47.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
With regard to the willingness to use painkillers, no statistically significant differences were revealed between men and women in years 2014–2016; however, the percentage of women (on average 22.3%) who took such drugs was higher compared with men (on average 16.1%). Interestingly, there were no statistically significant differences in the taking of analgesics or in the reasons for their use in relation to the runners’ sex, place of residence, or level of education.

The runners most often used drugs containing predominantly ibuprofen, followed by ketoprofen, paracetamol, drotaverine, and diclofenac.

When asked about the reasons for taking analgesics, the marathon runners argued that they experienced pain or, in 3 cases in 2014, 2 in 2015, and 5 in 2016, they perceived the medicine application as a preventive means to avoid or reduce pain during the run.

To assess whether the runners were aware of the consequences of using the painkillers shortly before or during intense exercise, the respondents were asked to answer the question: ‘Do you think that painkillers used before or during increased physical activity can give rise to negative health effects?’ On average, 59.3% of them gave affirmative responses, characterised by statistically significant differences in the analysed years (Figure 2).

The answer to the next question of the survey: ‘Do you understand the potential danger of taking analgesics?’ given by the runners who used them was interesting. They were aware that the use of analgesics could cause different kinds of adverse physiological effects (43.6% in 2014, 86.2% in 2015, 78.5% in 2016) and lead to an increase in injuries through pain relief (38.2% in 2014, 55.2% in 2015, 35.9% in 2016).

The results of the study clearly indicate that the awareness of the harmfulness of taking analgesics before or during intense physical exercise is not a sufficient factor to deter runners from using painkillers. Nearly 40% of the runners (39.8%) who declared to use analgesics believed in their hazardous nature. Despite this knowledge, they decided to consume them. The specific percentages of respondents in each of the years is presented in Figure 3.

**Discussion**

The participants of our study were 30.6 ± 7.4 years old and the mean age did not differ statistically between both sexes. Other studies described mainly subjects who were, on average, 10 years older [16, 21, 27].

A comparison of data on the use of analgesics during marathon runs is shown in Table 2.

The use of painkillers, both in the authors’ own research and in other publications [16, 20, 28], was motivated by the runners’ desire to remove or avoid pain while running. Our data, including a clear conclusion that more women than men took painkillers, are consistent with the results found for the marathons in Bonn [16] and in Boston [21]. The percentage of women using analgesics was 19% and 8% higher than the percentage of men who did so in those 2 marathon locations, respectively.

Furthermore, the spectrum of painkillers, including ibuprofen, ketoprofen, diclofenac, or paracetamol used by the Poznań runners did not differ from the profile of analgesic drugs taken by long-distance athletes running in other countries [16, 27].

The vast majority of competitors in the Poznań Marathon (on average 59%) were aware that the use of analgesics before or during increased intensity exercise might induce negative health effects. Most par-
participants taking part in the marathon in Bonn 8 years before lacked such knowledge. At that time, about 93% of the competitors declared not to be informed about the possible health risks associated with the use of analgesics during exercise [16].

The marathon runners in Poznań were conscious that the possible negative health effects of using analgesics during a run included problems with the digestive tract, the kidneys, and the liver, as well as a greater possibility of injuries. The participants of the triathlon in Brazil mainly pointed to gastrointestinal and kidney problems [28].

Among the Poznań Marathon runners declaring the use of analgesics, an average of 39.8% decided to consume them despite being convinced of the dangers of their use. In related publications, no such information was provided.

This study confirms that marathon runners have applied analgesics before or during running a marathon for decades. The awareness of analgesic-related side effects did not stop them from using painkillers.

Bearing in mind the many negative effects associated with the use of painkillers by participants of major running events, such as marathons, and the scale of the phenomenon described in this paper, we suggest to start an information campaign targeting the dangers of using such remedies, especially by high-performance athletes [25] or even non-athletes and healthy children [29].

Conclusions

Nearly every 6th participant of the Poznań Marathon used analgesics before running (on average 84%) and/or during running (on average 27%) because of the experienced or expected pain. The awareness of analgesic-related side effects did not deter runners from using painkillers.

Although more than half of the respondents in the surveyed groups believed that the use of analgesics before or during physical activity might have negative health effects, it is advisable to implement a programme to raise the awareness of the risks associated with the use of painkillers, especially non-steroidal anti-inflammatory drugs.

Disclosure statement

No author has any financial interest or received any financial benefit from this research.

Conflict of interest

The authors state no conflict of interest.

References


