The prevalence of pain and use of analgesics in Kazakhstani swimmers

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1. ABSTRACT

Introduction: Chronic pain is a major issue for elite athletes because it can have long-term effects on mental and physical health, which can eventually damage sports performance and career longevity. In addition to determining the main types of pain reported in these activities, this study attempts to ascertain the prevalence of chronic pain and the use of analgesics among professional swimmers in Kazakhstan.

Methods: Thirty professional swimming athletes from the Kazakhstani Swimming Federation participated in this study. A survey by using the questions from the Extended Nordic Musculoskeletal Questionnaire (NMQ-E) and the Numeric Pain Rating Scale was used to gather data on demographics, main pain sites, its effect on athletes` lives, analgesic consumption patterns, and pain severity ratings.

Results: The research shows the most frequent is the shoulder pain after the lower back pain in Kazakhstani elite swimmers, which is understandable for swimmers and written in previous studies. Research indicates that more elite swimmers experience occasional pain rather than constant pain. Despite this, only NCAIDs (non-steroid anti-inflammatory drugs) type of analgesics are used by surveyed participants; there's no reported use of prescribed analgesics, and nearly half never use any analgesics. The effectiveness of the analgesics is generally rated as low to satisfactory.

Conclusion: The findings highlight that Kazakhstani elite swimmers commonly experience pain in their lower back area after shoulder pain, which is probably linked with overloading and extreme load on lower back during the stokes and turns during swimming process and competitions. Findings of research suggest that improved pain management strategies focusing on customized rehabilitation techniques are required to treat recurrent pain and lessen reliance on unprescribed analgesic usage.

2. BACKGROUND

An uncomfortable feeling or discomfort that lasts longer than six months is known as chronic pain, and athletes frequently have chronic pain in one or more body areas (Christopher et al., 2020). Since pain is a personal and subjective experience, its type and severity can vary. Approximately 80% of people in society suffer pain episodes and the most common types of pain are found in lower back (Nakamura et al., 2014), while sportsmen frequently have lower back and leg discomfort as a result of degenerative disc disease, orthopedic surgery, stress fractures, muscle imbalances, and lower extremity inflexibility.(Jung et al., 2021)

Athletes frequently experience pain, especially in sports involving high impact, repetitive motion, or intense physical contact. The most common causes of pain and physical injury are poor training habits or unhealthy lifestyle choices. Alaiti and Reis (2022) research provides evidence that the development of impairment in primary pain and chronic musculoskeletal disorders is significantly influenced by pain-related anxiety, maladaptive attitudes, catastrophizing, and avoidance behavior. Chronic pain and other aftereffects of recurrent physical injuries may be brought on by insufficient care or a lack of rehabilitation.

Musculoskeletal discomfort affects around 50% of athletes. 48% of participants in a study of professional athletes reported- shoulders, knees, and lower back as the most often mentioned areas. (Goes et al., 2020)

According to Trompeter et al. (2017), Low back pain prevalence varies from 18–65% (basketball) to 1–94% (cross-country skiing). A common cause of low back pain in athletes, especially during recurrent asymmetric loading exercises, is sacroiliac joint dysfunction (Peebles & Jonas, 2017).

All levels of competitive swimming have shoulder soreness, which may be frustrating and even ruin an athlete's career. (Feijen et al., 2021) . Skilled swimmers may swim up to 18,000 meters a day; train five to seven days a week, sometimes twice a day; 80% of this workout is he freestyle stroke (ton of repeated shoulder revolutions.). The shoulder is prone to a variety of injuries due to the extreme strain this enormous load and its intrinsic instability exert on the joint and periarticular tissue. (Feijen et al., 2020)

According to Feijen et al. (2020), 91% of swimmers have shoulder pain very common, which is main reason for missed workouts. 97% of elite swimmers experience shoulder pain after intense activity and

shoulder-specific injuries ranging from 23% to 51% for men and 33% to 41% for women. (McKenzie et al, 2023). Filho et al. (2022) realized that 54% of triathlon athletes, who are specialized in swimming as well as cycling and running, both male and female, suffer from injuries.

Swimming physical demands may cause athletes to suffer a distinct pattern of chronic pain than other athletes, which might result in different patterns of analgesic consumption. The use of analgesics in different athletes is impacted by various characteristics such as the kind of training, frequency of pain episodes, or availability to medical treatment. This study would provide insightful information on local pain trends and its management techniques unique to each mentioned sport.

Athletes frequently use medications, especially NSAIDs (like ibuprofen). Analgesics are commonly used by up to 35% of athletes, and some of them do so without consulting a doctor beforehand. This can have detrimental consequences on cartilage health as well as gastrointestinal and renal disorders. (Christopher et al., 2020) According to the study Harle et al. (2018), the bulk of the 70 publications that were located looked at how frequently top athletes take painkillers, such as opioids, corticosteroids, anesthetics, and nonsteroidal anti-inflammatory medicines (NSAIDs). A smaller group of research evaluated how drugs affected outcomes including pain, function, and side effects. According to reports, oral NSAIDs are the most often utilized drug, with over 50% of athletes using them at some major competitions. Elite amateur cyclists reported regularly using NSAIDs in conjunction with caffeine in 11 interviews. Club physicians, club physiotherapists, and English professional football players all spoke of the tremendous pressure to prevent injury-related absences from games. They found that the desire to meet minimum game appearance requirements in order to get greater compensation, fear of losing a roster position, and guilt over missing games were all associated with the usage of injectable analgesics.

Although research on the incidence of pain and usage of analgesics in athletes has been conducted, no information about the prevalence of pain in athletes from Kazakhstan has been discovered, and nothing is known about the chronic pain experienced by Kazakhstani swimmers in general as well as using analgesics.

3. PROBLEM STATEMENT.

Hypothesis, objective, and research question

3.1. Research Questions:

How prevalent chronic pain and analgesics usage in Kazakhstani swimmers?

What is the impact of chronic pain on swimmers?

3.2. Hypothesis:

Chronic pain and using of analgesics are prevalent among Kazakhstani swimmers

3.3. Objectives:

To investigate the prevalence chronic pain and analgesics usage in Kazakhstani swimmers

To investigate its impact of chronic pain on athletes` lives

4. SPECIFIC AIMS

1. Obtain ethical approval from the NU-IREC and recruit elite athletes from the Kazakhstani Swimming Federation.
2. Conduct surveys with athletes and collect information about their chronic pain and analgesics using experience, influence on quality of life and performance.
3. Perform statistical analysis and analyze the data using R-studio software.
4. Interpret results and make conclusions about the prevalence of pain and using analgesics in Kazakhstani swimmers.

5. EXPERIMENTAL PLAN

Specific Aim 1: An IREC application form, together with a thorough methodology and all required documents, was filled out and submitted in order to receive ethical approval from the Nazarbayev University Institutional Research Ethics Committee (NU IREC). Using databases including Google Scholar, Science Direct, ResearchGate, and PubMed, a thorough literature assessment was carried out throughout the waiting period. Swimming, Kazakhstani swimmers` chronic pain, persistent pain, pain prevalence, injury prevalence, NSAID use, and analgesic use in athletes were the main search terms employed in the literature. The Kazakhstani Swimming Federation was approached to find elite swimmers for the research after ethical permission was obtained.

Specific Aim 2: To provide enough statistical power for identifying the anticipated prevalence of chronic pain, the sample size was set as thirty. This sample size was chosen in order to find significant variations in the degrees of chronic pain and the usage of analgesics among Kazakhstani top swimmers. All participants gave their informed permission. Kazakhstani elite swimmers aged 18 and above who gave their informed consent were the requirements for inclusion. Athletes who are now receiving treatment for an acute injury are excluded.

Data on the prevalence of chronic pain, the usage of analgesics, and its effects on sports performance and quality of life were gathered by a survey. Data was gathered using the Numeric Pain Rating Scale (NPRS) and the Extended Nordic Musculoskeletal Questionnaire (NMQ-E). The eleven items of the NMQ-E (Dawson et al., 2009) cover nine different body areas and produce 99 data points. All replies are binary (yes/no), with the exception of age. In order to measure musculoskeletal health by body area and general condition, each "Yes" response is given one point, while each "No" response is given zero points.

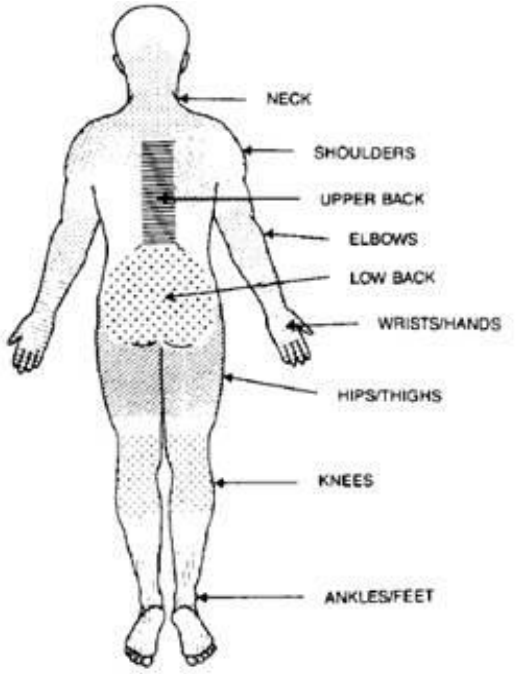

Figure 1. Extended Nordic Musculoskeletal Questionnaire (NMQ-E). Dawson et al, (2009)

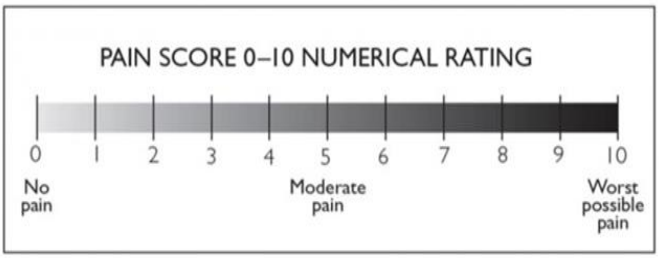

Figure 2. Numeric Pain Rating Scale (NPRS). Benjamin et al. (2019)

In Numeric Rating Scale Benjamin et al. (2019) from 0 to 10, the numbers are distributed equally throughout the page. Patients are asked to circle the number that represents their level of pain throughout the assessment.

The survey consists from 21 questions and 3 personal information questions (gender, age, professional experience).

Specific Aim 3: Microsoft Excel and R-studio software were used to analyses the gathered data. Descriptive analysis was one of the statistical tests used to calculate the mean, median, mode, range, standard deviation, and variance for sensory qualities, pain severity, and location. To evaluate distribution patterns and linkages within the sample, graphical data visualization techniques such diagrams and histograms were used.

The results were contrasted with previous research to determine patterns and variations in Kazakhstani elite swimmers' usage of analgesics and chronic pain.

Specific Aim 4: Key findings on the prevalence of pain and the use of analgesics were stated, along with significant patterns discovered from the data analysis. All of the data's effects on athletes' long-term health, performance, and well-being were discussed, and suggestions for potential remedies were included along with ideas for new research areas.

6. RESULTS

SURVEY RESULTS

The demographics

Among the 32 top swimmers within the inquire about, 59.4% (n = 19) were female and 40.6% (n = 13) were male. The normal age of the members was 20.9 a long time, with a middle age of 20 (18–32 years). The participants' swimming experience was 11.57 (SD = 4.18), with a middle of 12.25 (2–23 a long time).

The severity of the pain

The participants' most extreme pain concentrated extended from 0 to 10, with a mean of 4.72 (SD = 2.44), a median of 4 (29.63% - 3 points; 22.22% - 5 points). The dispersion of maximal pain levels did not significantly shift from normality, agreeing to the Shapiro-Wilk test (W = 0.953, p = 0.290). Figure 3 shows the distribution of pain, outlining the subjects' shifted expressed pain levels.

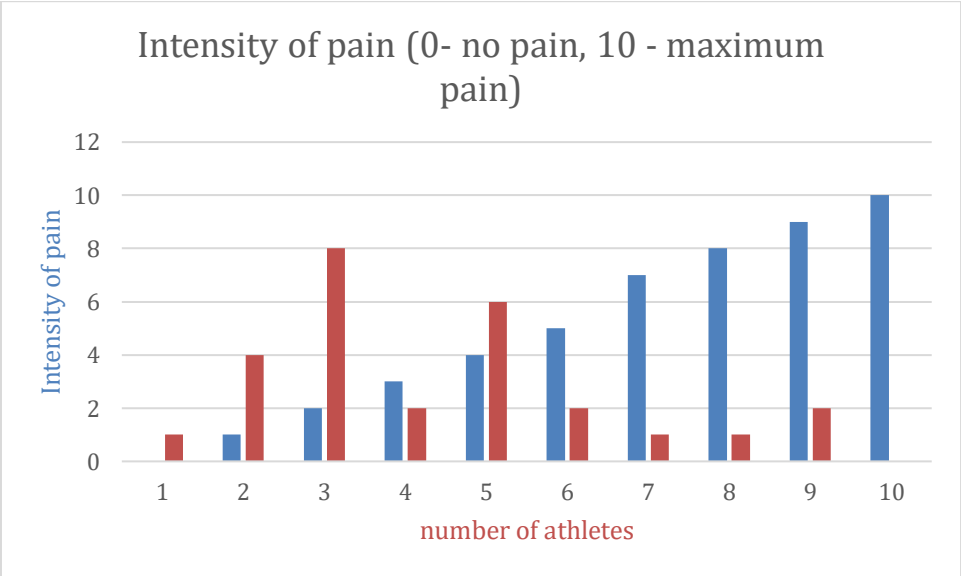

Figure 3. Intensity of pain graph bars

Episodes of Pain Over the Last Month

The distribution of pain attack intensity levels is appeared in Figure 4, with 8 (20%) and 9 (22%), the foremost commonly values. A minor level of inconvenience (1-3) was famous by 10% overviewed members and middle of the road level of inconvenience (4-6) by 33% of the swimmers. Over half (57%) of the members complained of 7-9 points. This suggests that occasions of pain were by and large impressive instead of fair

slight aggravation. Raised pain levels may recommend continuous afflictions, traumas from overexertion, or inadequately approaches to overseeing pain. Extra measures may be required to lighten the escalated of serious pain. It may be useful to explore the effect of pain attacks by and large well-being, or the need for pain relievers.

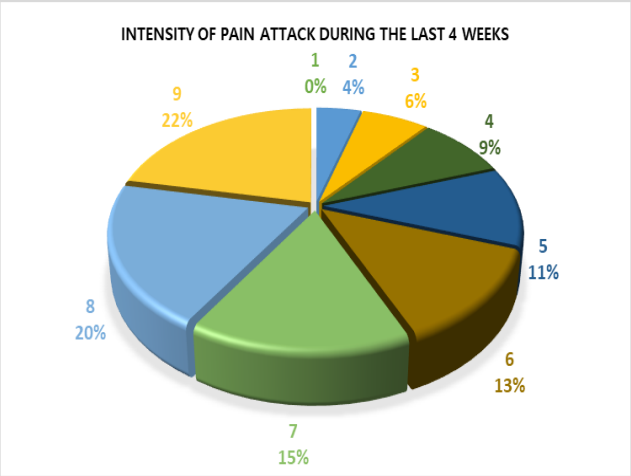

Figure 4. Intensity of pain attack during the last 4 weeks

The distribution of pain intensity is shown in Figure 5, which shows a significant difference in the frequency of the reported pain points. With an average score of 3.37 (and = 2.45) and the average is 2, the pain level of individuals in the previous four weeks. Half of the participants report the severity of pain between 2 to 4. The abnormal distribution of the intensity of the pain is shown by the normal test of Shapiro-Wilk (W = 0.863, P = 0.002) levels compared to most others.

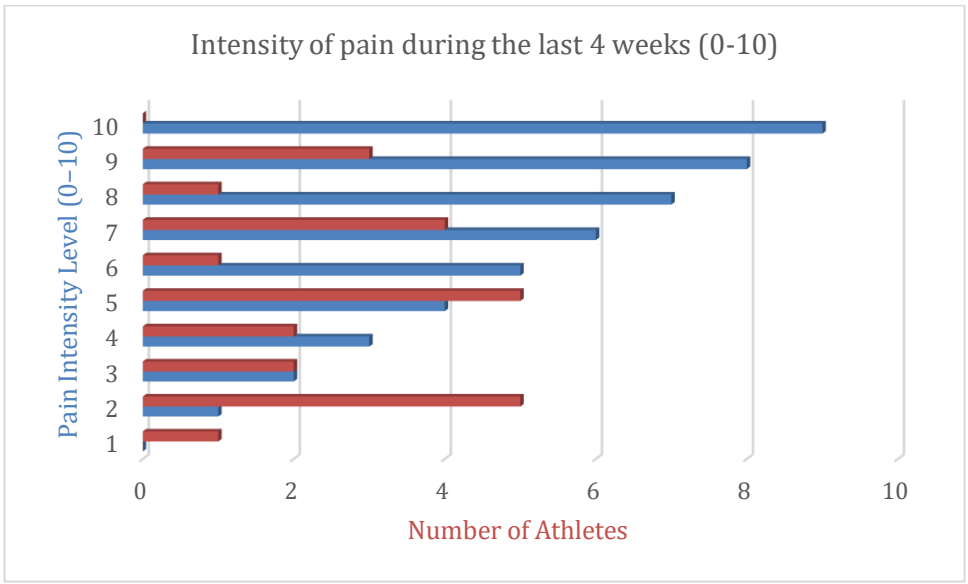

Figure 5. Intensity of pain during the last 4 weeks

The characteristic of the pain

15 individuals says that they have experienced pain episodes without pain in between, which is the most common answer. 10 people said they felt the pain with uncomfortable sensations in the process, which was the second most common answer. Only 4 people said that they felt pain continuously with sporadic attacks and 3 participants said they felt constantly pain with small fluctuations. These results implied that among the athletes is evaluated, the pain models are not more common than chronic pain. The diagram represents 89.3% of cases, with bouts of pain, with or without discomfort between the two cases. Among these groups, constant pain - whether not continuous or slightly fluctuated - appear less often (25%).

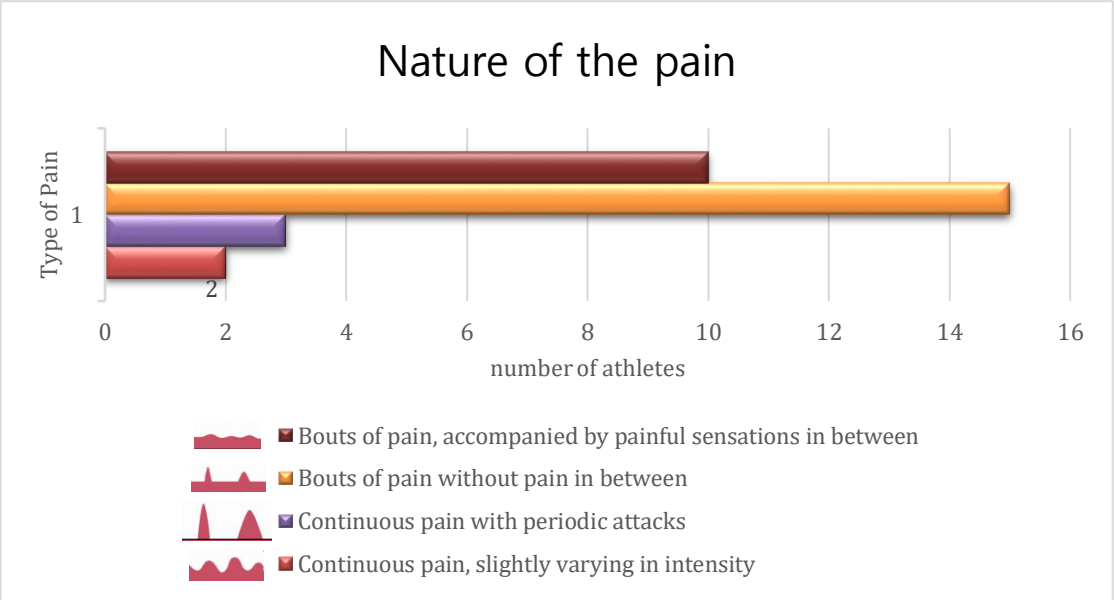

Figure 6. The nature of pain

The frequency of pain in different body areas

With 38.5% of cases, the lower back is the most affected area. At 30.8%, the shoulder is the second most affected position. Other areas such as neck, hips, ankles, in the middle of the back, knees and back each contribute 7.7% or less. Average frequency of pain is 1.5; Average pain frequency is 2.88; An abnormal distribution is expressed by the Shapiro-Wilk test (P = 0.0025). According to the Kruskal-Walli's test, there is no change in pain frequency between parts of the body (P = 0.429).

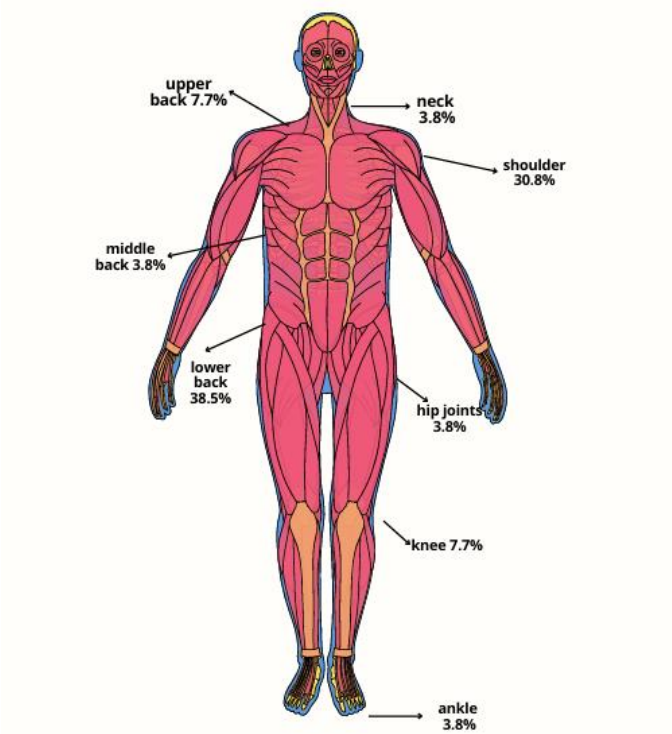

Figure 7. Pain experiencing body parts

Location and irradiation of Pain

Pain and irradiation of related to painful irradiation, 46.15% of individuals do not undergo any irradiation, but 53.85% have experienced irradiation pain for other body areas. There is no statistical difference between different types of pain detected by using Kruskal-Walli's test (P = 0.3916), showing the same frequency of pain in different types of pain reported. The most exposed area (28%) is the leg. The second most popular is back (18%). Lower frequencies (≤ 9%) in other places (chest, abdomen, head, tibia and collarbone). (Figure 8. Pain irradiation)

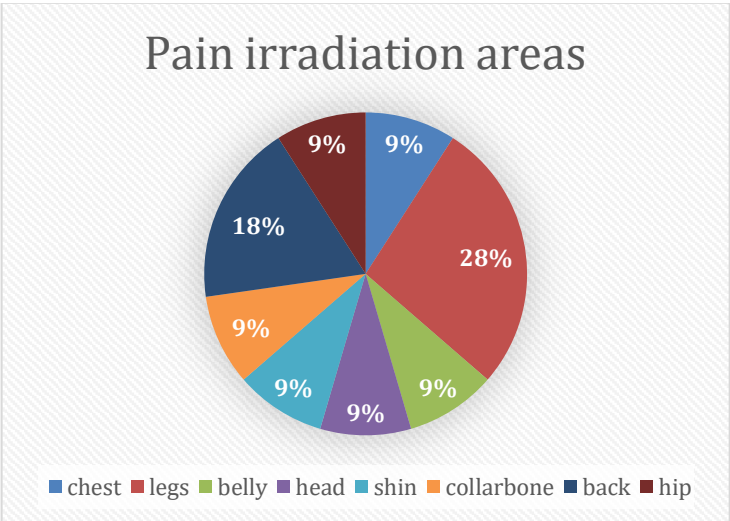

Figure 8. Pain irradiation body areas

Analysis of burning sensations

60% of individuals not indicating any burning feeling. A small burning sensation described by 24%, no one pointed out a strong burning feeling and only 8% reported a slight burning feeling. (Figure 10). Data sensation burning feelings are not distributed regularly, according to statistical knowledge (Shapiro-wilk p = 0.04). There is no significant change in the intensity of the feeling of burning (Kruskal Wallis p = 0.083). The average score for the feeling of burning is 5. Moderate change is indicated by a deviation of 5.7 -type. irradiation of leg pain and back pain is frequent, this may suggest nervous association. Most of the time, there are very little or no burning sensation, indicating that nerve pain is not a decisive feature. There is no clear difference in the intensity of the burning sensation between groups.

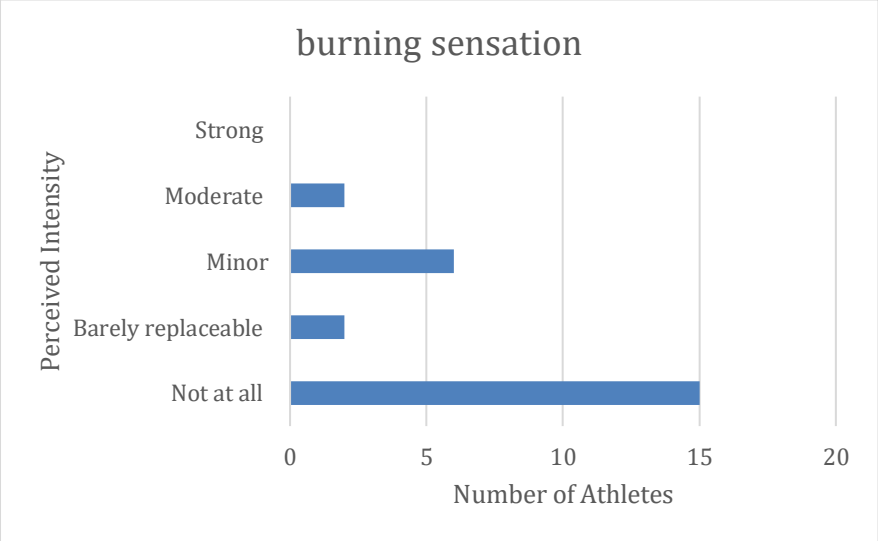

Figure 9. Burning sensation frequency

Analysis of Tingling Sensations

48% of objects do not indicate any tingling, 28% said their tingling was almost noticeable, 4% of the report is fierce and 8% have tingling light, 8% said they had experienced intense tingling. (Figure 10. Tingling frequency).The average level of tingling is 4.8. Moderate change is indicated by standard deviation of 4.32, inter -regional range (IQR) is 5, indicates the degree of change of the reaction.

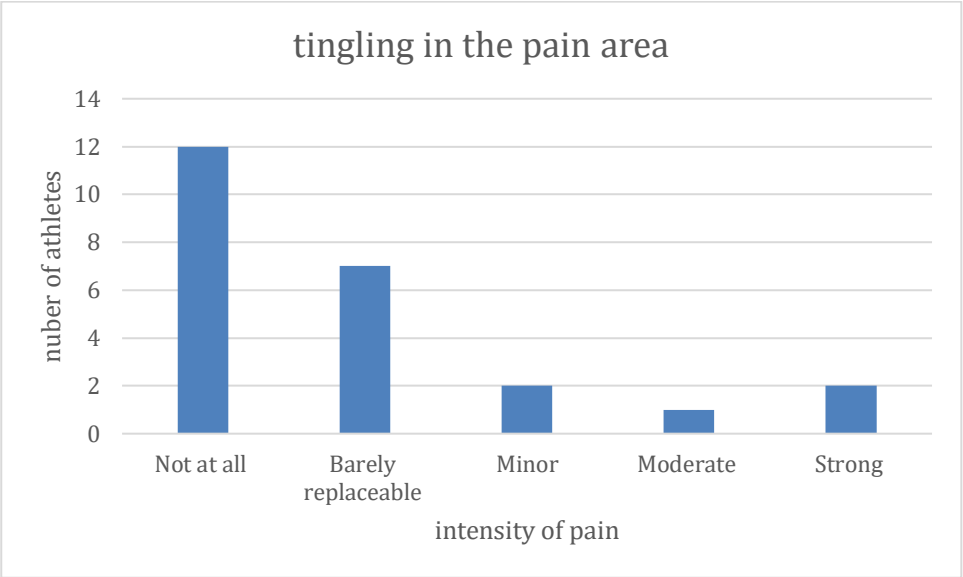

Figure 10. Tingling frequency

The analysis of painful sensations with light contact

84% of the object says that light exposure has made them no longer uncomfortable. Only 4% experienced significant discomfort, while 12% experienced barely noticeable pain. There is no mild or serious discomfort that has been reported by anyone. (Figure 11). 1.36 is the average level of pain. The closely concentrated reactions around "completely zero", as shown by the standard deviation of 0.74.A low variance (0.55) indicates that the level of pain changes very little. Most objects have not indicated it is tingling or discomfort while setting up light contact. There is a bigger difference in the tingling sensation, some people report more serious symptoms. Light contact causes very little pain, showing the limit sensitivity.

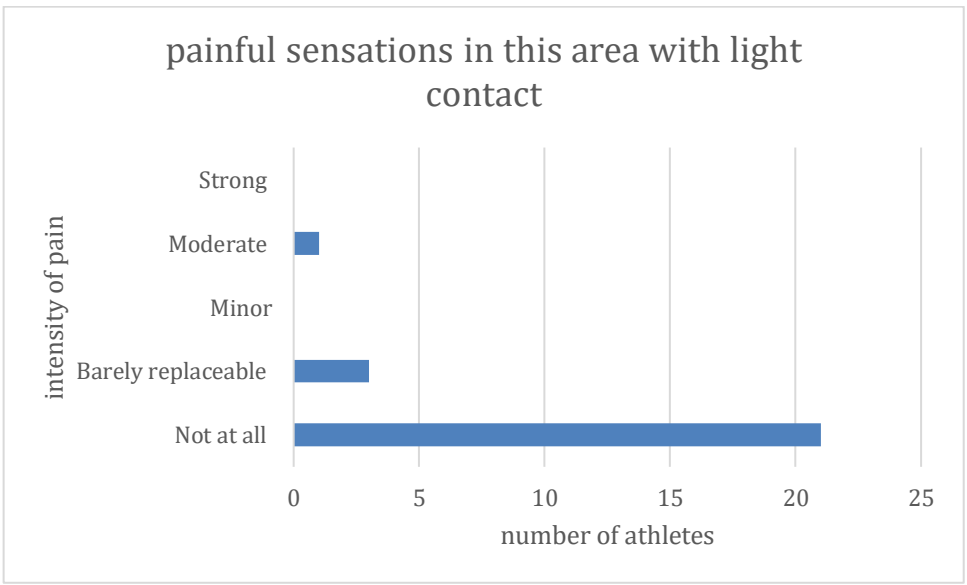

Figure 11. Frequency of pain with light contact

Sharp Pain Attacks (Electric Shock-Like Sensation)

34.8% said they had no acute discomfort at all. 21.7% had moderate or hardly perceptible attacks. 8.7% had severe pain, compared to 13% who reported moderate discomfort. 21.7% of subjects reported having moderate to severe pain (Levels 4-5), suggesting that some people have severe bouts. (Figure 13. electric shock sensations) The average pain level was 2.48, indicating that most people answered "Barely noticeable" to "Mild." The median is 3, which falls into the category of mild discomfort. A modest range of answers is indicated by the Interquartile Range (IQR) of 1.5. Compared to light-contact pain, the variance and standard deviation indicate a very significant dispersion in pain levels (1.57 and 1.25, respectively). Compared to light-contact pain, which showed a smaller standard deviation (0.74), this form of pain is more variable.

Acute pain attacks (electrical sensation in the shape of a shock)

34.8% said they did not have acute discomfort. 21.7% have moderate or noticeable attacks. 8.7% suffered severe pain, compared to 13% of moderate discomfort. 21.7% of the subjects said they had pain from medium to severe (level 4-5), which showed that some people had serious battles. (Figure 13) The average level of pain is 2.48, which shows that most people have answered "almost unaware" with "soft". The average is 3, falling into light discomfort. A series of modest feedback is indicated by the inter -regional beach (IQR) is 1.5. Compared to the pain in the war against light, variance and standard deviation shows a significant dispersion of pain level (1.57 and 1.25 respectively).Compared to clear contact pain, it shows that the standard deviation is smaller (0.74), this pain has changed more.

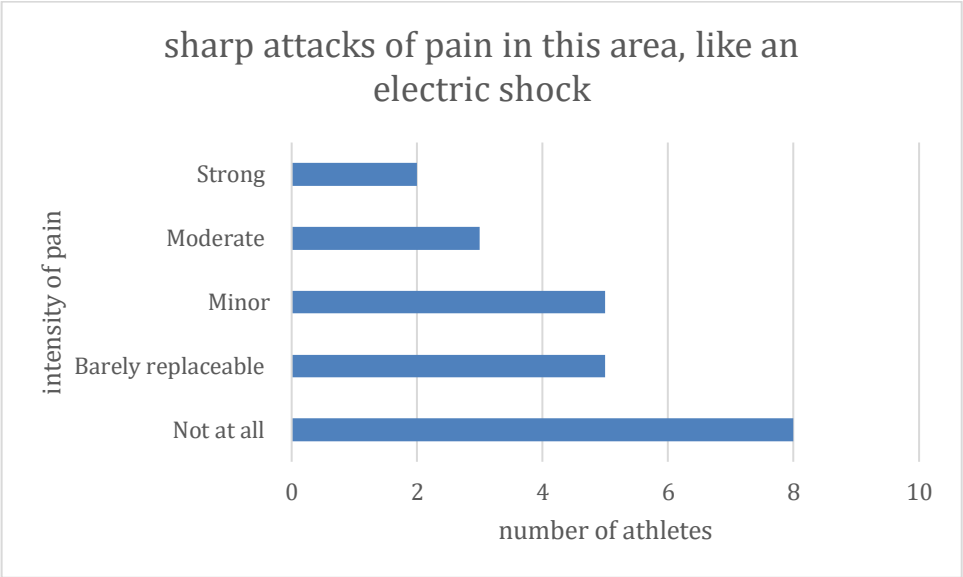

Figure 12. Frequency of electric shock sensations

When exposed to cold or hot temperatures, most (64%) did not indicate any unpleasant symptoms (level 1). 16% reported uncomfortable but almost noticeable (level 2). No one feels intense pain (level 5), although 8% shows light (level 3) and uncomfortable (level 4). (Figure 14. Feeling of cold or hot)

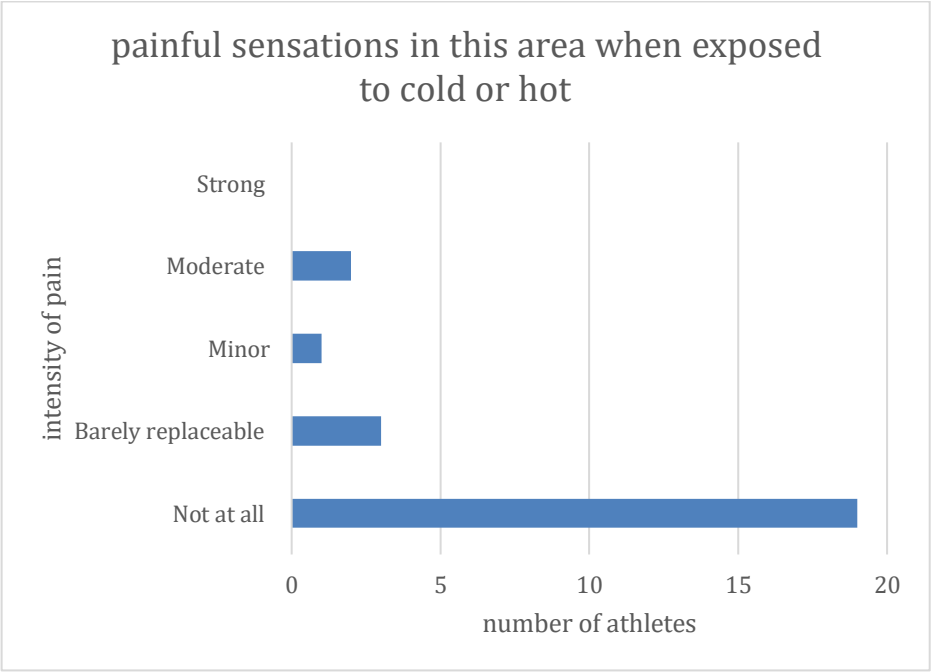

Figure 13. Intensity of pain sensations from cold or hot

Numbness

Most of the objects (16) did not indicate the feeling of numbness. A small percentage (4) feels paralyzed but almost no noticeable. There is no impact of extreme paralysis, and only a few people report a light (2) or average impairment (2). (Figure 15). Most of the answers are close to "completely zero" (1),

according to the average (1.52). The most typical answer, according to the average (1) and the mode (1), is "absolutely no". The variation of the reaction is limited, as shown in low variance (0.88) and standard deviation (0.94).

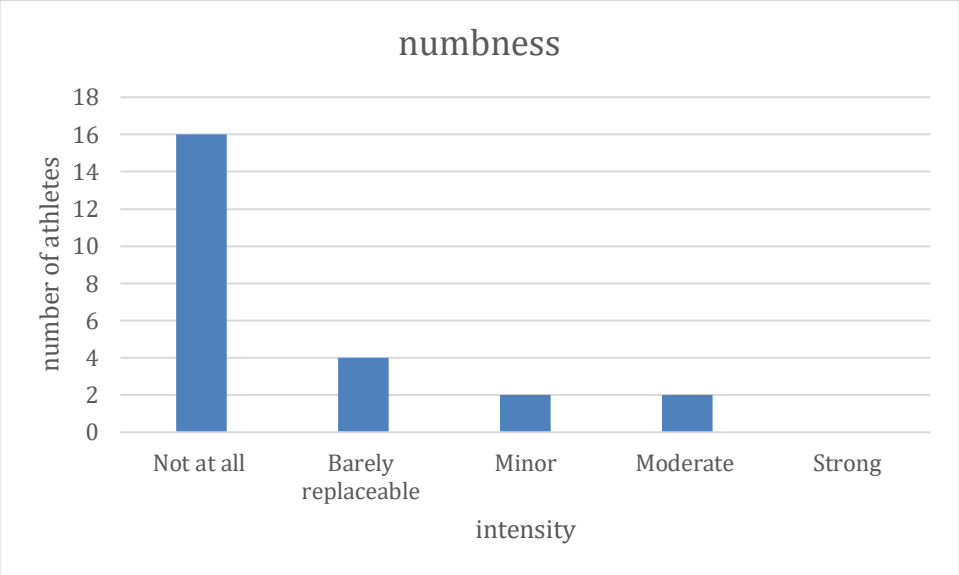

Figure 14. Numbness

Slight pressure

In Figure 15 Light pressure level 1 and 2 is the most frequent answer, which shows that many people have little or no pain. Only a small percentage looks like a moderate pain (3 matches 4), even at least the report has reported intense pain (5). Average (2.04): "almost uncomfortable" and "light" uncomfortable lights are the most popular answers. On average (2): "is almost noticeable" or less than half of the individuals describe their discomfort. The two "steps in all" and "almost unaware" are the most common answers, according to the regime (1 and 2, dual needles). A moderate reaction range is indicated by variance (1,195) and standard deviation (1.09), indicating variations in the way of feeling pain when responding to modest pressure.

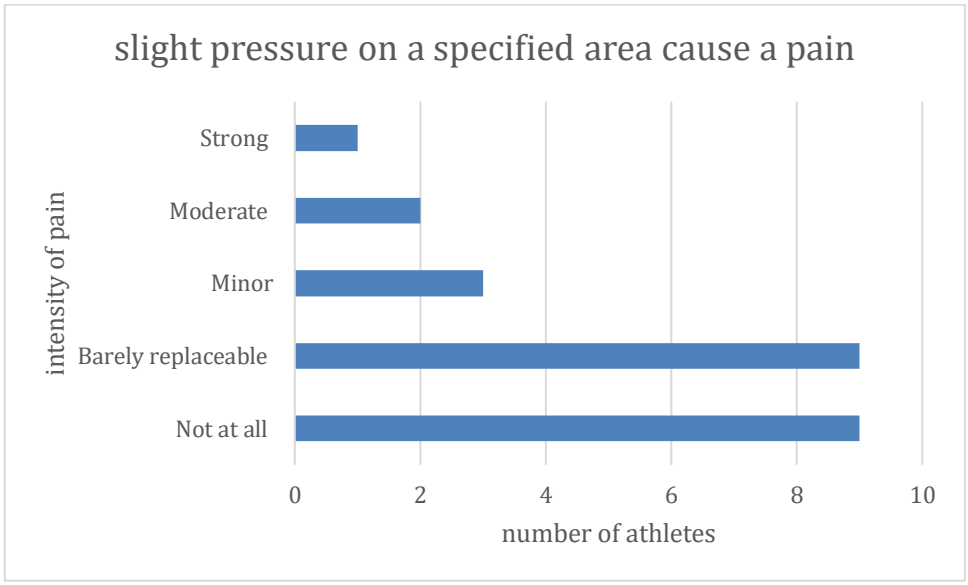

Figure 15. Frequency of pain intensity from slight pressure

Painkillers

32% of participants rarely use painkillers and nearly half (48%) never use them. There were no participants saying that they had daily analgesics and only sixteen percent used them often. (Figure 16. Frequency use of painkillers). With an average frequency score of 1.67, most of the feedback is close to "never". Half of the individuals on average, between "never" and "rarely". Mode ("never"): according to the most common reaction, many people avoid painkillers. Relatively unchanged reactions, as shown by modest variance (0.56) and standard deviation (0.75).

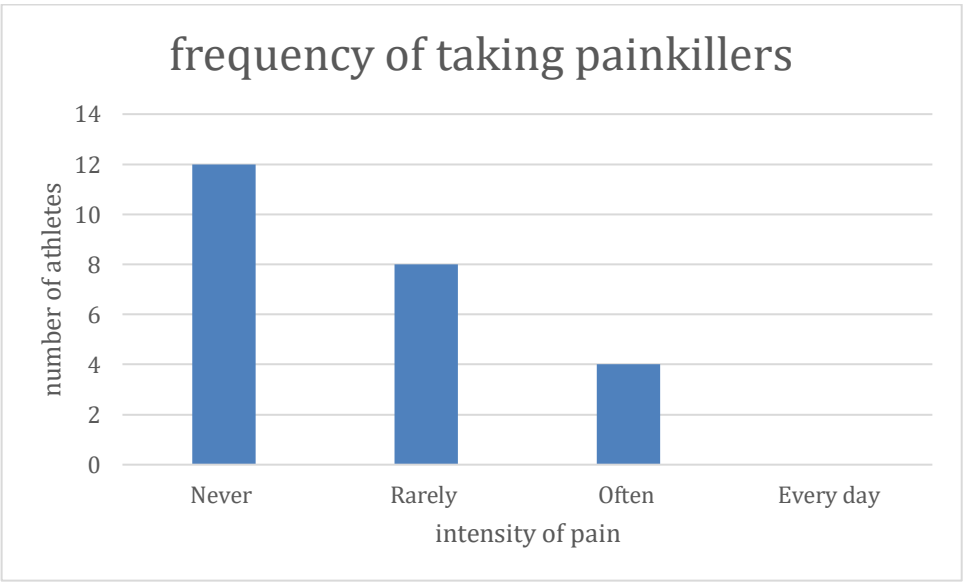

Figure 16. Frequency of analgesics usage

Painkillers' effectiveness

The majority of participants (17 out of 32) rated the effectiveness of painkillers as "very low." “Satisfactory” was the second most common rating. Only one person rated the effectiveness of painkillers as "Very High" (Figure 17. analgesics efficacy). The majority of respondents indicated that analgesics are not very helpful, as seen by the prevalence of very low efficacy responses.

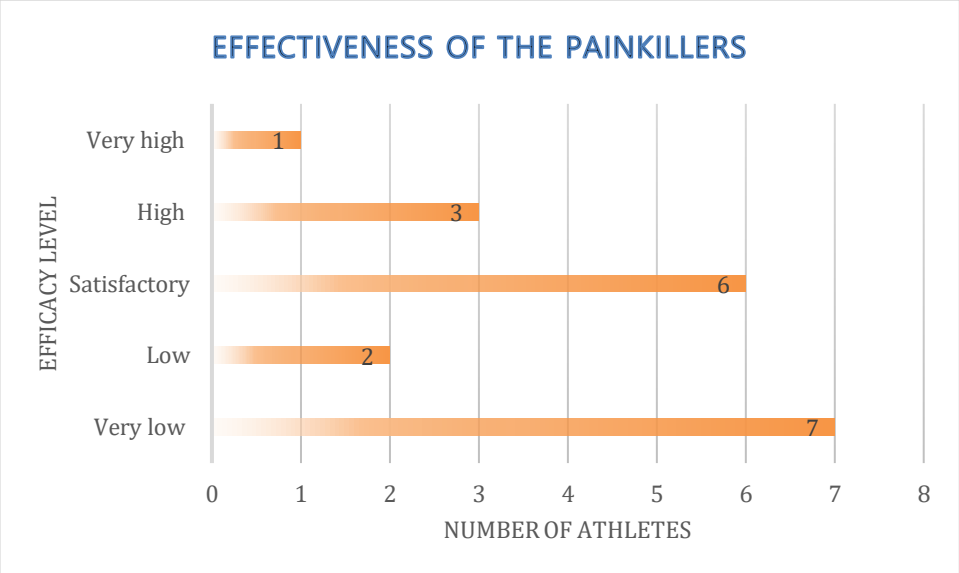

Figure 17. Analgesics efficacy

Analgesic Types

89.5% of the population use over-the-counter (OTC) pain relievers. No one used prescription medicines, such as opioids. 10.5% use alternative methods, such as herbs, natural treatments. Most participants opt for over-the-counter medications (OTC) rather than prescriptions, therapies or complementary medications.

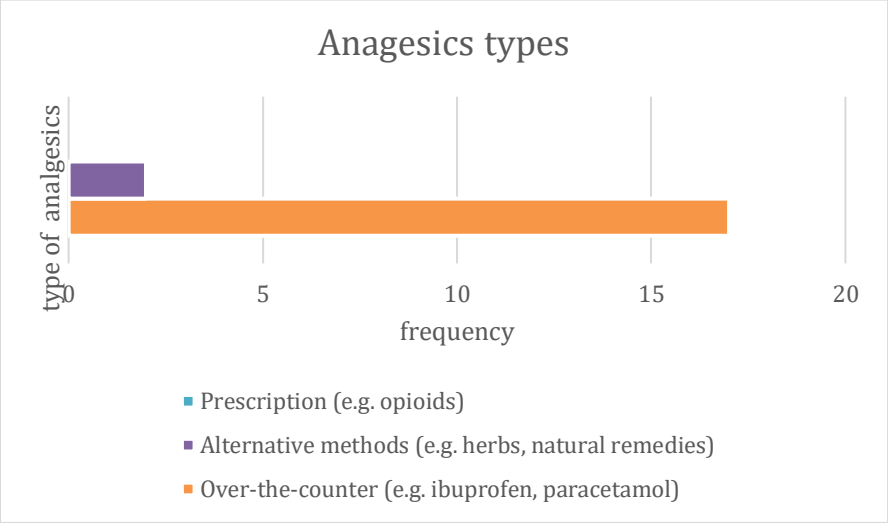

Figure 18.Types of analgesics

7. DISCUSSION

Prevalence of Lower Back Pain

As the results of conducted survey, lower back is the most prevalent painful body area (38.5% of participants) in Kazakhstani swimmers, the second most common is shoulder with 30.8%. The results are consistent with Tesarz et al., (2012) on chronic pain in athletes due to repetitive stress and biomechanical strain, but the lower back pain is more prevalent than the shoulder pain in comparison with Feijen et al. (2020), where mentioned that very common pain for swimmers is shoulder with 91%. The difference may be the result of variants in the training method, training volume or stroke technique between countries or age groups. In addition, this may indicate that our group puts more stress on the waist column, due to the incomplete nuclear stability, or the excessive dependence on specific characteristics such as butterflies and chest, is known to put a lot of stress on the lower back.

Pain Frequency and Patterns

15 individuals feel pain without rest time, while some reports pain continuously. The pain is not more often in athletes, which may be the result of injury due to abuse or inflammation. 29.63% answered that their intensity of pain was 3 points; 22.22% - A response as 5 points. It can be understood as an adaptation or a tolerance that is raised to pain. It is interesting to note that more than 40% of the participants have given the

intensity of the pain, a note of 8 and 9 out of 10. A powerful tolerance to low -level discomfort with significant serious waves can be indicated by this contrast. Many swimmers have reported low average pain despite the highest intensity, which can be explained by Tesarz et al. (2012) Note that athletes have a stronger threshold and tolerance due to repetitive physical stress. Similarly, Kuppens et al. (2019) discovered that swimmers who exercise more than others had less pain sensitivity.

Characteristics of Pain

48.0% of participants said they didn't feel any tingling, while tingling was barely perceptible at 28.0%, strong tingling felt only 8.0% of participants, same results with other pain sensation characteristics as well as feeling burning, cold, hot, electric shock-like pain, numbness which are characteristic of neuropathic pain, which means that surveyed athletes mostly have musculoskeletal origin pain rather than neuropathic.

For the question about light contact sensitivity 84% reported that they have no discomfort, 4% with moderate pain. It means none of the volunteers complained of excruciating discomfort. 34.8% report having no acute pain attacks, 21.7% mild pain, 21.7% report moderate to severe pain. It can be interpreting that athletes' experiences with chronic pain differ greatly.

Pain Management and Analgesic Use

Our results align with a study done by Harle et al. (2018), where examined above 70 papers on usage of analgesics by elite athletes: more than 50% of athletes reported using oral nonsteroidal anti-inflammatory medicines (NSAIDs) during the study, making them the most often utilized analgesics. 89.5% participants of our study used over-the-counter (OTC) analgesics, 10.5% preferred alternative methods (herbals), no one answered non-prescription methods. It may be result of high awareness of side effects, low availability or anti-doping considerations.

8. CONCLUSION

Practical Implications

Considering results of the survey it is recommended to do core stability and mobility exercises to decrease the risk since lower back pain is more common. Moreover, early therapies with customized pain management techniques to lessen severe pain episodes (intensity 8–9) before the pain becomes incapacitating will help. Furthermore, it is important to emphasize the difference between using analgesics without prescription and when to seek medical attention.

Future Directions

For the future research it will be better to increase accuracy, for example include more elaborate pain assessment explanation; increasing the sample size to include more athlete groups; including different athlete groups.

Conclusion

It is well-known now that swimming athletes' chronic pain is a multidimensional problem and need a thorough pain evaluation and treatment techniques in sports medicine. It is offered insightful information about the frequency and types of pain episodes by results of conducted study.

9. LIMITATIONS

The main limitation of this study is the absence of a preliminary, standardized explanation for assessing pain, since many subjects reported high pain ratings (8–9 out of 10). Moreover, modest sample size and restriction to certain athlete categories also can effect on accuracy of study, which should be considered in further studies regarding the pain evaluation.

10. ACKNOWLEDGEMENTS

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12. APPENDICES

Survey of self-evaluation of pain and analgesics usage for swimmers:

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