



China's Non-professional Far-reaching Mobilization of High School Students' Knee Injury Status

Bohan Li

The High School Affiliated to Renmin University, Beijing, China, 100080
poolskiilli@163.com

Abstract. In China, With the increasing demand for selecting more great teenage athletes for the professional sports association and helping more teenagers to have healthier bodies, education bureaus and sports bureaus publish several policies to increase the importance of sports for students. However, in China, high middle schools have not built a series of integrated policies to support students' health during sports, and knee injuries are a common issue for a proportion of students. This literature review and data analysis investigates the knee injury situation among middle high school students in China. The conclusion reveals that adding professional exercise instructors in high school might help to alleviate the knee injury situation among half-professional players.

Keywords: Knee injury, High school students, High school athletic, Precaution for the knee injury

1 Introduction

In China, With the increasing demand for selecting more great teenage athletes for the professional sports association and helping more teenagers to have healthier bodies, education bureaus and sports bureaus publish several policies to increase the importance of sports for students. However, because the policies intended to protect the athletes from being wounded in high school sports leagues are not standardized yet, and most high schools do not consider sports competition as an important thing, so they don't investigate enough to ensure the students won't be hurt in doing sports, injuries happen frequently in high school sports competitions in China. For students who want to be professional players in the future, knee injuries could affect their performance in the game. Knee injuries may have an impact on students who must take Gaokao in order to gain admission to a prestigious university. Solving the sports injury problems in China is important and needs to be solved immediately. Previously, researchers in this field only looked at overall injuries among Chinese senior high school students and injuries caused by specific sports. No one designed the specific investigation into the knee joint. Thus, this paper uses literature review and data analysis as methods to investigate knee injuries among senior high school students.

This paper uses literature review as the method to investigate how to reduce the harmful effect of sports injuries on high school students. References selected in this

paper are all written by Chinese scholars who select samples from where they live. Combining all of this data could help get a general conclusion on the question this article intends to investigate.

Besides, the author collected relevant data from the author's high school sports team. As a member of our school basketball team and flag football team, the author collected data from our own team in 2022. The data includes knee injury conditions among our school team members and how the members of our school team perform to protect them from knee injuries.

Because it is not possible for China to increase the financial input in the sports field to improve the problem mentioned above, producing a paper that combines the information on knee injuries of high school students is necessary, guiding the researchers in this field to clearly define what the next step they should take when investigating high-school sports injuries. It also helps the high school coaches in China to know what information they should give their students to prevent themselves from being hurt.

2 Common Knee Injuries

Because sports with high antagonism will always cause athletes to receive external force from incorrect technique, posture, or other players, the knee joint and soft tissue surrounding the knee joint may experience significant pressure to release the external force. If the force had not been released properly and the people had received a great external force in a relatively short period [1], sports injuries would be caused. Common injuries caused by sports have been separated into four categories: medial ligament injuries, anterior ligament injuries, lateral structure injuries, and posterior cruciate ligament injuries [1].

2.1 Medial ligament

The medial and posteromedial capsules consist of the medial and posteromedial ligaments with particular strength in the medial portion [1]. The abnormal rotation of the body would likely cause the rupture to break down or fall off. After the injuries to the medial ligaments, patients would lose the ability to rotate their knees. Since the medial ligaments generally link people's joints horizontally, any gigantic, unusual force from the outside could damage the medial ligament. The major sports competitions Chinese students participate in are basketball, soccer, and gymnastics. In basketball and soccer, when players want to change their forward direction, most of the technical actions they use require them to rotate the calf. Whenever the player's leg endures an extreme external force on their calf when they are doing the technical posture, their medial ligament might be hurt.

2.2 Anterior ligament

Anterior ligaments always only produce very little abnormal movement [1]. While the tibia has already been rotated, anterior ligament injuries are likely to happen. For high

school sports contests in China, soccer and basketball are the two sports most likely to cause anterior ligament injuries since when athletics land on the ground with one leg, it is the most possible reason to cause anterior ligament damage.

2.3 Literal structure

The literal structure consists of the lateral ligament; the lateral and posterolateral capsule; the popliteal and biceps; and the strongest structure among these structures, fascia lata [1]. In competition sports, an immediate medial pull could cause these structures to hurt.

Most players of average height who rely on adjusting their center of gravity to complete technical gestures in sports are more likely to have literal structure issues because changing their tiptoes to get a faster acceleration in a relatively short period has become their habit. Under this situation, these players must endure more pressure on their literal structure in daily life compared to those who do not have that habit.

2.4 Posterior cruciate ligament

Posterior cruciate ligament injuries have always been wrongly distinguished as anterior ligament injuries. The commonest cause of posterior cruciate ligament injuries is a blow on the front of a flexed knee [1].

Because nowadays, injuries that happen to the posterior cruciate ligament are still hard to cure, paying attention to prevent the posterior cruciate ligament is very important.

3 The current state of Knee Injuries among high school students in China

3.1 The state for general students among high schools

Knee injuries are still a great problem that needs to be taken care of among young Chinese teenagers. According to Dongju Wang's investigation, 10% of the boys and 6.6% of the girls in Zhengzhou who play basketball once have knee injuries [2]. What's more, in Zhengzhou, 14.4% of injuries resulting from basketball are knee injuries [2]. Once teenagers are exposed to knee injuries, they will not only be unable to do the common and generally exercise in their daily lives but also mostly lead them to hospitals to receive treatments to cure their knees, since most knee injuries can potentially have a huge and bad effect on an athlete's knees. The fact that in Sichuan, 29.15% of the funds established to treat athletics are spent on curing knee injuries, which also justifies how important it is for teenagers to protect themselves from receiving a knee injury [3-4]. Among all kinds of sports competitions, basketball and soccer are the two sports which are most likely to cause knee injuries among Chinese high school students [5]. Because these two sports are the most popular sports activities among Chinese high school students, they have a relatively large population. Nevertheless, because these two sports also require athletes to change their body posture in a short time and because these two

games need participants to endure their exhausted state for a long time, there are more chances for them to get hurt on their knees when their muscles are tired. In 2006, a girl was drown at swimming pool at hers campus. In 2012, Ji lost his balance while trying to stop another player's shot. His head fall on the ground first, resulting in a concussion [12].Once teenagers encountered unpredictable sports injury, their family almost has to burden the medication fee. Although "special security fund" is set for prevent school and family sustain too much economic loss, for the place where student isn't satisfying the minimum students this fund required, family and school still have to sustain the medical fee. This might also generate confliction between family and school [11].

3.2 The state for half-professional athletics among high schools

First, the definition of "half-professional athlete" refers to students who have high skills in sports and participate in competitions between different schools for their school but do not choose to be professional athletes. This group of people makes up a high proportion in Beijing. Almost every middle school has a basketball and a soccer team, but among nearly 70 schools, only two to three students get the chance to play professional sports. The auhtor, a high school half-professional athletic player, would use the data collected from our high school sports team to reveal part of the state of knee injuries for half-professional athletics among high schools.

Table 1. Basketball Team (Data collected from RDFZ ICC basketball team)

| | Players who had knee injuries (6) | Players who do not had knee injuries (25) |
|------------------------------------|-----------------------------------|---|
| Stretch after the training | 1 | 8 |
| do the leg training with equipment | 4 | 6 |
| Wear knee brace in the game | 2 | 11 |
| Prefer break though than shot ball | 6 | 12 |

Among 31 people on the RDFZ ICC basketball team, 6 had had a knee injury before. Four of their heights are below 185 centimeters. The other two players' heights are taller than 195 centimeters. Both people with a height greater than 195 have a heavy-weight (more than 110kg). Whenever they are having a high-strength game, their knees will more likely endure high pressure. For those whose height is below 185, they rely on high-frequency cross-over and high speed to support them in winning the game. They always enforce themselves to keep a high speed during the whole game, so their knees endure high external forces for a long time too.

Moreover, the data reveals that players who do not have knee injuries tend to keep a better stretching habit compared to those who have had knee injuries before. Do not stretch after training because your muscles cannot relax enough after spending so much time on the field. This would result in their muscles being unable to support the force they need to support during the game.

Doing leg training is also an interesting risk factor for players to have a bad knee. Regularly and properly training legs will not affect the knee a lot, but doing it in an

improper way would hurt the knees so much. The result reveals that most of the half-professional students in high school might not use the equipment properly.

Not wearing a knee brace during the game is also a big problem for our team. Considering buying a professional knee brace is expensive and wearing a knee brace in the game could influence players' performances, most members of the basketball team do not like to wear the knee brace even though they know wearing it could protect them better.

Table 2. Flag Football Team (Data collected from RDFZ ICC flag football team)

| | Players who had knee injury (4) | Players who do not had knee injury (26) |
|-------------------------------------|---------------------------------|---|
| Stretch after the training | 1 | 6 |
| Do the leg training with equipment | 3 | 8 |
| Wear knee brace in the game | 0 | 3 |
| Do high frequency run with the ball | 3 | 8 |

The data collected from the flag football team almost shows the same conclusion as the basketball team. However, there might be another factor that might influence the knee injury condition of members of the flag football team – the grassland we used in school. Because American football shoes are hard to buy in China, not every player has the proper shoes to play the game. Affected by the quality of grassland, players' knees have to sustain a bigger force than normal.

4 Treatment

4.1 Precautions

To prevent potential knee injuries, students have to recognize the importance of the necessity of taking precautions to avoid the potential possibility of receiving injuries [6]. As students understand the consequence of getting knee injuries, they will start to have the awareness to protect themselves. Before exercising, the knee joint should be fully prepared; the exercise content should be diversified; more professional venues and equipment should be selected; the muscles around the knee joint (quadriceps, etc.) should be strengthened; and proper rest should be avoided to avoid excessive knee joint fatigue. Relax and self-massage after exercise to increase awareness of self-protection [7]. Warm-ups should be taken seriously by all students. For the half-professional players, they should recognize that under a greater degree of physical challenge, if they have no professional director to direct their training and games, they should do more things to prevent injuries—enough stretching, wearing a knee brace, letting themselves take a break during a high-strength game, and protecting their knees after the game.

4.2 Therapy

For regular knee pain, it is a traditional practice to apply bandages and ice compresses after training. Those with team doctors can perform acupuncture, physiotherapy, or TCM massage therapy [8]. If knee pain cannot be released for a long period, Chinese herbal fumigation is also a good way to release the pain [9]. Once the severity of knee injuries has been achieved to ligament tear, patients have to go to the hospital and undergo the operation and course of treatment [10].

5 Conclusion

Through the research above, the paper finds that the state of knee injuries among high school students in China is not really optimistic. Students who do not participate in the high-strength competition have almost no awareness of how to protect themselves from getting hurt in daily sports activities. Students who participate in sports competitions among high school unions have some primary knowledge to protect their knees, but because not every half-professional high school sports player has a sports director, there are still some potential risk factors that might increase the possibility of their knees being injured compared to professional players.

This paper mainly focuses on revealing the situation of knee injuries confronted by high school students in China, but it does not provide a proper and general solution to this problem. Avoiding health problems could not only be solved by increasing efficiency when patients go to the hospital, but also needs to be solved by calling on people's consciousness to prevent themselves from getting hurt. Because Gaokao is still the most important thing for students in China nowadays, most of them would not choose to spend their time and money on sports. According to the data collected above, adding sports instructors in middle high school is an important and necessary way to protect half-professional athletes' knees. How to call on Chinese high school students to have the intention of protecting themselves is still a question.

6 References

1. Trickey, E. L. Ligamentous Injuries Around The Knee. *The British Medical Journal*, 2(6050), 1492–1494. <http://www.jstor.org/stable/20412619>
2. Dongju, Wang. Investigation of Injuries of Middle School Basketball Student-Athletes in Zhengzhou. *Bulletn of sport science and technology*. 2009:102-103
3. Yalin, Si. Research and Analysis of Knee Sports Injury and Rehabilitation in Triple Jump. *Sports human science*. 2018: 13
4. Wenjing, Wang. Sports injuries and prevention of middle school track and field athletes. *Sports Medical Station*. 2020:83
5. Xingbo, Qin. Investigation and Research on Frequent Sports Injuries in Middle School Students' Sports Activities. *Sports Human Science*. 2021:31-32
6. Dong, Wang. Causes and prevention of common injuries in middle school students' physical training. *Sports Science*. 2022:74-75

7. Tao Zhong. Prevention of Knee Joint Injury in Volleyball Hand Crossing. Journal of Inner Mongolia Normal University (Natural Science Edition). 2018:355
8. Ping, Xia. Prevention and treatment of knee pain in middle-distance runners. Sports Medical Station. 2021:83
9. Jiming, Gao. Knee pain, try Chinese herbal fumigation. Hunan Journal of Traditional Chinese Medicine. 2021:107
10. Yue, Xing. Evaluation of Meniscal RAMP Lesions on Magnetic Resonance Imaging After Anterior Cruciate Ligament Rupture. Journal of Clinical Radiology. 2020:1158-1161
11. Dingsheng, Fu. Resolve the dilemma of liability determination for accidental injury accidents in campus sports. People's education.2016:34-35
12. Qiuguang, Zhu. Study on the Identification and Evaluation for Physical Exercise's Risk of Accidental Injury in Kunming Colleges. Yunnan Normal University. 2017:2-3

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

