

Knowledge, attitude, and perception of amateur football players regarding the utilization of cryotherapy for acute ankle ligament sprain: A cross-sectional study

ABSTRACT

Background: Ankle sprain is a frequently reported sports injury among high-velocity athletes, especially footballers. Cryotherapy (CRYO), although recognized in medical and sports rehabilitation settings, is often less understood by amateur athletes who might not receive the same guidance as professionals.

Materials and Methods: This cross-sectional study included 384 conveniently recruited AFP who responded to the CRYO KAP questionnaire in treating acute ankle sprain with cryotherapy.

Results: A total of 384 amateur football players (AFPs) aged 16–30 years participated, with most of the participants aged 16–20 years and predominantly male (96.6%). The player's frequency of playing per week was significantly associated with their knowledge, with those who played more having better knowledge. Players' attitude and players' perception were both significantly associated with their gender, education level, and frequency of playing per week ($P < 0.05$).

Conclusion: AFPs demonstrated an overall fair level of knowledge, attitude, and perception regarding the use of CRYO for acute ankle sprain. Playing frequency was significantly associated with knowledge, whereas attitude and perceptions were influenced by gender, education level, and frequency of play. These findings highlight the need for structured injury education and improved access to basic physiotherapy support within amateur football settings.

Keywords: Acute ankle sprain, amateur football players, attitude, cryotherapy, knowledge, perception

المُلخَص:

الخلفية: يُعدّ التواء الكاحل من الإصابات الشائعة بين الرياضيين الذين يمارسون رياضات تتطلب سرعات عالية، وخاصة لاعبي كرة القدم. وعلى الرغم من الاعتراف بالعلاج بالتبريد في الأوساط الطبية والتأهيل الرياضي، فإن فهمه لدى الرياضيين الهواة غالباً ما يكون محدوداً، نظراً إلى أنهم قد لا يتلقون توجيهاً مماثلاً لما يتلقاه المحترفون.

المواد والطرق: شملت هذه الدراسة المقطعية 384 لاعب كرة قدم من الهواة. جرى اختيارهم باستخدام أسلوب العينة الملائمة، حيث أجابوا على استبانة لقياس المعرفة والتوجهات والتصورات المتعلقة باستخدام التبريد في علاج التواء الكاحل الحاد.

النتائج: تراوحت أعمار جميع اللاعبين المشاركين في الدراسة بين 16 و30 عاماً، فيما كان معظمهم بين 16 و20 عاماً، وغالبيتهم من الذكور (96.6%). ارتبط عدد مرات لعب كرة القدم أسبوعياً ارتباطاً ذا دلالة إحصائية بمستوى المعرفة، حيث كان اللاعبون الأكثر لعباً أكثر دراية. كما ارتبط كل من توجهات اللاعبين وتصوراتهم ارتباطاً ذا دلالة إحصائية بكل من الجنس، والمستوى التعليمي، وعدد مرات اللعب أسبوعياً ($P < 0.05$).
الخلاصة: أظهر لاعبو كرة القدم الهواة مستوى متوسطاً من المعرفة والتوجهات والتصورات العامة فيما يتعلق باستخدام التبريد في علاج التواء الكاحل الحاد. وارتبط عدد مرات اللعب أسبوعياً ارتباطاً ذا دلالة إحصائية

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بالمعرفة، بينما تأثرت التوجهات والتصورات بالجنس والمستوى التعليمي وعدد مرات اللعب. تُبرز هذه النتائج الحاجة إلى برامج تنقيفية منظمة حول الإصابات وتحسين إمكانية الوصول إلى خدمات العلاج الطبيعي الأساسية في أوساط كرة القدم للهواة. الكلمات الدالة: التواء الكاحل الحاد، لاعبو كرة القدم الهواة، التوجهات، العلاج بالتبريد، المعرفة، التصور.

INTRODUCTION

Sports-related injuries are common among physically active populations, particularly in football, where frequent running, kicking, and contact expose players to a high risk of lower limb injuries.^[1,2] Ankle sprains are among the most frequently reported injuries in football and commonly result from inversion mechanisms during play.^[3,4] Inversion injuries account for a substantial proportion of musculoskeletal injuries in sports and may lead to complications if not appropriately managed. When inadequately managed, these injuries may lead to persistent pain, instability, and recurrent injury.

Studies conducted among semiprofessional football players in Nigeria have reported a high burden of sports-related injuries.^[5,6] In the United States and the United Kingdom, over 2 million ankle sprains are treated in emergency rooms annually, constituting 20% of all sports injuries.^[7,8]

The use of nonrecommended acute injury management practices, such as the application of heat modalities during the inflammatory phase, has been reported in some sporting contexts. Heat application during this phase may worsen inflammation by promoting vasodilation and increasing tissue perfusion, which can prolong the healing process and delay recovery.^[9] Nonoptimal early management of ankle sprains may result in reduced range of motion, persistent symptoms, and chronic ankle instability.^[10]

Cryotherapy, one of the oldest therapeutic methods for managing acute soft-tissue injuries, is often used as a first-line intervention to alleviate pain and promote proper and timely healing.^[11] The application of cryotherapy has ancient roots, with historical accounts of its use for treating inflammation and related conditions. In ancient Greece, cold was recognized for its analgesic properties, and common people employed ice, snow, or cold water to ease the pain of acute trauma.^[12] Over time, scientific understanding of cryotherapy has evolved, with explanations of its physiological effects on the body emerging. By decreasing tissue temperature, cryotherapy helps diminish pain, reduce metabolic rate, and prevent muscle spasm, thereby minimizing the inflammatory process and supporting recovery following soft-tissue trauma.^[13] The effectiveness of cryotherapy lies in its ability to decrease tissue temperature, which lowers the metabolic rate within and around the injured area. The process aids in pain management by altering nerve

conduction velocity, inhibiting pain receptors, and reducing muscle spasms, resulting in a significant reduction in pain sensation.^[14] Due to its accessibility, simplicity, and low cost, cryotherapy is widely accepted for treating sports injuries, postoperative pain, and other pain-related conditions, particularly among athletes who require rapid and convenient relief. The role of cryotherapy in the management of acute soft tissue injuries remains debated, with evidence suggesting short-term benefits for pain relief and symptom control, while long-term outcomes remain less clear.^[15]

In Enugu, Nigeria, football holds a prominent place in the sporting culture and is often regarded as the region's primary athletic activity.^[16] As the number of amateur football players (AFPs) increases, so does the prevalence of sports injuries, particularly acute injuries. AFPs may have limited access to formal medical care and structured injury education compared to professional players. This highlights the importance of understanding their knowledge, attitudes, and perceptions regarding commonly used acute injury management strategies such as cryotherapy. The application of cryotherapy as an initial treatment can provide a beneficial reduction in pain and accelerate healing. Although cryotherapy may assist in short-term symptom management, it should be considered alongside broader injury prevention and management strategies. Structured injury prevention programs have demonstrated effectiveness in reducing injury risk and supporting return to sports, yet awareness and integration of such approaches remain limited in many amateur football settings.^[17]

Evidence suggests potential benefits of cryotherapy in the early management of acute ankle sprains, though much of the available literature remains limited in scope.^[12] Understanding AFPs' awareness and attitudes toward cryotherapy can help determine if they are making informed choices to manage pain and prevent complications that may arise from improper management of ankle sprains. With ankle sprains being such a prevalent injury, this study provided a better understanding of the way forward in handling cases of ankle ligament sprain injury.

Despite the widespread use of cryotherapy in sports injury management, limited evidence exists regarding how well AFPs understand its indication, methods of application, and perceived benefits, particularly in low-resource settings. This study therefore sought to assess the knowledge, attitude, and perception of AFPs regarding the utilization of cryotherapy for acute ankle ligament sprain in the Enugu Metropolis. It was hypothesized that players' demographic and playing

characteristics would significantly influence their knowledge, attitudes, and perceptions toward cryotherapy.

MATERIALS AND METHODS

Study design and participants

This cross-sectional study included 384 conveniently recruited AFPs living within the Enugu Metropolis. Participants were eligible if they were AFPs aged 18 years and above who had previously sustained an ankle sprain during football-related activities such as training sessions, organized matches, or recreational play. Conversely, individuals were excluded if they did not play football at least a minimum of 3 times a week or had significant hearing loss or a history of any mental illness. These exclusion criteria were applied to ensure regular exposure to football-related injury risk and to minimize factors that could impair questionnaire comprehension or response reliability.

Sample size determination

The sample size for this cross-sectional study was determined using the Cochran formula for estimating proportions in large or unknown populations. This method is appropriate for descriptive observational studies assessing knowledge, attitude, and perception where the true population proportion is not known.

The Cochran formula is expressed as:

$$n = \frac{Z^2 PQ}{e^2}$$

Where:

- n = required minimum sample size
- Z = standard normal deviate corresponding to a 95% confidence level (1.96)
- P = estimated population proportion (set at 0.5 to maximize sample size in the absence of prior prevalence data)
- $Q = 1 - P$
- e = margin of error, set at 0.05

Substituting these values:

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.5)^2}$$

$$n \approx 384$$

Using a proportion of 0.5 provided a conservative estimate, ensuring adequate statistical power and representativeness of the sample. Therefore, a minimum sample size of 384 AFPs was required and achieved in this study. This sample size was considered sufficient to allow meaningful analysis of associations between demographic and playing

characteristics and knowledge, attitude, and perception regarding cryotherapy utilization.

Ethical approval

Before the commencement of the study, ethical approval was obtained from the University of Nigeria Teaching Hospital Ituku-Ozalla Health Research Ethics Committee (Reference No: UNTH/HREC/2022/04/395). All participants provided informed consent, indicating their voluntary willingness to partake in the study. The confidentiality of participants' responses was maintained throughout the research process, ensuring that no identifying information was disclosed.

Instruments and questionnaire validation

The instrument used in this study was built from scratch with reference to Zech and Wellmann^[18] in their study on the perception of football players regarding injury risk factors and prevention strategies. The instrument was rightfully constructed and validated by two senior lecturers of the Department of Medical Rehabilitation and one clinician from the Department of Physiotherapy, University of Nigeria Teaching Hospital Ituku-Ozalla. A pilot study was conducted with 20 AFPs in Imo State, who were not part of the main study population. The reliability was evaluated using Cronbach's Alpha due to the instrument's complex response format. The reliability indices obtained were: 0.587 for knowledge regarding the utilization of cryotherapy for acute ankle sprain, 0.764 for attitude, and 0.731 for perception. The overall reliability index of the instrument was 0.732, indicating acceptable internal consistency.

It consists of four sections: Section one elicited data on the demographic details, including age, gender, marital status, education, duration of playing football, and frequency of play per week. It also elicited data on the players' characteristics, including the type of playground, footwear used while playing, use of first aid kits, participation in warm-up and stretching exercises, and use of bracing or shoe insoles.

Section two assessed the knowledge of the players regarding the utilization of cryotherapy for acute ankle ligament sprain. Examples of knowledge items include the following: cryotherapy refers to therapy with ice or gel packs that are usually kept in the oven until needed, I have never used or experienced cryotherapy for an acute ankle sprain injury, cryotherapy reduces blood flow to the injury and helps ease pain and swelling, and cryotherapy should be applied to the sprain for 10–20 min at a time for 8–10 times per 24-h period up to a week after the injury.

Section three assessed the attitude of the participants regarding the utilization of cryotherapy for acute ankle

ligament sprain. Attitude items include the following: I will often use hot packs or gels and other heat modalities over the area where the acute ankle ligament injury occurred rather than use cryotherapy and I believe cryotherapy is more effective, inexpensive, and a simple intervention for pain management.

Section four assessed the perception of the players on the utilization of cryotherapy for acute ankle ligament sprain. Perception items include the following: cryotherapy is important immediately after an ankle sprain injury to avoid chronic inflammation and further musculoskeletal complications, I believe that using cryotherapy on a sprained ankle helps it heal faster, and I believe cryotherapy should be used only for those who are accustomed to cold and find it pleasurable.

In the knowledge, attitude, and perception assessment, the response to each item was recorded on the 5-point Likert scale, where the responses ranged from “Strongly Agree, to Strongly Disagree.” Positive responses, indicating a favorable view of cryotherapy, were scored lower (e.g., Strongly Agree = 1), whereas negative responses, indicating incorrect or unfavorable views, were scored higher (e.g., Strongly Disagree = 5).

The questionnaire was administered in English using a paper-based format. Face validity was assessed by expert review, focusing on clarity, relevance, and appropriateness of each item for the study objectives.

Data collection

The data collection took place between February and March 2022. Participants were initially identified by their involvement in amateur football leagues within the selected study area. A snowballing technique was adopted by cascading through identified participants to help reach their playing peers. The self-administered questionnaire was handed to the participants to fill out after they provided informed consent and were given prior orientation about the study procedure. It took an average of 20 min to fill out the questionnaire, and out of 400 questionnaires that were sent out, 384 were appropriately filled and returned, giving a response rate of 96%.

Data analysis

The Statistical Package of Social Sciences (SPSS) version 27.00 was used to analyze the data collected. Descriptive statistics of frequency and percentage were used to summarize the categorical responses. Association between demographic variables, playing characteristics, and level of knowledge, attitude, and perception regarding cryotherapy were examined using the Chi-square test. Fisher’s exact test was applied where expected cell counts were <5. Statistical significance was set at $P < 0.05$.

Completed questionnaires were checked for completeness and manually coded. Data were entered into Microsoft Excel for initial storage, cleaning, and verification. Following data validation, the dataset was imported into the Statistical Package of Social Science (SPSS) version 27.0 for analysis. Descriptive tables were generated directly from SPSS output files and cross-checked against the raw dataset to ensure accuracy and consistency.

This study was reported in line with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.

RESULTS

Summary of demographic characteristics

A total of 384 AFPs participated in this study. Most participants were aged between 16 and 20 years (50.5%), single (90.1%), and had the lowest educational level, which was secondary school education (45.5%). Furthermore, a large portion of the participants had played football for more than 10 years (66.7%) and played football more than two times a week (81.3%), as shown in Table 1.

General characteristics of the players

Table 2 revealed that most of the participants played on a natural grass field (52.1%), played with a first aid kit (74.7%),

Table 1: Participants' demographics ($n=384$)

Variables	Frequency (%)
Age	
16–20	194 (50.5)
21–25	126 (32.8)
26–30	64 (16.7)
Gender	
Male	371 (96.6)
Female	13 (3.4)
Marital status	
Single	350 (90.1)
Married	30 (8.9)
Education	
PhD	12 (3.1)
Masters	17 (4.4)
Bachelor	64 (16.7)
Diploma	116 (30.2)
School (secondary school)	175 (45.6)
Duration of playing football (years)	
1–5	35 (9.1)
5–10	93 (24.2)
> 10	256 (66.7)
Frequency of playing per week	
1 time	20 (5.2)
2 times	52 (13.5)
More than 2 times	312 (81.3)

Education level: 'School' refers to secondary school education

and carried out warm-up (100%), stretching (97.9%), bracing (69.5%), and taping (77.6%) before playing.

Knowledge regarding the utilization of cryotherapy for acute ankle ligament sprain

The findings on participants' knowledge regarding the use of cryotherapy show that a large proportion of participants strongly agreed that cryotherapy is ice or gel packs that are usually kept in

the oven until needed, early and appropriate use of cryotherapy is a first step to reducing the pain and also proper and timely healing of ankle sprain injury, cryotherapy reduces blood flow to the injury and help ease pain and swelling, and cryotherapy can be applied in various ways including ice packs, coolant sprays, ice massage, and/or ice baths. Participants commonly expressed uncertainty ('maybe') regarding several aspects of cryotherapy. Specifically, 24.3% were unsure about the statement that they had never used or experienced cryotherapy for an acute ankle sprain. 33.1% were uncertain about the recommended duration and frequency of cryotherapy application. 35.4% were unsure whether ice could be applied directly to the skin without a protective interface [Table 3].

Attitude regarding the utilization of cryotherapy for acute ankle ligament sprain

Greater part of the sample strongly agreed that cryotherapy is better than heat for a sprained ankle on the football pitch (41.9%), on the effectiveness and affordability of cryotherapy for pain management (42.2%), desire for further education on cryotherapy use (53.4%), willingness to recommend cryotherapy to teammates (55.2%), and that every football game should include first aid kits with cryotherapy options (51.6%). While large proportion of participants indicated uncertainty (maybe) in choosing between heat and cold for treating acute ankle ligament injuries (41.4%), in replacing cryotherapy with medications (37.5%), when asked if they would receive cryotherapy only in hot weather (42.2%), willingness to pay for cryotherapy after an acute sprain (44.3%), and belief in cryotherapy's physiological benefits (35.9%), as shown in Table 4.

Perceptions regarding the utilization of cryotherapy for acute ankle ligament sprain

Most of the respondents answered maybe on whether

Table 2: General characteristics of the players

Variables	Frequency (%)
Type of playground	
Turf	135 (35.2)
Natural grass	200 (52.1)
Open floor	49 (12.8)
Previous ankle injury	
Yes	252 (65.6)
No	132 (34.4)
Play with first aid kit	
Yes	287 (74.7)
No	97 (25.3)
Warm-up	
Yes	384 (100.0)
No	-
Stretching	
Yes	376 (97.9)
No	4 (1.0)
Bracing	
Yes	267 (69.5)
No	117 (30.5)
Taping	
Yes	298 (77.6)
No	86 (22.4)
Shoe insoles	
Yes	343 (89.3)
No	41 (10.7)

Table 3: Knowledge regarding the utilization of cryotherapy for acute ankle ligament sprain

Variables	Strongly agreed, <i>n</i> (%)	Agreed, <i>n</i> (%)	Maybe, <i>n</i> (%)	Disagreed, <i>n</i> (%)	Strongly disagreed
CRYO refers to therapy with ice or gel packs that are usually kept in the oven until needed	133 (34.6)	80 (20.8)	84 (21.9)	33 (8.6)	54 (14.1)
Early and appropriate use of CRYO is a first step to reducing the pain and also proper and timely healing of ankle sprain injury	188 (49.0)	132 (34.4)	60 (15.6)	4 (1.0)	-
I have never used or experienced cold being used for acute ankle sprain injury	54 (14.1)	58 (15.1)	93 (24.3)	58 (15.1)	54 (14.1)
CRYO reduces blood flow to the injury and helps ease pain and swelling	178 (46.4)	129 (33.6)	48 (12.5)	17 (4.4)	12 (3.1)
A CRYO should be applied to the sprain for 10–20 min at a time for 8–10 times per 24-h period up to a week after the injury	93 (24.2)	127 (33.1)	127 (33.1)	21 (5.5)	16 (4.2)
I have been adequately trained in the appropriate use of CRYO for ankle sprain	65 (16.9)	91 (23.7)	127 (33.1)	57 (14.8)	44 (11.5)
CRYO worsens the healing process of a sprained ankle	109 (28.4)	115 (29.9)	76 (19.8)	47 (12.2)	37 (9.6)
CRYO is appropriate for people with health conditions, such as diabetes, open wounds, burns, damage to the peripheral nervous system, or vascular disease	97 (25.3)	92 (24.0)	102 (26.6)	40 (10.4)	53 (13.8)
CRYO can be applied in various ways, including ice packs, coolant sprays, ice massage, and/or ice baths	188 (49.0)	119 (31.0)	65 (16.9)	4 (1.0)	8 (2.1)
CRYO, such as ice, can be applied directly to the skin over the area of the sprain without a protective interface between the ice and skin	71 (18.5)	86 (22.4)	136 (35.4)	50 (13.0)	41 (10.7)

Table 4: Attitude regarding the utilization of cryotherapy for acute ankle ligament sprain

Variables	Strongly agreed, <i>n</i> (%)	Agreed, <i>n</i> (%)	Maybe, <i>n</i> (%)	Disagreed, <i>n</i> (%)	Strongly disagreed, <i>n</i> (%)
I will often use a hot pack or gel and other heat modalities over the area where the acute ankle ligament injury occurred than use CRYO	70 (18.2)	115 (29.9)	159 (41.4)	12 (3.1)	28 (7.3)
I believe that cold is better than heat for the treatment of a sprained ankle on the football pitch	161 (41.9)	105 (27.3)	88 (22.9)	12 (3.1)	18 (4.7)
I am sure the CRYO is more effective, inexpensive, and simple intervention for pain management	162 (42.2)	118 (30.7)	96 (25.0)	-	8 (2.1)
I will often use medications over the area where the acute ankle ligament injury occurred rather than use CRYO	36 (9.4)	56 (14.6)	144 (37.5)	108 (28.1)	40 (10.4)
I will only receive CRYO if it is applied in hot weather	36 (9.4)	76 (19.8)	162 (42.2)	69 (18.0)	41 (10.7)
Would you pay to receive CRYO following an acute ankle sprain injury	48 (12.5)	101 (26.3)	170 (44.3)	36 (9.4)	29 (7.6)
I believe that by decreasing tissue temperature, ice can diminish pain, metabolism and muscle spasm, minimizing the inflammatory process and thereby aiding recovery after soft tissue injury	86 (22.4)	131 (34.1)	138 (35.9)	21 (5.5)	8 (2.1)
Every football game should be equipped with first aid kits that have the components of CRYO	198 (51.6)	107 (27)	46 (12.0)	21 (5.5)	12 (3.1)
I would like more education on how to use CRYO appropriately for ankle sprain	205 (53.4)	119 (31.0)	60 (15.6)	-	-
I will recommend CRYO to my teammates immediately after they have an ankle sprain injury	212 (55.2)	74 (19.3)	84 (21.9)	14 (3.6)	-

CRYO: Cryotherapy

cryotherapy could have a greater therapeutic impact than medications and heat (41.4%), that extreme cold could reduce agility and affect performance (32.8%), on whether cryotherapy feels like an old approach for health after an ankle sprain (32.8%), use of cryotherapy only by those accustomed to cold (41.4%), and family doctors' recommendation for cryotherapy acceptance (28.4%). Most of the participants also agreed that cryotherapy is essential right after an ankle sprain to prevent chronic inflammation and other complications (43%) and that cryotherapy promotes faster healing (40.6%), while a great proportion disagreed with the idea that cryotherapy is a new concept for them (36.2%) and that they did not feel at risk of complications from cryotherapy (37.2%). Moreover, most of the participants strongly agreed that a physiotherapist should be consulted for proper cryotherapy application, as shown in Table 5.

Relationship between the demographic variables, playing characteristics, and the level of knowledge regarding the utilization of cryotherapy for acute ankle ligament sprain

The only variable with a statistically significant association was playing frequency per week ($R = 28.631$, $P < 0.001$); participants who played more than twice weekly displayed higher knowledge levels than those who played once or twice weekly ($P = 0.001$), as shown in Table 6.

Relationship between the demographic variables, playing characteristics, and the respondents' attitudes regarding the utilization of cryotherapy for acute ankle ligament sprain

Age with most of the participants in the 16–20 age group demonstrating good attitudes ($R = 6.736$, $P = 0.034$),

gender ($R = 15.951$, $P = 0.001$), marital status with singles primarily displaying good attitudes ($R = 10.735$, $P = 0.013$), educational level with diploma holders most represented in good attitudes ($R = 17.546$, $P = 0.002$), frequency of play per week with participants who played more than twice weekly displaying higher levels of good attitudes ($R = 25.717$, $P = 0.001$), and playing characteristics, all showed statistically significant associations with attitudes toward cryotherapy, as shown in Table 7.

Relationship between the demographic variables, playing characteristics, and the respondents' perceptions regarding the utilization of cryotherapy for acute ankle ligament sprain

Educational level significantly influenced perceptions, particularly among diploma holders, who largely displayed poor perceptions, while those with school-level education showed both good and poor perceptions ($R = 21.584$, $P = 0.006$). Duration of playing football also showed a noticeable association, with those playing more than 10 years primarily demonstrating poor perceptions ($R = 13.534$, $P = 0.009$). Frequency of play was another significant factor, with participants who played more than twice weekly exhibiting better perceptions ($R = 12.741$, $P = 0.013$), as shown in Table 8.

Overall, the findings indicate that while AFPs demonstrated fair knowledge, attitudes, and perceptions regarding cryotherapy, these domains were significantly influenced by playing frequency, education level, and gender. Knowledge was primarily associated with frequency of play, whereas attitudes and perceptions were influenced by a broader range of demographic and playing characteristics.

Table 5: Perception regarding the utilization of cryotherapy for acute ankle ligament sprain

Variables	Strongly agreed, n (%)	Agreed, n (%)	Maybe, n (%)	Disagreed, n (%)	Strongly disagreed, n (%)
It is possible for CRYO to produce far-reaching therapeutic effect than medications and heat modalities in acute ankle sprain	70 (18.2)	115 (29.9)	159 (41.4)	12 (3.1)	28 (7.3)
CRYO is important immediately after ankle sprain injury to avoid chronic inflammation and further musculoskeletal complications	158 (41.1)	165 (43.0)	49 (12.8)	4 (1.0)	8 (2.1)
I believe that if I expose my body to the extremely cold temperature of CRYO, my body would lose its agility and I will not play well again	60 (15.6)	80 (20.8)	126 (32.8)	62 (16.1)	56 (14.6)
Receiving CRYO might seem an odd path to health following an acute ankle sprain injury	40 (10.4)	74 (19.3)	126 (32.8)	107 (27.9)	37 (9.6)
The use of cold over heat for an acute ankle sprain injury sounds very new to me	28 (7.3)	64 (16.7)	100 (26.7)	139 (36.2)	53 (13.8)
Do you feel at risk of getting more complications using CRYO following an acute ankle sprain injury?	41 (10.7)	29 (7.6)	113 (29.4)	143 (37.2)	58 (15.1)
I believe that using CRYO on a sprained ankle helps it heal faster	115 (29.9)	156 (40.6)	97 (25.3)	8 (2.1)	8 (2.1)
I believe that CRYO should be used only for those that are accustomed to cold and it's pleasurable to them	24 (6.3)	37 (9.6)	159 (41.4)	110 (28.6)	54 (14.1)
I believe the physiotherapist should be consulted for the best practice of CRYO over an acute ankle sprain injury	155 (40.4)	118 (30.7)	99 (25.8)	8 (2.1)	4 (1.0)
I would only accept CRYO over an acute ankle sprain injury if our family doctor recommends it	69 (18.0)	78 (20.3)	109 (28.4)	67 (19.8)	52 (13.5)

CRYO: Cryotherapy

DISCUSSION

This study examined the knowledge, attitude, and perception of AFPs regarding the use of cryotherapy for acute ankle ligament sprain. The findings indicate an overall fair level of knowledge, attitude, and perception, with significant associations observed between demographic and playing characteristics.

In this study, 81.3% of the participants played football more than twice a week. This agrees with the fact that there is a higher likelihood of injury occurrence with a higher time of play and that ankle sprain is of high occurrence and is consistent with the findings of Katherine *et al.*^[19] Furthermore, most of the participants played football on natural grass. About 74.7% reported playing with a first aid kit. The vast majority of the participants reported doing some stretching (97.9%) and warm-up exercises before playing. This can be said to be an increased awareness of the need for safety in playing, which agrees with the study done by Kuo-Ming *et al.*^[20]

Knowledge regarding the utilization of cryotherapy for acute ankle ligament sprain

This study found that the level of knowledge regarding the utilization of cryotherapy (CRYO) for acute ankle ligament sprains among AFPs within the Enugu Metropolis was generally fair. Despite the high occurrence of ankle injuries and frequent exposure to the sport, key demographic variables such as age, gender, marital status, educational level, duration of play, and player characteristics showed no

statistically significant associations with knowledge levels. This is contrary to the work by Notoatmodjo,^[21] which posited that knowledge is influenced by age and education level. The discrepancy may arise from the lack of formal education on cryotherapy or limited exposure to structured sports medicine programs. In addition, this could also be a result of neglect in incorporating some first aid classes into the school curriculum or the poor level of sensitization of physical therapy.

The frequency of play, however, showed a statistically significant association with knowledge. Players who participated in football more than twice weekly displayed better knowledge of cryotherapy. This finding aligns with the study by Katherine *et al.*,^[22] which observed that repeated exposure to sports-related injuries and their management can enhance knowledge about therapeutic modalities. Regular participation likely offers players more opportunities to witness or utilize cryotherapy, thereby fostering a better understanding of its application and benefits.

The duration of play and characteristics of the players do not correlate with the level of knowledge on the utilization of cryotherapy in the treatment of acute ankle injury. Despite the duration of play, which might have exposed them to the use of cryotherapy, there is still no significant relationship between the play duration and their level of knowledge. The characteristics of the players seem to show greater knowledge of the players in the prevention of injury; however, it has no relationship to their knowledge of cryotherapy utilization as first aid in treating acute ankle sprain.

Table 6: Chi-square tests for the relationship between demographic variables, playing characteristics, and knowledge level ($n=383$)

Variables	Knowledge level			Total
	Poor	Fair	Good	
Age group (years)				
16–20	7	105	81	193
21–25	2	71	53	126
26–30	1	43	20	64
$R (P)$		4.468 (0.346)		
Gender				
Male	10	215	145	370
Female	0	4	9	13
$R (P)$		4.812 (0.090)		
Marital status				
Single	7	200	142	349
Married	3	19	12	34
$R (P)$		10.582 (0.102)		
Education				
PhD	0	5	7	12
Masters	0	8	9	17
Bachelor	3	44	17	64
Diploma	4	64	48	116
$R (P)$		9.863 (0.275)		
Duration of playing football in years				
1–5	0	23	11	34
5–10	1	50	42	93
>10	9	146	101	256
$R (P)$		4.498 (0.343)		
Frequency of playing per week				
1 times	0	9	11	20
2times	0	47	5	52
More than 2 times	10	163	138	311
$R (P)$		28.631 (<0.001)*		
Playing characteristics				
Fair	0	28	17	45
Good	10	191	137	338
$R (P)$		1.633 (0.442)		

*R=Pearson's chi-square value; $P<0.05$ indicates statistical significance

Attitudes regarding the utilization of cryotherapy for acute ankle ligament sprain

This study revealed significant associations between demographic variables such as age, gender, marital status, and education level with participants' attitudes toward cryotherapy. Younger players, particularly those aged 16–20 years, demonstrated more positive attitudes. This aligns with findings by Kuo-Ming *et al.*,^[20] which reported that younger athletes tend to be more open to adopting modern injury management techniques.

Gender played a significant role, with males predominantly displaying positive attitudes toward cryotherapy. This is consistent with the findings of Gbadamosi *et al.*^[23] who reported that male AFPs in northern Nigeria were more receptive to physiotherapy

Table 7: Chi-square tests for the relationship between demographic variables, playing characteristics, and attitude level ($n=384$)

Variables	Attitudes level		Total
	Fair	Good	
Age group (years)			
16–20	106	87	193
21–25	81	45	126
26–30	46	18	64
$R (P)$		6.736 (0.034)	
Gender			
Male	232	138	370
Female	1	12	13
$R (P)$		15.951 (0.001)	
Marital status			
Single	201	144	345
Married	24	6	30
$R (P)$		10.735 (0.013)	
Education			
PhD	5	7	12
Masters	14	3	17
Bachelor	49	15	64
Diploma	58	58	116
School	107	67	174
$R (P)$		17.546 (0.002)	
Duration of playing football years			
1–5	24	10	34
5–10	54	39	93
>10	155	101	256
$R (P)$		1.666 (0.435)	
Frequency of playing per week			
1 times	5	15	20
2times	45	7	52
More than 2 times	183	128	311
$R (P)$		25.717 (0.001)	
Playing characteristics			
Fair	18	27	45
Good	215	123	383
$R (P)$		9.291 (0.002)	

*R=Pearson's chi-square value; $P<0.05$ indicates statistical significance

interventions, including cryotherapy. The limited representation of females in this study may have influenced this outcome.

Furthermore, education level significantly influenced attitudes, with diploma holders showing balanced positive attitudes. This aligns with Notoatmodjo's^[21] assertion that education can influence attitudes by shaping perceptions and encouraging the adoption of health-promoting behaviors.

Furthermore, frequency of play and player characteristics showed significant associations with attitudes. Participants who played more than twice weekly demonstrated more positive attitudes, likely due to their higher exposure to injury prevention and management practices. This finding

Table 8: Chi-square tests for the relationship between demographic variables, playing characteristics, and perception level (n=384)

Variables	Perception level			Total
	Poor	Fair	Good	
Age group (years)				
16–20	5	150	38	193
21–25	2	105	19	126
26–30	1	53	10	63
R (P)	1.902 (0.754)			
Gender				
Male	8	303	59	370
Female	0	5	8	13
R (P)	18.150 (<0.001)			
Marital status				
Single	6	281	58	345
Married	2	21	7	30
R (P)	8.273 (0.219)			
Education				
PhD	0	10	2	12
Masters	2	13	2	17
Bachelor	0	55	9	64
Diploma	1	103	12	116
School	5	127	42	174
R (P)	21.584 (0.006)			
Duration of playing football in years				
1–5	2	28	4	34
5–10	1	85	7	93
>10	5	195	56	256
R (P)	13.534 (0.009)			
Frequency of playing per week				
1 times	0	11	9	20
2times	0	43	9	52
More than 2 times	8	254	49	311
R (P)	12.741 (0.013)			
Playing characteristics				
Fair	2	32	11	45
Good	6	276	56	338
R (P)	3.312 (0.191)			

*R=Pearson's chi-square value; P<0.05 indicates statistical significance

is supported by a study by Robert *et al.*,^[24] which found that athletes who engaged in regular play were more likely to appreciate the role of cryotherapy in managing injuries.

Perceptions regarding the utilization of cryotherapy for acute ankle ligament sprain

The perceptions of AFPs regarding the use of cryotherapy were significantly associated with gender, education level, duration of play, and frequency of play. Males demonstrated more positive perceptions, consistent with the findings of Kuo-Ming *et al.*^[20] who reported that males tend to have higher exposure to sports-related injury management practices. However, the small sample size of female participants in this study limits a comprehensive gender comparison.

Education level emerged as a significant factor influencing perceptions. Diploma holders and those with school-level education predominantly displayed positive perceptions, aligning with the findings of Robert *et al.*^[24] who found that education enhances awareness and acceptance of therapeutic modalities. The duration and frequency of play were also significant factors, with participants who played for more than 10 years or more than twice weekly demonstrating better perceptions. This suggests that prolonged exposure to football environments enhances awareness of cryotherapy, as highlighted by Katherine *et al.*^[22]

Conversely, marital status and player characteristics showed no significant associations with perceptions. This finding diverges from studies that suggest a potential role of personal and social factors in shaping perceptions. However, the absence of direct relevance of marital status to sports-related practices might explain this result.

Overall, the findings indicate that while the knowledge, attitudes, and perceptions of AFPs regarding cryotherapy are influenced by specific demographic and playing characteristics, there is still room for improvement in awareness and education. The fair knowledge levels observed could be attributed to informal exposure to cryotherapy during play rather than structured training. This aligns with the study by Gbadamosi *et al.*,^[23] which emphasized the need for better integration of physiotherapy practices into amateur football settings.

Furthermore, the significant influence of frequency and duration of play highlights the importance of regular participation in fostering better attitudes and perceptions of cryotherapy. Educational programs targeting AFPs and coaches could further enhance their understanding and utilization of cryotherapy as an effective first aid measure for acute ankle ligament sprains.

Strengths of the study

This study provides one of the few empirical assessments of cryotherapy utilization among AFPs in a Nigerian setting. The relatively large sample size and inclusion of multiple KAP domains strengthen the relevance of the findings for injury prevention and sports rehabilitation practice.

Limitations of the study

Some participants had limited educational backgrounds, which may have affected comprehension of certain questionnaire items. In addition, the absence of a standardized questionnaire specific to cryotherapy utilization in ankle sprain may limit comparability with other studies. The use of Chi-square and Fisher's exact tests allowed for appropriate assessment of associations between categorical variables. The absence of multivariable regression analysis limits the ability to control for confounding factors. Future research employing

regression-based models may provide deeper insight into independent predictors of cryotherapy knowledge and utilization among AFPs.

Implications for practice and research

The findings emphasize the need for structured injury education programs within amateur football academies. Incorporating physiotherapists into amateur teams could improve early injury management and reduce long-term complications. Future research should explore intervention-based studies to determine whether targeted education improves appropriate cryotherapy utilization.

CONCLUSION

AFPs demonstrated a generally fair level of knowledge, attitude, and perception regarding the use of cryotherapy for acute ankle sprain. Playing frequency was significantly associated with knowledge, whereas attitude and perceptions were influenced by gender, education level, and frequency of play. These findings underscore the need for structured injury education and improved access to physiotherapy-led guidance within amateur football settings. Integrating basic sports physiotherapy support may enhance appropriate early injury intervention and management and improve recovery outcomes.

Ethics approval and consent to participate

The study's design, potential hazards, and associated discomfort were communicated to the participants, who then provided written informed consent before enrollment. The study was approved by the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu, with approval no: NHREC/05/01/2008B-F WA00002458-1RB00002323, and it was conducted according to the recommendations in the Declaration of Helsinki.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

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Conflicts of interest

There are no conflicts of interest.

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