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Prevalence of Anterior Knee Pain in University Runners

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ABSTRACT: *This study aimed to describe the prevalence of anterior knee pain among university runners. This cross-sectional study utilized a qualitative with descriptive design study. Fifty-seven subjects were divided into two groups; i) active runners who participated in the competition in current years, and ii) recreational runners running 15-20 km/week. The participants answered a self-questionnaire online consisting of an anterior knee pain scale (AKPS), numeric pain rating scale (NPRS), and lower extremity functional scale (LEFS). AKPS results showed that recreational runners more likely to get anterior knee pain with ≤ 83, while NRPS results showed that the active runner experience a low pain scale with 50%. However, LEFS has similar results for both groups, with high activity functions and no limitations. In conclusion, running does not affect the anterior knee pain towards runners. The running intensity is suggested to increase gradually to allow body adaptation towards repetitive movement and prevent injury to the lower limb.*

Keywords: *anterior knee pain, lower extremity functional scale, numeric pain rating scale, runners*

I. INTRODUCTION

Runners experience constant and repetitive collisions with the ground, while there are multiple theories as to why some runners experience overuse injuries. There is a high incidence of lower extremity injuries among runners, with estimates reaching as high as 79%, with the knee being the most commonly affected site (van Gent et al., 2007). Short-distance runners (<15 km) have an incidence ranging from 14.3-44.7%, while long-distance runners (half-marathons or marathons) seem to have more injuries (16.7–79.3%) (Poppel et al., 2021).

Anterior knee pain (AKP), also known as patella femoral pain (PFP), is triggered by running, squatting, going up and down, cycling and jumping. AKP is more common in females, and the incidence in the general population is as high as 25% in adolescents and young adults and even higher among athletes (Witvrouw et al., 2000). Overuse injuries are frequent in recreational runners, with a reported annual prevalence of up to 70% (Hreljac et al., 2000). Among the most common running injuries is AKP, which may affect 10-40% of the general population aged 18-45 and older active adults (Brantingham et al., 2009). AKP is a common musculoskeletal disorder, with a prevalence as high as 22.7% (Smith et al., 2018). AKP is an often-persistent knee disorder aggravated by tasks that load the patellofemoral joint (PFJ), including sporting tasks such as running and loading.

Ferreira et al. (2018) state that adolescent athletes have higher pain and function limitations than physically active non-athletes. These findings indicate that being engaged in professional sports practice may be related to high pain levels and poor function in adolescents with AKP and presented poorer functional status than physically active non-athletes. Approximately half of the recreational distance runners will experience a running-related injury (RRI) in any given year. Lack of running experience was the most critical risk factor for RRI, possibly due to differences in mechanics due to lower training history and lack of technical

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skill (Napier et al., 2018). Furthermore, increasing the training gradually may help prevent injury with quality training skills.

Adolescents diagnosed with AKP continue to report pain and symptoms over the years. AKP in adolescence is known to reduce participation in sports and general physical activities (Stathopulu & Baildam, 2003). Myer et al. (2010) reported that the prevalence of AKP in adolescent athletes at the beginning of the season was 16.3 per 100 athletes and increased to 22.0 per 100 athletes during the competitive season. 25% of recreational athletes diagnosed with AKP will stop participating in sports because of knee pain which frequently affects running and jumping athletes (de Oliviera Silva et al., 2015). Although recreational physical activities also can stress the PFJ, the prevalence of overtraining in professional athletes is between 20-60% (Peluso & Guerra de Andrade, 2005). These facts may reflect training routines with high loads and intense training rhythm (high mechanical demand) that lead to increased PFJ stress, recognized as a significant problem of AKP (Ferrari et al., 2018). This study aimed to describe the prevalence of anterior knee pain among university runners.

II. Methodology

This cross-sectional study involved fifty-seven participants from Universiti Pendidikan Sultan Idris (UPSI) runners as showed in Figure 1. These runners were aged between 19 to 50 years with no history of knee surgery or traumatic or degenerative knee conditions. All participants volunteered to answer the questionnaire through an online platform. The participants were divided into two groups; i) active runners (n=38), and ii) recreational runners (n=19).

The runner athlete actively participates in the competition and regularly practices for at least six months in any category. The recreational runner has retired from training but still running 15-20 km/week and participating in any category.

Self-administered questionnaires collect demographic profiles and behavioral factors such as training sessions, competition involvement, and past injury. Then, the questionnaire Anterior Knee Pain Scale (AKPS), Numeric Pain Rating Scale (NPRS), and the Lower Extremity Functional Scale (LEFS) among the UPSI runner.

AKPS questionnaire consisted of 13 short questions about the participant's knee symptoms and functional limitations associated with AKP. The tool has a maximum score of 100, which rate all participant's AKP symptoms. The pain intensity questionnaire uses the Numeric Pain Rating Scale (NPRS), which requires participants to make three pain ratings corresponding to current, best and worst pain experienced over the past 24 hours on a scale of 0 (no pain) to 10 (worst pain imaginable).

The LEFS measures lower extremity function in various disorders and treatments. The LEFS (80-point scale) score consists of 20 questions subdivided into four groups. These groups consist of activities with increasing physical demands. Questions on activity vary from walking between rooms to running on uneven ground. The minimal clinically significant difference is nine scale points. The statistics were analyzed using IBM Statistical Package for Social Sciences (SPSS) version 26.0 using descriptive and inferential statistical analysis.

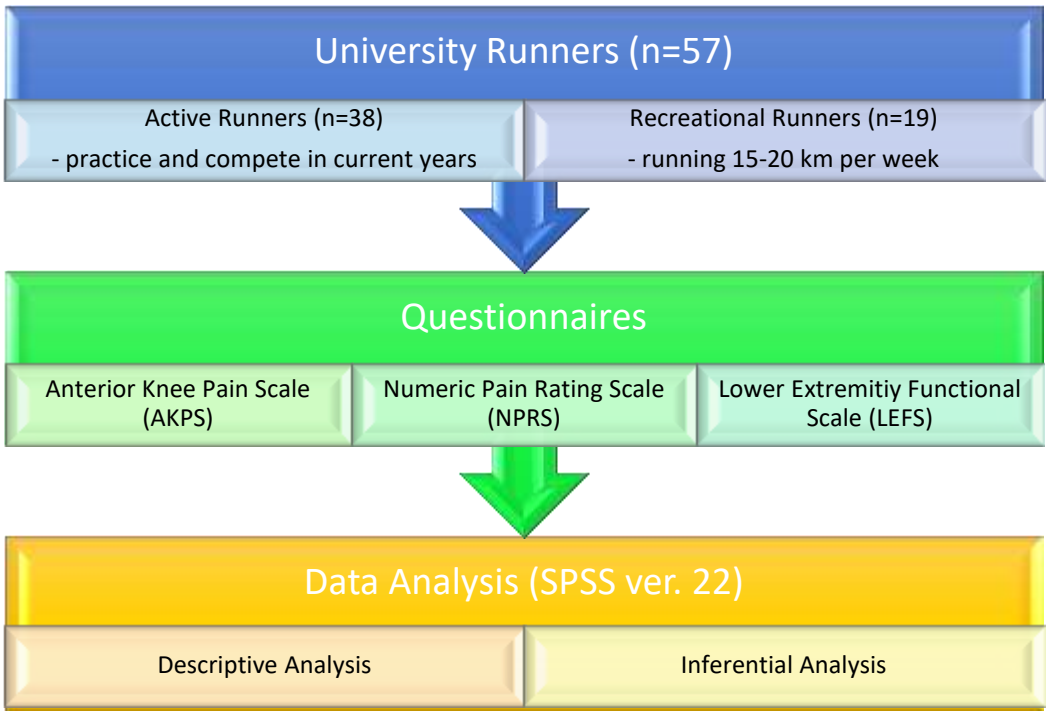

Figure 1: Flowchart of the research design

III. Results and Discussion

Table 1 demonstrated data in frequency and percentage by gender, age, and running categories for both runners type; active and recreational. Most of the active runners were male (65.8%) with ages of 20-24 years old (60.5%) and participated in both running categories (36.8%). On the other hand, most of the recreational runners were female (52.6%) with ages of 20-24 years (100%) and participated in both running categories (52.6%).

Table 1: Demographic data of active and recreational university runners

	ACTIVE		RECREATIONAL	
	n	%	n	%
Gender				
Male	25	65.8	9	47.4
Female	13	34.2	10	52.6
Age (years)				
15-19	3	7.9		
20-24	23	60.5	19	100
25-29	4	10.5		
30-34	1	2.6		
35-39	3	7.9		
40-44	2	5.3		
45-50	2	5.3		
Running Categories				
Short Distance	13	34.2	8	42.1
Long Distance	11	28.9	1	5.3
Both	14	36.8	10	52.6

Table 2 shows the participants' running frequency, duration, competition, and past injury. Most active runners trained 5-6 days/week (26.3%) with 1 hour (31.6%). They competed in a year (39.5%) and experienced injury (63.2%). On the other hand, the recreational runner trained 2-3 days/week (42.1%) for about 30 minutes (31.6%). They were involved in a one-time competition (36.8%) and experienced injury (84.2%).

Table 2: Frequency, duration, competition, and previous injury in university runners

	ACTIVE		RECREATIONAL	
	n	%	n	%
Frequency (days/week)				
1-2	4	10.5	4	21.1
2-3	7	18.4	8	42.1
3-4	7	18.4	1	5.3
4-5	7	18.4	3	15.8
5-6	10	26.3	0	0.0
6-7	3	7.9	3	15.8
Duration (hours)				
0.5	8	21.1	6	31.6
1.0	12	31.6	5	26.3
1.5	10	26.3	2	10.5
2.0	7	18.4	6	31.6
3.0	1	2.6	0	0.0
Competition				
1	9	23.7	7	36.8
2	1	2.6	1	5.3
3	4	10.5	1	5.3
in month	9	23.7	6	31.6
in year	15	39.5	4	21.1
Previous Injury				
yes	24	63.2	16	84.2
no	12	31.6	3	15.8
maybe	1	2.6	0	0.0
never	1	2.6	0	0.0

Figure 2: Total score of anterior knee pain scale in university runners

Figure 2 shows that active runners had the highest excellent score (50.0%), which demonstrated a low tendency in anterior knee pain, while recreational runners mainly in a good and fair score (36.8%). The lowest for both groups fall under poor scores with the active runner (2.6%) and recreational runner (10.5%). Anterior knee pain was present in 40% of participants with a ≤ 83 score according to the standardized Total Score of Anterior Knee Pain Scale (AKPS) questionnaire (Kunene et al., 2019). Anterior knee pain was strongly associated with age and running experience, where most affected participants had the running experience of 3–5 years. In this study, recreational runners with running experience of 3-5 years have a maximum percentage (36.8%) of good and fair scores in the AKPS questionnaire. On the other hand, active runner maximum percentage (50%) in the excellent score. The athletes with AKPS scored lower in the Symptoms, Pain, Quality of Life, Sport/Rec dimensions of the KOOS than non-athletes (Ferreira et al., 2018). The lower levels of function and higher pain intensity would be related to decreased factors associated with physical function and pain in patients (Piya et al., 2009). This study shows the result of AKPS was low in active running may be due to training duration and session.

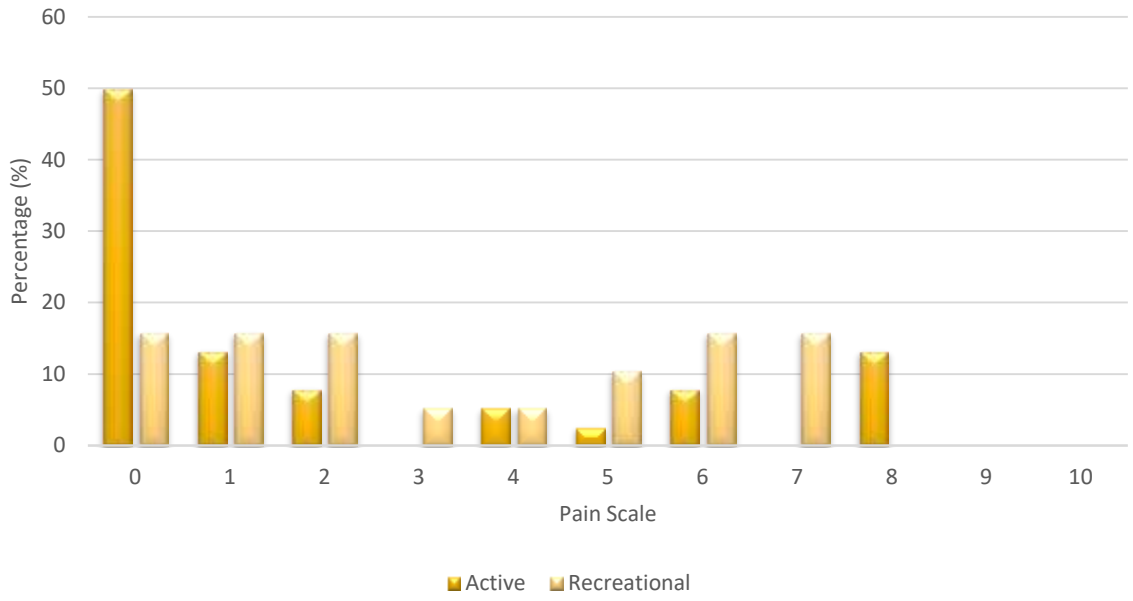

Figure 3: Numeric pain rating scale in university runners

Figure 3 shows that the maximum percentage of the active runner is 0 pain scale with 50.0%, and the minimum percentage on the 5 pain scale with 2.6%. The recreational runners demonstrated a maximum percentage is equal (15.8%) on the several pain scale (0, 1, 2, 6, and 7), and the minimum percentage is also equal (5.3%) on the pain scale 3 and 4. No participant answered they have a 9-10 pain of Numeric Pain Rating Scale (NPRS) score on the knee. The Numeric Pain Rating Scale (NPRS) questionnaire for pain in the knee is valid and reliable (Ferreira-Valente et al., 2011). NPRS is slightly more sensitive than the other measures, and the finding is consistent with some other studies that have compared the NPRS to other pain measures and supported their cross-cultural reliability.

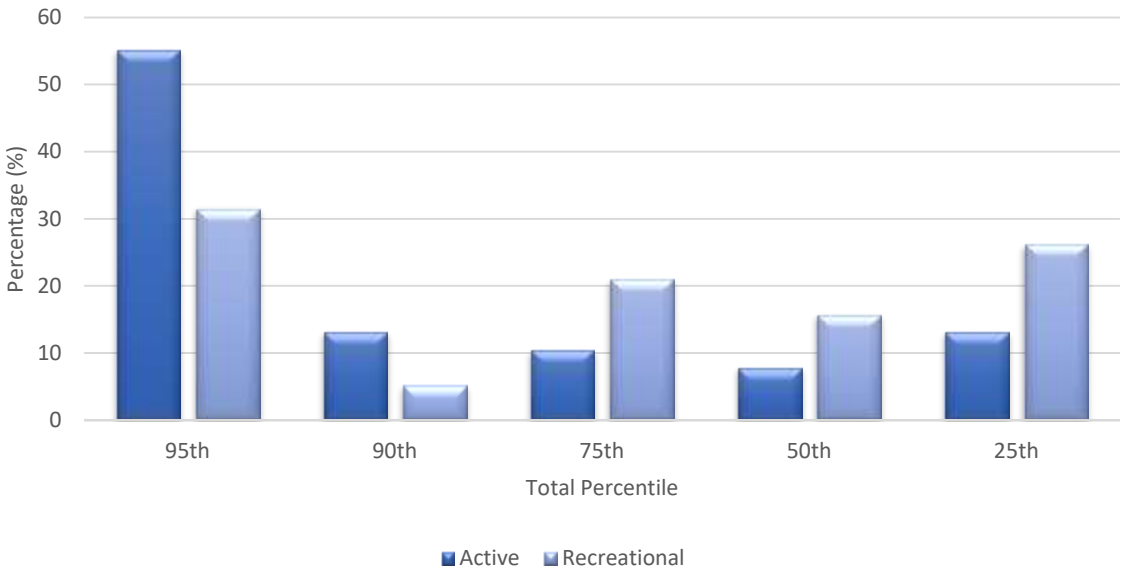

Figure 4: Lower extremity functional scale in university runners

Figure 4 shows that the active runner has a maximum percentage of a high function of 95th percentile with 55.3%, while the minimum percentage in the score of 50th percentile low function is 7.9%. The recreational runners demonstrate the maximum percentage of 31.6% in the high function 95th percentile, while the minimum percentage is 5.3% in the high function 90th percentile. This result shows that active and recreational runners have high activity functions and no limitations. The Lower Extremity Functional Scale (LEFS) questionnaire is reliable and determines the measurement of pain and disability during the following activities: walking, running, ascending and descending stairs, kneeling, squatting, jumping, and prolonged sitting (Binkley et al., 1999). LEFS was reliable, valid, and responsive for use in lower extremity musculoskeletal dysfunction patients. The AKPS, LEFS, and VAS were used to assess pain and function after intervention with a baseline kinematic and electromyography (Dos Santos et al., 2019). They found that the forefoot landing, increased step rate by 10%, and forward trunk lean running techniques could reduce AKP symptoms.

IV. CONCLUSION

This study showed a high prevalence of anterior knee pain among recreational runners and a low knee pain intensity among active runners. Both groups have high functional activity with no limitation. Running is not bad for the knees, and it is probably good if it increases in intensity gradually. The non-runners have higher rates of osteoarthritis than people who are recreational runners. In both cases, problems occur when people do not give their bodies enough time to strengthen and adapt to the repetitive movement. Muscle strength of the lower limb is essential in preventing imbalance and leads to anterior knee pain among runners.

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