



## Prevalence of “Jumper’s Knee” In Different Ages of Volleyball Players: Survey Study

Abdallah Ahmed Abdallah Abdelsameea<sup>1</sup>, Prof. Dr. Aliaa Attia Diab<sup>2</sup>, Ass. Prof. Dr. Yasser Ramzy Lasheen<sup>3</sup>

<sup>1</sup>B.Sc. in Physical Therapy, for Basic Science, Faculty of Physical Therapy Cairo University, Egypt.

<sup>2</sup>Professor of Physical Therapy for Basic Science, Faculty of Physical Therapy, Cairo University, Egypt.

<sup>3</sup>Assistant Professor of Physical Therapy for Basic Science, Faculty of Physical Therapy, Cairo University, Egypt.

Email: [elasheryabdallah@gmail.com](mailto:elasheryabdallah@gmail.com)

**Abstract: Background:** Jumper's knee also called patellar tendinopathy is a painful condition of the knee caused by small tears in the patellar tendon that mainly occurs in sports requiring strenuous jumping. **Purpose:** This study was conducted to investigate and compare the prevalence of jumper's knee among different ages of volleyball players in Cairo, Egypt. **Methods:** Cross sectional survey study was conducted on 861 volleyball players from 18 clubs in Cairo. All participants signed a consent form prior to participation in the study. The participants were the tallest players in the court and do repeated vertical jumps. They were assigned into two groups based on their gender and then each group was divided into 5 groups according to their age. Weight, height and VISA score was recorded for each participant, **Results:** it showed that in male volleyball players, the mean value of age was 18.96 ±4.58 year and mean value of BMI was 22.32 ±1.98 kg/m<sup>2</sup>. while In female volleyball players, the mean value of age was 17.21 ±3.73 year, and mean value of BMI was 21.68±1.89kg/m<sup>2</sup> The statistical analysis by Chi-square test revealed that there were significant differences in incidence of jumper's knee among groups of male volleyball players (P=0.0001; P<0.05) and female volleyball players (P=0.0001; P<0.05). **Conclusion:** There were statistically significant differences in the prevalence of jumper's knee among different ages of volleyball players in Cairo, Egypt.

[Abdallah Ahmed Abdallah Abdelsameea, Aliaa Attia Diab, Yasser Ramzy Lasheen. **Prevalence of “Jumper’s Knee” In Different Ages of Volleyball Players: Survey Study.** *N Y Sci J* 2021;14(2):9-16]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 2. doi: [10.7537/marsnys140221.02](https://doi.org/10.7537/marsnys140221.02).

**Keywords:** Prevalence; Jumpers Knee; Volleyball Players

### 1. Introduction:

Knee is a synovial joint that functions as a complex hinge whilst also permitting rotational, anteroposterior and medial/lateral translational movement with 60 of freedom. (Pinskerova et al., 2004). “Jumper's knee,” also called patellar tendinopathy, is a painful condition of the knee caused by small tears in the patellar tendon that mainly occurs in sports requiring strenuous jumping (Christian et al., 2013).

The Victorian Institute of Sport Assessment (VISA) scale is the only condition-specific scale for patellar tendinopathy (Visentini et al., 1998). It has become the most widely used PROM in symptom severity assessment and the monitoring of changes related to injury over time (Scott et al., 2013).

Since sports injuries often are under-reported, it is hard to determine the exact frequency of patellar tendinopathy both in the United States and on an international scale. Jumping sports such as volleyball, basketball, and long and high jumps have a high prevalence of the disease (Ferretti, 1986). Studies have shown that patellar tendinopathy is substantially higher in elite versus recreational athletes. Patellar

tendinopathy can occur in adolescent athletes to those in their third decade and up, jumper's knee occurs more often in males (Rudavsky and Cook, 2014; Durcan et al., 2014; Lian et al., 2005).

This study may add a piece of information to the physiotherapist in the governmental hospital, and private clinical about the prevalence of jumper's knee in the athletics in Egypt as well as it could help the therapists in designing an ideal rehabilitation programs for these subjects. So, this study was designed trying to provide a quantitative database about the prevalence of jumper's knee in volleyball players in Cairo, Egypt. As well as it could open the way for the physiotherapists to research and study the reasons, the prevention and the treatment of the jumper's knee.

### 2. Subjects, Materials and Methods:

It is Cross sectional survey study. 861 volleyball players were recruited from 18 clubs in Cairo (Al-Ahly, Gezira, Shooting, Heliopolis, El-Shams, elsharqia, helolido, Al-Zohour, El-Zamalek, National Bank, El-Nile, El-Tersana, Maadi, Misr Insurance, and Nasr City Club, eltayaran, army, petrojet) and

were asked to fill the Arabic version VISA score. The age of the players ranged from (12- 30) years divided into two groups based on their gender and then each group was divided into 5 groups according to Egyptian volleyball federation according to their ages females (12 to 14), (14 to16), (16 to 18), (18 to 20), (20 to 30).; Males (13 to 15), (15 to17), (17 to 19), (19 to 21), (21 to 30). Only volleyball players were selected. All players were medically and psychologically stable. All players received a good explanation of the questionnaire. Body mass index (BMI) ranged from 15.58-28.4 kg/m<sup>2</sup>.

Participants were weighed in light clothing and bare feet with socks, fasting, and with an empty bladder (Haslam and Wittert, 2009). Participants stand in bare feet that kept together with head in vertical position (Haslam and Wittert, 2009). BMI was calculated as weight (kg)/ height (m)<sup>2</sup> (Haslam and Wittert, 2009).

Each participant had a questionnaire form and filled it by his own in the court after completing all the following actions. The investigator asked the participant to downstairs with normal gait cycle. The investigator asked the participant to fully extend the knee actively. The investigator asked the participant to step forward with one leg, lowering his hips until both knees are bent at about a 90-degree angle. And to make sure his front knee is directly above his ankle, not pushed out too far, and to make sure his other knee doesn't touch the floor. The investigator asked the participant to stand erect with his feet approximately one shoulder width apart. And to push his hips back, slowly bending his knees to a 90-degree angle. While keeping his back straight and eyes looking ahead. Then slowly rise to starting position. The investigator asked the participant to do 10 single leg hops.

#### Statistical analysis

The statistical analysis was conducted by using statistical SPSS Package program version 25 for Windows (SPSS, Inc., Chicago, IL). The following statistical procedures were conducted:

- Quantitative descriptive statistics including the mean and standard deviation for demographic data and VISA score variables.

- Quantitative descriptive statistics including the number and percentage for distribution of studied volleyball players and incidence of jumper's knee variable.

- One way analysis of variance (ANOVA-test) to compare among 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> groups for VISA score within each gender of volleyball players.

- Chi-square test ( $\chi^2$ -test) to compare among 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> groups for incidence of jumper's knee within each gender of volleyball players.

- Statistical level all statistical analyses were significant at level of probability less than an equal 0.05 ( $P \leq 0.05$ ).

### 3. Results:

In male volleyball players, the mean value of age was 18.96  $\pm$ 4.58 year with minimum value 13.00 year and maximum value 30.00 year, mean value of weight was 71.32  $\pm$ 12.33kg with minimum value 44.00 kg and maximum value 100.10 kg, mean value of height was 178.77 $\pm$ 9.86 cm with minimum value 150.42 cm and maximum value 199.60 cm, and mean value of BMI was 22.32  $\pm$ 1.98 kg/m<sup>2</sup>with minimum value 16.79 kg/m<sup>2</sup> and maximum value 28.28 kg/m<sup>2</sup>.

In female volleyball players, the mean value of age was 17.21  $\pm$ 3.73year with minimum value 12.00 year and maximum value 29.40 year, mean value of weight was 63.14  $\pm$ 10.00kg with minimum value 36.00 kg and maximum value 99.00 kg, mean value of height was170.65  $\pm$  6.92 cm with minimum value 149.00 cm and maximum value 187.00 cm, and mean value of BMI was 21.68 $\pm$ 1.89kg/m<sup>2</sup>with minimum value 15.58 kg/m<sup>2</sup> and maximum value 28.40 kg/m<sup>2</sup>.

Comparison of mean values VISA score among different studied age group were represented in Table (1).

**Table (1):** Comparison of mean values VISA score among different studied age group

Items	Gender	
	Male volleyball players n=443	Female volleyball players (n=418)
	Mean $\pm$ SD	Mean $\pm$ SD
1 <sup>st</sup> Group	87.15 $\pm$ 10.83	86.48 $\pm$ 8.66
2 <sup>nd</sup> Group	78.76 $\pm$ 19.96	81.57 $\pm$ 16.84
3 <sup>rd</sup> Group	78.38 $\pm$ 18.57	83.30 $\pm$ 14.48
4 <sup>th</sup> Group	77.48 $\pm$ 18.04	87.11 $\pm$ 5.80
5 <sup>th</sup> Group	88.65 $\pm$ 8.13	87.54 $\pm$ 9.53
F-value	9.869	4.046
P-value	0.0001	0.003
Significance	S	S

Data are expressed as mean  $\pm$ standard deviation P-value: probability value S: significant.

In male volleyball players, the number (%) incidence of jumper's knee 113 (25.50%) were positive (jumper's knee  $\leq 80$ ) and 330 (74.50%) were negative (jumper's knee  $> 80$ ). In female volleyball players, the number (%) incidence of jumper's knee

37 (8.90%) were positive (jumper's knee  $\leq 80$ ) and 381 (91.10%) were Negative (jumper's knee  $> 80$ ). Incidence of jumper's knee within each age group were represented in table (2).

**Table (2):** Incidence of jumper's knee within each age group

Items	Gender			
	Male volleyball players (n=443)		Female volleyball players (n=418)	
	Positive ( $\leq 80$ )	Negative ( $> 80$ )	Positive ( $\leq 80$ )	Negative ( $> 80$ )
1 <sup>st</sup> Group	8 (8.30%)	88 (91.70%)	3 (3.50%)	83 (96.50%)
2 <sup>nd</sup> Group	28 (30.10%)	65 (69.9%)	15 (17.90%)	69 (82.10%)
3 <sup>rd</sup> Group	34 (39.50%)	52 (60.50%)	14 (15.60%)	76 (84.40%)
4 <sup>th</sup> Group	38 (43.20%)	50 (56.80%)	3 (3.90%)	73 (96.10%)
5 <sup>th</sup> Group	5 (6.30%)	75 (93.80%)	2 (2.40%)	80 (97.60%)
Chi-square value	54.924		22.968	
P-value	0.0001		0.0001	
Significance	S		S	

SD: standard deviation P-value: probability value NS: non-significant.

#### 4. Discussion:

Lower extremity tendinopathy is a common sports injury, but it can also affect non-athletes. Because tendinopathy is difficult to treat and has negative effects on the ability to work and quality of life, development of preventive interventions is important. The first step in the Van Mechelen prevention model is to determine the extent of the problem. The primary aim of that study was to determine the incidence and prevalence of lower extremity tendinopathy in a Dutch general practice population. The secondary aim was to investigate possible associated factors. A cross-sectional study was performed in a Dutch general practice. Using International Classification of Primary Care codes, the electronic patient files were searched to identify cases of adductor tendinopathy, greater trochanteric pain syndrome, jumper's knee, Achilles tendinopathy, and plantar fasciopathy in 2012. The tendinopathy patients were compared to the general practice population regarding age, gender, use of medication, and comorbidity using 95 % confidence intervals. The prevalence and incidence rates of lower extremity tendinopathy found in this study were 11.83 and 10.52 per 1000 person-years. Lower extremity tendinopathy was more prevalent among older patients. No differences between tendinopathy patients and the general practice population were found regarding gender, use of medication, or comorbidity. And this came in disagreement with the current study. Also the study found that 17 athlete were complaining from jumper's knee with

prevalence rate of 1.6 per 1000 person and the male gender is considered a risk factor for jumper's knee. And its incidence is 13.5% of all lower limb tendinopathies (Albers et al., 2016).

"Jumper's knee," also called patellar tendinopathy, is a painful condition of the knee caused by small tears in the patellar tendon that mainly occurs in sports requiring strenuous jumping. The tears are typically caused by accumulated stress on the patellar or quadriceps tendon. As the name implies, the condition is common in athletes from jumping sports such as volleyball, track (long and high jump), and basketball. The condition has a male predominance. Contrary to traditional belief, jumper's knee does not involve inflammation of the knee extensor tendons. Studies dating back 40 years describe jumper's knee as a degenerative condition. Jumper's knee is a clinical diagnosis made through detailed history taking and a physical exam. Ultrasound can facilitate the diagnosis, as this imaging study is readily available and affordable. Treatment mainly revolves around conservative measures such as reducing activities that place loading impact on the knee. Once the pain subsides, restoration of function is achieved through physical and exercise therapy. Surgery usually remains the last resort for chronic refractory cases. Since sports injuries often are under-reported, it is hard to determine the exact frequency of patellar tendinopathy both in the United States and on an international scale. Jumping sports such as volleyball, basketball, and long and high jumps have a high

prevalence of the disease. Studies have shown that patellar tendinopathy is substantially higher in elite versus recreational athletes. Patellar tendinopathy can occur in adolescent athletes to those in their third decade and up. Jumper's knee occurs more often in males. (**Santana and Sherman, 2019**).

In our study, Cross sectional survey study was conducted on 861 volleyball players from 18 clubs in Cairo. All participants signed a consent form prior to participation in the study. The participants were the tallest players in the court and do repeated vertical jumps. They were assigned into two groups based on their gender and then each group was divided into 5 groups according to their age. Weight, height and VISA-P score was recorded for each participant, the results showed that in male volleyball players, the mean value of age was  $18.96 \pm 4.58$  year and mean value of BMI was  $22.32 \pm 1.98$  kg/m<sup>2</sup> with minimum value 16.79 kg/m<sup>2</sup> and maximum value 28.28 kg/m<sup>2</sup>, the number (%) incidence of jumper's knee in 1st, 2nd, 3rd, 4th, and 5th groups 8 (8.30%), 28 (30.10%), 34 (39.50%), 38 (43.20%), and 5 (6.30%), respectively, were positive (jumper's knee  $\leq 80$ ) and 88 (91.70%), 65 (69.9%), 52 (60.50%), 50 (56.80%), and 75 (93.80%), respectively, were negative (jumper's knee  $> 80$ ). while In female volleyball players, the mean value of age was  $17.21 \pm 3.73$  year, and mean value of BMI was  $21.68 \pm 1.89$  kg/m<sup>2</sup> with minimum value 15.58 kg/m<sup>2</sup> and maximum value 28.40 kg/m<sup>2</sup>. the number (%) incidence of jumper's knee in 1st, 2nd, 3rd, 4th, and 5th groups 3 (3.50%), 15 (17.90%), 14 (15.60%), 3 (3.90%), and 2 (2.40%), respectively, were positive (jumper's knee  $\leq 80$ ) and 83 (96.50%), 69 (82.10%), 76 (84.40%), 73 (96.10%), and 80 (97.60%), respectively, were negative (jumper's knee  $> 80$ ). The statistical analysis by Chi-square test revealed that there were significant differences in incidence of jumper's knee among groups of male volleyball players ( $P=0.0001$ ;  $P<0.05$ ) and female volleyball players ( $P=0.0001$ ;  $P<0.05$ ).

A study that agree with the current one is designed to determine the prevalence of PT and patellar tendon abnormality (PTA) in a population of male collegiate basketball players. It is a cross-sectional study. National Collegiate Athletic Association Divisions II and III, National Association of Intercollegiate Athletics, and Northwest Athletic Conference male collegiate basketball teams were assessed in a university laboratory setting. Ninety-five male collegiate basketball players (age =  $20.0 \pm 1.7$  years). A diagnostic ultrasound image of an athlete's patellar tendon was obtained from each knee. Patellar tendinopathy was identified based on a player's symptoms (pain with palpation) and the presence of a hypoechoic region on an ultrasonographic image. A majority of participants,

53 of 95 (55.8%), did not present with pain during palpation or ultrasonographic evidence of PTA. Thirty-two basketball players (33.7%) displayed ultrasonographic evidence of PTA in at least 1 knee; 20 of those athletes (21.1%) had PT (pain and tendon abnormality). Nonstarters were 3.5 times more likely to present with PTA (odds ratio = 3.5, 95% confidence interval = 1.3, 9.6;  $P = .017$ ) and 4 times more likely to present with PT (odds ratio = 4.0, 95% confidence interval = 1.1, 14.8;  $P = .038$ ) at the start of the season. One in 3 male collegiate basketball players presented with either PT or PTA. Sports medicine professionals should evaluate basketball athletes for PT and PTA as part of a preseason screening protocol (**Hutchison et al., 2019**).

Another study aimed to describe an isokinetic curve anomaly, a double-humped curve called "Camel's Back curve", consequence of a jumper's knee history. 170 Professional basketball players were enrolled ( $24.8 \pm 4.6$  years;  $91.8 \pm 12.0$  kg,  $194 \pm 9.0$  cm). All players performed isokinetic tests of the knee extensors on a concentric mode at the angular speed of 60°/s and 180°/s. 43 players had a jumper's knee history and 35 (81%) had a "Camel's Back curve" at 60°/s. The sensitivity and the specificity of this curve were 81.3% and 100%, respectively. The minimum torque of strength was decreased from 12 to 18% compared to the 2 maximal peaks. Yet, the strength measured every 5° of ROM was significantly different between the players with "Camel's Back curve" and those with normal curve. And finally, that study concluded that "Camel's Back curve" had never been described in that context. It may be secondary to a protective inhibitory mechanism which could alter jumping. The presence of a "Camel's Back curve" would enable clinicians to adapt physical preparation, knee rehabilitation, and trainings to improve players performances (**Dauty et al., 2019**).

Another study that came in agreement with the current study was conducted to investigate hip and foot/ankle impairments associated with patellar tendinopathy in volleyball and basketball athletes using classification and regression tree analysis. Initially, 311 athletes participated in the preseason screening. Of those, 41 were excluded due to the presence of Osgood-Schlatter disease, history of surgery, or steroid injection. Using the criteria described above, 59 athletes were included in the PT group (22 women and 37 men) and 133 in the non-PT group (25 women and 108 men). Participants with VISA-P score between 80 and 94 points ( $n=80$ ) were excluded from this study. So, the prevalence of jumper's knee in that study was 19% (**Mendonça et al., 2018**).

In another study that came in agreement with

the current one and conducted to estimate the prevalence of Anterior Knee Pain (AKP) in Marathon runners and to estimate age wise prevalence of Anterior Knee Pain (AKP). A total 100, male (n=48) and female (n=52) Marathon runners within the age group of 15-30 years old participated in this study, they were surveyed for Anterior Knee Pain & functional disability using Anterior Knee Pain Questionnaire (AKPS) called Kujala scale. After that a total score was calculated of each subject. A cut-off of 83 on the Kujala scale was chosen to identify those individuals with Anterior Knee Pain (AKP). 68% in the given population were positive for AKPQ and 32% were negative. 46% had painful walking for > 2 km. 29% had pain on running for > 2 km, 22% had severe pain & 14% were unable to run. And the least affected component were Atrophy of Thigh muscles & Flexion Deformity where 82% had no flexion deformity. In addition, injuries occurred with a higher frequency in age group of 23 to 25 years with (mean age=23 years old). finally the study concluded that there is 68% Prevalence of Anterior Knee Pain (AKP) in Marathon runners in the age group of 15 to 30 years (**Mistry et al., 2018**).

Another study was conducted to describe the prevalence and pain location of self-reported patellar tendinopathy and patellar tendon abnormality in a male elite basketball population. Cross-sectional design was used. Participants currently playing in the National Basketball League (the elite male basketball league in Australia) aged more than 17 years were included. Data were collected at the commencement of the competitive season. Ethics was approved by a university ethics committee and all players provided informed consent. An online questionnaire was used to collect demographic player data (date of birth, self-reported height [m] and body mass [kg]), self-reported current or previous patellar tendinopathy and years playing basketball (defined as “competitive with a referee”). Sixty male athletes from the Australian National Basketball League were included. Main outcome measures were Self-reported patellar tendinopathy (PT) using the Oslo Sports Trauma Research Centre Overuse Questionnaire (OSTRC). Pain location using pain mapping (dichotomised: focal/diffuse) and severity during the single leg decline squat. Ultrasound tissue characterisation scans of both patellar tendons. Results showed that thirteen participants (22.7%) self-reported PT. Only 3 who reported PT had localised inferior pole pain. Thirty athletes reported pain during the decline squat, 15 described focal pain; 10 diffuse pain (5 missing data). Those with diffuse pain had greater years played [Md  $\frac{1}{4}$  21 (13e24), n  $\frac{1}{4}$  10 than focal pain (Md  $\frac{1}{4}$  12 (7e26), n  $\frac{1}{4}$  15), p  $\frac{1}{4}$  0.042, r  $\frac{1}{4}$  0.3]. Bilateral tendon abnormality was

found in 45% of athletes and 15% had unilateral tendon abnormality. And upon these results, Elite male basketball athletes self-reporting PT had heterogeneity in pain location. When focal pain with loading was used as a primary definition of PT, ‘jumpers’ knee’ was not common in this cohort. This study found that abnormality of the patellar tendon was common and did not correlate with symptoms. (**Hannington et al., 2020**).

The prevalence of patellar tendinopathy has been reported to be as high as 50% in elite male volleyball (VB) players; however, the rate of injury in female collegiate VB athletes is unknown. One study was conducted to 1) identify the prevalence of ultrasonographic evidence of patellar tendon abnormality at the start of the preseason in female collegiate VB players; 2) report the incidence of tendinopathy during the season; and 3) determine if the preseason presence of tendon abnormality is associated with onset of disease. One hundred and six female collegiate VB players had both patellar tendons imaged. Incidence of patellar tendinopathy was tracked during the course of the 4-month season. Twenty-two athletes presented with ultrasonographic evidence of patellar tendon abnormality in at least one knee at the start of the preseason. The incidence of time-loss patellar tendinopathy was 0.26 (95% CI: 0.04, 0.85) per 1000 athletic exposures. This study was unable to determine if preseason presence of tendon abnormality was associated with a greater risk of tendinopathy due to power. The prevalence of tendon abnormality in the preseason and the incidence of patellar tendinopathy in female collegiate VB players are lower than that observed in other populations. (**Keefer et al.,2020**).

Another study was designed to investigate the prevalence of pre-patellar tendonitis among the university collegiate athletes. The study design was non-experimental and the study type was observational. 60 subjects were chosen based on their convenience. The study setting was SRM sports complex, SRM Institute of Science And Technology. Age group of 18-25 years, both males and females, severe anterior knee pain over patellar tendon, pain increased in sports activities eg. jumping are included in the study. Recent patellar fracture, previous surgical history are excluded in the study. The whole procedure is explained to the samples and written informed consent form was taken from the samples. VISA score (Victorian Institute Of Sports Assessment score) questionnaire is given to the samples to fill the questions according to the severity of pain they having. The result of the study is pre-patellar tendonitis presents in the athletes or players with lower the score of VISA-P score questionnaire and below the score of 60% (n=39) are symptomatic

in pre-patellar tendonitis. The prevalence of current symptoms was highest in volleyball (n=15), in athletics (n=9), in basketball (n=9), and in football (n=6). The percentage (%) of symptomatic is 65% (n=39) and asymptomatic is 35% (n=21). Thus it could be concluded that pre-patellar tendonitis overall symptomatic percentage is 65% (n=39). During the loading activity of volleyball, basketball, athletes and football players. Whether the more amount of load transmitted to the patellar tendon reduce the activity of playing performance, highly demand on speed in sports activity and decrease the functional activity (**Jeevanathan et al., 2019**).

Another study was conducted to collect epidemiological data on pain below patella in France hope Championship basketball. The authors conducted a sectional survey by questionnaire, a given day. They sent ten questionnaires to the attention of players and a questionnaire to the attention of the coaches of the 18 participating training centers at the Championship of France pro A hope. The survey took place between November and December 2015. Questionnaires were developed with the help of professionals and tested by 10 players and 1 coach of the regional championship before being sent. The rate of analysable questionnaires was 95% (170/180) for the players and 100% for the coaches. Forty-one percent of players have entrusted suffer pains below patella earlier at the time of the survey and 77% acknowledged having suffered at least once during their careers. Fifty-nine percent of them signalled us have been diagnosed patellar tendinopathy (PT). Among these players (diagnosed PT), only 20% asserted having known only an episode, 37% had suffered several times and 44% had a chronic impairment. Among the diagnosed players' PT, only 60.4% had stopped the practice of basketball and 82% had had physical therapy. When resumed, only 10% were asymptomatic. All coaches would be ready to dedicate of time to specific sessions to jumper-knee prevention. Seventy-eight percent admitted that the players were not the challenge of prevention of injuries for their future career. Ninety-four percent felt that it would be interesting to provide a tool for the prevention of jumper-knee. Finally, their findings highlight the extreme frequency of below patella pain in the basketball training centers, which for many are already in a cycle of recurrence and persistence. It appears necessary to implement approaches to prevention as coaches seem very favorable (**Caquot et al., 2016**).

Another study was designed to investigate the prevalence of hypoechoic areas by US and its' association with VISA-P scores among asymptomatic jumpers while highlighting sex comparisons. Study design was Cross-sectional study. And setting was at

Pre-participation exam at a National Collegiate Athletic Association (NCAA) division I college. Thirty-one college athletes who engage in jumping sports were included in that study. Main outcome measures were Hypoechoic images of patellar tendon captured by ultrasound examination were compared to a self-reported knee functional survey, the Victorian Institute of Sport Assessment for patellar tendinopathy (VISA-P) scale (0–100). With a total of 31 athletes (13 males and 18 females), prevalence rate of the hypoechoic areas of patellar tendon was 19.4% (6/31) in the right knee and 29.0% (9/31) in the left knee. There was no proportional difference in a comparison of prevalence rate of hypoechoic area [ (+) or (-)] by sex in either right or left knee. The VISA-P scores were significantly lower in US (+) than US (-) in the right knee ( $p = 0.003$ , Cohen's  $d = 1.675$ ), but not the left knee ( $p = 0.250$ , Cohen's  $d = 0.512$ ). The receiver operating characteristics curve analysis indicated the most sensitive and specific VISA-P values based on status [ (+) or (-)] of hypoechoic area was 89.5 with 86.4% and 77.7% of sensitivity and specificity. In short, hypoechoic areas were detected by US examination among self-reported asymptomatic jumpers. There was an association between hypoechoic areas and VISA-P scores in the right knee, but not in left knee. VISA-P scores may be used as a screening tool for the presence of hypoechoic areas and jumper's knee (**Fazekas et al., 2018**).

The prevalence of patellar tendinopathy is elevated in elite soccer compared to less explosive sports. While the burden of training hours and load is comparably high in youth elite players (age < 23 years), little is known about the prevalence of patellar tendinopathy at this age. There is only little data available on the influence of age, the amount of training, the position on the field, as well as muscular strength, range of motion, or sonographical findings in this age group. There was a recent study that was conducted to examine the above-mentioned parameters in all age groups of a German youth elite soccer academy. One hundred nineteen male youth soccer players (age  $15.97 \pm 2.24$  years, height  $174, 60 \pm 10, 16$  cm, BMI  $21, 24 \pm 2, 65$ ) of the U-13 to U-23 teams were part of the study. Data acquisition included sport specific parameters such as footwear, amount of training hours, leg dominance, history of tendon pathologies, and clinical examination for palpatory pain, indurations, muscular circumference, and range of motion. Subjective complaints were measured with the Victorian Institute of Sport Assessment Patellar (VISA-P) Score. Furthermore, sonographical examinations (Aplio SSA-770A/80; Toshiba, Tokyo, Japan) with 12-MHz multifrequency linear transducers (8–14 MHz) of both patellar

tendons were performed with special emphasis on hyper- and hypo echogenic areas, diameter and neovascularization. The prevalence of patellar tendinopathies was 13.4%. Seventy-five percent of the players complained of pain of their dominant leg with onset of pain at training in 87.5%. The injured players showed a medium amount of  $10.34 \pm 3.85$  training hours and a medium duration of symptoms of  $11.94 \pm 18.75$  weeks. Two thirds of players with patellar tendinopathy were at the age of 15–17 (Odds ratio 1.89) while no differences between players of the national or regional league were observed. In case of patellar tendinopathy, VISA-P was significantly lower in comparison to healthy players (mean  $\pm$  SD  $76.80 \pm 28.56$  points vs.  $95.85 \pm 10.37$ ). The clinical examination revealed local pain at the distal patella, pain at stretching, and thickening of the patellar tendon ( $p = 0.02$ ). The mean tendon diameter measured 2 cm distally to the patella was  $4.10 \pm 0.68$  mm with a significantly increased diameter of 0.15 mm in case of an underlying tendinopathy ( $p = 0.00$ ). The incidence of hypo-echogenic areas and neovascularizations was significantly elevated in players with patellar tendon syndrome (PTS) ( $p = 0.05$ ). The prevalence of patellar tendinopathy in youth elite soccer is relatively high in comparison to available data of adult players. Especially players at the age of 15 to 17 are at considerable risk. Tendon thickening, hypo-echogenic areas, and neovascularization are more common in tendons affected by PTS. **(Bode et al., 2017).**

#### Conclusion:

There were statistically significant differences in the prevalence of jumper's knee among different ages of volleyball players in Cairo, Egypt.

#### Funding:

Not funded.

#### Conflict of Interest:

Authors declare no potential conflicts of interest.

#### Acknowledgments

Authors would like to thank all females who participated in the current study.

#### References:

1. Pinskerova V, Johal P, Nakagawa S, et al. (2004): Does the femur rollback with flexion? *The J Bone Joint Surg Br*; 86: 925e31.
2. Christian R, Rossy W and Sherman O (2013). Patellar Tendinopathy - Recent Developments toward Treatment. *Bull Hosp Jt Dis*; 72(3):217-24.
3. Visentini P.J., Khan K.M., Cook J.L., Kiss Z.S., Harcourt P.R., Wark J.D. (1998). The VISA score: an index of severity of symptoms in patients with jumper's knee (patellar tendinosis) *J Sci Med Sport*, 1, pp. 22-28.
4. Scott A., Docking S., Vicenzino B., Alfredson H., Murphy R.J., Carr A.J. et al. (2013). Sports and exercise-related tendinopathies: a review of selected topical issues by participants of the second International Scientific Tendinopathy Symposium (ISTS) Vancouver 2012 *Br J Sports Med*, 47, pp. 536-544.
5. Ferretti A, Conteduca F, Camerucci E, et al. (2002): Patellar tendinosis: a follow-up study of surgical treatment. *J Bone Joint Surg Am*;84-A:2179-85.
6. Rudavsky A., Cook J. (2014). Physiotherapy management of patellar tendinopathy (jumper's knee) *J Physiother*, 60, pp. 122-129.
7. Durcan L, Coole A, McCarthy E, Johnston C, Webb MJ, O'Shea FD, Gissane C, Wilson F. (2014): The prevalence of patellar tendinopathy in elite academy rugby: a clinical and imaging study. *J Sci Med Sport*. Mar;17(2):173-6.
8. Lian O.B., L. Engebretsen, Bahr R. (2005). Prevalence of jumper's knee among elite athletes from different sports: a cross-sectional study *Am J Sports Med*, 33, pp. 561-567.
9. Haslam D and Wittert G (2009). *Fast Facts: Obesity*. 1 ed. Health press.
10. Albers IS, Zwerver J, Diercks RL, Dekker JH, Van den Akker-Scheek I (2016). Incidence and prevalence of lower extremity tendinopathy in a Dutch general practice population: a cross sectional study. *BMC musculoskeletal disorders*. Dec 1;17(1):16.
11. Santana JA, Sherman AI (2019). Jumpers Knee. In: *StatPearls*. StatPearls Publishing, Treasure Island (FL).
12. Hutchison MK, Houck J, Cuddeford T, Dorociak R, Brumitt J. (2019) Prevalence of patellar tendinopathy and patellar tendon abnormality in male collegiate basketball players: A cross-sectional study. *Journal of athletic training*. Sep 1;54(9):953-8.
13. Dauty M, Menu P, Garraud T, Mesland O, Berlivet T, Metayer B, Fouasson-Chailloux A. (2019) Jumper's knee mechanical consequences in professional basketball players: the "Camel's Back curve". *European journal of applied physiology*. Mar 6; 119(3):735-42.
14. Mendonça LD, Ocarino JM, Bittencourt NF, Macedo LG, Fonseca ST. (2018) Association of hip and Foot Factors with Patellar Tendinopathy (Jumper's knee) in athletes. *journal of*

- orthopaedic & sports physical therapy. Sep;48(9):676-84.
15. Mistry S D, Chilgar L, Kumar A. (2018): Prevalence of Anterior Knee Pain in Marathon Runners. Website: [www.ijpot.com](http://www.ijpot.com). 2018 Jan;12(1):82.
  16. Hannington M, Docking S, Cook J, Edwards S, Rio E. (2020) Self-reported jumpers' knee is common in elite basketball athletes—But is it all patellar tendinopathy?. *Physical Therapy in Sport*. May 1;43:58-64.
  17. Keefer Hutchison M, Patterson C, Cuddeford T, Dudley R, Sorenson E, Brumitt J. (2020): Low prevalence of patellar tendon abnormality and low incidence of patellar tendinopathy in female collegiate volleyball players. *Research in Sports Medicine*. Apr 2;28(2):155-67.
  18. Jeevanathan K, Swetha G. and Malarvizhi D. (2019). The Prevalence of pre-Patellar Tendonitis Among University Collegiate ATHLETES. *March IJSDR | Volume 4, Issue 3*.
  19. Caquot J, Perrochon A, Bugeaud JL, Dumélié X, Pajon M, Daviet JC. (2016) Prevalence of pain below patella in the basketball players of the championship of France hope pro A. *Annals of physical and rehabilitation medicine*. Sep 1;59:e15-6.
  20. Fazekas ML, Sugimoto D, Cianci A, Minor JL, Corrado GD, d'Hemecourt PA. (2018) Ultrasound examination and patellar tendinopathy scores in asymptomatic college jumpers. *The Physician and Sportsmedicine*. Oct 2;46(4):477-84.
  21. Bode G, Hammer T, Karvouniaris N, Feucht MJ, Konstantinidis L, Südkamp NP, Hirschmüller A (2017). Patellar tendinopathy in young elite soccer—clinical and sonographical analysis of a German elite soccer academy. *BMC Musculoskeletal Disorders*. Dec 1;18(1):344.
  22. Mendonça LD, Ocarino JM, Bittencourt NF, Macedo LG, Fonseca ST. (2018) Association of hip and Foot Factors with Patellar Tendinopathy (Jumper's knee) in athletes. *journal of orthopaedic & sports physical therapy*. Sep;48(9):676-84.

2/2/2021