Knowledge and Associated Risk Factors of Knee Osteoarthritis among School Teachers at Assiut City

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Abstract

Background and aim: Knee osteoarthritis considered as a foremost cause of disability globally, with a substantial societal impact and an increasing financial burden on healthcare systems. School teachers estimated as one of the professions with a high frequency of occupational musculoskeletal illnesses. The study aimed to assess knowledge and associated risk factors of knee osteoarthritis among school teachers. **Subjects and Method:** Descriptive cross-sectional design. **Setting:** Nine schools representing 10% of the total Assiut City schools which selected randomly. **Sample:** Total of 749 teachers. **Study tools:** Two tools were used; **Tool (I):** Five parts; personal data, chronic diseases, data of knee pain, risk factors of knee osteoarthritis and school teachers knowledge. **Tool (II):** Knee Injury and Osteoarthritis Outcome Score scale. **Results:** It found that 42.6% aged 40 -< 50, 56.9% female and 80.2% were overweight and obese, 51.3% of teachers suffering from knee pain and 70.2% had poor knowledge which affected by age, educational level, residence and years of experience. As well as, pain and symptoms subscales of Knee Injury and Osteoarthritis Outcome were significantly linked with age, sex and body mass index. **Conclusion and recommendations:** There were deficient of knowledge about knee osteoarthritis. Furthermore, the most significant risk factors were age, female sex, urban residence, body mass index more than or equal 25 (kg/m^2), married status, presence of chronic diseases, education and family history. It was recommended that health education program about knee osteoarthritis should be provided for school teachers.

Keywords: Associated risk factors, Knee osteoarthritis, Knowledge, School teachers,

Introduction:

Osteoarthritis (OA) is the most common type of arthritis, which affects 240 million of population worldwide and is a chronic disease in nature. Currently, it is more prevalent than it used to be, and it is predicted that this tendency will continue as life expectancy and the prevalence of obesity increase [1 & 2].

Knee osteoarthritis or "cartilage wear down" is recognized as the common form of lower extremity OA. As osteoarthritis worsens, the cartilage, bone, and surrounding soft tissues (ligaments, capsules, tendons, and muscles) are worn down. Eventually, this leads to knee deformity, laxity, or ligament instability. Knee osteoarthritis is the primary cause of infirmity and health loss. The healthcare efforts for patients with long-term conditions like knee osteoarthritis are needed for self-manage activation [3&4].

Knee osteoarthritis caused by well-known risk factors as family history, age, female gender, Body Mass Index (BMI), faulty behaviors (carrying heavy loads repeatedly, cross-legged sitting or sitting in kneeling position) and obesity which increases the chance of knee osteoarthritis by more than three times and accelerates the disease progression [4, 3 & 5].

Signs and symptoms involve "pain after moving joints to smallest angle, tenderness and joint stiffness become worst when the patient wakes up in the morning or after some resting, inability to move joints to its full range, hearing or feeling a grinding sensation after joint movement and bone spurs" [6]. The diagnosis of knee OA involves physical examination and radiological interventions. It is a clinical disease containing individual symptoms of joint pain on loading and bony swelling, objective physical examination of knee stiffness and deformity or crepitations, along with supplementary radiographic findings. Osteoarthritis treatment by non-invasive intervention is a fast increasing research field with a common goal of finding equally the best symptomatic and a disease-modifying treatment that would slow down or discontinue advance progress of OA [7, 8 & 9].

Most of the occupations are susceptible to work-related musculoskeletal pain such as knee osteoarthritis due to job conditions, among of them; schools' teachers are stands out. Teachers' work involves an extensive variety of duties and tasks that may be performed in unpleasant working conditions, mainly in unindustrialized countries. These may involve or lead to persistent standing and awkward posture. Hence, these factors have been strongly connected with the teaching profession's development of "Work Musculoskeletal Disorders" (MSD) [10]. The uppermost prevalence of MSD among fixed teachers was in Egypt, (76%), Thailand (73.7%), Brazil (73.5%) and Malaysia (72.9%) [11].

Community health nurses should provide array of health care efforts for knee osteoarthritis sufferers regarding medication, exercise, physical activity, health education, healthy food containing calcium and vitamin D, controlling of weight gain and self-management support to control their disease and pain [6].

Significance of the study:

Osteoarthritis is "the ninth leading cause of disability burden, measured in Years of Life lost due to Disability (YLD), in men (3.9%) and the third among women (5.75%)". In a study carried out by **Fahmy et al, 2022** [12] in Cairo, Egypt the estimated prevalence of knee pain among school teachers was 50.6%. Knee osteoarthritis is a main cause of malfunction and has a great impact on people's lives, including mobility, independence and daily activities leading to limited recreational, sports and occupational activities [4]. Teachers formed a very vital portion of the community and guaranteeing their occupational safety is significant to ensure their continuous productivity [13].

Knee osteoarthritis knowledge has impact on people's support seeking, physical activity levels, social and leisure contribution, emotional well-being, and choice of treatment decisions. Lack of knee OA knowledge about associated risk factors and its management options reduces adherence to treatment and consequently affects symptoms, function and increases healthcare costs [14 & 5(. It is important to understand the existing knowledge and risk factors of knee osteoarthritis among school teachers which will provide important clause to develop strategies for controlling the incidence of knee osteoarthritis [15, 16 & 17(. So, the present study was conducted.

Aim of study:

The present study aimed to assess knowledge and associated risk factors of knee osteoarthritis among school teachers in Assiut City.

Research questions:

1- What is the level of school teachers knowledge regarding knee osteoarthritis?
2- What are the associated risk factors of knee osteoarthritis among school teachers?

Subjects and method:

Design:

Descriptive cross-sectional research design.

Setting: Total number of governmental schools in Assiut City is estimated to be 86 schools; number of primary schools is thirty-seven (22 in West and 15 in East city), preparatory schools twenty-seven (16 in West and 11 in East city) and secondary schools twenty-two (9 in West and 13 in East). The current study performed in nine schools (4 primary, 3 preparatory and 2 secondary) schools which representing 10% of the total school and selected by stratified random sample.

Subjects:

The study population comprised of regular school teachers who worked in the selected previous nine schools. According to Directorate of Education in Assiut, 2022 the total number of teachers was 786 teachers in the selected previous nine schools. Total coverage for all teachers was used in this study; 37 teachers were dropout/ refuse. So, the current sample size included 749 school teachers.

Data collection tools:

After revising literature about knowledge and associated risk factors of OA. A self-administered questionnaire involving two tools in Arabic language developed by the researchers: **Tool (I):** Divided into five parts as the following: **Part (1):**

Personal data; age, sex, educational level, marital status, residence, years of experience and BMI which calculated after measuring weight and height, then divided weight in kg by square height in meter (kg/m2). **Part (2):** Presence of chronic diseases such as Hypertension, Diabetes Mellitus, kidney diseases, liver diseases and cancer. **Part (3):** Questions regarding knee pain and complains included presence of knee pain, duration of compliant (years), receiving of medications, knee exercise and physical therapy. **Part (4):** Included the associated risk factors among the participants such as BMI (overweigh and obese), age, female sex, standing > 2h/day, family history, climbing of stairs, walking, heavy lifting and previous joint injury or disease which studied by previous researches such as **Akhter and Khanum, 2021 [34] and Aftab et al., 2015 [35]**

Part (5): School teachers knowledge included (15) questions about knee osteoarthritis as; definition of osteoarthritis, signs and symptoms of osteoarthritis, risk factors, causes, diagnosis, most affected joints, and management of knee osteoarthritis **Alyami et al, 2020 [18] and Alqarni et al., 2022[5(**.

-Scoring system for knowledge (Total of 25 grades): Each correct answer took one grade and wrong answer or didn't know took zero grades. Knowledge total score was categorized as follow: less than 50% was graded as poor, 50% to less than 75% was graded as fair and greater than or equal 75% of total scores were graded as good **Alyami et al, 2020 [18] and Mukharrib et al, 2018 [19]**.

Tool Reliability:

The value of Cronbach's alpha reliability test was 0.709.

Tool (II): Knee Injury and Osteoarthritis Outcome (KOOS) Score: It developed by **Roos et al, 1998 [20]** and covers five measurements scored distinctly: "Pain (nine items); symptoms (seven items); activities of daily life function (17 items); sport and recreation function (five items) and knee-related quality of life (four items)". All items were scored from 0 to 4 and each of the five scores calculated as the sum of the items involved. Scores were then converted to a 0-100 scale, with zero express extreme knee problems and 100 for no knee problems, as common in orthopaedic scales. Scores between 0 and 100 represent the percentage of total possible score achieved. A total score was not calculated since it was better to investigate and explain the five dimensions separately.

Transformed scale=

$$100 - \frac{\text{Actual raw score} \times 100}{\text{Possible raw score range}}$$

For example: Pain raw score of 16 would be transformed as following:

$$100 - \frac{(16 \times 100)}{36} = 66$$

-Test-Retest Reliability: In the original scale 0.85 for pain, 0.93 for symptoms, 0.75 for activities of daily living, 0.81 for sport and recreation function, and 0.86 for knee-related quality of life. The value of Cronbach's alpha reliability test in the current study was 0.870 for pain, 0.873 for symptoms, 0.891 for activities of

daily living, 0.8410 for sport and recreation and 0.860 for knee-related quality of life.

-Tools validity: The translated Arabic tools were tested and reviewed by three professors of Community Health Nursing, faculty of nursing, Assiut University who revised for simplicity, significance, inclusiveness and applicability. Improvements were done according to the modifications needed.

-Method: The current research proceeded according to the following phases:

1. Administrative phase:

An official letter approval was obtained from the Dean of the Faculty of Nursing, Assiut University to the Directorate of Education in Assiut City; this letter included a permission to carry out the study and explained its aim and nature in the selected schools.

-Pilot study:

A pilot study conducted with 10% (79) school teachers to test the data collection tools in terms of clarity and comprehensibility. The pilot study results showed that there was no need for modifications. Therefore, these school teachers were included in the study.

2. Data collection phase:

- Ethical considerations:

Research proposal was accepted from the Ethical Committee in Faculty of Nursing, Assiut University. There was no risk for the study subjects during the application of the research. The study followed common ethical principles in research. Oral consent was acquired from teachers who were eager to participate in the study after explaining the nature and purpose. Confidentiality and anonymity were assured. Study subjects had the right to reject to participate or withdraw from the study without any rational at any time and study subject's privacy was considered during collection of data.

Field work:

Data collected from first of October to the end of November 2022. The researchers introduced themselves, explained the purpose of the study and the main parts of the questionnaire for school teachers. Then informed oral consent was obtained from each teacher to participate in the study with taken in consideration the interviewed teacher available work time to obtain the necessary information. Around 30-35 sheets were collected/ day through three days/ week. The average time taken for completing each questionnaire around 25-30 minutes depending on the teacher's responses. During interviewing the teachers; the researchers distributed the questionnaire and when the form delivered weight and height was taken by the researchers and assured that all questions were answered completely.

-Statistical analysis:

Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as number, percentage, mean and standard deviation. Chi-square test was used to compare between qualitative variables. Independent samples t-test was used to compare quantitative variables between two groups and ANOVA test was used for more than two groups. Multiple logistic regression analysis was done to measure the risk factors. P-value considered statistically significant when $P < 0.05$.

Results:

Table (1): Illustrates that 42.6% of teachers aged from 40 -<50 with Mean ± SD (44.56 ± 7.95), 56.9% female, 87.3% married, and 56.6% from rural areas. Also, the table clears that 39.9% of teachers had ≥ 20 years of experience with Mean ± SD (18.07 ± 7.74), 51.9% done moderate intensity activities, 47.0% and 33.2% were overweight and obese.

Figure (1): Represents that 61.5% of teachers hadn't chronic diseases, 25.2% had hypertension followed by DM 13.2% and only 3.1% had kidney diseases.

Table (2): Clears that, 51.3% of teachers suffering from knee pain, 36.2% had from 3–6 years duration of complaint, 78.1% receiving medication, 51.6% and 43.8% made knee exercise and physical therapy.

Figure (2): Declares that 80.2% overweight and obese as a risk factor of knee osteoarthritis followed by 71.3% of them aged 40 years and more, 56.9% female, 45.1% standing>2 hours/day and 42.6% had family history then 29.4% climbing total of ≥ 5 flights of stairs/ day and 25.4% walking> 3 km /day while only 1.3% hadn't any risk factors for knee osteoarthritis.

Table (3): Shows the mean scores of five different Knee Injury and Osteoarthritis Outcome subscales among school teachers; the teachers experienced problems with knee-related QOL score 63.78 ± 24.03, sports/ recreational score 65.07 ± 24.61, pain score 66.59 ± 19.92, as it moved to the zero edge of the score which revealed the presence of problem then symptoms score 71.18 ± 19.60 and activity of daily living score 72.58 ± 17.86.

Figure (3): Demonstrates that 70.2% of teachers had poor knowledge, 21.4% had fair knowledge and only 8.4% of them had good level of knowledge regarding knee osteoarthritis.

Table (4): Presents that there was statistically significant relation between knowledge level and school teachers personal data related to age (P value=0.014*), educational level (P value=0.008*), residence and years of experience (P value=0.000*). While there wasn't statistically significant relation regarding sex, marital status and BMI (P value= 0.386, 0.267 and 0.591).

Table (5): Refers that there was statistically significant relation between KOOS subscales pain, symptoms, activity of daily living score, sports/ recreation scores and teachers' age (P value=0.040, 0.013, 0.001&0.007) and sex (P value=0.003, 0.000, 0.000& 0.000). In addition, there was statistically significant relation with pain score and teachers' educational level and BMI (P-value= 0.046& 0.000). Also, symptoms and activity of daily living scores was statistically significant affected by teachers' BMI (P-value=0.000). Likewise, there was statistically significant effect with sports/ recreation and Knee-related QOL scores with educational level (P-value=0.008 &0.009), marital status (P-value=0.022&0.000), residence (P-value=0.000). On the other hand, there wasn't statistically significant relation between five KOOS subscales and teachers' years of experience.

Table (6): Clarifies that there was statistically significant relation between prevalence of knee pain and school teachers personal data related to age, sex, BMI, marital status, chronic diseases, years of experience, educational level and family history of knee osteoarthritis (P-value= 0.000, 0.045, 0.000, 0.000, 0.000, 0.013, 0.050 &0.000).

Table (7): Proves that age, sex, BMI, marital status, chronic diseases, educational level and family history were significant differences influencing the respondents' knee osteoarthritis.

Table (1): Personal data of school teachers at Assiut City

Personal data	No. (749)	%
Age: (years)		
< 40	215	28.7
40 - < 50	319	42.6
≥ 50	215	28.7
Mean ± SD (Range)	44.56 ± 7.95 (22.0-59.0)	
Sex:		
Male	323	43.1
Female	426	56.9
Educational level:		
University	682	91.1
MD/ PHD	67	8.9
Marital status:		
Single	54	7.2
Married	654	87.3
Divorced	20	2.7
Widow	21	2.8
Residence:		
Rural	424	56.6
Urban	325	43.4
Years of experience:		
< 15	262	35.0
15 - < 20	188	25.1
≥ 20	299	39.9
Mean ± SD (Range)	18.07 ± 7.74 (1.0-38.0)	
Type of activity that your job required:		
Sedentary	116	15.5
Low intensity activities	63	8.4
Moderate intensity activities	389	51.9
High intensity activities	181	24.2
BMI:		
Normal	148	19.8
Overweight	352	47.0
Obese	249	33.2
Mean ± SD (Range)	28.43 ± 3.90 (18.8-43.0)	

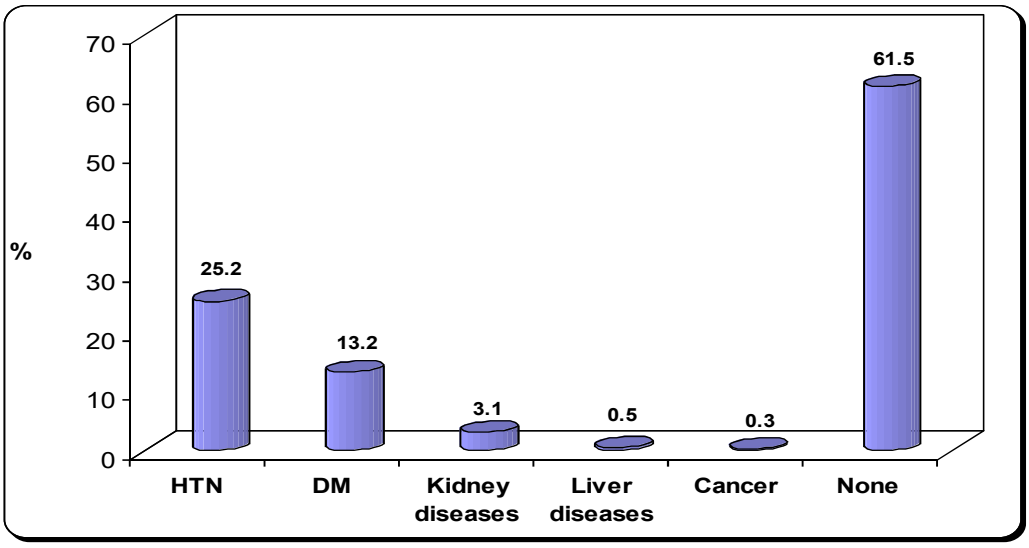

Figure (1): Distribution of chronic diseases among school teachers at Assiut City (n=749).

Table (2): Knee pain prevalence among school teachers at Assiut City

Items	No. (749)	%
Suffering from knee pain:		
Yes	384	51.3
No	365	48.7
Duration of complaint: (years)		
< 3	125	32.6
3 – 6	139	36.2
> 6	120	31.3
Taking medications:		
Yes	300	78.1
No	84	21.9
Practicing of knee exercise:		
Yes	198	51.6
No	186	48.4
Performing of physical therapy:		
Yes	168	43.8
No	216	56.3

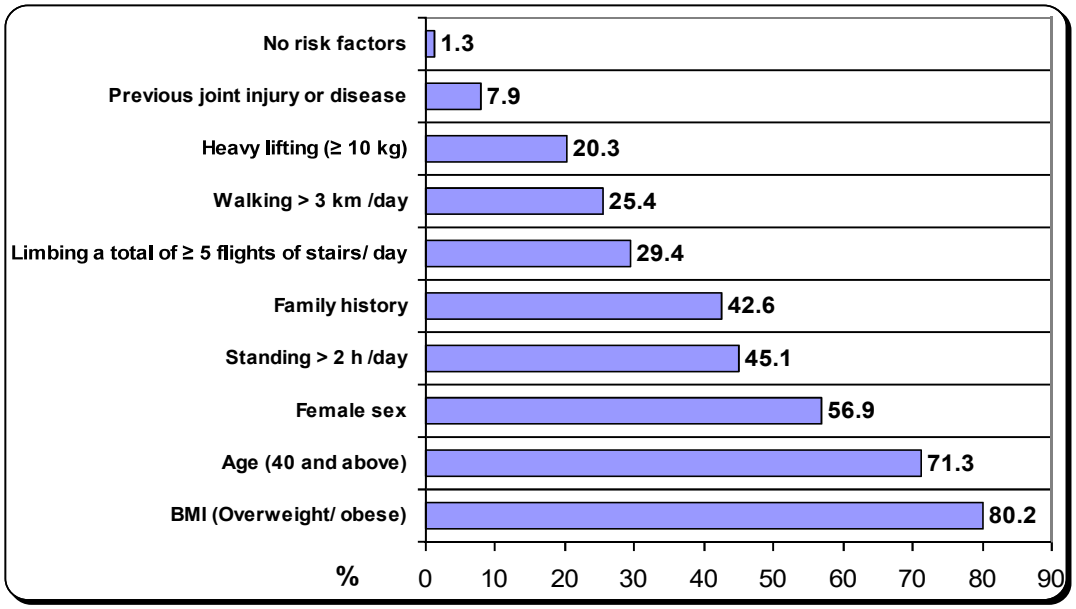

Figure (2): Distribution of knee osteoarthritis risk factors among school teachers at Assiut City(n=749).

Table (3): Mean score of Knee Injury and Osteoarthritis Outcome Score (KOOS) among school teachers at Assiut City

Subscales	Mean ± SD	Range
Pain score	66.59 ± 19.92	0.0-100.0
Symptoms score	71.18 ± 19.60	14.3-100.0
Activity of daily living score	72.58 ± 17.86	4.4-100.0
Sports/ Rec score	65.07 ± 24.61	0.0-100.0
Knee-related QOL score	63.78 ± 24.03	0.0-100.0

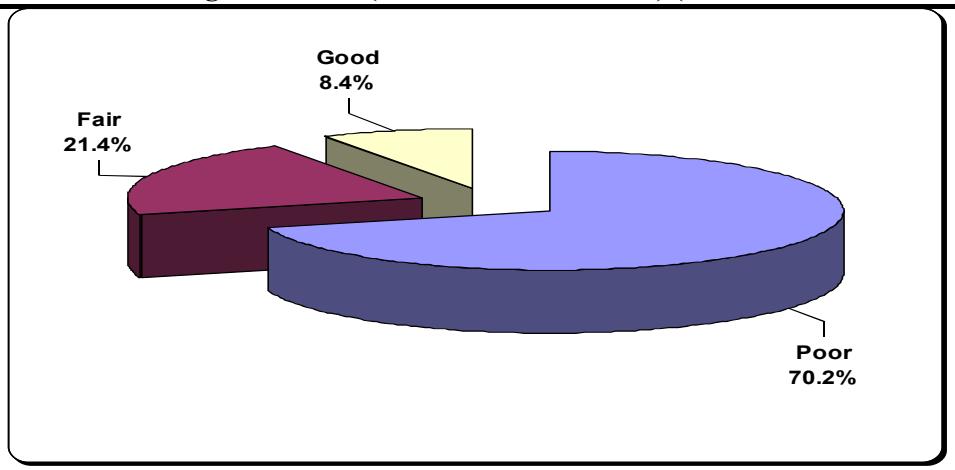

Figure (3): Levels of school teachers knowledge regarding knee osteoarthritis at Assiut City (n=749).

Table (4): Relation between level of knee osteoarthritis knowledge and schools teachers' personal data at Assiut City

Personal data	Knowledge levels (n=749)						P-value
	Poor		Fair		Good		
	No.	%	No.	%	No.	%	
Age: (years)							
< 40	153	71.2	53	24.7	9	4.2	
40 - < 50	233	73.0	59	18.5	27	8.5	**0.014***
≥ 50	140	65.1	48	22.3	27	12.6	
Sex:							
Male	229	70.9	63	19.5	31	9.6	0.386
Female	297	69.7	97	22.8	32	7.5	
Educational level:							
University	489	71.7	136	19.9	57	8.4	**0.008***
MD/ PHD	37	55.2	24	35.8	6	9.0	
Marital status:							
Married	463	70.8	134	20.5	57	8.7	0.267
Not married	63	66.3	26	27.4	6	6.3	
Residence:							
Rural	331	78.1	69	16.3	24	5.7	**0.000***
Urban	195	60.0	91	28.0	39	12.0	
Years of experience:							
< 15	190	72.5	60	22.9	12	4.6	
15 - < 20	146	77.7	31	16.5	11	5.9	**0.000***
≥ 20	190	63.5	69	23.1	40	13.4	
BMI: (kg/m^2)							
Normal	109	73.6	28	18.9	11	7.4	
Overweight	251	71.3	74	21.0	27	7.7	0.591
Obese	166	66.7	58	23.3	25	10.0	

Chi-square test

Table (5): Relation between Knee Injury and Osteoarthritis Outcome Score (KOOS) and personal data of school teachers at Assiut City

Personal data	Pain score	Symptoms Score	Activity of daily living score	Sports/ Rec score	Knee-related QOL score
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age: (years)					
< 40	67.38 ± 18.53	73.69 ± 17.48	75.53 ± 16.29	69.16 ± 23.00	66.25 ± 23.69
40 - < 50	67.99 ± 19.82	71.51 ± 19.45	72.82 ± 17.65	64.55 ± 25.23	64.32 ± 24.64
≥ 50	63.71 ± 21.16	68.17 ± 21.45	69.27 ± 19.15	61.74 ± 24.75	60.49 ± 23.19
P-value	**0.040***	**0.013***	**0.001***	**0.007***	**0.039***
Sex:					
Male	69.05 ± 20.21	76.61 ± 19.58	76.38 ± 17.55	68.82 ± 24.71	63.95 ± 25.33
Female	64.72 ± 19.52	67.05 ± 18.61	69.69 ± 17.57	62.22 ± 24.17	63.64 ± 23.03
P-value	**0.003***	**0.000***	**0.000***	**0.000***	0.863
Educational level:					
University	66.13 ± 19.69	70.75 ± 19.43	72.19 ± 17.85	64.33 ± 24.69	63.06 ± 23.82
MD/ PHD	71.23 ± 21.77	75.53 ± 20.96	76.51 ± 17.56	72.61 ± 22.50	71.08 ± 25.09
P-value	**0.046***	0.057	0.059	**0.008***	**0.009***
Marital status:					
Married	66.19 ± 19.54	70.46 ± 19.47	72.18 ± 17.18	64.28 ± 24.01	62.60 ± 23.97
Not married	69.30 ± 22.29	76.09 ± 19.93	75.33 ± 21.86	70.47 ± 27.90	71.91 ± 23.01
P-value	0.155	**0.009***	0.109	**0.022***	**0.000***
Residence:					
Rural	66.33 ± 20.35	71.30 ± 19.25	73.62 ± 17.14	67.95 ± 24.16	66.45 ± 22.48
Urban	66.92 ± 19.37	71.01 ± 20.09	71.22 ± 18.70	61.31 ± 24.71	60.29 ± 25.53
P-value	0.692	0.841	0.068	**0.000***	**0.000***
Years of experience:					
< 15	66.40 ± 18.58	71.27 ± 18.69	73.06 ± 17.75	65.97 ± 24.53	62.95 ± 24.22
15 - < 20	64.52 ± 21.46	69.42 ± 19.14	72.11 ± 17.95	67.69 ± 23.52	66.42 ± 22.96
≥ 20	68.04 ± 19.99	72.20 ± 20.63	72.45 ± 17.94	62.63 ± 25.19	62.83 ± 24.48
P-value	0.163	0.310	0.844	0.066	0.218
BMI: (kg/m^2)					
Normal	72.71 ± 20.34	79.03 ± 18.73	80.46 ± 16.08	70.74 ± 25.13	66.72 ± 26.05
Overweight	65.40 ± 19.95	70.86 ± 19.92	71.22 ± 18.35	64.43 ± 24.15	63.74 ± 24.30
Obese	64.63 ± 18.97	66.95 ± 18.30	69.82 ± 16.88	62.59 ± 24.50	62.07 ± 22.27
P-value	**0.000***	**0.000***	**0.000***	**0.005***	0.176

Independent samples t-test ANOVA test

Table (6): Relation between prevalence of knee pain with school teachers personal data at Assiut City

Personal data	Prevalence of knee pain (n=384)				P-value
	Yes		No		
	No.	%	No.	%	
Age (years) Mean ± SD	46.07 ± 7.56		42.96 ± 8.04		0.000*
Sex:					
Male	152	39.6	171	46.8	0.045*
Female	232	60.4	194	53.2	
Residence:					
Rural	227	59.1	197	54.0	0.156
Urban	157	40.9	168	46.0	
BMI: (kg/m^2) Mean ± SD	29.12 ± 3.86		27.70 ± 3.81		0.000*
Marital status:					
Married	355	92.4	299	81.9	0.000*
Not married	29	7.6	66	18.1	
Chronic disease:					
Yes	193	50.3	95	26.0	0.000*
No	191	49.7	270	74.0	
Years of experience: Mean ± SD	18.75 ± 7.78		17.35 ± 7.64		0.013*
Educational level:					
University	342	89.1	340	93.2	0.050*
MD/ PHD	42	10.9	25	6.8	
Family history with knee osteoarthritis:					
Yes	225	58.6	94	25.8	0.000*
No	159	41.4	271	74.2	

Independent samples t-test Chi-square test

Table (7): Multiple logistic regression analysis of risk factors of knee osteoarthritis among school teachers at Assiut City

Risk factors (n=384)	P-value	OR	95% C.I. for EXP(B)	
			Lower	Upper
Age (years)	0.000*	1.041	1.018	1.064
Sex (Female)	0.024*	1.476	1.052	2.069
Residence (Urban)	0.636	0.924	0.667	1.281
BMI (kg/ m^2)	0.022*	1.051	1.007	1.098
Marital status (Married)	0.000*	2.637	1.563	4.448
Chronic disease	0.004*	1.686	1.184	2.400
Educational level (Master)	0.002*	2.438	1.374	4.324
Family history	0.000*	3.960	2.828	5.545
Constant	0.000*	0.006		

Multiple logistic regression analysis

Reference group: Age ≤ 40 years, gender (male), residence (rural), BMI ≤ 25, Marital status, chronic diseases (no), educational level and family history (no)

Discussion:

The most common musculoskeletal complaint is knee osteoarthritis which mostly present in the middle-aged group and it could range from mild to severe. It is a very frequent health problem worldwide affecting work performance, general well-being and bears high economical costs. Understanding teacher's knowledge and associated risk factors of the disease could be of great benefit in the prevention and management approaches. The importance lies in the fact that by processing and analyzing the data, healthcare team could point out the specific areas where the teacher must be educated about.

The present study aim was to assess knowledge and associated risk factors of knee osteoarthritis among school teachers.

The fact that findings of the present study revealed that more than two-fifths of teachers their age from 40-<50 with Mean ± SD (44.56 ± 7.95), this reading matched with **Mukharrib et al, 2018** [19] who found that more than half aged 30-49 years. But disagreed with **Alqarni et al, 2022** [5] who found that more than two-fifths aged 18-24 years old. Also, **Alyami et al, 2020** [18] founded that more than half of the study sample aged 18 to 29 years old.

The current study revealed that female represented more than half of schools' teachers; this was in the same line with **Alqarni et al, 2022**[5] who reported that more than three-quarters of the respondents were female and **Alyami et al, 2020**[18] who recorded that more than half of participants were females. This result wasn't in agreement with results of **Mukharrib et al, 2018** [19]who reported that more than three-fifths were male.

The presented result showed that more than three-quarters of schools' teachers were overweight and obese. This was congruent with **Mukharrib et al, 2018** [19] who recorded that more than two-thirds were overweight and obese. Regarding family history of osteoarthritis, the proposed results reveled that more than two-fifths of teachers had family history with knee osteoarthritis. This was attributed to the wide prevalent nature of the disease that most of population suffer from it. This was in the same line with **Alyami et al, 2020** [18] **and Mukharrib et al, 2018** [19] who pointed out that more than three-fifths and nearly three-fifths had a family member afflicted with OA.

The current results disclosed that slightly more than half of schools' teachers were suffering from knee pain, more than one-third had from 3–6 years duration of complaint, more than three-quarters receiving medication, slightly more than half and more than two-fifths made knee exercise and physical therapy. This related to schools' teachers considered one of the occupational groups that more exposed to musculoskeletal work-related disorders such as knee osteoarthritis due to the combined work environment circumstances. This was in the same regard with **Mukharrib et al, 2018** [19] who found that most of participants diagnosed with knee osteoarthritis. Likewise, **Hussien and Abdul Raheem, 2020** [13] reported that three-fifths of respondents had knee pain. **Ojoawo et al, 2016** [21] and **Mat et al., 2019** [22] reported the prevalence of

knee pain was nearly two-fifths and one-third.

According to the participated teachers risk factors of knee osteoarthritis the current result recorded that most teachers were overweight and obese. World Health Organization (WHO) announced that Egypt ranks 18th as the highest prevalence of obesity worldwide **Aboulghate et al, 2021 (36)**. It's well known that overweigh and obesity is the leading cause of morbidity. Obesity places more pressure on weight-bearing joints leading to knee osteoarthritis. As well as two-thirds of teachers aged 40 years and more, more than half were female, more than two-fifths standing >2 hours/day and had family history then climbing a total of ≥5 flights of stairs/ day and walking>3 km /day.

On the other hand, **Hussien and Abdul Raheem, 2020 (13)** ranked these risk factors as following from the most to the less frequent risk factors: standing > 2hours/day, age (40 and above), family history and female sex, BMI ≥ 30 kg2 /m, climbing a total of 5 or more flights of stairs/day, heavy lifting (≥ 10 kg), previous joint injury or disease and walking >3km/day. A review done by **Yucesoy et al., 2015 (23)** disclosed that prolonged standing was considered a risk factor for knee OA.

It was obvious from the current study that the most affected Knee Injury and Osteoarthritis Outcome subscales among school teachers with knee-related QOL, sports/ recreational, pain then symptoms and activity of daily living; this can be attributed to this items reflect the negative effect of knee osteoarthritis of the affected persons.

In referral to the school teachers knowledge regarding knee osteoarthritis; the presented data cleared that more than two-thirds had poor level of knowledge, one-fifth had fair knowledge level and only 8.4% had good level of knowledge. This can be explained by the scarcity of awareness and lack of sufficient attention about the nature of this disease. This result was congruent with the findings of **Ganasegeran et al, 2014 (7)** who reported that more than half of the respondents had low levels of knowledge. Likewise, **Dar and Qadir, 2022(17)**revealed that only 8% of sample has good knowledge.

Moreover, **Ganasegeran et al, 2014, (7) Jeihooni et al, 2017 (24) and Al-Khlaifat et al, 2020 (15)** in their conducted studies reported low levels of knowledge. This reading aligned with **Alharthi, 2017 (25)** who reported that awareness of OA among Saudi Arabians remained insufficient. On the other hand, **Mukharrib et al, 2018 (19) and Alyami et al, 2020 (18)**pointed out that more than three-quarters and one-third showed a good level of OA awareness.

The results of the current study presented that age had significant link with the schools' teacher level of knowledge regarding knee osteoarthritis (p-value= 0.014); this can be due to the study sample had university education beside more than half of them complained from knee pain and they have more intention to know more about the studied disease. This result agreed with **Shihora and Motwani, 2017 (1) and Mukharrib et**

al, 2018 [19] (p-value= 0.001 and 0.048). But this observation was not in the same line with **Alqarni et al, 2022 [5]** who recorded the absence of this relation with the respondents' age. While the present study found that there wasn't statistically significant relation between knowledge level and teachers' sex (p-value=0.386). This observation aligned with **Mukharrib et al, 2018 [19]** and **Ashfaq et al, 2020 [6]** who found that there wasn't relation between knowledge and participant's sex (p-value= 0.476 and 0.161), these results disagreed with **Alyami et al. 2020 [18(, Alanazi et al, 2021 [2]** and **Alqarni et al, 2022 [5]** who found that sex significantly associated with the respondents' knowledge. Likewise, **Ganasegeran et al, 2014 [7]** and **Shihora & Motwani, 2017 [1]** found that male respondents displayed higher knowledge score compared to females (p= 0.001 and 0.001).

Educational contextual affects a lot of awareness about certain disease. In present study, it was identified that educational background significantly associated with OA knowledge (p= 0.008). This was similar with **Mukharrib et al, 2018[19]**, **Alyami et al. 2020 [18]** and **Alqarni et al, 2022 [5(**. Moreover, there wasn't statistically significant relation between knowledge and participants" BMI. This disagreed with **Mukharrib et al, 2018 [19]** who found significant effect of BMI on knowledge level (p= 0.008). According to relation between knowledge level and residence, there was a significance link with respondents" residence and their knowledge level (p-value=0.000), this wasn't similar with **Alanazi et al, 2021 [2]** (p-value= 0.183).

As regards to the relation between knee injury and osteoarthritis out come score and personal data; the result pointed to significant effect between the subscale and age; and most the subscales with sex and BMI. This explained that knee osteoarthritis problems increased with age, sex and BMI.

Concerning the significant risk factors associated with knee osteoarthritis**;** it was found that age, female sex, BMI (overweight and obese, marital status (married), chronic diseases, educational level and family history were significant differences influencing the respondents' knee osteoarthritis. In their study **Jojo et al, 2019 [26], Ashfaq et al, 2020 [6]** and **Althomali et al, 2021 [27]** reported that females tend to develop knee osteoarthritis more often as compared to other sex. This was in the same regard with **Alqarni et al, 2022[5]** who reported that two parameters, sex (p= 0.027) and age (p = 0.015) were significantly associated with the pathogenicity of OA. Also, **Abdul Rahim et al, 2022[11]** reported that age had significant effect.

In the same regard, **Narasimha, et al, 2016 [28]** noted that there was significant association between prevalence of knee osteoarthritis and BMI of study participants (p-value=0.04). Also, **Ashfaq et al, 2020 [6]** reported that the main factor found by scientist was BMI which played a major role in developing osteoarthritis. **Pal et al., 2016 [29]** in India, reported that the prevalence of knee OA gradually increased with increasing

age, more common in females than in males and in obese people. Consistent with **El Said et al, 2022** [30] who carried out a study in Qena governorate, Egypt and reported that aging, female sex, positive family history, high BMI increased risk factors of osteoarthritis.

In the same regard **Edgard et al, 2017** [31] founded that female sex, obesity, cardiovascular risk factors, were the main risk factors associated with OA. **Ali, 2018** [32] concluded that obese women, diabetes mellitus and previous surgery are the high risk for developing knee osteoarthritis. Similar results reported with **Ojoawo et al, 2016** [21] that more female were affected and many of those affected had family history. As well as; **Oboirien et al**, **2018** [33] stated that age, the female gender, and increased BMI are risk factors associated with the development of knee osteoarthritis. In contrast, **Akhter and Khanum, 2021**[34] recorded that there is no association between gender and knee osteoarthritis. The proposed study confirmed that there are multiple risk factors associated with the development of knee osteoarthritis and this was supported by **Aftab et al, 2015** [35] **and Fahmy et al, 2022** [12].

Limitations and obstacles of the study:

It is difficult to generalize the results of this study since it was conducted in one geographic setting. More than half of the participants were females, because more teachers were females which could be attributed to unintended gender bias. The cross-sectional nature of this study not determines the causal relationships.

Conclusion:

The current study proves that knee pain was prevalent among slightly more than half of the schools' teachers. There was deficient of knowledge level about knee osteoarthritis. As well as the most significant risk factors associated with knee pain among the respondents' were age, female sex, urban residence, BMI more than or equal 25, married status, presence of chronic diseases, postgraduate education and presence of family history.

Recommendations:

1. Awareness campaigns should be conducted to increase the public knowledge about osteoarthritis with especial focus on knee osteoarthritis among the schools' teachers.
2. Health education programs should be implemented for schools' teachers to educate them about musculoskeletal work-related disorders including knee osteoarthritis.
3. Educational materials including brochures, handouts and booklet should be available in schools contain the information about risk factors and prevention of knee osteoarthritis.
4. Advanced studies using different research designs to establish risk factors relationships are required to recognize changeable risk factors for appropriate preventive and therapeutic interventions.
5. Further studies on larger sample size among different groups and in different settings are needed for generalization of the study results.

Conflict of interest:
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